FLORA OF EGYPT

Volume Four

Monocotyledons

(Alismataceae - Orchidaceae)

Loutfy Boulos

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2005

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Foreword

Experience has led me to the empirical conclusion that the working life of a flora is about 50 years. It will always remain a valuable archive, but beyond this time the cumulative effect of changes in nomenclature and classification becomes sufficiently obtrusive to erode its viability as a practical tool for plant identification. Täckholm's fine Flora of Egypt has already passed its half century, and it is good to see that a worthy successor is now in place.

It is particularly apt that this should have been achieved by one of Täckholm's own erstwhile students. Prof. Boulos brings to bear his extensive knowledge of Egyptian plants, and also his wide experience of collecting in North Africa, Arabia and eastern Africa, whose outlying floristic elements intermingle in Egypt.

The present volume, containing the Monocotyledonous families so prominent in fields and waterways, completes the Flora, and serves as a fitting tribute to over 40 years of happy cooperation with colleagues in my own Institute.

Kew, March 2005

W. D. Clayton

Royal Botanic Gardens, Kew

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Preface

May I borrow the words of our esteemed colleague Derek Clayton and say, "This is a new beginning," in describing a new piece of work? This may apply to the present *Flora of Egypt*, of which this, the fourth and last volume covering the monocots, is now in print. I do not pretend to have been able to solve all the taxonomic problems, and deal in detail with every critical group in this Flora. However, I hope that I have reached, with the kind help of numerous colleagues, a stage at which younger generations would be able to refer to an updated work that may inspire them to produce more detailed research.

This volume covers the 29 monocot families, which comprise 180 genera, 482 species and 29 infraspecific taxa of native and naturalized plants, except for the Gramineae, in which 44 cultivated species, as well as four species of Alliaceae, are included. The largest families are: Gramineae 284 species (including 44 cultivated) in 110 genera; Cyperaceae 47 species in 12 genera; Hyacinthaceae 31 species in seven genera; and Alliaceae 26 species (including four cultivated) in two genera. The largest genera are: *Allium* 21 species (excluding cultivated species); *Cyperus* 19; *Bromus* 18; *Eragrostis* 14; and *Bellevalia* 12 species.

Line drawings of 404 species and infraspecific taxa are included in 130 plates, drawn by Margaret Tebbs, Kew (122 plates), Magdy El-Gohary, Egypt (six plates), Emmanuel Papadopoulos, Kew (one plate), and the late Bent Johnsen, Sweden (one plate). In addition, 159 colour photographs of some species, in their natural habitats, by Rafik Khalil, Dina Ali, Nigel Hepper, Tom Cope, Brian Mathew, Alfred Evans, Bassem Amer, and the author, are also provided.

Endemic taxa in this volume are eleven: ten species and one variety. Near-endemic taxa (occurring in Egypt and one neighbouring country) are 16: fourteen species and two subspecies. *Medemia* is the only near endemic genus in the flora of Egypt, and is restricted to southern Egypt and northern Sudan. Endemic taxa in the four volumes amount to 63 and near endemics to 92. Near-endemics in volume 1 are listed in this volume, as they did not appear in a list in volume 1.

The number of species treated in the four volumes of this Flora amounts to 2125, of which about 50 are cultivated. This leaves us with 2075 native and naturalized species known from Egypt.

The number of genera treated in the *Flora of Egypt* is 758, of which 238 are in volume 1; 166 in vol. 2; 174 in vol. 3; and 180 in vol. 4.

Several annexes appear in this volume: additions and corrections to volumes 1, 2 and 3; keys to major divisions, and to the 128 families treated in the four volumes; a glossary of botanical terms; Latin-vernacular names and vernacular-Latin names; cumulative index to the genera and families in the four volumes; index to all taxa in this volume; index to species illustrated in line drawings and index to species illustrated by colour photographs.

The flora of Egypt, as with any other flora, is changing. However, the changes in some regions are obvious and probably drastic. Two major regions may be mentioned here to exemplify these changes: the western Mediterranean coastal region and the Nile Valley.

Urbanization of the northern Mediterranean region, during the last few decades, has resulted in the destruction of many habitat types. As a result, many bulbous species of *Allium*, *Bellevalia*, *Ornithogalum*, *Muscari*, and *Leopoldia*, among others, have become very rare, and some are endangered or probably extinct. Also, because of overcollecting of medicinal plants, such as *Urginea maritima*, many that were fairly widespread and common, are now rather rare species.

The construction of the Aswan High Dam in 1964 allowed the annual Nile flood to be controlled. Consequently, the basin lands of Upper Egypt were no longer subject to inundation after the summer flood. As a result, some species such as *Damasonium alisma*, which had regularly appeared in the basin lands and was rather widespread, are now very rare or have almost disappeared. The same may be applied to *Ceruana pratensis*, *Potentilla supina*, and *Homognaphalium crispatulum*, which were once fairly common on the muddy banks of the Nile after the annual floods, and are now very rare.

Several weed species have been introduced into Egypt during the last few decades, and are now completely naturalized. Some of these species are invasive, for example *Symphyotrichum squamatum*, which was introduced into Egypt some 30 years ago from tropical America, is now a noxious weed throughout cultivated and arable land of the country. *Cenchrus echinatus*, introduced from the warmer parts of the New World, is now a widespread and troublesome weed, especially in recently reclaimed lands. *Ipomoea carnea*, introduced as an ornamental shrub from tropical South America, is now naturalized and has spread rapidly throughout the Nile Delta, Faiyum, and the northern regions of Upper Egypt.

The above examples of invasive species, urbanization of natural habitats and over-collecting are difficult to manage. The changing flora of Egypt reflects the interference of man in a natural system, which should be dealt with by means of research and careful management that is oriented towards conservation.

L. Boulos

Cairo, May 2005

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Acknowledgements

I wish to thank Professor Sir Peter Crane, FRS, Director of the Royal Botanic Gardens, Kew; Professor Simon Owens, Keeper of the Herbarium, and all members of the staff of the Herbarium and Library for the use of the facilities, and for their kind help and support throughout the preparation of this work. I also extend my sincere thanks to my colleagues and friends at Kew, past and present, who never hesitated to offer their precious time, advice and help over the years to bring this work, the *Flora of Egypt*, to a happy conclusion.

I am privileged and honoured by major contributions in this volume by eminent botanists, colleagues, and friends: Derek Clayton, Kew, contributed the Foreword; Tom Cope, Kew, contributed Gramineae and supervised the production of the line drawings for all grass plates; Brian Mathew, Kew, contributed Alliaceae and Iridaceae and supervised the botanical artwork for both families; Sven and Britt Snogerup, Lund, contributed Juncaceae and provided one plate of the line drawings; Phillip Cribb, Kew, contributed Orchidaceae; David Simpson, Kew, co-authored Cyperaceae and edited the family; Ilkka Kukkonen, Helsinki, and Ihsan El-Habashy, Mansoura, Egypt, co-authored Cyperaceae; Magdi Ali, Aswan, Egypt, co-authored Potamogetonaceae, James Cullen, Cambridge, revised the key to the families; Adel El-Gazzar, Suez Canal University, revised several parts of the text and the keys to genera and species. John Akeroyd, London, kindly revised most of the text and contributed numerous corrections.

The following colleagues kindly revised manuscripts or helped in different ways: Ib Friis, Copenhagen (Alismataceae); Henk Beentje, Kew (Cymodoceaceae); Kamal Batanouny, Cairo (*Pancratium*); Peter Boyce, Kew (Araceae, Lemnaceae); Abdel-Aziz Fayed, Assiut, Egypt (Vernacular names, corrections to colour photos of *Verbascum* and *Ifloga*); Tamer Ali, St Katherine, Sinai (Vernacular names).

I also wish to thank my Egyptian colleagues who kindly provided transportation and field facilities during my botanical excursions: Mostafa Saleh, Al-Azhar University; Ismail Abdel-Galil Hussein, Desert Research Centre, Mohamed Abdel-Razek and Rafik El-Ghareeb, Alexandria University; Adel El-Gazzar, Suez Canal University; Ahmad Hegazy, Cairo University; Ibrahim Mashaly, Mansoura University; Rafik Khalil and Dina Ali, Cairo.

I am most grateful to the botanical artists: Margaret Tebbs (122 plates), Magdy El-Gohary (six plates), Emmanuel Papadopoulos (one plate), for their great skill and patience in producing such high quality artwork. Plate number 26 was drawn by the late Bent Johnsen, Sweden.

The Herbarium, Royal Botanic Gardens Kew, very generously raised funds for the line drawings of the 67 plates of Gramineae, which is much appreciated.

Philip Oswald, Editor of the Botanical Society of the British Isles Handbooks, kindly allowed me to use nine plates of Cyperaceae for publication in this volume, before the Cyperaceae Handbook for BSBI was published.

My sincere thanks are also due to Dr. Mounir Neamatalla, President of Environmental Quality International (EQI) and all members of his staff for their kind support throughout the preparation of this Flora.

I wish to thank Elhamy, my son and publisher, and the staff of Al Hadara Publishing, as well as the Director and staff of Nubar Printing House, Cairo, for their high quality work, which allowed the production of this Flora in its elegant form.

A special thank you to Soad, my wife, for her tolerance and patience during my long travels at home for fieldwork, and abroad to produce this work.

Credits for colour photographs

Rafik Khalil and Dina Ali: *Asphodelus tenuifolius* (down left photo), *Urginea maritima, Pancratium sickenbergeri, Medemia argun* (all except lower left photo p. 431), *Typha domingensis, Typha elephantina, Lolium perenne, Brachypodium distachyum, Avena barbata, Trisetaria linearis, Bromus scoparius, Bromus madritensis, Aegilops bicornis, Schismus arabicus, Panicum turgidum* (up left photo).

Nigel Hepper: *Tulipa stylosa, Tulipa biflora,* (up right photo), *Scilla peruviana, Bellevalia trifoliata, Leopoldia comosa, Ixiolirion tataricum* (up right photo), *Narcissus tazetta, Eminium spiculatum.*

Tom Cope: *Stipagrostis ciliata, Leptothrium senegalense, Setaria pumila, Saccharum officinarum, Cymbopogon schoenanthus.*

Bassem Amer: *Dracaena ombet* (front cover), *Hyphaene thebaica,* lower photo p. 429, *Commelina forsskaolii.*

Tamer Ali: *Epipactis veratrifolia.*

Alfred Evans: *Colchicum ritchii.*

Conservation and sustainable use of medicinal plants in Egypt: *Boissiera squarrosa.*

All other colour photographs by L. Boulos.

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Phytogeographical regions

N: The Nile region including the delta, valley and Faiyum.

O: The oases of the Western Desert: Wadi Natrun, Siwa, Farafra, Bahariya, Kharga, Dakhla, Kurkur, Dungul and Uweinat.

M: The Mediterranean coastal strip from the border with Libya near Sollum to Port Said.

D: All the deserts of Egypt except that of Sinai.

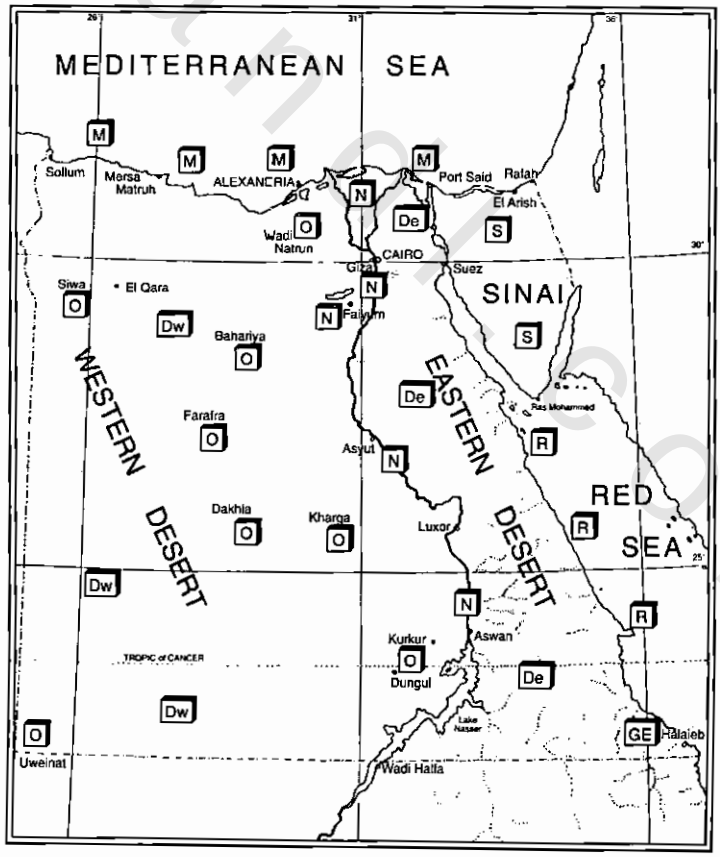
De: Desert east of the Nile except that of Sinai.

Dw: Desert west of the Nile.

R: The Red Sea coastal strip.

GE: Gebel Elba and the surrounding mountainous region.

S: The entire Sinai peninsula including the coastal Mediterranean strip and El-Tih Desert east of Suez Canal.



Endemic taxa in this volume

Najas pectinata (Parl.) Magn. (N, S).
Colchicum cornigerum (Schweinf. ex Sickenb.) Täckh. & Drar (De (North Galala), S).
Bellevalia flexuosa Boiss. var. *galalensis* Täckh. & Drar (De (Qalala) Galala Mountains).
Bellevalia salah-eidii Täckh. & Boulos (M, Hammam).
Muscari albiflorum (Täckh. & Boulos) Hosni (M, Sollum).
Muscari salah-eidii (Täckh. & Boulos) Hosni (S, Rafah).
Allium blomfeldianum Asch. & Schweinf. (M).
Allium mareoticum Bornm. & Gauba (M).
Allium crameri Asch. & Boiss. (De, S).
Pancratium arabicum Sickenb. (M, S).
Bromus aegyptiacus Tausch (N, ? M, ? De).

Near-endemic taxa

Colchicum guessfeldtianum Asch. & Schweinf. (Egypt, western Saudi Arabia).
Ornithogalum trichophyllum, Boiss. & Heldr. (Egypt, southern Palestine).
Bellevalia eigii Feinbrun (Egypt, Palestine).
Bellevalia zoharyi Feinbrun (Sinai, Palestine).
Bellevalia sessiliflora (Viv.) Kunth (Egypt, Libya).
Bellevalia desertorum Eig & Feinbrun (Sinai, Palestine).
Leopoldia eburnea Eig & Feinbrun (Egypt, southern Palestine).
Leopoldia longipes (Boiss.) Losinsk. subsp. *negevensis* Feinbrun & Danin (Sinai, Palestine).
Allium desertorum Forssk. (Egypt, Palestine).
Allium stamineum Boiss. subsp. *decaisnei* (C. Presl) Kollmann (Sinai, Palestine).
Allium barthianum Asch. & Schweinf. (Egypt, Libya).
Allium tel-avivense Eig (Egypt, Palestine).
Iris mariae Barbey (Sinai, southern Palestine).
Medemia argun (Mart.) Württemb. ex H. Wendl. (southern Egypt, northern Sudan).
Medemia is the only near endemic genus in the flora of Egypt.
Biarum olivieri Blume (Egypt, Palestine).
Aegilops longissima Schweinf. & Muschl. (Egypt, Palestine).

Abbreviations

auct.	*auctorum:* of authors.
auct. mult.	*auctorum multorum:* of many authors.
c.	*circa:* around.
comb. inval.	*combinatio non rite publicatum*: combination not validly published.
comb. nov.	*combinatio nova:* nomenclatural new combination.
et al.	*et alii:* and others.
excl.	*exclusus:* excluded.
l. c.	*loco citato:* on the page perviously cited.
nom. ambig.	*nomen ambiguum:* ambiguous name.
nom. confus.	*nomen confusum:* confused name.
nom. conserv.	*nomen conservandum:* conserved name.
nom. et orth. conserv.	conserved name and orthography.
nom. illeg.	*nomen illegitimum:* illegitimate name.
nom. non rite publ.	name not validly published.
nom. nud.	*nomen nudum:* name unaccompanied by a description.
nom. rejic.	*nomen rejiciendum:* rejected name.
nom. superfl.	*nomen superfluum:* name superfluous when published.
obs.	*observatio:* observation.
op. cit.	*opere citato:* in the work previously cited.
p. p.	*pro parte:* in part.
sensu lat.	*sensu lato:* in a broad sense.
s. n.	*sine numero:* without a number.
sensu str.	*sensu stricto:* in a strict sense.
syn.	synonym.
syns.	synonyms.

Abbreviations of the authors' names follow those proposed by R. K. Brummitt & C. E. Powell, *Authors of Plant Names,* Kew (1992).

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(mainly the basic floras)

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Class 2. Monocotyledoneae

Mostly herbs, a few shrubs or trees; mature root system entirely adventitious; leaves usually exstipulate, alternate, parallel-veined; flowers usually 3-merous; stem vascular bundles scattered and without cambium; cotyledons 1, terminal or undifferentiated.

ALISMATACEAE

L. Boulos

Herbaceous aquatic perennials, rarely annuals; rootstock corm-like or stoloniferous; leaves simple, erect, floating, submerged or emergent; basal or alternate, entire, petiolate, sheathing at the base; inflorescence compound, of branched whorls, or simple, with 2-3 bracts at base of each whorl; flowers regular, bisexual or unisexual; sepals 3, green, persistent; petals 3 or 0, free, deciduous; stamens 3, 6, 9 or numerous; filaments usually elongate; carpels superior, 3-many, in spirals or whorled, free or connate at the base; ovules 1 to many; style terminal or subventral; stigma terminal or lateral; fruit a group of achenes, drupelets or follicles; seeds mostly small, without endosperm; embryo curved or horseshoe-shaped. 14 genera, about 100 species, cosmopolitan, especially north temperate.

1. Carpels connate at the base in a single whorl, 2- to many-ovulate, long-beaked — 3. **Damasonium**
\+ Carpels free, 1-ovulate, short-beaked — 2

2. Carpels 5-10; fruitlets drupaceous, with spongy exocarp and woody endocarp — 2. **Caldesia**
\+ Carpels 11-28; fruitlets achenial, laterally compressed — 1. **Alisma**

1. **Alisma** L.

Literature: Björkquist, I. 1967. Studies in *Alisma* L., Op. Bot. (Lund) 17: 1-128; 19: 1-138 (1968).

Perennial aquatic or marsh herbs, with acrid juice; stock thick with stolons; leaves aerial, sometimes floating or submerged, erect, in a basal rosette; inflorescence compound; flowers and branches in whorls; flowers bisexual; sepals and petals 3; stamens 6, in pairs opposite the petals; carpels numerous, in a single whorl, free, 1-locular; style subventral; ovules solitary; achenes laterally compressed, ventrally beaked. 10 species, mainly north temperate and Australia.

1. Leaves ovate, elliptic-ovate to lanceolate, or subcordate; petiole distinct (8)10-24(30) cm; anthers elliptic; styles equalling or longer than the ovaries, ± erect — 1. **A. plantago-aquatica**
\+ Leaves linear, elliptic to narrowly oblong-elliptic, gradually attenuate to a petiole 1.5-8 cm; anthers suborbicular; styles shorter than the ovaries, recurved — 2. **A. gramineum**

1. **Alisma plantago-aquatica** L., Sp. Pl., ed. 1, 342 (1753).

Perennial herb 30-80 cm; leaves basal, usually aerial, long-petiolate; leaf-blade 5-12 x 2.5-8 cm, ovate, elliptic-ovate to lanceolate, or subcordate, entire, with 7-9 primary veins, and numerous parallel secondary veins, the apex acute to subacute; petiole (8)10-24(30) cm, sheathing at the base; inflorescence 25-45 (60) cm, paniculate, pyramidal; flowers bisexual; sepals *c.* 2 mm, ovate; petals 3.5-5 mm, white or purplish-white; styles 0.5-1.5 mm, equalling or longer than the ovaries, filiform, ± erect, stigmatic in the upper 1/8-1/5 of their length; achenes numerous in whorls *c.* 5 mm diam., 2-3 x 1.5 mm, oblong-elliptic, compressed; pericarp spongy; seeds *c.* 1 x 0.5 mm; testa black.

N; Nile banks, ditches and marshy ground. North and East Africa, temperate Europe, southwest to Central Asia, North America, southeast Australia, New Zealand.

NOTE: *Alisma plantago-aquatica* is known in Egypt from a few localities within the Nile Delta.

2. **Alisma gramineum** Lej., Fl. Spa 1: 175 (1811).
Syns. *Alisma loeselii* Gorski in Eichw., Skizze 127 (1830).
Alisma plantago-aquatica L. var. *decumbens* Boiss., Fl. Orient. 5: 9 (1882).

Like *Alisma plantago-aquatica,* but leaves submerged or aerial, linear, elliptic to narrowly oblong-elliptic, gradually attenuate to the petiole 1.5-8 cm; blade to 3.5 cm wide; petals 2.5-3.5 mm; anthers suborbicular; styles shorter than the ovaries, recurved.

N, O, M; ditches and pools. Western and Central Europe, Balkans, northwest Africa, Egypt, Iran, Afghanistan, Pakistan, Central Asia, North America.

NOTE: The plants are sometimes only 10-15 cm, with few flowers.

2. **Caldesia** Parl.

Herbaceous aquatic perennials or annuals; leaves floating; blade broadly elliptic to ovate; inflorescence compound, pyramidal, with whorls of 3 branches or 3 pedicillate flowers, subtended by 3 bracts and 2-3 bracteoles; flowers bisexual; sepals 3; petals 3, white; stamens 6; carpels 2-20, free, crowded on a small receptacle; style ventral, persistent; ovules solitary, basal; achenes smooth or warty. 4 species, Old World tropics, 1 extending to Europe.

1. **Caldesia reniformis** (D. Don) Makino, Bot. Mag. Tokyo 20: 34 (1906).
Syns. *Alisma reniforme* D. Don, Prodr. Fl. Nepal. 22 (1825).
Alisma parnassifolium Bassi var. *majus* Micheli in A. & C. DC., Monogr. Phan. 3: 36 (1881).
Caldesia parnassifolia (Bassi) Parl. var. *majus* (Micheli) Buchenau, in Engl. & Prantl, Natürl. Pflanzenfam. IV, 15: 16 (1903).
Caldesia parnassifolia (Bassi) Parl. var. *nilotica* Buchenau in Engl. & Prantl, Natürl. Pflanzenfam. IV, 15: 16 (1903).

Perennial; leaves basal, leaf-blade 5-8 x 5-12 cm, broadly ovate, the base deeply cordate, with 12-16 veins; inflorescence with 4-7 whorls; bracts *c.* 1 x 0.4 cm; bracteoles 3-5 x



Plate 1. ALISMATACEAE: *Alisma plantago-aquatica* 1, basal part and inflorescence; flower and fruit (down left). *Alisma gramineum* 2, habit. *Caldesia reniformis* 3, habit; flower (up); fruit (down left); achene (down right). *Damasonium alisma* 4, habit of fruiting plant; inflorescence (left). Drawn by Margaret Tebbs.

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1.5-2 mm; sepals *c.* 4 x 3 mm, ovate, spreading; petals *c.* 5 mm; stamens 6; carpels 10-15, *c.* 1 mm, ovate; style *c.* 1 mm; achenes 6-8, 4 x 3 mm; exocarp spongy; endocarp with 5-8 longitudinal ridges.

? N; swamps and pools. Tropical Africa and Madagascar to India, Sri Lanka, China, northern Australia.

NOTE: The occurrence of *Caldesia reniformis* in Egypt according to Täckholm (1974) is based on a single collection without detailed locality. No authentic material has been traced; the above description is based on material from Sudan and East tropical Africa.

3. **Damasonium** Mill.

Aquatic herbaceous annuals or perennials; leaves basal, partly submerged, emergent or floating; similar to *Alisma* in habit and general appearance, but with 6-9 carpels radiating stellately in a single whorl; carpels connate at the base in a single whorl, 2-many-ovulate; fruit a star-shaped whorl of compressed, acute or shortly rostrate follicles. 5 species, Eurasia, western North America, South Australia.

1. **Damasonium alisma** Mill., Gard. Dict., ed. 8, no. 1 (1768).
   Syns. *Alisma damasonium* L., Sp. Pl., ed. 1, 343 (1753).
   Damasonium bourgaei Coss., Notes Pl. Nouv. Crit. Midi Espagne 2: 47 (1849).
   Damasonium alisma Mill. var. *compactum* (Micheli) Durand & Schinz, Consp. Fl. Afr. 5 489 (1895).
   Damasonium alisma Mill. subsp. *bourgaei* (Coss.) Maire, Cat. Pl. Maroc 1: 22 (1931).

Annual or short-lived herbaceous perennial, (5)10-30(50) cm; leaves basal, long-petiolate; blade 2-6 x 0.6-1.8 cm, oblong to oblong-ovate, the apex obtuse, the base subcordate to truncate, 3-5-veined; inflorescence erect, exceeding the leaves, with (1)2-5 whorls of 4-12 flowers each; bracts several at each whorl, 2-5 x 1.5-2 mm, lanceolate; sepals 1.5-2 mm, ovate; petals 3-4 mm, broadly ovate, pinkish-white; stamens 6, 2-2.5 mm; follicles 5-7 x 1 mm, usually 6, sharply beaked.

N, M; inundated land, muddy canal banks. Western and southern Europe, North Africa, Cyprus, Syria, Palestine, Turkey, Caucasus, Iran, Central Asia, India.

NOTE: *Damasonium alisma* was fairly common in the basin lands which were regularly inundated in summer time for several months by the annual Nile flood. But after the construction of the Aswan High Dam in 1964, which allowed the control of the annual flood, the basin lands were subjected to a network of irrigation canals and the plant became rare.

HYDROCHARITACEAE

L. Boulos

Freshwater or marine, aquatic herbaceous perennials, submerged or floating, monoecious or dioecious; stems short or elongate, sometimes creeping; leaves alternate, opposite or

verticillate, simple, sessile or petiolate, sometimes sheathing at the base; flowers bisexual or unisexual, insect- or water-pollinated, rarely wind-pollinated, borne in 1- to many-flowered spathes of 2 free or connate bracts; sepals 3, free; petals 3, free or 0; stamens 1-15, in 1 or more whorls; filaments elongate; anthers 2-locular, opening longitudinally; ovary inferior, 1-locular; ovules numerous, parietal; styles 2-15, simple or 2-3-branched; fruit dry or berry-like, with a membranous or fleshy pericarp, mostly opening by decay of the pericarp, rarely stellately dehiscent; seeds without endosperm. 15 genera, 80 species, cosmopolitan.

1. Marine plants 2
+ Freshwater plants 3

2. Leaves 0.8-5.5 cm, ovate, broadly elliptic or oblong-linear; stamens 3; styles simple 1. **Halophila**
+ Leaves 6-15(25) cm, linear; stamens 6 or more; styles deeply 2-lobed 2. **Thalassia**

3. Stems elongate; leaves whorled or opposite 5. **Elodea**
+ Stems very short; leaves basal 4

4. Leaves linear; petals absent or rudimentary 4. **Vallisneria**
+ Leaves broadly ovate to elliptic; petals present, conspicuous 3. **Ottelia**

1. **Halophila** Thouars
Syn. *Lemnopsis* Zoll., non Zipp.

Submerged marine perennials, monoecious or dioecious; rhizomes creeping, rooting at the nodes; leaves in pairs, sessile or petiolate, with 3 longitudinal veins; stipules 2, membranous, subtending each pair (or whorl) of leaves; flowers unisexual, male and female spathes similar, solitary in the leaf-axils, 1-2-flowered; male flowers pedicellate, tepals 3, stamens 3, anthers sessile; female flowers with 3 tepals, staminodes 0; ovary of 3-5 carpels, 1-locular; placentation parietal; styles 3-5; stigmas 3-5, filiform; fruit beaked, opening by decay of membranous pericarp. 8 species, tropical coasts.

1. Leaves oblong-linear; petiole much shorter than the blade; stipules 1-1.5 cm 1. **H. stipulacea**
+ Leaves ovate to broadly elliptic; petiole longer than the blade; stipules 3-4.5 mm 2. **H. ovalis**

1. **Halophila stipulacea** (Forssk.) Asch., Stiz. Ges. Nat. Freunde Berlin 1867: 3 (1867).
Syn. *Zostera stipulacea* Forssk., Fl. Aegypt.-Arab. 158 (1775).

Dioecious herbaceous perennial; rhizome 0.25-2 mm diam., terete; roots 1 per node; erect stems 2-3 x 0.5 mm; leaves of 1 pair on each erect stem; blade 2.5-5.5 x 0.6-1 cm, oblong-linear, the apex rounded, the base cuneate, glabrous; 2 of the 3 longitudinal veins running just below the margins, connected by ascending cross-veins; margins serrulate; petiole 0.5-1.2 cm; stipules 1-1.5 x 0.5-1 cm, notched, strongly keeled; tepals of male flowers *c.* 4 x 2 mm, elliptic; stamens *c.* 3 mm; ovary 3-4 x 2 mm, ovoid-ellipsoid; perianth-tube 5-6 mm, the lower part persisting in fruit as a beak; styles 3; stigmas 3; fruit *c.* 5 x 2 mm, ellipsoid; beak 5-6 mm; seeds numerous, *c.* 0.5 mm, subglobose, reticulate.

M (Mersa Matruh harbour), De (Suez Canal); R (coasts), S (coasts); sheltered shallow sea-water, sandy and muddy shores. Egypt, Sudan, Ethiopia, Madagascar, Saudi Arabia, Bahrain, Oman, India.

NOTE: *Halophila stipulacea* has entered the Mediterranean Sea through Suez Canal and reaches as far west in Egypt as Mersa Matruh harbour.

2. **Halophila ovalis** (R. Br.) Hook.f., Fl. Tasman. 2: 45 (1858).
Syn. *Caulinia ovalis* R. Br., Prodr. Fl. Nov. Holl. 339 (1810).

Dioecious herbaceous perennial; rhizome 0.25-1.25 mm diam., terete; roots 1(-2) per node; erect stems ± absent; leaves in pairs; blade 0.8-1.6 x 0.4-1 cm, ovate to broadly elliptic, the apex rounded, the base slightly cuneate to rounded, glabrous, with 2 longitudinal veins running close to the margins, connected by ascending cross-veins; margins entire; petiole (1)1.4-2.2 cm; stipules 3-4.5 x 1.5-2.5 mm, obovate, slightly notched, auriculate at base; male flowers on pedicels 2-2.5 cm; tepals 3-4 x 2.5 mm, ovate-elliptic, yellowish; anthers *c.* 3 mm; female flowers with ovary of 3 carpels, *c.* 2 mm, ovoid; perianth-tube to 1 cm, the lower part persisting in fruit as a beak; styles 3; stigmas 3, 1-2.5 cm; fruit 3-4 mm, globose, with a beak 4-6 mm; seeds numerous, *c.* 1 mm, globose, reticulate.

R (Gulf of Suez); muddy shores, coarse coral rubble in shallow sea-water. Coasts of warmer regions of the Old World.

2. **Thalassia** Banks ex C. Koenig
Syn. *Schizotheca* Solms

Dioecious herbaceous perennials, marine, submerged, rhizomatous; stems short erect, produced at intervals from nodes along the rhizome; roots 1 per node; leaves sessile, few, on the erect stems, linear, sheathing at the base, with many longitudinal veins connected by cross-veins; margins entire; stipules 0; flowers unisexual; male spathes 1-2 in the leaf-axil, pedunculate, 1-flowered; male flowers with 3 tepals, stamens 3-12; female spathe solitary in the leaf-axil, pedunculate, 1-flowered; female flowers subsessile, with 3 tepals; staminodes 0; ovary of 6-8 carpels, 1(-3)-locular; placentation parietal; ovules several; perianth-tube narrowly cylindrical; styles 6-8; deeply 2-lobed, filiform, papillose; fruit globose, beaked, hairy, opening by stellate dehiscence of the carpels; seeds conical. 2 species, tropical and subtropical regions, 1 in the Old World, 1 in the New World.

1. **Thalassia hemprichii** (Solms) Asch., Petermann's Georgr. Mitth. 17: 242 (1871).
Syn. *Schizotheca hemprichii* Solms in Schweinf., Beitr. Fl. Aethiop. 194, 246 (1867).

Dioecious herbaceous perennial; rhizomes 2-4 mm diam., terete; stems 3-4 mm diam., erect, terete; leaves 6-15(25) x 0.5-1 cm, linear; leaf-sheath 3-8 cm, whitish, ± translucent, membranous, persistent; male spathe with peduncle 2-3 cm; spathe bracts *c.* 2 cm; male flowers with pedicels 2-3 cm; tepals 7-8 x 3 mm; stamens (3-) 6-9 (-12); anthers 0.8-1 cm, yellow; female spathe with peduncle 1-1.5 cm; bracts 1.5-2.5 cm; female flowers with ovary of 6 carpels to 1 cm; perianth-tube 2-3 cm; styles deeply 2-lobed; stigmas 1-1.5 cm, recurved at maturity; fruit 2-2.5 x 1.5-3 cm; seeds 3-9, *c.* 8 x8 mm, greenish with brownish base.

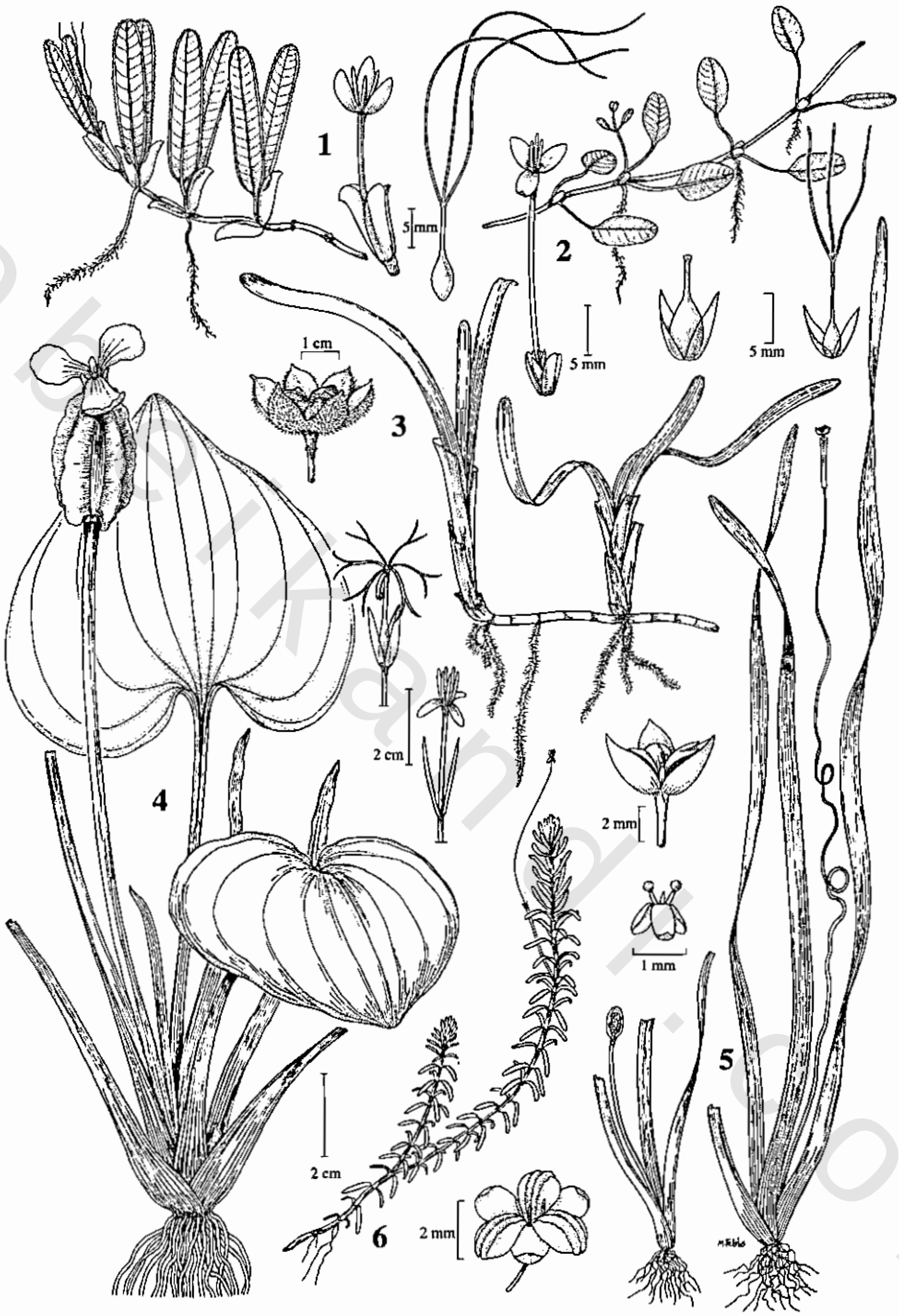


Plate 2. HYDROCHARITACEAE: *Halophila stipulacea* 1, leafy branch; male flower (right); female flower (further right). *Halophila ovalis* 2, leafy branch; male flower (down left); female flower (down right); fruit (down middle). *Thalassia hemprichii* 3, leafy branch; male flower (down left); female flower (middle left); fruit (up left). *Ottelia alismoides* 4, habit. *Vallisneria spiralis* 5, habit of female plant; male plant (down left); male flower (middle left); female flower (up left). *Elodea canadensis* 6, flowering branch; female flower (down right). Drawn by Margaret Tebbs.

R (coasts); coastal mud and coral sand. Tropical and subtropical coasts of the Old World.

3. **Ottelia** Pers.
Syns. *Boottia* Wall., *Damasonium* Schreb., non Mill.

Monoecious, dioecious or bisexual, submerged, freshwater annuals or herbaceous perennials; stems corm-like (our species); leaves basal; stipules 0; flowers unisexual or bisexual; spathe solitary in leaf-axil; male flowers pedicellate, persistent at anthesis; female and bisexual flowers sessile or subsessile; sepals 3; petals 3; stamens 3-15 or more, in whorls of 3; staminodes (0-)3 or more; ovary of 3-20 or more carpels; ovules numerous; styles 3-20 or more, 2-lobed; stigmas 5-40 or more; fruit fleshy, cylindrical to ovoid, opening by the decay of the pericarp or by regular dehiscence; seeds numerous, hairy. 21 species, tropical and warm regions, mainly of the Old World, 1 in the New World.

1. **Ottelia alismoides** (L.) Pers., Syn. Pl 1: 400 (1805).
Syns. *Stratiotes alismoides* L., Sp. Pl., ed. 1, 535 (1753).
Damasonium alismoides (L.) R. Br., Prodr. Fl. Nov. Holl. 344 (1810).

Annual or short-lived herbaceous perennial, monoecious, dioecious or bisexual; stems corm-like; juvenile leaves linear to obovate; mature leaves submerged or floating, petiolate; leaf-blades 6-15 x 5-18 cm, broadly ovate to elliptic, obtuse or rounded, the base cuneate to cordate, with 2-10 longitudinal veins connected by cross-veins; margins entire; peduncle of spathe 10-40 cm; spathe submerged, cylindric to ellipsoid, 2-5-lobed at the apex, with 4-10 wings or ribs; male flowers several per spathe, with pedicels to 6 cm; female and bisexual flowers sessile; sepals 0.5-2.2 x 0.2-0.8 cm, obtuse to rounded; petals 1.8-2.8 x 0.5-1 cm, obcordate to orbicular, white with yellow base or pinkish; stamens 3-12; anthers 2.5-4 mm, yellowish; filaments 4-6 mm; staminodes to 4.5 cm, filiform or 2-lobed; ovary 0.8-2 x 0.5-0.8 cm, narrowly ellipsoid, of 3-10 carpels; perianth-tube *c.* 7 mm; styles 3-10; stigmas 6-20, 4-6 mm, yellowish; fruit 1.5-4 x 1-2 cm, ellipsoid to ovoid, opening by decay of the pericarp; seeds 1-1.2 x 0.4 mm, narrowly cylindrical, blackish.

N, O, M; irrigation canals, pools, rice fields. Egypt, Sudan, Tanzania, India, tropical Asia, China, northern Australia, few localities in Europe, western Asia, North America.

NOTE: *Ottelia alismoides* grows in dense populations in rice fields and canals, often choking water courses up to 2 m wide (cf. Täckholm & Drar, Fl. Egypt 1: 124, 1941).

4. **Vallisneria** L.

Dioecious, submerged, freshwater herbaceous perennials; stems elongate or shortly erect; leaves sessile, basal, spirally arranged, linear, sheathing at the base, with 3-5 longitudinal veins; stipules 0; flowers unisexual; male spathe solitary in leaf-axil, with short peduncle and numerous flowers; male flowers with 3 sepals, 1 minute petal, 1-3 stamens and 1 rudimentary staminode; female spathe solitary in leaf-axil, long-pedunculate, 1-flowered; female flowers with 3 sepals, 3 minute petals and 3 staminodes; ovary narrowly cylindrical, 1-locular; placentation parietal; ovules numerous; perianth-tube absent; styles 3, reduced; stigmas 3, linear, deeply 2-lobed; fruit narrowly cylindrical, opening by decay of the pericarp; seeds narrowly ellipsoid to oblong, striate. 2 species, warmer regions of the world.

1. **Vallisneria spiralis** L., Sp. Pl., ed. 1, 1015 (1753).
Syn. *Vallisneria aethiopica* Fenzl, Flora 27: 311 (1844).

Dioecious, submerged, freshwater herbaceous perennial; stems 0.5-1.8 mm diam., terete, stoloniferous; leaves 5-30(45) x 0.2-1.2 cm, linear, parallel-veined, entire; male spathe with peduncle to 6 cm; spathe 4-5.5 x 2-2.5 mm, brownish, ± 50-flowered; male flowers with 3 sepals, ± 0.5 mm; female spathe with peduncle to 80 cm; spathe 1-2 x 0.1-0.2 cm, light brown; female flowers with sepals 2-3 x 0.8-1.8 mm; petals 0.5 x 0.2 mm; ovary 1-2.5 x 0.1 cm; stigmas *c.* 2 mm, 2-fid; fruit 1-3 x 0.1-0.15 cm, narrowly cylindrical, longitudinally striate with reddish brown; seeds 1.2-2 x 0.5 mm, ellipsoid-oblong, papillose.

N (Aswan); lakes, slow-flowing canals. Central and southern Europe, northwest Africa, Egypt, Palestine, Syria, Turkey, Caucasus, Iraq, Iran, Pakistan, Afghanistan, Central Asia, India, Sri Lanka, Sudan, tropical East Africa, naturalized elsewhere.

5. **Elodea** Michx.

Dioecious, submerged, freshwater herbaceous perennials; stems elongate, slender, simple or branched; leaves verticillate, the lower sometimes opposite, sessile, 1-veined, with 2 minute, entire nodal scales; spathes axillary, sessile, tubular, 1-flowered; flowers long-pedicellate, reaching the water surface at anthesis, water-pollinated; sepals 3, petals 3, almost equal to sepals; stamens 3-9; anthers 2-locular; ovary sessile within the spathe, 1-locular, attenuate into a long filiform beak; styles 3, usually 2-lobed, free; fruit a capsule. 12 species, North and South America, naturalized elsewhere.

1. **Elodea canadensis** Michx., Fl. Bor. Amer. 1: 20 (1803).

Dioecious, submerged, freshwater herbaceous perennial; stems slender, elongate, often branched; leaves 0.6-1.2 x 0.1-0.25 cm, oblong-linear, acute or obtuse; middle and upper leaves in whorls of 3, minutely serrulate, the upper crowded towards the stem tips; lower leaves opposite or whorled; male spathes apparently pedunculate, inflated, 2-fid; male flowers several per spathe, long-pedicellate, the perianth floating; sepals 3, to 5 mm; petals 3, to 5 mm, white; stamens 9, connate at the base; female spathes 1-flowered, cylindrical, 2-fid; sepals 3, 2-3 mm, linear; petals 3, 2.5 mm, white; staminodes 3; stigmas 3, to 4 mm, 2-fid; ovary ovoid, 2-5-ovulate.

N (Cairo); pools, ditches, and canals. North America, extensively naturalized in Europe and North Africa.

NAJADACEAE

L. Boulos

Monoecious or dioecious submerged annuals, rarely perennials, of fresh or brackish water; roots simple, adventitious, without root-caps; stems elongate, much-branched, slender or robust, rooting at the base and lower nodes; internodes sometimes armed with spines; leaves in subopposite pairs or in pseudo-whorls of 3-7, sessile, with an open folded sheath and a linear 1-veined blade; midrib sometimes with spines; margins

serrulate, with spines on each side; apex acute to acuminate, with 1-3 spines on each side; sheath variously shaped, the upper part serrulate or spiny-dentate, the basal part enclosing 2 small axillary hyaline scales or prophylls; inflorescence a solitary unisexual flower at the base of an axillary shoot, sessile or shortly stalked, naked or enclosed in a thin membranous spathe; male flower consisting of 1 subsessile anther; anther 1- or 4-sporangiate; pollen globose to ellipsoid; pollination hydrogamous; female flower of 1 ovary; ovary subsessile, ovoid, 1-carpellate, 1-locular, 1-ovulate; ovule subsessile, erect; style short, cylindrical, with 2-3(-4) branches; fruit a 1-seeded nutlet; pericarp thin, persistent; seed elliptic-oblong; testa hard, areolate; areoles irregularly arranged in longitudinal rows; embryo straight; endosperm absent. 1 genus, about 40 species, worldwide especially in tropical and subtropical regions, absent from very cold regions.

1. **Najas** L.
Syn. *Caulinia* Willd.

Literature: Dandy, J. E. in Townsend, C. C. & Guest, E. (eds). 1985. Najadaceae, Fl. Iraq 8: 32-35. Baghdad.
Triest, L. 1987. A revision of the genus *Najas* L. (Najadaceae) in Africa and surrounding islands. Mém. Acad. Roy. Sci. Outre-Mer, Cl. Sci. Nat. Méd. Nouv.; sér. 21 (4), Bruxelles.
Triest, L. in Polhill, R. M. (ed.). 1989. Fl. Trop. East Afr. Najadaceae. Balkema, Rotterdam.

Description as for the family.

1. Plant dioecious; stems armed with spines	1. **N. marina**
+ Plant monoecious; stems unarmed	2
2. Leaf-sheath rounded	3
+ Leaf-sheath truncate to deeply auriculate	4
3. Male and female flowers each in a spathe	2. **N. pectinata**
+ Male flower in a spathe; female flower naked	3. **N. horrida**
4. Male flower in a spathe; seed-areoles broader than long, arranged ladder-like, (60-)80-100 in each longitudinal row	4. **N. minor**
+ Male flower naked; seed-areoles longer than broad, never ladder-like, (18-)25-35(-60) in each longitudinal row	5. **N. graminea**

1. **Najas marina** L., Sp. Pl., ed. 1, 1015 (1753).

Dioecious submerged coarse annual, rooting in substrate; stems 0.5-1.5 m, 1-2 mm diam., armed with spines; leaves 0.5-6.5 cm, 1-5.5 mm broad including teeth on both sides, fleshy, acute; margins serrulate, with conspicuous spiny teeth 2 mm; septa and fibres absent; leaf-sheath 1.5-5 x 1-5.5 mm, rounded, entire or serrulate, with 1(-3) spine-cells on each side; inflorescence axillary, solitary; male flower 2-5 x 1-3 mm, enclosed in a spathe; neck of spathe 0.5-1 mm, the apex tapering and bearing brownish spine-cells; anther 1.2-4 x 1-2.5 mm, 4-sporangiate; female flower 2-5 mm, naked; ovary 1-3.5 x 0.5-1.8 mm; style and stigma 0.5-1.5 mm; stigma (2-)3(-4)-lobed; nutlet with persistent membranous pericarp and style-remnants; seed 2-4 x 1-2 mm, ovate; testa pitted with irregularly arranged areoles; areoles irregular in shape and dimensions.

Two subspecies occur in Egypt:

subsp. **armata** (Lindb. f.) Horn, Kew Bull. 7: 29 (1952).

Syns. *Najas muricata* Delile, Descr. Egypte, Hist. Nat. 281, t. 50, f. 1 (1814), non Thuill., Fl. Paris, ed. 2, 510 (1799).

Najas marina L. var. *muricata* (Delile) K. Schum in Mart., Fl. Brasil. 3: 725 (1894).

Najas delilei Rouy, Fl. France 13: 294 (1912).

Najas armata Lind. f., Acta Soc. Sci. Fenn., n. s. B, 1 (2): 8 (1932).

Najas marina L. var. *delilei* (Rouy) Maire, Fl. Afr. Nord 1: 205 (1952).

Najas marina L. subsp. *deleili* (Rouy) Oberm., Fl. South. Afr. 1: 82, t. 24, f. 2 (1966), nom. non rite publ.

Stems very spiny, with (10-)15-25 spines per 2 cm; leaves 0.6-2(-2.4) cm, 1.5-5 mm broad including teeth on both sides; margins each with 4-10 teeth; seed 2.5-3.5 x 0.8-2.1 mm.

N, O, M, S; fresh and brackish water in canals, ditches, lakes, artificial lakes, springs and pools. Africa, Spain, Crete, Turkey, Syria, Palestine, Iraq, Sri Lanka, Australia.

subsp. **ehrenbergii** (A. Br.) Triest, Mém. Acad. Roy. Sci. Outre-Mer, Cl. Sci. Nat. Méd., nouv. sér. 21: 24 (1987).

Syns. *Najas major* All. var. *ehrenbergii* A. Br., J. Bot. 2: 275 (1864).

Najas marina L. var. *ehrenbergii* (A. Br.) K. Schum, Mart. Fl. Bras. 3, 3: 725 (1894).

Najas marina L. var. *angustifolia* Rendle, Trans. Linn. Soc., ser. 2, Bot. 5 (12): 395 (1899).

Najas marina L. var. *communis* Maire, Fl. Afr. Nord 1: 205 (1952).

Stems with few spines (0-4 spines per 2 cm); leaves 1.7-2.5(-4) cm, 1.4-2 mm broad including teeth on both sides; margins each with 5-14 teeth; seed 2-2.5 x 1.3-1.5 mm.

O (Kharga); fresh and brackish water. Libya, Egypt, Iraq, Arabia, Socotra.

NOTE: The type of *Najas marina* subsp. *armata* was collected in Fariskur, Egypt, by Delile *s. n.* (holo, MPU). This subsp. is widespread in Egypt, while subsp. *ehrenbergii* was recorded only from Kharga Oasis.

2. **Najas pectinata** (Parl.) Magn. in Asch. & Schweinf., Mém. Inst. Egypt. 2: 145 (1887).

Syns. *Caulinia pectinata* Parl., Fl. Ital. 3: 665 (1860).

Najas horrida Rendle, Trans. Linn. Soc., ser. 2, Bot. 5 (12): 422-423, t. 42, f. 183-191 (1899), non A. Br. ex Magn.

Monoecious submerged robust annual; stems *c.* 1 mm diam., unarmed; leaves 1-1.5 cm, linear-lanceolate, acute, 1-2 mm wide including teeth on both sides; leaf-sheath 1.5-2 mm, rounded, serrulate, with 4-8 spine-cells on each side; inflorescence axillary, male and female flowers solitary, on the same branches; male flower enclosed in a spathe; spathe 1.5 x 0.5 mm, with brown spine-cells at the tapering apex; anther 1.5 x 0.4 mm, 1-sporangiate; female flower enclosed in a spathe; spathe 2(-3) x 0.5 mm, with brownish spine-cells on the apex; ovary 0.8-1 x 0.3-0.4 mm; style and stigma 1.2-1.4 mm; stigma 2-lobed; nutlet with persistent thin membranous pericarp, style- and spathe-remnants; seed 2-2.5 x 0.5-0.7 mm, ellipsoid; testa with areoles regularly arranged in longitudinal rows; areoles ± square to rectangular or hexagonal.

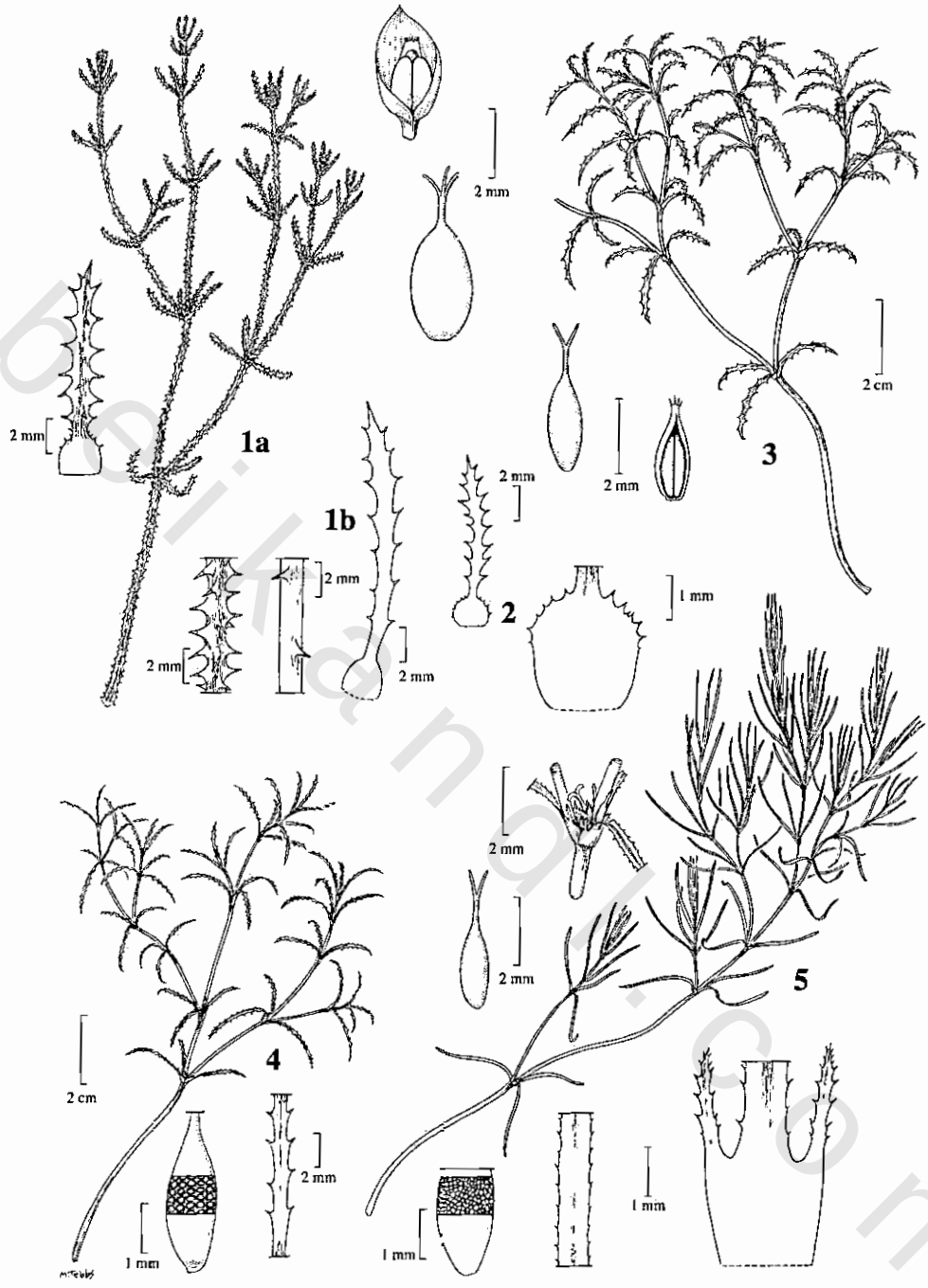


Plate 3. NAJADACEAE: *Najas marina* subsp. *armata* 1a, habit; leaf (left); part of stem (down right); male flower enclosed in a spathe (up right); female flower (midcle right). *Najas marina* subsp. *ehrenbergii* 1b, leaf; part of stem (left). *Najas pectinata* 2, leaf and leaf-sheath. *Najas horrida* 3, habit; male flower enclosed in a spathe (middle left); female flower (further left). *Najas minor* 4, habit, fruit showing the areoles on the testa (down right); part of leaf (down further right). *Najas graminea* 5, habit; leaf sheath and part of leaf (down right); part of fruit showing areoles on the testa (down); axillary inflorescence (up left); female flower (middle left). Drawn by Margaret Tebbs.

N, S; fresh and brackish water bodies. Endemic.

NOTE: The Type of *Najas pectinata* was collected by Figari *s.n.* in Medinet- el-Fayoum, Egypt, April 1844 (holo, FI), fide Triest (1987). The species is known from a few localities: Shubra (southern Nile Delta), Giza, Faiyum and Wadi Watir in Sinai, near the Gulf of Aqaba.

3. **Najas horrida** A. Br. ex Magn., Bietr. vii, 46, 47 (1870).
Syns. *Najas interrupta* K. Schum. in Engl., Pflanzenw. Ost. Afr. C: 94 (1895).
Najas minor sensu Bennett in Deyer, Fl. Trop. Afr. 8 (2): 227 (1901), non All.
Najas pectinata sensu Horn, Kew Bull. 7: 38 (1952) p. p., non (Parl.) Magn.

Monoecious submerged robust annual; stems 0.4-1 m, unarmed; upper parts often bushy because of the curved leaves; leaves 0.3-2.5 cm, 0.6-3.2 mm broad including the teeth on both sides, linear-lanceolate, acute, flattened; margins serrulate, with (2-)5-12(-16) conspicuous spiny teeth; teeth 0.15-1.4 mm; midrib without spines; fibres absent; leaf-sheath 1.5-3.5 mm including spine-cells, rounded, serrulate or lacerate, with 1-15 spine-cells on each side; male and female flowers solitary, generally on different branches; male flower 1.3-3 x 0.3-1.2 mm including the tapering neck of spathe, bearing brownish spine-cells on the apex; anther 1-2.3 x 0.6-1.2 mm, 4-sporangiate; female flower 1.5-3.5 mm, naked; ovary 0.5-2.4 x 0.2-0.9 mm; style and stigma 0.65-1.75 mm; stigma 2-3-lobed; nutlet with persistent membranous pericarp and style-remnants; seed 1.6-3 x 0.5-0.85 mm; testa with areoles 0.05-0.1 mm, ± square, rectangular or hexagonal, regularly arranged in longitudinal rows of 20-35(-40).

N (Nile Delta at Damietta, Nile Valley at Edfu and Lake Nasser); fresh and brackish water. Africa, Madagascar.

NOTE: The habit of *Najas horrida* may vary from robust plants with rigid curved leaves to slender plants with lax straight leaves, not only from one locality to another but in the same locality.

4. **Najas minor** All., Auct. Syn. Meth. Stirp. Horti Taur. 3 (1773).
Syns. *Caulina fragalis* Willd., Mém. Acad. Roy. Sci. Hist. Berol. 1798, Cl. Phil. Expér. 88, t. 1, f. 2 (1798).
Najas fargilis (Willd.) Delile, Descr. Egypte, Hist. Nat. 175 (1814).

Monoecious submerged annual, slender or robust; stems 0.3-0.4 mm diam., unarmed; upper parts either plumose because of the closely packed leaves, or bushy because of the curved leaves; leaves 0.5-2 cm, 0.5-1.75 broad including teeth on both sides; margins serrulate, with 8-18 spiny teeth; midrib without spiny teeth; fibres absent; leaf-sheath 1.6-2.25 mm including the auricle and spine-cells, truncate to auriculate; auricle 0.13-0.3 mm including spine-cells, serrulate or lacerate, with (4-)8-12 spine-cells on each side, apex obtuse; inflorescence axillary; male and female flowers solitary, generally on different branches; male flower *c.* 1.8 x 0.6 mm including the tapering spathe-neck, with no spine-cells on the apex; anther *c.* 1.3 x 0.5 mm, 1-sporangiate; female flower 3-4 mm, naked; ovary 1.6-2 x 0.4-0.65 mm; style and stigma 1.6-2.3 mm; stigma 2-lobed; nutlet with persistent, thin membranous pericarp and the style-remnants; seed 1.75-2.75 x 0.45-0.65 mm, oblong-elliptic; testa pitted with ladder-like regularly arranged areoles, in longitudinal rows of (60-)80-100 each; areoles *c.* 0.03 x 0.1 mm, broader than long.

N, O (Bahariya) M; fresh and brackish water. Southern Europe, Algeria, Tunisia, Egypt, Palestine, Syria, Iraq, Turkey, Caucasus, Iran, Afghanistan, Central Asia, Siberia, India, Sri Lanka, Manchuria, Japan, North America.

5. **Najas graminea** Delile, Descr. Egypte, Hist. Nat. 282, t. 50, f. 3 (1814).
Syns. *Caulinia graminea* (Delile) Batt. in Batt. & Trab., Fl. Algérie Tunisie 315 (1905).
Najas graminea Delile var. *vulgata* Magn. in Asch. & Schweinf., Mém. Inst. Egypte. 2: 145 (1887).

Monoecious submerged slender annual; stems 30-60 cm, 0.4-1.5 mm diam., often plumose in upper parts because of the closely packed leaves; leaves (1-)1.4-2(-3.3) cm, (0.24-)0.5-1 mm broad including the teeth on both sides, flattened, linear-lanceolate, acute; margins minutely serrulate, with (18-)34-70 inconspicuous spiny teeth, each mainly of the brownish spine-cell (a unicellular tooth, magnification needed); midrib without spiny teeth; fibres absent or present on margins and near midrib; leaf-sheath (1.4-)2-3(-3.9) x 1-2 mm, including the auricle and spine-cells, deeply auriculate; auricle (0.4-)0.8-1.2(-1.5) mm including spine-cells, acute, serrulate, with 3-14 spine-cells on each side; inflorescence axillary; male and female flowers solitary or 2-4 together at the same node, the males towards the top; naked, anther 0.7-1.3 x 0.3-0.5 mm, 4-sporangiate; female flower 1.6-3.7 mm, naked; ovary 0.7-1.6 x 0.25-0.85 mm; style and stigma 0.5-1.8 mm; stigma 2(-3)-lobed; nutlet with persistent, thin membranous pericarp- and style-remnants; seed (1.25-)1.5-2.4(-4.2) x 0.5-0.8 mm, oblong-elliptic, sometimes slightly recurved; testa pitted with areoles arranged regularly in longitudinal rows, never ladder-like, mostly hexagonal, longer than broad, with (18-)25-35(-60) in each row.

N, O, M; fresh and brackish water, rice fields, ponds, ditches. Atlantic and southern Europe, tropical and southern Africa, Algeria, Tunisia, Libya, Egypt, Palestine, Lebanon, Syria, Arabia, Socotra, Iran, Afghanistan, Central Asia, India, Sri Lanka, Malaysia, China, Japan, Australia, adventive in California.

NOTE: The type of *Najas graminea* was collected by Delile *s. n.* in Rosetta, Egypt "dans les canaux rizières" (holo, MPU). The type of *N. graminea* var. *vulgata* was collected in "Grande Oasis", Egypt, Schweinfurth 620 (lecto, P).

POTAMOGETONACEAE

Magdi M. Ali & L. Boulos

Glabrous herbs of fresh or brackish water, mainly perennials, with creeping rhizomes in the substrate; stems elongate, submerged or floating, rarely prostrate on mud; leaves alternate, rarely opposite or in whorls of 3, sheathing at the base; blades submerged and/or floating; stipules usually present; flowers bisexual, in axillary terminal spikes, regular, inconspicuous; bracts absent; tepals 4, free, valvate; stamens 4, sessile, opposite the tepals, connate at the base; anthers 2-thecous, opening by longitudinal slits; carpels (1-)4, free or shortly connate at the base, superior, 1-ovulate; styles short; fruit a nutlet or drupaceous. 2 genera, about 90 species, temperate and tropical regions, of which the genus *Groenlandia* Gay is monotypic.

1. **Potamogeton** L.

Literature: Boulos, L. 1966. Flora of the Nile region in Egyptian Nubia. Feddes Repert. 73: 184-215.
Dandy, J. E. in Tutin, T.G. *et al.* Potamogetonaceae, in Flora Europaea 5: 7-11. Cambridge Univ. Press, Cambridge.
El-Hadidi, M. N. 1965. *Potamogeton trichoides* Cham. & Schlecht. in Egypt. Candollea 20: 159-165.
Feinbrun-Dothan, N. 1986. Flora Palaestina. 4: 6-10. The Israel Academy of Sciences and Humanities. Jerusalem.
Heller, D. & Heyn, C. C. 1991. Conspectus Florae Orientalis: an annotated catalogue of the flora of the Middle East. 6: 3-4. The Israel Academy of Sciences and Humanities. Jerusalem.
Kaplan, Z. & Symoens, J.-J. 2005. Taxonomy, distribution and nomenclature of three confused broad-leaved *Potamogeton* species occurring in Africa and on surrounding islands. Bot. J. Linn. Soc. 148: 329-357.
Lye. K. A. in Edwards, S. *et al.* (eds) 1997. Potamogetonaceae, in Flora of Ethiopia and Eritrea 6: 19-23. Addis Ababa, Uppsala.
Preston, C. D. 1995. Pondweeds of Great Britain and Ireland. BSBI Handbook 8. Botanical Society of the British Isles, London.
Tawadrous, R. W. 1981. Taxonomical and ecological studies of water plants in Egypt: The genus *Potamogeton* L. M. Sc. Thesis, Institute of African Research and Studies, Cairo University.
Täckholm, G. & V. & Drar, M. 1950. Flora of Egypt. 1: 97-105. Fouad I University (now Cairo University), Cairo.
Täckholm, V. 1974. Students' Flora of Egypt. Publ. Cairo University. Beirut.

Glabrous aquatic herbs, mainly perennials of fresh or brackish water; rhizomes present or absent; stems branched; leaves alternate or opposite, floating and/or submerged; sessile or petiolate; stipule free from the leaf-base or joined with it to form a stipular sheath and a free ligule; leaf-blades linear and grass-like to oblong, 1 to many-veined; margins entire or denticulate; spikes cylindrical to ovoid, dense or lax, often interrupted, raised above the water and wind-pollinated, or submerged and water-pollinated; tepals 4, rounded, clawed, green or brown; carpels (1-)4, free or shortly connate at the base; fruit a nutlet or drupaceous; endosperm absent; embryo hook-shaped or spiral. About 90 species, widespread in temperate and tropical regions.

1. Leaves filiform to narrowly linear, 0.2-2 mm wide — 2
\+ Leaves ovate, elliptic, lanceolate or oblong, over 2 mm wide — 4

2. Stipules adnate to the leaf-base, forming a sheath 1-4 cm and a free ligule 2-6 mm — 1. **P. pectinatus**
\+ Stipules free from the leaf-base, forming a stipular sheath, sometimes soon deciduous — 3

3. Stipules closed, tubular for most of their length, later splitting almost to the base; midrib prominent, bordered by a marginal vein — 2. **P. pusillus**
\+ Stipules open, convolute; midrib prominent at the base, not bordered by a marginal vein — 3. **P. trichoides**

4. Leaves all submerged, sessile — 5
\+ Leaves mostly submerged; floating leaves petiolate — 6

5. Leaves oblong to oblong-linear; lateral veins 1-2(-3) on each side of the midrib — 4. **P. crispus**

+ Leaves broadly ovate to almost orbicular; lateral veins 5-12 on each side of the midrib — 5. **P. perfoliatus**

6. Submerged leaves sessile or short-petiolate — 6. **P. schweinfurthii**
+ Submerged leaves long-petiolate — 7. **P. nodosus**

1. **Potamogeton pectinatus** L., Sp. Pl., ed. 1, 127 (1753).

Submerged perennial; rhizomes slender to robust, with tuberous buds 3-6.5 mm diam. appearing towards the end of growing season; stems to 2.3 m, filiform, slender to robust, terete, much-branched above; leaves all submerged, 6-13 x 0.03-0.2 cm, filiform to narrowly linear, sessile, the margins entire, the apex acute to acuminate or apiculate; lateral veins 1-2 on each side of the midrib, inconspicuous; stipules adnate to the leaf-base, forming a sheath 1-4 cm, open and convolute, with white membranous margins; ligule 2-6 mm, membranous; turions absent; peduncles 2-9 cm, slender; spikes 1.3-6 x 0.35-0.7 cm, cylindrical, becoming interrupted at anthesis; flowers (4-)8-14; fruitlets 3-5 x 2.5-3.5 mm, obovoid, slightly compressed, with a short subventral beak.

N, O, M, S; River Nile, brackish and freshwater canals and lakes. Subcosmopolitan.

2. **Potamogeton pusillus** L., Sp. Pl., ed. 1, 127 (1753).
Syn. *Potamogeton panormitanus* Biv., Nuov. Pl. 6 (1838).

Submerged perennial; rhizomes absent; stems to 40(-80) cm, terete, branched; leaves all submerged, 0.13-6 x 0.1-0.12 cm, narrowly linear, sessile, translucent, with 1 prominent midrib and 1(-2) weaker veins on each side of the midrib, the margins entire, the apex apiculate; stipules 0.3-1.5 cm, closed, tubular for most of their length, later splitting almost to the base, translucent, rather persistent; turions 1-2.3 x 0.06-0.1 cm, usually sessile and axillary; peduncles 1-4.5 cm, slender, slightly compressed; spikes axillary, 0.6-1.3 x 0.2-0.45 cm; flowers 3-8, rarely interrupted; fruitlets 1.8-2.3 x 1.2-1.5 mm, obovoid, compressed, with convex margins; dorsal keel obscure, smooth; beak 0.3-0.4 mm.

N, O; River Nile, canals and streams. Africa, Europe, Asia, North and South America.

NOTE: *Potamogeton pusillus* is known in Egypt from two localities: Kharga Oasis and the Nile at El-Malkata, 10 km north of Aswan.

3. **Potamogeton trichoides** Cham. & Schlecht., Linnaea 2: 175, t. 4, f. 6 (1827).

Submerged annual or perennial; rhizomes absent; stems to 1(-2) m, very slender, terete, branched; leaves all submerged, 1.5-8 x 0.03-0.1 cm, ± filiform, sessile, the margins entire, the apex gradually acute, 3-veined; midrib prominent towards the base; stipules 0.3-1.9 cm, open, convolute, translucent, persistent; peduncles 1-7.5 cm, slender; spikes 0.3-1 x 0.15-0.4 cm; flowers 2-4(-6); fruitlets 2.2-2.8 x 1.3-2 mm, ± rounded; dorsal keel muricate.

N; River Nile. Western and Central Europe, Mediterranean region, Africa.

4. **Potamogeton crispus** L., Sp. Pl., ed. 1, 126 (1753).

Submerged perennial; rhizomes slender or robust, creeping; stems to 1.6 m, robust,



Plate 4. POTAMOGETONACEAE: *Potamogeton pectinatus* 1, flowering branch. *Potamogeton pusillus* 2, flowering branch; part of the leaf (up within); closed stipule (left). *Potamogeton trichoides* 3, flowering branch; part of the leaf (left); open stipule (right). *Potamogeton crispus* 4, flowering branch with turions; flower (right). *Potamogeton perfoliatus* 5, flowering and fruiting branch. *Potamogeton schweinfurthii* 6, flowering and fruiting branch. *Potamogeton nodosus* 7, flowering branch. Drawn by Margaret Tebbs.

compressed, branched or unbranched; nodal glands absent; leaves all submerged, 1-7.5 x 0.2-1.5 cm, oblong to oblong-linear, sessile, the margins serrulate, undulate, young leaves ± flat, the apex obtuse to acute; midrib with 1-2(-3) veins on each side; stipular sheath 3-7.5 mm, open, translucent, truncate at the apex, soon decaying; turions 1.2-3.3 cm, robust, with dense broad leaves, or 2.4-6 cm, slender, with fewer narrow leaves; peduncles 1.5-6.5(-12.5) cm, slightly compressed; spikes 0.5-1.6 x 0.4-0.6 cm; flowers 3-8(-10); fruitlets 4-6.2 x 2-2.5 mm, with a distinct dorsal keel.

N, O, M, D, S; River Nile, irrigation canals and ponds. Temperate Europe, Africa, Asia, Australia, North America.

NOTE: *Potamogeton crispus* is widespread in the River Nile system. The plants used to produce flowers and fruits more frequently than they do now, most probably due to the environmental stress to which aquatic habitats are subjected. Now the plants produce more turions, which constitute the main process of reproduction.

5. **Potamogeton perfoliatus** L., Sp. Pl., ed. 1, 126 (1753).

Submerged perennial; rhizomes robust; stems to 2.6 m, robust, terete, unbranched or branched; nodal glands absent; all leaves submerged, 1-4.2 x 0.5-2.5 cm, thin, translucent broadly ovate to almost orbicular, sessile, amplexicaul, the margins denticulate and slightly undulate, the apex obtuse to subacute, lateral veins 5-12 on each side of the midrib; stipules 0.7-1.1 cm, open, translucent, soon decaying; peduncles 1.2-7.4 cm, robust; spikes 1-2.5(-3) x 0.25-0.7 cm; flowers 10-22; fruitlets 2.6-3.5(-4) x 1.7-2.9 mm, broadly ovoid, with a short beak and faint lateral ridges, not keeled.

N, S; River Nile, deep lakes and reservoirs. Europe, North Africa, temperate Asia, North America.

6. **Potamogeton schweinfurthii** A. Benn. in Dyer, Fl. Trop. Afr. 8: 220 (1901).

Submerged perennial; rhizomes terete, slender; stems to 3.8 m, terete, robust, unbranched or sparsely branched; nodal glands absent; all leaves submerged, 8.4-23.5(-29) x 0.7-1.7 cm, translucent, narrowly lanceolate to oblong-elliptic, sessile or short-petiolate, the margins denticulate, the base cuneate, the apex acute; floating leaves not seen in Egyptian specimens; stipules 3.5-8.3 cm, translucent, persistent; turions absent; peduncles 4-20(-24) cm, terete, robust; spikes 3-5 x 0.3-0.9 cm; flowers numerous; fruitlets 3-4 x 2-2.5 mm, with a distinct dorsal keel.

N (Lake Nasser), De (Ismailia Canal). River Nile, irrigation canals. Africa, Madagascar, Mascarene Islands.

7. **Potamogeton nodosus** Poir. in Lam., Encycl. Suppl. 4: 535 (1816).
Syn. *Potamogeton fluitans* Roth, Tent. Fl. Germ. 1: 72 (1788), p.p.

Perennial; rhizome creeping, robust; stems to 2.5 m, terete, robust, unbranched or sparsely branched; leaves submerged and floating; submerged leaves with blades 9.5-14 x 1.3-2.5 cm, elliptic, translucent, the margins denticulate, the apex acute, midrib with 5-10 lateral veins on each side, petiole 4.8-8.5 cm; intermediate leaves sometimes replace floating leaves, with petioles 9-14.5(-23) cm; floating leaves with blades 1.8-11 x 0.6-3 cm, coriaceous, broadly elliptic, the base rounded to cuneate, the apex obtuse, apiculate, midrib with 7-11 veins on each side, petiole 1.5-10.5(-22) cm; stipules 4-9 cm, open,

gradually tapering towards the apex, rather persistent; turions absent; peduncles 5-14.5 cm, robust, terete; spikes 1.4-3 x 0.2-0.35 cm; flowers numerous; fruitlets 2-3 x 2.7-4 mm, with a dorsal keel.

N, M, De (Ismailia Canal), S; River Nile, canals. Europe, Africa, temperate and tropical Asia, Australia, Pacific Islands, North, Central and South America.

ZANNICHELLIACEAE

L. Boulos

Monoecious submerged aquatics of fresh or brackish water; rhizome with unbranched roots; stems branched; leaves whorled, subopposite or alternate, linear to filiform, entire, sheathing at the base, 1(-3)-veined; flowers unisexual, small, water-pollinated, axillary, in sympodial inflorescences; male flowers of 1 anther, or 2-3 connate anthers; female flowers ± sessile, the petioles 0 or of 3 scale-like segments connate at the base; carpels 1-5(-8), free; styles short; ovules 1 per ovary, apical, pendulous; fruit a group of achenes or drupelets in the leaf-axis, ± sessile; endosperm absent. 4 genera, 8 species, cosmopolitan.

1. **Zannichellia** L.

Monoecious, submerged annuals or short-lived perennials; rhizome creeping, slender; roots 1-2 per node, unbranched; stems branched; leaves in whorls of 3, subopposite or alternate, narrowly linear to filiform, entire; leaf-sheath 0 or short; axillary scales 2; flowers unisexual, solitary or in groups of 1 male and a cluster of female flowers at each whorl; male flowers long-stalked; perianth 0; anthers 4-8- locular; female flowers with a cupular perianth; carpels 1-9; styles exserted; stigmas peltate; fruit of 1-9 achenes, stipitate, with a persistent style. 1 species, cosmopolitan.

1. **Zannichellia palustris** L., Sp. Pl., ed. 1, 969 (1753).
   Syns. *Zannichellia palustris* L. var. *pedicellata* Wahlenb. & Rosén, Nov. Act. Sci. Upsal. 8: 254 (1821).
   Zannichellia repens Boenn., Prodr. Fl. Monast. 272 (1824).
   Zannichellia major (Hartman) Boenn. ex Rchb. in Mössler, Handb., ed. 2, 3: 1591 (1830).
   Zannichellia pedunculata Rchb. in Mössler, Handb., ed. 2, 3: 1591 (1830), non Fuss (1854).
   Zannichellia pedicellata (Wahlenb. & Rosén) Fries, Mant. 3: 133 (1832-1842).
   Zannichellia marina Nielsen, Bot. Tidsskr., ser. 2, 1: 204 (1872).

Monoecious, submerged, in fresh or brackish water; annual or short-lived perennial, often forming dense mats; rhizome slender, branching; stems to 50 cm, erect; leaves 1-3 per node, 1-5.5 x 0.5-0.2 cm, linear, opposite or alternate, 1-veined, the apex acute; basal sheath 0 or tubular and membranous; axillary scales minute; flowers usually 1 male and a cluster of female together, axillary; male flowers of 1 stamen; filaments elongate at anthesis to *c.* 2 cm; anther 4-8-locular; female flowers (1-)4-5(-8), umbellate, enclosed in cupular sheath when immature; peduncle 1-5 mm; carpels ovoid, stipitate; stigmas

spoon-shaped; fruit of 1-9 achenes; achenes 2-5.5 x 0.8 mm, reniform, stipitate, the convex side keeled with protuberances, style persistent.

N, O, M, D; fresh and brackish water in canals and drains. Cosmopolitan.

NOTE: According to Dandy in Tutin *el al.*, Fl. Europ. 5: 13 (1980), *Zannichellia palustris* is very variable in flower and fruit characters, but not vegetatively, which has led to the description of many specific and infraspecific taxa, none of which appears satisfactory. Therefore this taxon is treated here as a single variable species.

RUPPIACEAE

L. Boulos

Description as for the genus *Ruppia,* the only genus in the family.

1. **Ruppia** L.

Monoecious, aquatic, submerged herbaceous perennials; rhizomes thin, rooted in the substrate; stems slender, branched; leaves alternate or opposite, linear, 1-veined, sheathed at the base; inflorescence a 2-flowered terminal spike; flowers bisexual, actinomorphic, inconspicuous; perianth 0; stamens 2; filaments very short, thick; anthers 2-thecous, extrorse; ovaries 2-8, usually 4, free, superior, sessile, becoming long-stipitate in fruit, 1-ovuled; ovules pedulous; stigma sessile, peltate; fruits in terminal few-rayed umbels; fruitlets ovoid-pyriform, asymmetric, beaked, indehiscent; seeds hard; endosperm 0. About 7 species, cosmopolitan, but especially subtropical, of saline, alkaline or brackish water.

1. Leaves *c.* 0.5 mm wide, capilliform; fruiting peduncles 4-6 cm, curved or twisted, not spirally coiled — 1. **R. maritima**
+ Leaves 0.5-1 mm wide, filiform; fruiting peduncles 8-12 cm, spirally coiled — 2. **R. cirrhosa**

1. **Ruppia maritima** L., Sp. Pl., ed. 1, 127 (1753).
Syns. *Ruppia maritima* L. var. *rostrata* C. Agardh, Physiogr. Sällsk. Årsb. 6: 37 (1823).
Ruppia rostellata Koch in Rchb., Ic. Pl. Crit. 2: 66, t. 174, f. 306 (1824).
Ruppia maritima L. subsp. *rostellata* (Koch) Asch. & Graebn., Syn. Mitteleur. Fl. 1: 357 (1897).

Monoecious submerged perennial; rhizomes horizontal, rooting in mud; stems much-branched, often forming mats; leaves 2.5-10 x 0.05 cm, capilliform, usually alternate below, opposite above, acute, minutely and sharply serrulate, sheathing at the base; sheath 0.5-2 cm, with a tooth *c.* 2 mm on both sides of its orifice; peduncles short at anthesis, becoming 4-6 cm in fruit, curved or twisted, not spirally coiled; flowers bisexual; perianth 0; anthers 0.5-1 x 0.5-1 mm, elliptic, yellow; pollination under water surface; carpels usually 4, 1-1.5 mm, narrowly ovoid, first sessile, stipitate at maturity; stipe 0.6-1.5 cm; stigma sessile, peltate; fruitlets 2-2.5 x 1.5-1.8 mm, ovoid-pyriform, asymmetric, beaked, indehiscent; seeds 1.2 x 0.8 mm, ovoid, testa whitish.



Plate 5. ZANNICHELLIACEAE: *Zannichellia palustris* 1, fruiting branch; cluster of fruits (up left). RUPPIACEAE: *Ruppia maritima* 2, habit; flowering branchlet (up right); cluster of fruits (further up right). *Ruppia cirrhosa 3*, habit. ZOSTERACEAE: *Zostera noltii* 4, habit; flowering branchlet (down left); leaf tip (up left). Drawn by Margaret Tebbs.

N, O, M, De, R, S; brackish water, canals lakes, pools and ditches. Cosmopolitan.

2. **Ruppia cirrhosa** (Petagna) Grande, Bull. Orto Bot. Napoli 5: 58 (1918).
Syns. *Buccaferrea cirrhosa* Petagna, Inst. Bot. 5: 1826 (1787).
Ruppia spiralis L. ex Dumort., Fl. Belg. 164 (1827).
Ruppia maritima L. var. *spiralis* (L. ex Dumort.) Moris, Stirp. Sard. Elench. 1: 43 (1827).

Like *Ruppia maritima,* but plant more robust; leaves 0.5-1 mm wide; anthers *c.* 2 x 1 mm, broadly oblong; pollination at water surface by floating pollen; fruiting peduncles 8-12 cm, or more (reaching water surface), spirally coiled.

M, S; coastal saline marshes. Cosmopolitan.

ZOSTERACEAE

L. Boulos

Submerged marine, herbaceous perennials, monoecious or dioecious; rhizomes creeping, with long internodes; roots 2 or more at each node, unbranched; shoots short, with several distichous, linear leaves, sheathing at the base; leaf-sheath open or closed, often with auriculate ligule at the junction with the blade; blade parallel-veined; inflorescence of 1 to few spadices, enclosed in the sheathing base of a spathe; flowers with 1 sessile dorsifixed stamen; ovary 1, 1-locular; style 1, with 2 long filiform stigmas, perianth 0; ovules 1, pendulous; fruit a small drupe, or irregularly dehiscent; endosperm absent. 3 genera, 18 species, warm to cool coasts.

1. **Zostera** L.

Literature: den Hartog, C. 1970. Sea-grasses of the World. North-Holland Publ. Co., Amsterdam.

Submerged marine, monoecious perennials; rhizome creeping, rooting at the nodes; erect stems annual; sterile stems short, arising from the axils of rhizomatous leaves; flowering stems terminal or lateral, branched; leaves distichous, linear, 3-11-veined; leaf-sheath auriculate, ligulate, membranous; male and female flowers in 2 lines, alternating with each other on one surface of the spadix; connective of anthers with or without an appendage; ovary 1-locular, with 1 ovule; style persistent, with 2 stigmas protruding from the sheath at anthesis; fruit a small drupe, cylindrical to ovoid, 1-seeded, indehiscent or irregularly dehiscent; seeds ellipsoid or ovoid, smooth or ribbed. About 12 species, warm, temperate to cool regions.

1. **Zostera noltii** Hornem., Fl. Danica 12 (35): 1, t. 2041 (1832).
Syns. *Zostera nana* Roth, Enum 1 (1): 8 (1827), nom. illeg.
Zostera minor Nolte ex Rchb., Ic. Fl. Germ. 7: 2 (1845).

Submerged marine, monoecious perennial; leaves on sterile stems 4-12(-20) x 0.05-0.2 cm, 3-veined, the apex notched; leaf-sheath 0.5-4 cm, open; flowering stems 8-10 cm, lateral, unbranched or sparsely branched, with 1-3 spathes; spathal sheaths 1.2-2 cm, anthers *c.* 2 mm, sessile, connective appendiculate; style as long as the ovary; fruit 1.5-2 mm, beaked.

M, S; muddy tidal zone and shallow saline coastal waters. Mediterranean Sea, Black Sea, Caspian Sea, Aral Sea, European and North African coasts of the Atlantic Ocean.

CYMODOCEACEAE

L. Boulos

Literature: den Hartog, C. 1970. Sea-grasses of the World. North-Holland Publ. Co., Amsterdam.

Dioecious, marine, glabrous herbaceous perennials; rhizomes creeping; leaves alternate, distichous or spiral, sheathing at the base; leaf-sheath with 2 apical auricles, ligulate, amplexicaul; blade linear, parallel-veined, with tannin dots and dashes between the veins; flowers unisexual, solitary on short branches, in cymose inflorescences; perianth 0; male flowers of 2 dorsally connate anthers, each anther with 2 thecae; pollen thread-like; female flowers of 2 free ovaries; ovules 1, pendulous; fruit a 1-seeded indehiscent nutlet; endosperm absent. 5 genera, 16 species, tropical and warm coastal shallows.

Key after Beentje, H. J. in Beentje, H. J. & Smith, S. A. L. (eds). 2002. Cymodoceaceae, Fl. Trop. E. Afr. Balkema, Rotterdam.

1. Rhizome sympodial, with elongate, ± branched stems to 60 cm, arising from each 4th internode; leaf-sheath and blade deciduous together; anthers subsessile — 2. **Thalassodendron**
+ Rhizome monopodial, with short stem to 10 cm at each node; leaf-sheath more persistent than the blade; anthers stalked — 2

2. Leaves subulate; flowers in inflorescences — 3. **Syringodium**
+ Leaves flattened; flowers solitary — 3

3. Leaf-vein 1; anthers connate at different levels; style undivided — 4. **Halodule**
+ Leaf-veins 7-17; anthers connate at the same level; style divided into 2 — 1. **Cymodocea**

1. **Cymodocea** K. König, nom. conserv.

Marine perennial herbs; rhizome creeping, monopodial; roots 1-5 at each node, branched; stems short, erect, arising from all nodes, with 2-7 leaves; scales scarious; leaf-sheath compressed, 2-auriculate, ligulate, persisting longer than the blade; blade linear, 7-17-veined, with cross-veins, margins entire except for the distal part which becomes serrulate or spinulose; flowers solitary, terminal; male flowers stalked; anthers 2, dorsally connate and attached at the same level to a common stalk; female flowers sessile or shortly stalked, of 2 free ovaries, each with a short style, distally 2-fid; fruit laterally compressed, with stony pericarp. 4 species, tropical and subtropical seas of the Old World.

1. Leaf-blade 4-9 mm wide, apex markedly serrate — 3. **C. serrulata**
+ Leaf-blade 2-4 mm wide, apex entire or nearly so — 2

2. Leaf-blade 9-15-veined; dorsal ridges of fruit coarsely dentate (Red Sea) 2. **C. rotundata**

\+ Leaf-blade 7-9-veined; dorsal ridges of fruit not dentate (Mediterranean Sea) 1. **C. nodosa**

1. **Cymodocea nodosa** (Ucria) Asch., Sitz.-Ber. Ges. Naturf. Freunde Berlin 1869: 4 (1869).
   Syns. *Zostera nodosa* Ucria, Nuov. Racc. Opusc. Aut. Silicl. 6: 12 (1793).
   Phucagrostis major Willd., Sp. Pl., ed. 4, 4 (2): 649 (1806).
   Cymodocea major (Willd.) Grande, Nuov. Giorn. Bot. Ital., n. s., 27: 238 (1920).

Marine herbaceous perennial; rhizome robust, with 1 much-branched root at each node; erect stems short, each bearing 2-5 leaves; leaf-sheath 2.5-6.5 cm, entire when shed, leaving a circular scar on the stem; leaf-blade 8-25 x 0.2-0.4 cm, entire, 7-9-veined, ± spinulose near the rounded apex; male flowers on a stalk 7-10 cm; anthers 1-1.5 cm; female flowers sessile; ovary 3 mm; style 2-3 mm; stigma 2-2.5 cm; fruit *c.* 8 x 6 mm, sessile, with 3 entire to slightly crebulate (not dentate) ridges.

M, S (Mediterranean coast of Sinai); sheltered coastal seashores, sublittoral sandy depressions. Mediterranean Sea, Atlantic coast of Africa southwards to the Tropic of Cancer.

2. **Cymodocea rotundata** Asch., Sitz.-Ber. Ges. Naturf. Freunde Berlin 1870: 84 (1870).

Like *Cymodocea nodosa*, but leaves 9-15-veined; leaf-sheath lacerate when shed; stigmas spirally coiled; fruit slightly longer, the dorsal ridges coarsely dentate; Red Sea plant.

R, S (Gulf of Suez and Gulf of Aqaba); shallow coastal water with coral sand. Red Sea, Indian and Pacific Oceans.

3. **Cymodocea serrulata** (R. Br.) Asch. & Magn., Sitz.-Ber. Ges. Naturf. Freunde Berlin 1870: 84 (1870).
   Syn. *Caulinia serrulata* R. Br., Frodr. Nov. Holl. 1: 339 (1810).

Marine herbaceous perennial; rhizome robust; roots 2-3 at each node, sparsely branched; erect stems to 10 cm, with 2-5 leaves; internodes 2-5 cm; leaf-sheath 1.5-3 cm, purple; auricles 1 mm, acute; ligules 1 mm; leaf-blade 5-15 x 0.4-0.9 cm, 13-17-veined, markedly serrate at the rounded apex, otherwise entire; male flowers unknown; female flowers sessile; ovary 1.5 mm; style 2-4 mm; stigmas 2-2.5 cm; fruit 7-9 x 3.5-4.5 mm, sessile, ellipsoid, with 3 dorsal smooth ridges and 1 mm apical persistent beak.

R (Qoseir); tidal pools, muddy coral sand. Egypt to Mozambique, Madagascar to West Pacific Ocean.

2. **Thalassodendron** Hartog

Marine perennial herbs; rhizome robust, woody, creeping, sympodial, with 1-2 erect unbranched or sparingly branched stems arising from each 4th internode; roots 2(-5), much branched, only on the internode preceding the stem-bearing internode; stems

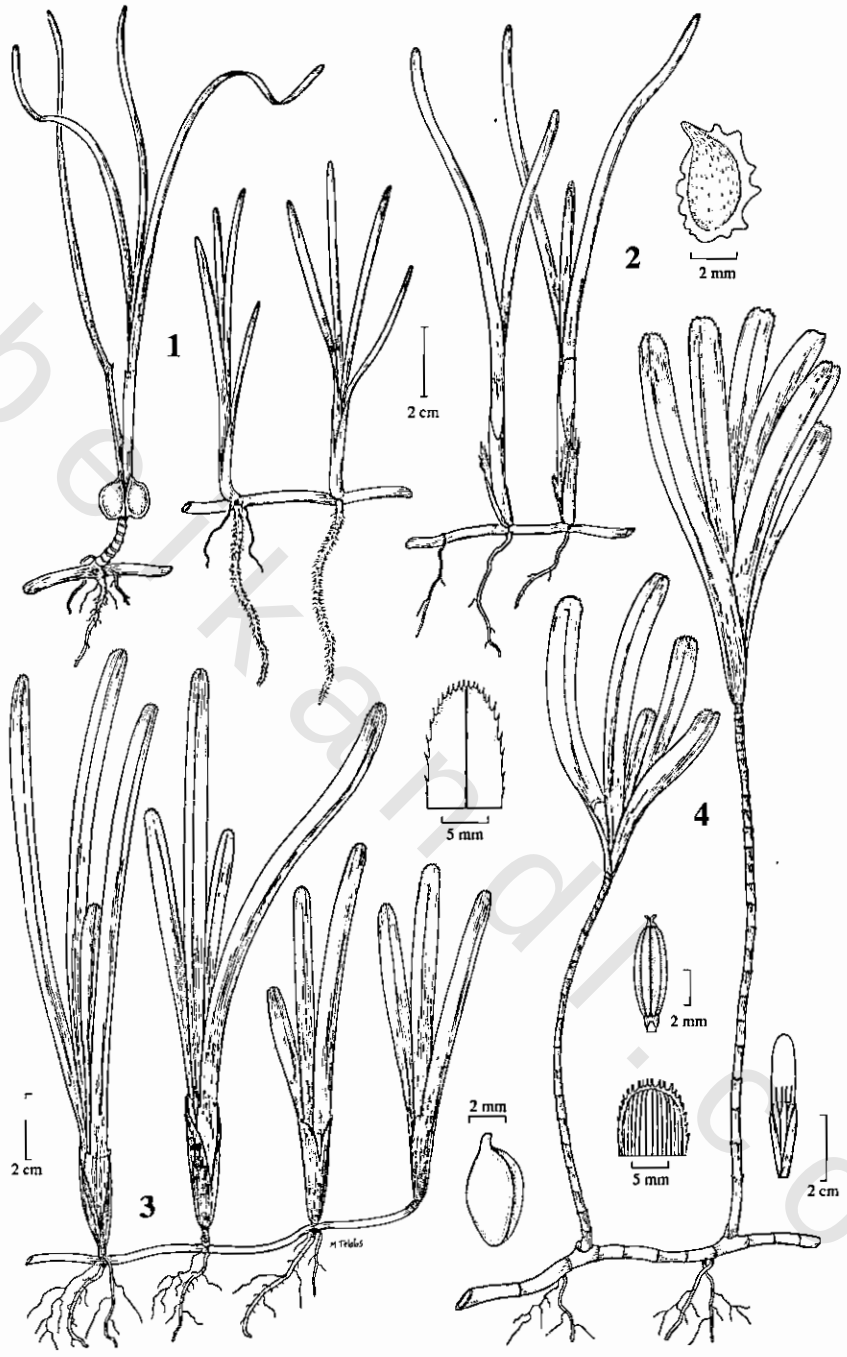


Plate 6. CYMODOCEACEAE: *Cymodocea nodosa* 1, rhizome with a fertile stem; rhizome with two sterile stems (right). *Cymodocea rotundata* 2, rhizome with two leafy stems; fruit (up right). *Cymodocea serrulata* 3, habit; leaf tip (up right); fruit (down right). *Thalassodendron ciliatum* 4, habit; female flower (right); leaf tip (within); male flower (up within). Drawn by Margaret Tebbs.

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elongate, arising from each 4th internode, with a terminal cluster of leaves; leaf-sheath compressed, ligulate, auriculate, amplexicaul, shed together with leaf, leaving closed scars; leaf-blade linear, the margins spinulose, the apex denticulate; flowers solitary and terminal on short lateral shoots, subsessile, enclosed by 4 leafy bracts; male flowers of 2 anthers, subsessile, dorsally connate, each with apical appendage; pollen filamentous; female flowers of 2 free ovaries; style short; stigmas long, coiled; fruit formed of the fleshy inner bract and the 2 fertilized ovaries, 1 usually abortive, often germinating while attached to the plant; seedlings free floating. 2 species, 1 Red Sea, Indo-Pacific Ocean, 1 Western Australia.

1. **Thalassodendron ciliatum** (Forssk.) Hartog, Verh. Konink. Nederl. Akad. Wet. Afd. Nat., ser. 2, 59 (1): 185-198 (1970).
Syns. *Zostera ciliata* Forssk., Fl. Aegypt.-Arab. 157 (1775).
Cymodocea ciliata (Forssk.) Shrenb. ex Asch., Stiz.-Ber. Ges. Naturf. Freunde Berlin 1857: 3 (1867).

Marine perennial herb; rhizome 4-6 mm thick, robust, mat-forming; internodes 0.5-3.5 cm; stems 10-60 cm, erect, sparsely branched or unbranched, brownish; leaf-sheath 1.5-3 cm; auricles obtuse; ligule 2-2.5 x 8-9 mm, wider than long; leaf-blade 6-12 x 0.6-1.2 cm, the margins entire, the apex rounded and denticulate; veins 16-26, parallel, with oblique cross-veins; male flowers subsessile, surrounded by 4 bracts; anthers 5-7 mm, linear; female flowers surrounded by 4 bracts, the inner fleshy; ovary *c.* 2 mm, ellipsoid; style *c.* 4 mm; stigmas *c.* 2 cm; fruit 3.5-5 cm, ellipsoid, of 2 carpels surrounded by the fleshy inner bract.

R, S (Gulf of Suez, Gulf of Aqaba); muddy tidal zone, coral sand in shallow sea water. Egypt to South Africa, Arabia, Madagascar, Indian Ocean islands, Malaysia, Australia.

3. **Syringodium** Kütz.

Marine perennial herbs; rhizome creeping, monopodial, with many vascular bundles; roots 1-3 or more at each node, unbranched or slightly branched; erect stems short, with 2-3 subulate leaves; scales scarious; leaf-sheath broad, 2-auriculate, ligulate, persisting longer than the blade; leaf-blade subulate, with 1 central and several pericentral vascular bundles, and 6-8 air channels; inflorescence cymose; flower enclosed by reduced leaf with inflated sheath; male flowers stalked, of 2 anthers, dorsally connate at lower end; female flowers sessile, of 2 free ovaries; style and stigmas short; fruit quadrangular in cross-section; dorsal ridge conspicuous; pericarp stony. 2 species, 1 Indo-Pacific Ocean, 1 Caribbean.

1. **Syringodium isoetifolium** (Asch.) Dandy, J. Bot. 77: 116 (1939).
Syn. *Cymodocea isoetifolia* Asch., Sitz.-Ber. Ges. Naturf. Freunde Berlin 1867: 3 (1867).

Marine perennial herb; rhizome 2-3 mm diam., slender; roots 1-3 at each node, branched or unbranched; erect stems 0.5-6 cm, with 2-3 leaves; internodes 1.5-3.5 cm; scales *c.* 5 mm, soon withering; leaf-sheath 1.5-3.5 cm; leaf-blade 6-25 x 0.1-0.2 cm, narrowed at the base; inflorescence a stalked cyme to 10 cm; male flowers with pedicel to 7 mm; anthers *c.* 4 mm; female flowers sessile; ovary 3-4 mm, ellipsoid; style *c.* 2 mm; stigmas 4-8 mm; fruit 3.5-4.5 x 1.5-2 mm, obliquely ellipsoid; beak *c.* 2 mm, 2-fid.

R, S (Gulf of Suez, Gulf of Aqaba); tidal pools, muddy and coral sand. Egypt to Mozambique, Madagascar to West Pacific Ocean.

4. **Halodule** Endl.

Marine perennial herbs; rhizome creeping, monopodial, with 2 vascular bundles; roots 1-4 or more at each node; erect stems short, with 1-4 leaves; leaf-sheath 1-6 cm, rather persistent, leaving circular scar when shed; leaf-blade linear, entire, narrowed at the base, with 3 veins and 1 prominent midrib becoming widened or furcate at apex; flowers solitary, terminal, enclosed in a leaf; male flowers subsessile, of 2 anthers connate at different levels; female flowers subsessile, of 2 free ovaries; style long, undivided; fruit shortly beaked; pericarp stony. 6 species, coastal shallows, pantropical.

1. **Halodule uninervis** (Forssk.) Asch. in Boiss., Fl. Orient. 5: 24 (1882).
Syns. *Zostera uninervis* Forssk., Fl. Aegypt.-Arab. CXX, 157 (1775).
Diplanthera uninervis (Forssk.) Asch. in Engl. & Prantl, Natürl. Pflanzenfam. 1: 37 (1897).

Marine perennial herb; rhizome 1.5-2.5 mm diam., wiry; roots 1-5 at each node; erect stems 2-4.5 cm; internodes 0.5-4.5 cm; scales 4-8 mm, ovate-elliptic; leaf-sheath 1-4 cm; leaf-blade 5-15 x 0.03-0.3 cm, flattened, with 1 prominent midrib, the base narrowed, the apex with 2 lateral teeth and often 1 median tooth; male flowers with pedicel 0.5-2 cm; anthers 2-5 mm, the upper attached 0.2-0.5 mm above the lower; female flowers with globose-ovoid ovary 1-2 mm; style 1-4 cm, terminal or lateral, undivided; fruit 1.5-2.5 x 1.5-2 mm, subglobose, the beak 0.25-1 mm, apical or lateral.

R; shallow coastal waters, mangrove creeks, muddy and coral sand. Egypt to Mozambique, South Africa, Madagascar, Mauritius, Seychelles, Arabia to Philippines, Australia, New Caledonia.

POSIDONIACEAE

L. Boulos

Description as for the genus *Posidonia,* the only genus in the family.

1. **Posidonia** K. König, nom. conserv.

Submerged, marine herbaceous perennials; rhizome covered with intact or decayed leaf-sheaths; roots tough; leaves sessile, distichous, flattened, with obtuse or rounded apex and distinct auriculate basal sheath; inflorescence terminal, on a flattened scape; flowers bisexual, or the uppermost functionally male, in short congested axillary spikes, subtended by leaf-like bracts; perianth 0; stamens 3; anthers sessile or subsessile, rather large; pollen filiform; carpel 1, ovoid-ellipsoid, 1-ovulate; stigma sessile, irregularly laciniate; fruit drupe-like, irregularly dehiscing near apex. 4 species, 1 Mediterranean and adjacent Atlantic, 3 Australia.

1. **Posidonia oceanica** (L.) Delile, Descr. Egypte, Hist. Nat. 78 (1814).
Syns. *Zostera oceanica* L., Mant. 123 (1767).
Posidonia caulini K. König in König & Sims, Ann. Bot. 2: 96 (1805).

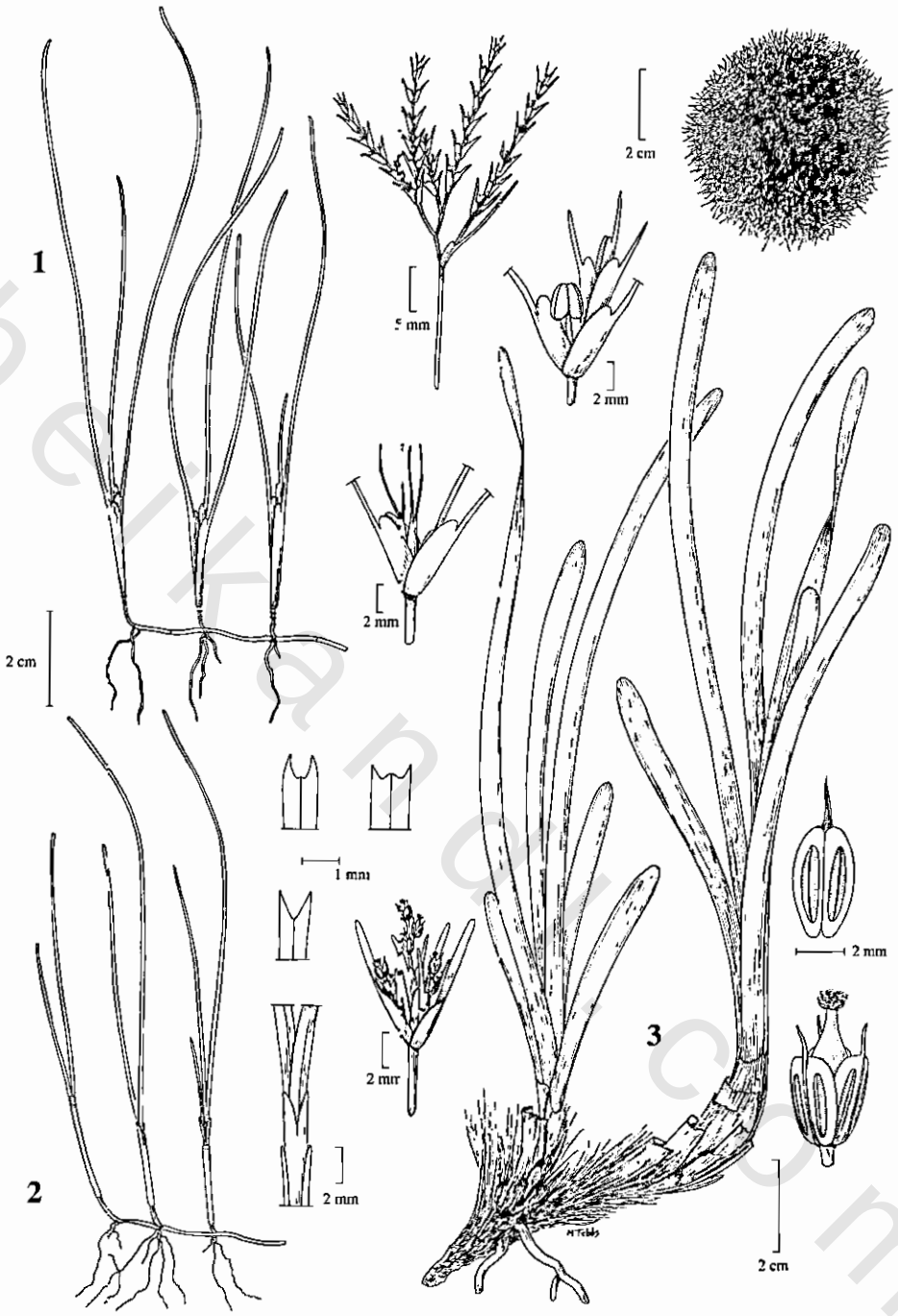


Plate 7. CYMODOCEACEAE: *Syringodium isoetifolium* 1, habit of sterile plant; part of a flowering plant (up right); female flower (down right); male flower (up right). *Halodule uninervis* 2, habit; leaf sheath (down right); three types of leaf tips (up right). POSIDONIACEAE: *Posidonia oceanica* 3, habit; spike with three flowers (left); bisexual flower (down right); stamen (middle right); spherical bundles of fine fibres "pilae marinae" (up). Drawn by Margaret Tebbs.

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Rhizomatous perennial herb; rhizome covered with densely imbricate, glossy brownish leaf-sheaths; leaves 10-25 x 0.5-0.8 cm, glabrous, strap-shaped, entire, the apex rounded; leaf-sheath 3.5-5 x 1-1.5 cm, concave-tipped; scape 10-20 cm, flattened; bracts 2-5 x 0.3-0.5 cm, blunt or rounded; flowers usually 3, sessile, in spikes with stout axis 1.5-2 cm; anthers *c.* 5 x 4 mm, broadly oblong-obovoid; carpel 3 x 1 mm, narrowly ellipsoid; stigma sessile, laciniate; fruit *c.* 1.5 x 1 cm, ellipsoid, pericarp thick.

M, S; usually forming an extensive massive turf on sand, in deep seawater, abundant on sandy beaches. Mediterranean coasts.

NOTE: The leaves of *Posidonia oceanica* are washed up on sandy beaches together with ellipsoid or spherical bundles of fine fibres, the "pilae marinae", which are often collected for fuel. The plant is used in folk medicine. According to Feinbrun-Dothan, Fl. Palaest. 4 (1986), and Heller & Heyn, Consp. Fl. Orient. 9: 4 (1991), it is not known from Palestine. According to Meikle, Fl. Cyprus 2: 1679 (1985), it is probably all around the coast of Cyprus, but usually growing in deep water and seldom collected. It is widespread but scattered in Crete (John Akeroyd, personal communication). Uotila in Davis *et al.*, Fl. Turkey 8: 35 (1984) states that all Turkish material seen of this species was sterile, largely consisting of fragments washed up on the beach. Although *Posidonia oceanica* is a common feature on the sandy beaches in Egypt, it seems to be rare or unknown from some parts of the eastern Mediterranean countries.

COLCHICACEAE

L. Boulos

Herbaceous perennials with a corm; leaves mainly at the base or cauline, flattened, linear or lanceolate, sheathing at the base; flowers solitary or in short racemes, bisexual, regular; tepals 6, free or connate at the base; stamens 6, free or inserted at the base of tepals; filaments narrow or broad at the base, glabrous; anthers 2-thecous, dorsifixed, longitudinally dehiscent; ovary superior, 3-locular; style 3-fid or styles 3; ovules several to many per locule; placentation axile; fruit a septicidal capsule; seeds globose or angular; endosperm present. 15 genera, about 165 species, Mediterranean region, western Asia to Australia, Africa, but especially South Africa.

1. Perianth-segments connate into a long tube — 1. **Colchicum**
\+ Perianth-segments free — 2. **Androcymbium**

1. **Colchicum** L.

Literature: Feinbrun, N. 1953. The genus *Colchicum* in Palestine and neighbouring countries. Pal. J. Bot., Jerusalem ser., 6: 71-95.

Herbaceous perennials; corm oblong or subglobose, covered by brown or brownish-black tunics; stem short, elongate in fruit; leaves basal, linear or broadly lanceolate, synanthous or hysteranthous, the outermost tubular at the base; perianth petaloid, pink, purple or white, rarely yellow, with a long narrow tube of connate tepals, limb campanulate, 6-lobed; stamens inserted at the base of limb; filaments subulate, with rather thickened base; styles 3, long, filiform, exserted from perianth-tube; ovary 3-locular, subterranean;

ovules several per locule; capsule ovoid to ellipsoid, septicidally opening from apex; seeds numerous, globose or angular. About 65 species, mainly Mediterranean region, extending to Sinai, Iraq, Arabia, Pakistan and Central Asia.

1. Leaves white-pilose on both sides when young, later becoming sparsely pilose — 2. **C. guessfeldtianum**
+ Leaves always glabrous — 2

2. Corm 1.5-2.5 cm, ovoid, neck short; tepals whitish-pink, lobes oblong-elliptic — 1. **C. ritchii**
+ Corm 3-4 cm, subglobose, neck elongate; tepals white or pale lilac, lobes oblong — 3. **C. cornigerum**

1. **Colchicum ritchii** R. Br. in Denham & Clapperton, Trav. Afr. App. 241 (1826).
Syn. *Colchicum aegyptiacum* Boiss., Diagn. Pl. Orient., ser. 1, 5: 66 (1844).

Herbaceous perennial; corm 1.5-2.5 cm, ovoid, the neck short; outer tunics dark brown, coriaceous; inner tunics membranous, forming a cylindrical sheath around the leaf bases and scape; leaves 2-4, appearing with the flowers, 8-25 x 0.5-3 cm, lanceolate to linear, recurved, glabrous, subacute; flowers 2-6(-8); tepals whitish-pink; floral-tube 8-16 cm, the lobes 3-3.5 x 0.4-0.6 cm, oblong-elliptic; inner tepals broader than the outer, with 2-4 teeth at the base; filaments 1-1.2 cm; anthers *c.* 3 mm, usually purple; styles 1.2-1.6 cm; stigmas punctiform; capsule 1.5-2.5 x 1-1.5 cm, ellipsoid, many-seeded; seeds *c.* 2.5 mm, subglobose, brownish.

M, D, S; sandy and calcareous soils. Libya, Egypt, Palestine, Saudi Arabia.

NOTE: The type of *Colchicum ritchii* was collected in Alexandria, Egypt. The corms are overcollected for their medicinal properties as they contain colchicin, used for the treatment of gout, rheumatism, also as a cathartic and emetic. This species deserves serious measures of conservation in its natural habitats in Egypt.

2. **Colchicum guessfeldtianum** Asch. & Schweinf., Mém. Inst. Egypt. 2, Suppl. 774 (1889).
Syn. *Colchicum ritchii* R. Br. var. *guessfeldtianum* (Asch. & Schweinf.) Stef., Sbornik Bulg. Akad. Nauk. 22: 1-100 (1926).

Herbaceous perennial; corms 3-4 cm, oblong-ellipsoid; outer tunics purplish, membranous. prolonged above the corm; leaves 3, 8-20 x 0.4-0.8 cm, appearing after anthesis, linear, subacute, the younger white-pilose on both sides, later becoming sparsely pilose; flowers 3-6; tepals pale rose-lilac; floral-tube 6-9 cm, the lobes 2.5-3.5 x 0.3-0.4 cm, oblong-linear, subacute, 6-9 nerved; filaments 1-1.2 cm; anthers *c.* 2.5 x 0.5 mm, yellowish-green; styles 0.8-1 cm; stigmas punctiform; capsule 1.5-1.8 x 0.8-1.2 cm, broadly ellipsoid, short-stipitate, many-seeded; seeds *c.* 2 mm, subglobose.

De (South Galala), S (Gebel Katherine, Gebel Serbal); rocky ground, 1100-2450 m. Egypt, western Saudi Arabia.

NOTE: The type of *Colchicum guessfeldtianum* was collected in 1876 from South Galala, 1100-1300 m, Eastern Desert, Egypt by G. Schweinfurth & P. Gussfeldt. According to Ascherson & Schweinfurth (1889), the type material collected in 1876 was in fruit, and flowering plants were first seen in November 1887 from material cultivated in Cairo.

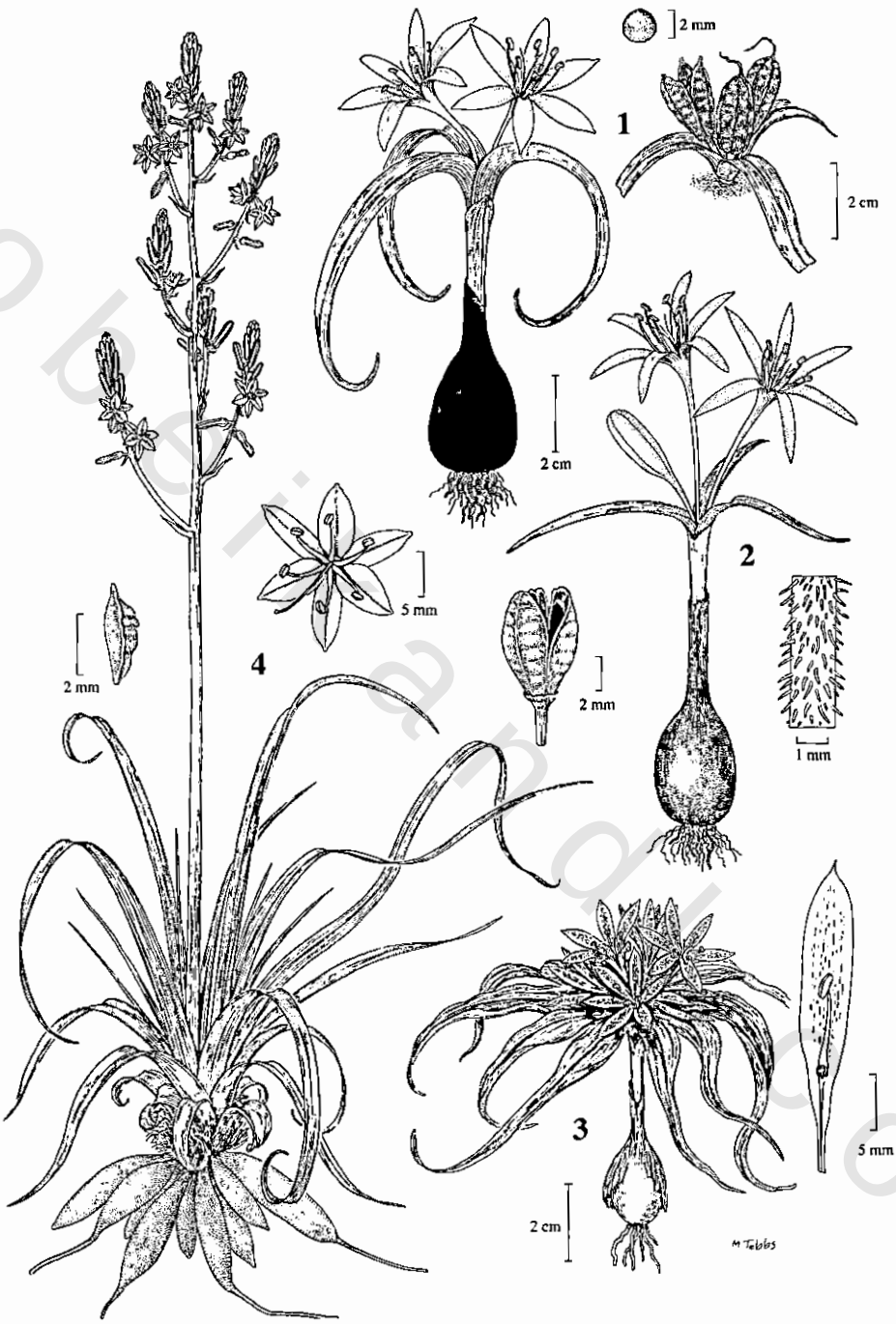


Plate 8. COLCHICACEAE: *Colchicum ritchii* 1, habit; fruits and seed (up right). *Colchicum guessfeldtianum* 2, habit; part of a young leaf (right). *Androcymbium palaestinum* 3, habit; tepal with a stamen (right). ASPHODELACEAE: *Asphodelus aestivus* 4, habit; flower and capsule (right); seed (left). Drawn by Margaret Tebbs.

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3. **Colchicum cornigerum** (Schweinf. ex Sickenb.) Täckh. & Drar in Täckholm & Boulos, Publ. Cairo Univ. Herb. 5: 79 (1974).
Syns. *Colchicum szovitsii* Fisch. & C. A. Mey. var. ? Schweinf. in Asch. & Schweinf., Mém Inst. Egypt. 2, Suppl. 775 (1889), pro descr.
Colchium szovitzii Fisch. & C. A. Mey. var. *cornigerum* Sickenb., Mém. Inst. Egypt. 4: 294 (1901).

Herbaceous perennial; corm 3-4 cm, subglobose, onion-like; tunics brownish, coriaceous-membranous, ending in a long neck; leaves 3, appearing ± with the flowers, growing further after flowering time to 30 x 3 cm, linear to lanceolate, narrowed at both ends, the apex acuminate, glabrous, shining; flowers 2-3, to 13 cm; tepals white or pale lilac; floral-tube *c.* 10 cm; lobes *c.* 2.5 cm, oblong, narrowed at base, 6-8-veined, 2-lamellate at base, the lamellae 1-2-toothed at apex; stamens *c.* 1.6 cm; anthers yellow; style straight, equalling or slightly shorter than the stamens; stigmas punctate; capsule *c.* 1.5 cm, oblong, stipitate, apex acute, narrowed at the base; seeds 2.5 mm, globose-angulate, brownish.

De (North Galala), S; rocky and sandy ground. Endemic.

NOTE: The type material of *Colchicum cornigerum* was collected from North Galala Mountain, Eastern Desert, Egypt by Schweinfurth in 1887. The nomenclature of this species has an interesting history: first it was designated at varietal rank, with ? and a desription, of *Colchicum szovitsii* Fisch. & C. A. Mey., by Schweinfurth in Asch. & Schweinf., in Mém. Inst. Egypt. 2, Suppl. 775 (1889). Sickenberger, in Mém. Inst. Egypt. 4: 294 (1901), named Schweinfurth's plant var. *cornigerum*, based on the description already given by Schweinfurth (1889). The result is that var. *cornigerum* should bear Sickenberger's name as author, since he provided the name, and Schweinfurth's name should appear before 'ex' because Sickenberger ascribed the name to him. Täckholm & Drar, in Täckholm & Boulos, Publ. Cairo Univ. Herb. 5: 79 (1974) upgraded the variety to a species, but provided the combination *C. cornigerum* (Schweinf.) Täckh. & Drar, which indeed should read *C. cornigerum* (Schweinf. ex Sickenb.) Täckh. & Drar, since they have also referred to Sickenberger (1901), who provided the validly published varietal name, which is used here as a basionym.

2. **Androcymbium** L.

Herbaceous perennials; corms covered by tunics; stem short, mainly subterranean; leaves basal, synanthous, in a rosette, forming a conspicuous involucre to the inflorescence; leaves and flowers enclosed in a tubular membranous sheath at their base; inflorescence umbellate; perianth petaloid, white, pink or lilac; perianth-segments 6, free, subequal, each with a claw and an elliptic to lanceolate limb with 1-2 nectariferous glands at filament insertion; stamens 6, inserted at base of limb; anthers versatile; ovary 3-locular; ovules numerous; styles 3, free; stigmas punctiform; fruit a septicidal capsule; seeds globose. About 12 species, Mediterranean region, Sinai, Ethiopia to South Africa.

1. **Androcymbium palaestinum** Baker, J. Linn. Soc. London (Bot.) 17: 445 (1879).
Syn. *Androcymbium gramineum* sensu Täckholm & Drar (1954), Täckholm (1974), Boulos (1995).

Herbaceous perennial 5-15 cm; corm 1.5-2 x 1.2-1.5 cm, ovoid; tunics dark brown; stem subterranean, covered by the tunics; leaves 5-12, overtopping the inflorescence, linear-

lanceolate, apex acute to acuminate, the base to 1.5 cm broad in outer leaves; tepals 1.5-1.8 x 0.3-0.4 cm, white to pale lilac, with purplish veins and dots; lobes longer than the claw, oblong-lanceolate, subacute to obtuse; stamens 8-9 mm; anthers *c.* 1 x 0.5 mm; capsule *c.* 1.5 x 1.25 cm, broadly ovoid to subglobose; seeds *c.* 2 x 1.6 mm, subglobose, punctulate.

M, De, S; fissures of calcareous rocks, coarse sandy and gravelly soils. Libya (Cyrenaica), Egypt, Palestine.

NOTE: *Androcymbium palaestinum* has long been confused with *A. gramineum* of the western Mediterranean region, Mauritania, Canary Islands (Fureteventura) and probably southern Spain. Maire, Fl. Afr. Nord 5: 21-24 (1958) classifies *A. palaestinum* as one of five varieties of *A. gramineum*. On the other hand, Heywood in Tutin *et al.*, Fl. Europ. 5: 21 (1980) refers to *A. europaeum* (Lange) Richter, endemic to southeast Spain, and adds: "frequently confused with *A. gramineum* (Cav.) Macbride, from North Africa, which has fruits 12-20 mm".

ASPHODELACEAE

L. Boulos

Annuals or herbaceous perennials, rhizomatous, or roots fibrous or fleshy; leaves all basal, sheathing at the base, entire; inflorescence a terminal raceme or panicle; bracts 1 per flower; flowers bisexual, white, pink, yellow or red, regular; perianth of 6 tepals, usually free; stamens 6, free; filaments linear, glabrous or hairy; anthers 2-thecous, dorsifixed, longitudinally dehiscent; ovary superior, 3-locular; style simple, slender; ovules 2 to several per locule; fruit a loculicidal capsule; seeds sometimes arillate; endosperm present. 17 genera, 750 species, Europe, Mediterranean region to Central Asia, Africa, but especially southern Africa.

1. Tepals white or pale pink; filaments of ± equal length — 1. **Asphodelus**
+ Tepals yellow; filaments of unequal length, the outer *c.* 1/2 the length of the inner — 2. **Asphodeline**

1. **Asphodelus** L.

Annuals or herbaceous perennials, rhizomatous, or roots fibrous or fleshy; leaves basal, linear, thin or subterete; inflorescence a terminal raceme or panicle; bracts membranous, persistent; pedicels jointed near base or ± at middle; flowers regular, protogynous; tepals 6, free or slightly connate at the base, white or pale pink, with a purplish or greenish mid-vein; stamens shorter than the tepals; filaments ± of equal length, dilated at base, filiform or fusiform above; anthers introrse, dorsifixed; ovary 3-locular; style 1, filiform; stigma capitate; capsule loculicidal, coriaceous; seeds 3-6 per capsule, angled, transversely sulcate at dorsal side. 16 species, Canary Islands, Mediterranean region, eastwards to Himalayas, southwards to Somalia.

1. Plant with short, compact rhizome and several spindle-shaped tuberous roots; leaves flat, to 2.5 cm broad — 1. **A. aestivus**
+ Plant with fibrous roots; leaves semiterete, 1-3 mm broad — 2

2. Leaves sticky, especially in the lower part; pedicels jointed near the base 3
+ Leaves not sticky; pedicels jointed at middle or slightly below, not near the base 4

3. Fruiting pedicels reflexed; capsule pendulous 3. **A. refractus**
+ Fruiting pedicels erecto-patent, not reflexed; capsule not pendulous 2. **A. viscidulus**

4. Annual 15-30(-40) cm; tepals 5-7 mm; capsule 2.5-3.5 mm 4. **A. tenuifolius**
+ Short-lived perennial 0.4-1 m; tepals 0.9-1.2 cm; capsule 4-5 mm 5. **A. fistulosus**

1. **Asphodelus aestivus** Brot., Fl. Lusit. 1: 525 (1804).
Syns. *Asphodelus ramosus* Sibth. & Sm., Fl. Graec. 3: 28, t. 334 (1823), non L. (1753).
Asphodelus microcarpus Viv., Fl. Cors. Diagn. 5 (1824).
Asphodelus ramosus L. subsp. *microcarpus* (Viv.) Baker, J. Linn. Soc. 15: 270 (1876).

Robust, erect herbaceous perennial, 0.5-1.2 m; rhizome short, compact; roots fleshy, in clusters, of several spindle-shaped tuberous roots to 10 x 2.5 cm, yellow when cut; leaves 10-50(-70) x 1-2.5 cm, broadly linear, flat, strap-shaped, keeled, acute; scape 0.8-1.2 cm diam., terete, solid; inflorescence a panicle of several dense racemes; bracts 1-3 x 0.2-0.6 cm, linear-lanceolate, the lower longer than the upper, soon deciduous; pedicels *c.* 1 cm, jointed slightly below the middle; tepals 1-1.4 x 0.4-0.6 cm, oblong- elliptic, the outer 3 slightly smaller than the inner, pinkish-white, with a distinct pinkish-brown mid-vein, subacute; filaments 0.8-1.2 cm, dilated at base and enveloping the ovary; anthers 1.5-2 x 0.4-0.6 mm; style ± equalling the stamens; capsule 0.8-1 x 0.6-0.8 cm, obovoid, sharply trigonous, transversely rugose, encircled at the base by the remnants of the tepals; seeds 6 or less by abortion, *c.* 5 x 2 mm, sharply angled, dark brown.

M, S; sandy and calcareous soils, especially in overgrazed ground. Atlantic Islands, Portugal, Mediterranean region, Sinai, Iraq.

NOTE: *Asphodelus aestivus* is one of the most widespread species in the western Mediterranean coastal region (Marmarica) and northern Sinai, and often grows in dense pure stands covering substantial areas, and reaching as far as 30 km or more from the coast into the adjacent desert regions. The plant is used in folk medicine; among other uses [cf. Täckholm & Drar (1954)] a glue is produced from the tuberous roots, locally used by shoe-makers and book-binders.

2. **Asphodelus viscidulus** Boiss., Diagn. Pl. Orient., ser. 1, 7: 118 (1846).

Annual 12-25 cm; roots fibrous, slender; leaves 4-10 x 0.1-0.2 cm, subulate, semiterete, glabrous, sticky, especially in the lower part and usually with adhering sand; scapes ascending, branched or unbranched, often curved; flowers in lax racemes; bracts 2-6 x 1.5-2 mm, oblong-lanceolate, membranous except at the green midrib, acuminate; pedicels 5-9 mm, jointed near the base; fruiting pedicels erecto-patent; tepals 4-5 x 2.5-3 mm, oblong, white, with a prominent pinkish-brown mid-vein; stamens *c.* 3 mm; capsule 2.5-3 mm, subglobose, with transversely rugose valves and remnants of the perianth at base; seeds 2 x 1 mm, the dorsal side transversely 3-sulcate, otherwise smooth, bluish-grey.

M, S; sandy desert plains. Egypt, Palestine, Arabia, Iraq, Iran.



Plate 9. ASPHODELACEAE: *Asphodelus viscidulus* 1, habit; capsule and seed (up within). *Asphodelus refractus* 2, habit; capsule and seed (up right). *Asphodelus tenuifolius* 3, habit; capsule and seed (up left). *Asphodelus fistulosus* 4, basal part, and flowering and fruiting branch; capsule and seed (down right). *Asphodeline brevicaulis* 5, basal part, and flowering and fruiting branch; capsule (down right). Drawn by Margaret Tebbs.

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3. **Asphodelus refractus** Boiss., Diagn. Pl. Orient., ser. 1, 13: 23 (1854).
Syn. *Asphodelus pendulinus* Coss. & Durieu, Bull. Soc. Bot. Fr. 4: 399 (1857).

Like *Asphodelus viscidulus,* but plant 25-45 cm; fruiting pedicels to 1.2 cm, reflexed; capsule 3-4 mm, broadly obovoid, pendulous.

De, S; sandy desert plains. Algeria, Tunisia, Libya, Egypt, Palestine, Arabia.

4. **Asphodelus tenuifolius** Cav., Anal. Cienc. Nat. 3: 46, t. 27, f. 2 (1801).
Syn. *Asphodelus fistulosus* L. var. *tenuifolius* (Cav.) Baker, J. Linn. Soc. London (Bot.) 15: 276 (1876).

Annual 15-30(-40) cm; roots fibrous; leaves 6-20 x 0.2-0.3 cm, narrowly linear, semiterete; scape terete, branched, hollow; inflorescence a panicle; bracts 2-4 x 1.2-1.5 mm, triangular-ovate, acuminate; flowering pedicels 2-4 mm; fruiting pedicels elongate to 6 mm, erect, thickened, jointed at or just below the middle; tepals 5-7 x 2.5-3 mm, oblong-elliptic, pinkish-white, with a prominent brownish-violet mid-vein; capsule 2.5-3.5 mm, ovoid-globose, transversely wrinkled; seeds 2.5 mm, blackish.

N, O, M, D, R, GE, S; desert wadis, sandy plains, alluvial soils, edges of cultivated land. Atlantic Islands, North Africa, eastern Mediterranean region, Sinai, Arabia, Iraq, Iran, Pakistan, India, Socotra, Sudan, Somalia.

5. **Asphodelus fistulosus** L., Sp. Pl., ed. 1, 309 (1753).

Erect herbaceous perennial 0.4-1 m; rhizome compact; roots fibrous, rather fleshy but not tuberous; leaves numerous, 10-25 x 0.25-0.4 cm, narrowly linear, erect, semiterete, fistulose, subulate-acuminate, keeled, the margins scabridulous; scapes usually several, terete, hollow; inflorescence a panicle with several erecto-patent lax racemes; bracts 3-8 x 2-3.5 mm, the upper smaller than the lower, lanceolate, acuminate, membranous except at the green midrib; flowering pedicels 2-4 mm, slender; tepals 0.9-1.2 x 0.3-0.45 cm, elliptic, obtuse, the outer 3 slightly smaller than the inner, whitish-pink, with a conspicuous crimson mid-vein; fruiting pedicels 0.8-1 cm, thickened, erecto-patent, jointed ± at the middle; stamens 6; filaments 6-7 mm, flattened but not dilated at base, nor enveloping the ovary; anthers *c.* 1.5 mm, brownish-violet; style *c.* 5.5 mm, 3-lobed; capsule 4-5 mm, subglobose, transversely rugose, with a collar of remnants of perianth at base; seeds 6 or fewer by abortion, *c.* 3 x 1.5 mm, transversely 2-3-sulcate dorsally, 2-3-pitted laterally, dark brown.

S (Ain Gedeirat); edges of cultivated ground. Atlantic Islands, Mediterranean region, Sinai, northwest Saudi Arabia.

NOTE: *Asphodelus fistulosus* is reported here new to the flora of Egypt. I have collected the plant twice at Ain Gedeirat, northern Sinai (Boulos 18870 and 19936, 30 March 2000 and 18 March 2002 respectively, K; Herb. Boulos, Cairo). The plants grow in rather scattered, but dense populations at the edges of cultivation in that small "oasis". According to Meikle, Fl. Cyprus 2: 1589 (1985) the distribution of this species is: Mediterranean region and Atlantic Islands. Feinbrun-Dothan, Fl. Palaest. 4: 22 (1986) restricted its distribution to the Mediterranean region. Collenette, Wildflowers of Saudi Arabia (1999) provides a colour photograph of the plant in its natural habitat, with one enlarged flower, from Al Hadda, on the Jiddah-Taïf road, in hard sand, 6200 ft (Collenette 1079, 1722, K!). The plant is identified, according to her, to *Asphodelus* sp.

aff. *aestivus*. However, the photographs and the specimens show, without any doubt, a typical *A. fistulosus*. Our finding from Ain Gedeirat and Collenette's on the Jiddah-Taïf road, extends the distribution of the species to include Sinai and northwest Saudi Arabia. It is worth mentioning here that Thulin, Flora of Somalia 4: 32 (1995), cites *Asphodelus fistulosus* as the only species in Somalia, and gives *A. tenuifolius* Cav. and *A. fistulosus* var. *tenuifolius* (Cav.) Bak. as synonyms. He adds "First record for Somalia. The two collections seen represent the annual small-flowered form that is sometimes recognized as *A. tenuifolius*". The line drawing given by him [modified from Fl. Palaest. 4, pl. 28 (1986)] shows the perennial *A. fistulosus,* not the annual *A. tenuifolius,* which he has attributed to the Somali material. Since both the perennial *Asphodelus fistulosus* and the annual *A. tenuifolius* are now widely accepted as separate species, the Somali plants may be better referred to *A. tenuifolius.*

2. **Asphodeline** Rchb.

Perennial herbs; roots fleshy; stems often leafy; leaves alternate, linear, with dilated membranous bases; inflorescence a terminal many-flowered raceme or panicle; bracts membranous, persistent; pedicels jointed; perianth-segments 6, free or connate at base; filaments unequal, dilated at base and enveloping the ovary; anthers versatile, dorsifixed; ovary 3-locular; style 1, filiform; stigma small, capitate, or slightly 3-lobed; capsule loculicidal, coriaceous; seeds 6, or 3 by abortion, angular, rugose. 14 species Mediterranean region, Sinai to Caucasus, Iraq.

1. **Asphodeline brevicaulis** (Bertol.) J. Gay in Balansa, Pl. d'Orient, no. 316, (1855) et ex Baker, J. Linn. Soc. London (Bot.) 15: 276 (1876).
Syn. *Asphodelus brevicaulis* Bertol., Nov. Comm. Acad. Bonon. 5: 430 (1842).

Erect herbaceous perennial 40-80 cm; roots fleshy but not tuberous; stems ± terete, densely leafy towards the base; leaves 8-25 x 0.2-0.4 cm, linear-subulate, decreasing in size towards the inflorescence, sheathing at the base; sheath membranous; inflorescence with several spreading angular branches; bracts to 1.6 x 0.5 cm, ovate-caudate, membranous except at the green midrib; flowers lax, solitary or in pairs in the axil of the bracts; pedicels 0.4-1 cm at anthesis, jointed near the base, elongate to 1.5 cm and thickened in fruit; tepals 1.5-2 x 0.3-0.4 cm, oblong-lanceolate, free almost to the base, yellow, with a green mid-vein; stamens 6, 2-seriate; filaments 1-1.6 cm, the outer slender, slightly dilated at base, the inner similar but longer than the outer; anthers 3-4 x 1.5 mm; style 1.2-1.6 cm, slender; stigma small, obscurely 3-lobed; capsule *c.* 1.2 cm, subglobose, coriaceous, transversely rugose; seeds *c.* 4 mm, sharply angled, smooth.

? S; rocky ground. ? Sinai, Palestine, Lebanon, Syria, Cyprus, southeastern Turkey, Iraq.

NOTE: The occurrence of *Asphodeline brevicaulis* in Egypt is doubtful, and the above description is based on material from Cyprus and Palestine. It is most desirable to acquire new collections to confirm its occurrence in the country.

LILIACEAE

L. Boulos

Perennial herbs with bulbs; leaves alternate, rarely verticillate, linear to ovate-lanceolate, often sheathing at the base; inflorescence racemose *(Lilium,* not in our area), umbel-like

(*Gagea*) or flowers solitary *(Tulipa);* flowers bisexual, generally radially symmetrical; ovary superior; perianth of 6 tepals, free, in 2 whorls; stamens 6, in 2 whorls; anthers epipeltate or pseudobasifixed; pistils with 3 carpels, 3-locular, each locule with many ovules; styles short to long, 3-lobed or with three stigmatic crests; fruit a loculicidal capsule; seeds usually disc-shaped, flat, often with a marginal rim, rarely ellipsoid or sharp-angled, not winged. 10 genera, 350 species, northern hemisphere especially southwest Asia to China.

1. Flowers in umbel-like inflorescences, star-shaped, small; perianth-segments entirely yellow inside 1. **Gagea**
+ Flowers solitary, cup-shaped, large; perianth-segments white or scarlet, with a yellow or black basal blotch inside 2. **Tulipa**

1. **Gagea** Salisb.

Bulbous perennial herbs; bulbs 1-3, globose to ovoid, enveloped in tunics; basal leaves 1-3; cauline leaves 1-3 or 0; inflorescence umbel-like, or flowers rarely solitary; bracts foliaceous, conspicuous; pedicels usually long; perianth yellow, greenish or white, persistent and often accrescent in fruit; perianth-segments 6, arranged like a star, free, subequal, 3-7-veined; stamens 6, connate at base of perianth-segments; style simple, slender; stigma ± capitate; capsule sessile or subsessile, loculicidal, membranous; seeds numerous, globose to ovoid, or flattened; endosperm fleshy. 70 species, temperate Eurasia, North Africa.

1. Roots of 2 types: normal thin roots, and a group of thick cord-like roots emerging from one side of the bulb and enveloping it 1. **G. dayana**
+ All roots ± uniform, if some thickened, then irregularly enveloping bulb in a dense net, and not emerging from one side of bulb 2

2. Plants usually growing singly; some roots thickened and irregularly enveloping the bulb in a dense net; tunics usually not extending above ground; basal leaves 2-4 mm broad, linear 2. **G. fibrosa**
+ Plants usually growing in colonies of several bulbs; all roots thin; bulb tunics extend above the ground, forming a sheath at base of stem; basal leaves 1-2 mm broad, filiform 3. **G. reticulata**

1. **Gagea dayana** Chodat & Beauverd in Dinsm., Pl. Post. Dinsm., Publ. Amer. Univ. Beirut, Nat. Sci., ser. 2, fasc. 1: 8 (1932).

Glabrescent bulbous perennial, 5-15 cm; bulbs single, 1-1.5 cm, ± globose; roots of 2 types: normal thin roots, and a group of thick cord-like roots emerging from one side of the bulb and enveloping it; basal leaves 1-2, 2.5-8 x 0.2-0.4 cm, canaliculate; cauline leaves 3-4, usually exceeding the inflorescence, linear to narrowly lanceolate; inflorescence 2-10 cm, 2-6-flowered; tepals 1.8-2.8 x 0.3-0.4 cm, narrowly lanceolate-elliptic, arranged like a star, yellow inside, green outside, elongate after anthesis; capsule *c.* 8 x 6 mm, broadly ellipsoid.

M, De; sandy ground. Egypt, Palestine Lebanon, Turkey, Afghanistan.

NOTE: According to Feinbrun-Dothan, Fl. Palaest. 4: 35-36 (1986), two varieties are known of *Gagea dayana*: var. *dayana*, restricted to Palestine and Lebanon, and var.

conjungens (Pacher) Heyn & Dafni, known from Egypt, Palestine, Turkey and Afghanistan. The above description is made after Egyptian material which, according to her, belongs to var. *conjungens*. On the other hand, Rix in Davis *et al.*, Fl. Turkey 8: 315-316 (1984) treats *G. dayana* var. *conjungens* as a synonym of *G. taurica* Steven, and extends the distribution of *G. taurica* to include northeast Greece, Caucasia, Crimea, Iran, ? Central Asia.

2. **Gagea fibrosa** (Desf.) Schult. & Schult. f., Syst. Veg., ed. 15, 7: 552 (1829).
Syns. *Ornithogalum fibrosum* Desf., Fl. Atlant. 1: 294 (1798).
Gagea rigida Boiss. & Spruner in Boiss., Diagn. Pl. Orient., ser. 1, 7: 108 (1846).

Glabrescent bulbous perennial, 5-15(-20) cm; plants usually growing singly; bulb 0.5-1.2 cm, ellipsoid; roots numerous, some thickened and irregularly enveloping the bulb in a dense net; tunics usually not extending above ground; basal leaves 1-2, 8-12 x 0.2-0.4 cm, linear; cauline leaves 2-5, 5-12 x 0.2-0.4 cm, linear, long-tapering towards the apex; inflorescence 2-5-flowered; pedicels 2-4 cm, pubescent, rigid and erect in fruit; tepals 1.6-2 x 0.25-0.4 cm, elongate to 2.5 cm after anthesis, yellow, arranged like a spreading star, narrowly oblanceolate-elliptic, acute, the margins scarious; capsule 0.8-1.2 x 0.6-0.8 cm, subglobose to broadly ellipsoid.

M, De, S; sandy desert wadis and plains. Greece, Aegean Islands, Cyprus, North Africa, Sinai, Palestine, Arabia, Iran.

3. **Gagea reticulata** (Pall.) Schult. & Schult. f., Syst. Veg., ed. 15, 7: 542 (1829).
Syns. *Ornithogalum reticulatum* Pall., Reise 3, App. 727, t. D, f. 2 (1776).
Ornithogalum circinatum L. f., Suppl. Pl. 199 (1781).

Like *Gagea fibrosa,* but plants usually growing in colonies of several bulbs; all roots thin; bulb tunics extend above the ground, forming a sheath to 2.5 cm at base of the stem; basal leaves 1-2 mm broad, filiform; capsule 1.2-1.5 x 0.8 cm, elongate-ellipsoid.

M, De, S; sandy deserts and plains. Algeria, Libya, Egypt, Palestine, Lebanon, Syria, Turkey, Caucasus, Iraq, Arabia, Iran, Pakistan, Afghanistan, Central Asia.

2. **Tulipa** L.

Bulbous perennial herbs; outer tunics brown, with felty lining of hairs inside, or glabrous; stem (scape) erect; leaves cauline, alternate, rather fleshy; flowers mostly solitary; perianth cup-shaped or campanulate; tepals deciduous; stamens 6, subequal; filaments dilated at base; anthers basifixed; ovary 3-locular; stigmas 3, sessile; capsule 3-locular, subglobose or oblong, septicidal; seeds numerous discoid. About 100 species, Europe, North Africa, southwest to Central Asia.

1. Scape 1-flowered; tepals scarlet, usually with a black blotch at base, often yellow at edge; filaments glabrous — 1. **T. stylosa**
\+ Scape 1-3-flowered; tepals white with a yellow basal blotch inside, outer tepals with a greenish median stripe tinged with purple outside; filaments hairy at base — 2. **T. biflora**

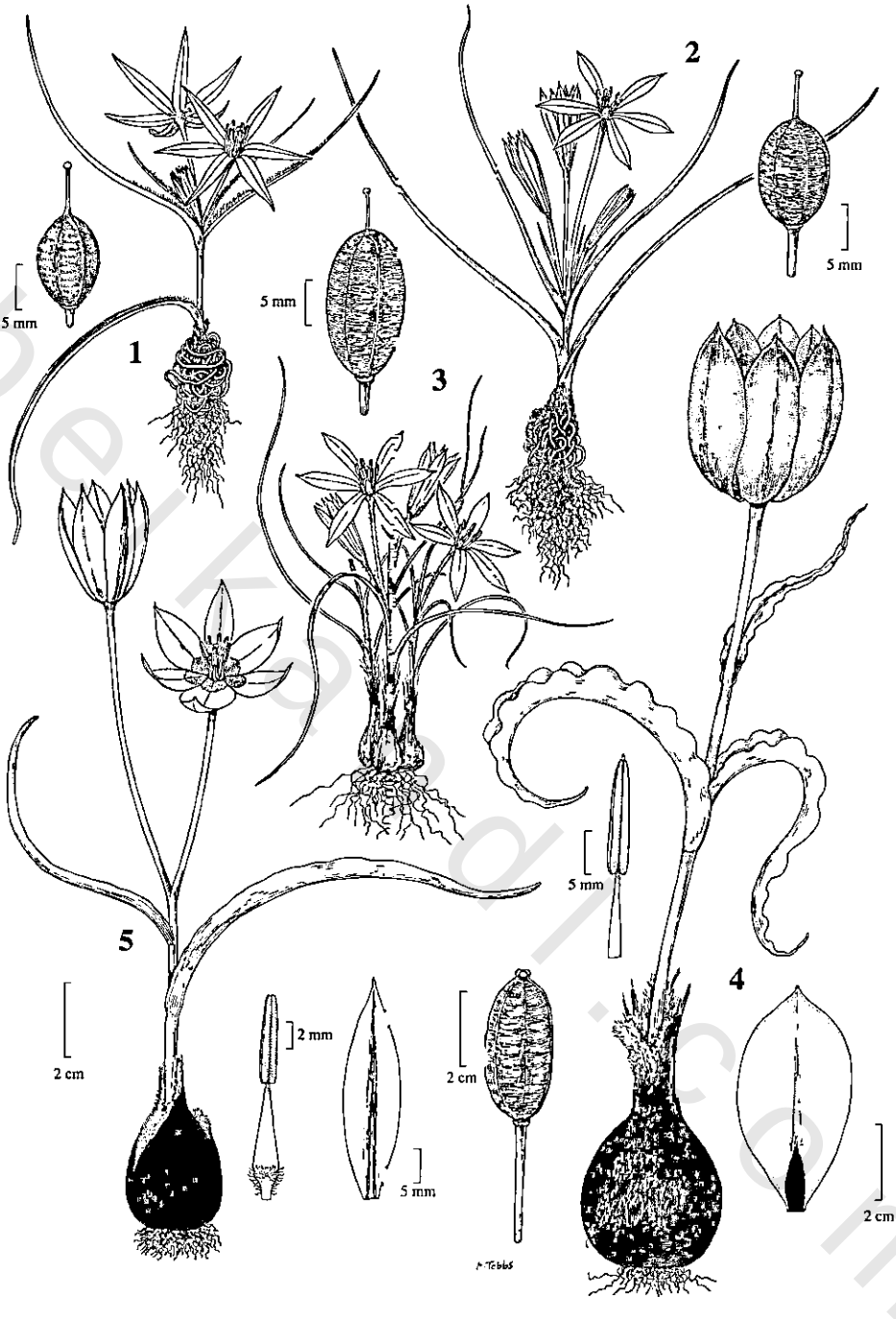


Plate 10. LILIACEAE: *Gagea dayana* 1, habit; capsule (left). *Gagea fibrosa* 2, habit; capsule (right). *Gagea reticulata* 3, habit; capsule (up). *Tulipa stylosa* 4, habit; tepal (down right); stamen (middle left); capsule (down left). *Tulipa biflora* 5, habit; stamen and tepal (down right). Drawn by Margaret Tebbs.

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1. **Tulipa stylosa** Stapf, Denkschr. Akad. Wiss. Math.-Nat. Kl. (Wien) 50: 17 (1885).
Syns. *Tulipa stapfii* Turrill, Bot. Mag. 157, t. 9356 (1934).
Tulipa montana, sensu Boiss., Fl. Orient. 5: 192 (1882), *p.p.* non Lindley (1827).
Tulipa montana var. *amblyophylla* Post., Plant. Post. 1: 13 (1890).

Glabrous bulbous perennial; bulb 2.5-4 cm diam.; tunics brown, papery, with dense felt-like lining inside; leaves usually 4, 5-12(-20) x 0.6-3.5(-5) cm, the lower longer and broader than the upper, linear-lanceolate to elliptic, acuminate, the margins undulate; scape 1-flowered; tepals 3.5-6.5 x 2-3.5 cm, the 3 inner shorter than the outer, scarlet, obovate-elliptic, cuneate and usually with a black blotch at base, often yellow at edge, the apex acute to acuminate; filaments 5-6 mm, glabrous, deep purple; anthers *c.* 1 cm, yellowish-purple; capsule 3.5-6.5 x 1.5-1.8 cm, subcylindrical, shortly beaked.

S; rocky ground, mountain ridges. Sinai, southern Palestine, Syria, Iraq, eastern Turkey, Iran.

2. **Tulipa biflora** Pall., Reise Russ. Reichs 3: 727, t. D, f. 3 (1776).
Syns. *Tulipa humilis* Herb., Bot. Reg. 30, Misc. 30 (1844).
Tulipa buhseana Boiss., Diagn. Pl. Orient., ser. 2, 4: 98 (1859).
Tulipa crispatula Boiss. & Buhse, Aufz. Reise Transkauk. Pers. 211 (1860).
Tulipa polychroma Stapf, Denkschr. Akad. Wiss. Math.-Nat. Kl. (Wien) 50: 18 (1885).

Glabrous bulbous perennial; bulb 2-3 cm diam.; tunics brown, leathery, with thick felt-lining inside; leaves 2-3, 6-12 x 0.5-2 cm, linear-lanceolate; flowers 1-2(-3), cup-shaped; tepals 2.5-4 x 0.5-0.8 cm, elliptic, acute, white inside, with a yellow basal blotch; outer 3 tepals with a greenish median stripe tinged with purple outside; inner 3 tepals broader than the outer; stamens 0.8-1 cm; filaments yellow, glabrous except at the hairy base; anthers yellow, shorter than the filaments; capsule 1.5-2.2 x 1.2 cm, 3-locular, short-cylindrical, apiculate.

De (South Galala), S; rocky calcareous ground. Egypt, Palestine, Syria, Iran, Caucasus.

NOTE: The identity of this species is disputed between *Tulipa biflora* and *T. polychroma.* It appears under the name *T. polychroma* in Täckholm & Drar, Fl. Egypt 3: 137 (1954) and in Boulos, Fl. Egypt Checklist 173 (1995). On the other hand, Feinbrun-Dothan, Fl. Palaest. 4: 40 (1986) cites this species under *T. polychroma,* but with no mention of Egypt in the general distribution, and states that *T. polychroma* significantly differs from *T. biflora* in leathery bulb-tunics, densely lanate inside, and in larger perianth-segments (25-45 mm, not up to 25 mm). Marias, Kew Bull. 35: 258 (1980) lists *T. polychroma* as a synonym to *T. biflora.* Wendelbo in Townsend & Guest (eds), Fl. Iraq 8: 86-87 (1985), states that there is much overlapping as very small-flowered plants have been found in Iran and large-flowered ones now and then in the area of *T. biflora* sensu str. He adds that plants from Egypt and Palestine have been named *T. polychroma,* but further studies are needed to see whether these really belong to the same species (*T. biflora*) as plants of Iraq and Iran. In the present treatment the name *Tulipa biflora* is applied to the Egyptian plants. According to Täckholm & Drar, *l.c.,* the bulbs are eaten by the local people and taste like chestnuts.

HYACINTHACEAE

L. Boulos

Bulbous perennials; leaves all basal, flat, spirally arranged, entire, sheathing at the base; inflorescence a raceme or spike, rarely branched; bracts 1 or 2 per flower, sometimes minute or absent; flowers bisexual, regular, greenish, yellowish, pink, purplish, blue or white; tepals 6, free or united; stamens 6, inserted at the base of the tepals; filaments often flattened; anthers 2-thecous, dorsifixed, longitudinally dehiscent; ovary superior, 3-celled; style simple; ovules (1-)2-numerous per locule; fruit a loculicidal capsule; seeds rounded to angular; endosperm present. About 40 genera, 900 species, temperate regions, but especially southern Africa, Mediterranean region, southwest Asia.

1. Flowers without a distinct perianth-tube — 2
\+ Flowers with a distinct perianth-tube — 4

2. Bracts conspicuous — 4. **Ornithogalum**
\+ Bracts small or absent — 3

3. Perianth-segments blue or pale lilac — 2. **Scilla**
\+ Perianth-segments white with green or purplish mid-vein, or dull purple, pink or olive-grey with a purplish mid-vein — 1. **Urginea**

4. Bracts longer than the pedicels — 3. **Dipcadi**
\+ Bracts minute or absent — 5

5. Perianth conspicuously lobed, not constricted at month of perianth-tube; perianth-lobes 1/3-1/2 length of tube — 5. **Bellevalia**
\+ Perianth ending in small reflexed teeth, not conspicuously lobed, ± constricted at mouth of perianth-tube below teeth; teeth less than 1/4 length of tube — 6

6. Fertile flowers dark violet, blue or lilac, not changing in colour at anthesis; stamens 1-seriate or obscurely 2-seriate — 7. **Muscari**
\+ Fertile flowers violet or purplish in bud, changing to greenish-yellow or olive-green at anthesis, then to dirty brown; stamens distinctly 2-seriate — 6. **Leopoldia**

1. **Urginea** Steinh.

Bulbous perennial herbs; bulb ovoid to subglobose, tunicate; leaves all basal, linear to oblong-elliptic; scape unbranched; inflorescence racemose; flowers numerous; pedicels articulate; bracts scarious, sometimes spurred at the base; perianth stellate-spreading, usually white with green or purplish mid-vein, persistent; segments 6, free, subequal, with a dark mid-vein; stamens 6, inserted at base of perianth-segments; filaments filiform; anthers dorsifixed; ovary 3-locular; ovules numerous in each locule; style simple, filiform; stigma truncate or subcapitate; capsule loculicidal, papyraceous; seeds flattened, winged, testa black. About 10 species, Mediterranean region, Africa, southwest Asia to India.

NOTE: Some authors unite *Urginea* and *Drimia* Jacq. under *Drimia*, others maintain the two as distinct genera.

1. Leaves 0.4-1 cm broad, strongly undulate; perianth-segments dull purple, pink or olive-grey, with a purplish mid-vein 1. **U. undulata**
+ Leaves 3-8 cm broad, flat; perianth-segments white with a green or purplish mid-vein 2. **U. maritima**

1. **Urginea undulata** (Desf.) Steinh., Ann. Sci. Nat. Bot., sér. 2, 1: 330 (1834).
Syns. *Scilla undulata* Desf., Fl. Atlant. 1: 300, t. 88 (1798).
Drimia undulata (Desf.) Stearn, Ann. Mus. Goulandris 4: 208 (1978).

Bulbous perennial; bulb 4-7.5 x 2-4.5 cm, ovoid, dark brown; roots fleshy; leaves 5-15 x 0.4-1 cm, linear, strongly undulate, appearing before the flowers; scape 0.8-1.5 m, erect, slender; raceme 8-30 cm, 10-25-flowered; bracts 2-5 mm, linear-lanceolate; pedicels 0.6-1.2 cm, erecto-patent; perianth stellate-spreading; perianth-segments 1-1.3 cm, linear-lanceolate, dull purple, pink or olive-grey, with a purplish mid-vein; filaments 1-1.2 cm, filiform; style longer than the stamens; capsule 1-1.5 x 0.8-1 cm, 3-quetrous, ± spherical; seeds *c.* 8 x 6 mm, flattened, blackish.

M, D, S; sandy and stony wadis, maritime rocky ground. Eastern Spain, Corsica, Sardinia, North Africa, Sinai, Palestine, Syria.

2. **Urginea maritima** (L.) Baker, J. Linn. Soc. London (Bot.) 13: 221 (1873).
Syns. *Scilla maritima* L., Sp. Pl., ed. 1, 308 (1753).
Urginea scilla Steinh., Ann. Sci. Nat., sér. 2, 1: 330 (1884).
Drimia maritima (L.) Stearn, Ann. Mus. Goulandris 4: 204 (1978).

Bulbous perennial; bulb 5-12(-18) cm diam., thick, ovoid to subglobose, often weighing up to 1 kg; tunics white or red, coriaceous; roots fleshy; leaves 20-40 x 4-10 cm, oblong-lanceolate, glaucous, withering before anthesis; scape 50-80 cm, stout, usually purplish; raceme 20-50 cm, 50-100-flowered; basal bracts 5-8 x 2.5-4 mm, lingulate, reflexed; upper bracts 2.5-6 x 0.5 mm, filiform; pedicels 1.5-2.5 cm, slender, erecto-patent; perianth stellate-spreading, perianth-segments 7-9 x 2-3 mm, oblong, obtuse, white with a green or purplish mid-vein; filaments 5-6 mm, flattened at the base; anthers *c.* 2.5 mm; style *c.* 4 mm; capsule 0.8-1.2 x 0.6-0.8 cm, obovoid, sharply 3-quetrous, coriaceous; seeds 7-8 x 3 mm, oblong, flattened, black, shining.

M, S; sandy and maritime rocky ground. Atlantic Islands, Portugal, Mediterranean region, Sinai, Saudi Arabia.

NOTE: *Urginea maritima,* long-used in cough mixtures, is overcollected in Egypt by herbalists for its medicinal properties and becoming rare. The plant is flowering in autumn.

2. **Scilla** L.

Bulbous perennials; leaves all basal; scape simple; inflorescence an elongate or corymbose raceme; bracts small, membranous or scarious, sometimes spurred at base, occasionally 0; perianth campanulate or stellate-spreading; perianth-segments 6, petaloid, free or slightly connate at base, with a darker mid-vein, blue, pale lilac, violet or purplish; stamens 6; filaments filiform, inserted at base of perianth; anthers dorsifixed; ovary 3-locular, ovules 2-10 per locule; style 1, filiform, stigma capitate; capsule loculicidal, subglobose-trigonous; seeds subglobose or pyriform, not flattened, black. About 40 species, Atlantic Islands, Mediterranean region, temperate Eurasia, southern Africa.

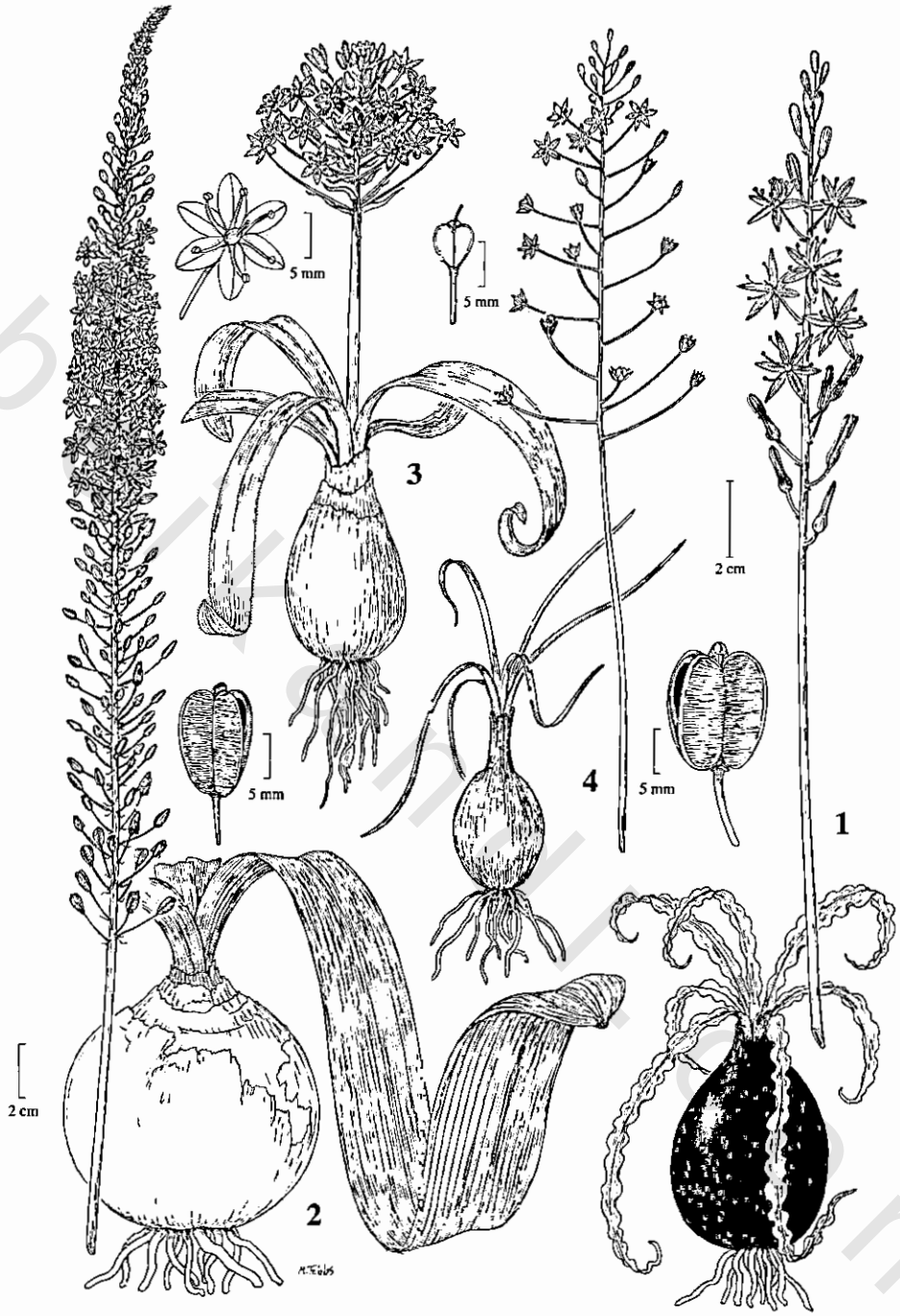


Plate 11. HYACYNTHACEAE: *Urginea undulata* 1, bulb with leaves, and inflorescence; fruit (left). *Urginea maritima* 2, bulb with a leaf, and inflorescence; fruit (middle right); flower (up right). *Scilla peruviana* 3, habit. *Scilla hanburyi* 4, bulb with leaves, and inflorescence; fruit (up left). Drawn by Margaret Tebbs.

1. Inflorescence hemispherical; bracts 1.2-2 cm; perianth blue — 1. **S. peruviana**
+ Inflorescence pyramidal; bracts absent; perianth pale lilac — 2. **S. hanburyi**

1. **Scilla peruviana** L., Sp. Pl., ed. 1, 309 (1753).
Syn. *Scilla hemispherica* Boiss., Voyage Espagne 63 (1844).

Bulbous perennial; bulb 4-6 cm diam., pyriform; tunics brownish, membranous; leaves 6-10 x 1-2 cm, oblong-linear, the margins ciliate; scape 5-10 cm, elongate in fruit to 30 cm; raceme corymbose, hemispherical, 40-80-flowered; bracts 1.2-2 cm, narrowly linear-lanceolate, acuminate, membranous; pedicels 2-6 cm, erecto-patent; perianth-segments 5-8 x 2-3 mm, lanceolate, ± equal, blue; stamens 4-6 mm; filaments filiform, flattened at the base; anthers *c.* 1 mm; ovary 2 mm, ovoid; stigma capitate; capsule *c.* 1.5 x 1 cm, ovoid, acuminate; seeds 4-8 per locule, *c.* 2 mm, subglobose, black.

M; sandy soils, barley fields. Portugal, Spain, Italy, Algeria, Tunisia, Libya, Egypt.

2. **Scilla hanburyi** Baker, J. Linn. Soc. London (Bot.) 13: 235 (1873).

Bulbous perennial; bulb 2.5-4 cm diam., pyriform, roots fleshy; tunics greyish-brown, membranous; leaves 2-8 x 0.2-0.3 cm, linear, withering before anthesis; scape 8-15(-20) cm, raceme pyramidal; bracts absent; flowering pedicels 0.5-2.5 cm, ascending; fruiting pedicels elongate to 4.5 cm, slender, spreading; perianth stellate-spreading; perianth-segments 3-5 x 1 mm, oblong, pale lilac, with a brownish or greyish midvein; filaments 2.5-4 mm; capsule *c.* 4 x 3 mm, obovoid, 3-sulcate; seeds *c.* 2 x 1 mm, pyriform, rugulose, blackish.

S; sandy desert plains and wadis. Sinai, southern Palestine, Lebanon, Syria.

3. **Dipcadi** Medik.

Glabrous bulbous perennials; leaves all basal, linear; inflorescence a raceme; bracts conspicuous, membranous; perianth tubular-infundibular or campanulate, 6-lobed; perianth-segments longer than or equalling the tube; outer segments falcate, the inner shorter and connivent; stamens 6, inserted at the throat of perianth; filaments short, filiform; anthers dorsifixed; ovary globose, 3-locular; style 1, straight; stigma capitate; capsule loculicidal, membranous; seeds numerous, strongly compressed, horizontal, black. About 30 species, Mediterranean region, Africa, Madagascar, southwest Asia to India.

1. Bracts 0.8-1.6 x 0.1-0.3 cm, longer than the pedicels — 1. **D. erythraeum**
+ Bracts 3-8 x 1 mm, shorter than or equalling the pedicels — 2. **D. viride**

1. **Dipcadi erythraeum** Webb & Berthel., Phyt. Canar. 3(2): 341 (1848).
Syns. *Hyacinthus serotinus* Forssk., Fl. Aegypt.-Arab. Suppl. 209 (1775), non L. (1753).
Uropetalum erythraeum (Webb & Berthel.) Boiss., Fl. Orient. 5: 286 (1882).

Bulbous perennial 12-25 cm; bulb 1.5-4 cm, ovoid; tunics papery, whitish; leaves 2-4, 8-25 x 0.2-0.5 cm, linear, fleshy; raceme 6-12-flowered; bracts 0.8-1.6 x 0.1-0.3 cm, lanceolate, acuminate, longer than the pedicels; pedicels 2-6 mm, slender in flower,

accrescent in fruit; perianth 1.1-1.4 cm; perianth-tube greyish-green; perianth-segments brownish-red; outer perianth-segments oblong, recurved at the apex, the inner rounded, shorter than the tube; capsule 1-1.2 x 1.2-1.4 cm, 3-quetrous; seeds *c.* 5 mm diam., orbicular, strongly compressed, black.

N, O, M, D, R, S; sandy wadis and plains Egypt, Palestine, Arabia.

2. **Dipcadi viride** (L.) Moench, Meth. Suppl. 267 (1802).
Syns. *Hyacinthus viridis* L., Syst. Nat., ed. 10, 984 (1762).
Dipcadi unifolium Baker, J. Linn. Soc. London (Bot.) 11: 399 (1871).

Glabrous bulbous perennial; leaves 1-5, 10-30 x 0.2-1.2 cm, linear to linear-lanceolate; racemes few- to many-flowered; bracts 3-8 x 1 mm, narrowly lanceolate, acuminate; pedicels 3-8 mm, slender in flower, to 1.8 cm and accrescent in fruit; perianth-segments 0.8-1.3 cm, green or brownish; style slender, as long as the ovary; capsule *c.* 1.5 x 1.5 cm; seeds 5-6 mm diam., orbicular, black.

GE; sandy soil. Tropical Africa.

NOTE: *Dipcadi viride* is a very variable species and our material from Gebel Elba, Egypt, identified to *Dipcadi unifolium* Baker, seems to refer to *D. viride*. The type of *Dipcadi unifolium* (Schweinfurth 23, K!) has been annotated by K. A. Bley to *Dipcadi viride*.

4. **Ornithogalum** L.

Bulbous perennials; leaves all basal; flowers in elongate or corymbose racemes; lower pedicels often markedly accrescent after anthesis; bracts conspicuous; perianth white, usually with a greenish dorsal stripe along each segment; perianth-segments 6, free or slightly connate at base; stamens 6, free; filaments simple or tricuspidate at apex; anthers dorsifixed, introrse; ovary sessile; stigma truncate or subcapitate; fruit a capsule, loculicidally dehiscent, angled; seeds numerous, globose or angled, sometimes flattened. About 200 species, temperate Eurasia and Africa, but especially southern Africa.

1. Flowers in elongate cylindrical racemes — 1. **O. narbonense**
\+ Flowers in corymbose racemes — 2

2. Scape 10-15 cm; perianth-segments with a dorsal green mid-vein; ovary green or yellowish — 3. **O. trichophyllum**
\+ Scape 30-60 cm; perianth-segments entirely white, without a dorsal mid-vein; ovary dark green to black — 2. **O. arabicum**

1. **Ornithogalum narbonense** L., Cent. Pl. 2: 15 (1756).
Syn. *Ornithogalum pyramidale* L. subsp. *narbonense* (L.) Asch. & Graebn., Syn. 3: 255 (1905).

Bulbous perennial; bulb 2-4 x 2-3 cm, ovoid; tunics membranous, brownish; leaves 2-4, 20-40 x 0.3-1 cm, linear; raceme 10-20 cm, elongate, cylindrical; bracts 1.5-2 cm, lanceolate, long-acuminate, membranous; pedicels 1.5-2.8 cm, erecto-patent at anthesis, erect and adpressed to rachis in fruit; perianth-segments 1.2-1.4 x 0.2-0.3 cm, white with a dorsal green midvein; anthers *c.* 3.5 x 1.5 mm; ovary 3-4 x 2.5 mm, oblong, greenish; style 3 mm; stigma subcapitate; capsule 1.2 x 0.5-0.6 cm, oblong, angular; seeds 4-5 x 1.5-2 mm, oblong, papillose, black.

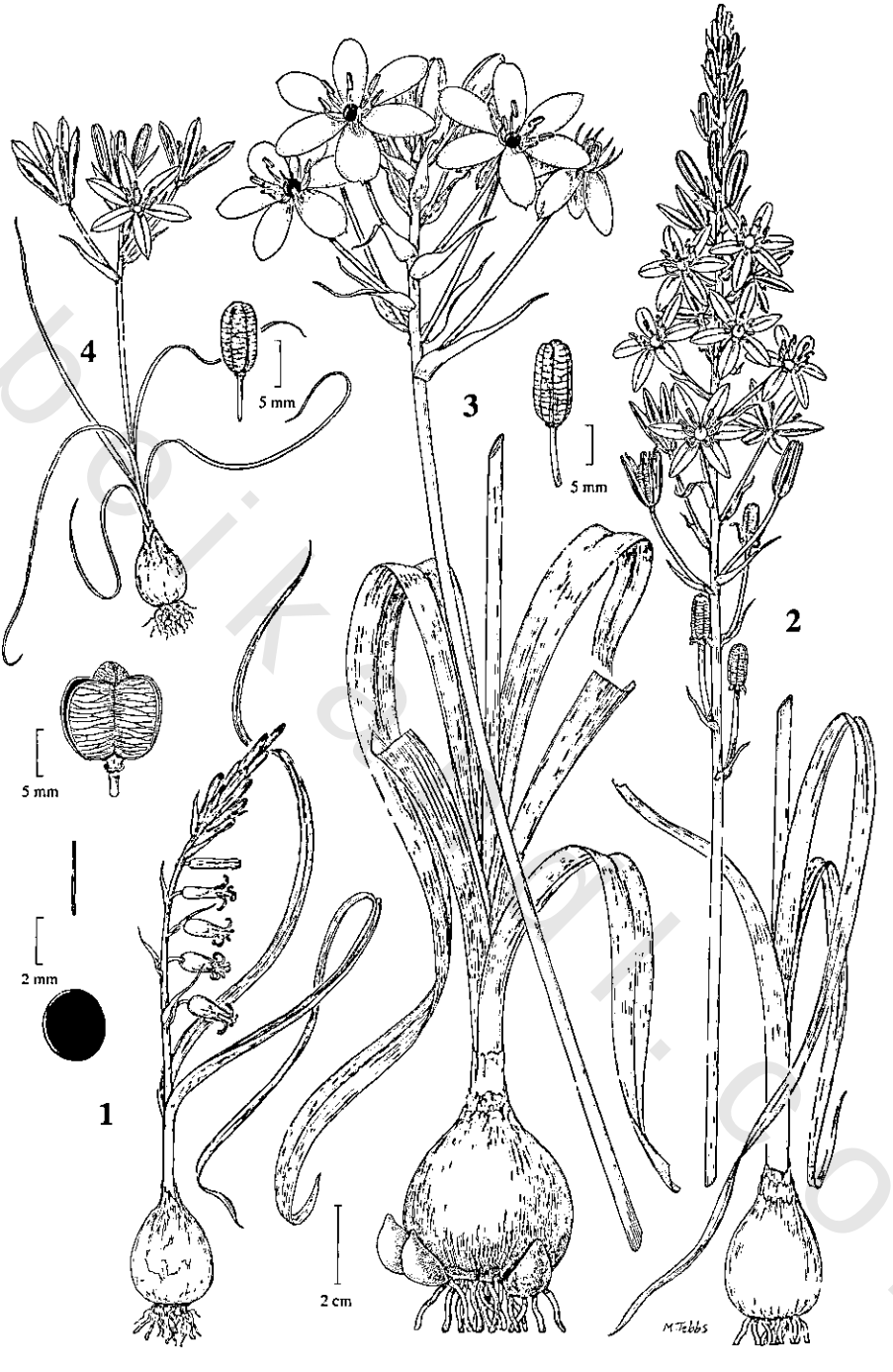


Plate 12. HYACYNTHACEAE: *Dipcadi erythraeum* 1, habit; capsule (up left); seed in top and lateral views (middle left). *Ornithogalum narbonense* 2, bulb with leaves, and inflorescence; capsule (up left). *Ornithogalum arabicum* 3, bulb with bulblets and leaves, and inflorescence. *Ornithogalum trichophyllum* 4, habit; capsule (right). Drawn by Margaret Tebbs.

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M; sandy soil, barley fields. Mediterranean region.

2. **Ornithogalum arabicum** L., Sp. Pl., ed. 1, 307 (1753).

Bulbous perennial 40-60 cm; bulb 3.5-4.5 cm diam., subglobose, with numerous bulblets; leaves 5-8, 10-25 x 1-3 cm, linear; scape 30-50 cm, stout; raceme corymbose, 8-25-flowered; bracts 2-3.5 x 0.5-0.8 cm, triangular-lanceolate, acuminate; pedicels to 10 cm, the lower longest; perianth stellate-spreading, entirely white; perianth-segments 2.5-3 x 0.8-1.5 cm, broadly elliptic, without a dorsal midvein, outer segments mucronate; stamens 1-1.2 cm; ovary 4-5 mm, subglobose, dark green to black, glossy; capsule *c.* 1.2 x 0.8 cm, broadly cylindrical.

M, S; rocky ground. Atlantic Islands, Mediterranean region, Sinai.

3. **Ornithogalum trichophyllum** Boiss. & Heldr. in Boiss., Diagn. Pl. Orient., ser. 2, 4: 108 (1859).

Bulbous perennial 8-18 cm; bulb 1.5-2.5 x 1.2-1.5 cm, ovoid; outer tunics grey, the inner white; leaves 4-6, 8-15 x 0.1-0.2 cm, filiform; scape 10-15 cm; raceme 2-6 cm, corymbiform, (2-)5-10-flowered; bracts 1.2-3.5 x 0.2-0.3 cm, lanceolate, acuminate, lower bracts longest; flowering pedicels 0.8-2 cm, erecto-patent; fruiting pedicels to 3 cm, erect; perianth white; perianth-segments 1.2-2 cm, elliptic, with a dorsal green mid-vein; capsule 0.8-1.2 x 0.8 cm, oblong-ovoid, green or yellowish.

N, M, S; sandy soil, barley fields. Egypt, southern Palestine.

5. **Bellevalia** Lapeyr., nom. conserv.

Literature: Feinbrun, N. 1938-1940. A monographic study on the genus *Bellevalia* Lapeyr. Pal. J. Bot., Jerusalem ser., 1: 42-54, 131-142, 336-409.

Bulbous perennials; bulb tunicate; leaves all basal, with ciliate, scabrous or hyaline margins; scape simple; inflorescence a conical, cylindrical or spicate raceme; bracts small, sometimes absent; upper flowers sometimes sterile; perianth campanulate, tubular or infundibular, white, violet or lilac, changing to greyish-brown or dirty-brown; corolla-tube well developed, not constricted at the base; corolla-lobes 6, spreading or erect; stamens 6, equal, 1-seriate at base of tube; anthers introrse; ovary sessile, 3-locular; ovules 2-6 per locule; style straight; stigma truncate or subcapitate; capsule sharply triquetrous; seeds subglobose, minutely rugose-pitted, bluish-black. About 45 species, Mediterranean region, Sinai to Iran and northern Afghanistan.

1. Raceme broadly conical; capsule cuneate at base — 2
\+ Raceme cylindrical; capsule rounded at base — 3

2. Scape 5-8 cm; flower buds white — 7. **B. zoharyi**
\+ Scape 40-60 cm; flower buds dark violet — 6. **B. longipes**

3. Mature fruit a papery indehiscent capsule, sessile or subsessile, falling as one unit — 4
\+ Mature fruit a thick-walled dehiscent capsule, pedicellate, persistent — 6

4. Scape 20-30 cm — 12. **B. salah-eidii**
\+ Scape 5-15 cm — 5

5.	Perianth 5-6 mm	10. **B. sessiliflora**
+	Perianth 0.8-1.3 cm	11. **B. desertorum**
6.	Perianth 0.8-1 cm, turbinate, gradually broadening from the base; perianth-lobes equalling or longer than the tube, acute	8. **B. romana**
+	Perianth not as above	7
7.	Leaves much longer than scape	9. **B. flexuosa**
+	Leaves equalling or shorter than scape	8
8.	Flower buds greenish-white	9
+	Flower buds variously coloured	10
9.	Leaves prostrate; capsule 1.2-1.5 cm	5. **B. eigii**
+	Leaves erect; capsule 0.9-1.1 cm	4. **B. warburgii**
10.	Flowering pedicels longer than perianth	1. **B. macrobotrys**
+	Flowering pedicels equalling or shorter than perianth	11
11.	Flowering pedicels 1-1.5 cm	2. **B. trifoliata**
+	Flowering pedicels 3-6 mm	3. **B. mauritanica**

1. **Bellevalia macrobotrys** Boiss., Diagn. Pl. Orient., ser. 1, 13: 35 (1854).

Bulbous perennial 25-50 cm; bulb 2.5-4 cm diam., leaves 2-5, 15-25(-30) x 1.5-3 cm, linear-lanceolate; scapes 1-2; raceme 20-50-flowered, usually longer than scape; flowering pedicels 1.2-1.5 cm, erecto-patent before flowering, horizontal to recurved at anthesis; fruiting pedicels 1.5-3 cm; perianth 0.8-1 cm, narrowly campanulate, zygomorphic, deep violet in bud, turning dirty brown; perianth-lobes 2-3 mm; capsule *c.* 1 x 0.8 cm, loculicidal, persistent; valves suborbicular.

M, De, S; sandy soil, cultivated fields. Egypt, Palestine, Lebanon, Syria, Turkey, Iraq, Iran, Caucasus.

2. **Bellevalia trifoliata** (Ten.) Kunth, Enum. Pl. 4: 308 (1843).
Syn. *Hyacinthus trifoliatus* Ten., Fl. Nap. 3: 376, t. 136 (1824-1829).

Bulbous perennial 25-50 cm; bulb 2-3.5 cm diam.; leaves 2-4, 12-30 x 1-2.5 cm, narrowly lanceolate; scapes 1-3; raceme cylindrical, 20-50-flowered, reddish-violet; flowering pedicels 1-1.5 cm, equalling or shorter than the perianth, erecto-patent before flowering, horizontal to slightly nodding at anthesis; fruiting pedicels accrescent, slightly longer than flowering pedicels; perianth 1.2-1.6 cm, narrowly tubular-campanulate, actinomorphic, violet in bud, turning greenish-brown; perianth-lobes *c.* 3 x 2.5 mm, ovate, olive-green; anthers *c.* 2.5 mm, violet; capsule 8-1.1 cm, orbicular-triquetrous, loculicidal; valves broadly ovate.

M, O, De, S; fields and moist alluvial soils, roadsides. Mediterranean region, Sinai.

3. **Bellevalia mauritanica** Pomel, Nouv. Mat. Fl. Atlant. 255 (1874).

Bulbous perennial; bulb 3-4 cm diam., ovoid, covered with dark brown membranous

tunics; leaves 3-4, 15-35 x 1-2 cm, linear; scape 30-40 cm; raceme many-flowered; flowering pedicels 3-6 mm; perianth *c.* 8 mm, campanulate, bracteate, whitish-violet; perianth-lobes *c.* 2 x 2 mm, broadly ovate, greenish; filaments deltate at base; anthers dark-violet; ovary ovoid-ellipsoid, blue; style whitish; stigma capitate; capsule *c.* 8 mm, obovoid, seeds subglobose, blackish.

M; sandy soils. Algeria, Tunisia, Libya, Egypt.

NOTE: The occurrence of *Bellevalia mauritanica* in Egypt needs to be confirmed by acquiring new collections.

4. **Bellevalia warburgii** Feinbrun, Pal. J. Bot., Jerusalem ser., 1: 355, t. 17, f. 2 (1940).

Bulbous perennial 30-50 cm; bulb 2.5-3 5 cm diam.; leaves 3-6, 20-35 x 2-3.5 cm, erect, lanceolate, the margins ciliolate to scabrous; scapes 1-2; raceme 25-60-flowered, cylindrical, lax; flowering pedicels 1.2-1.8 cm; fruiting pedicels 2-3.5 cm, ± horizontal; perianth 0.9-1.1 cm, tubular-campanulate, greenish-white in bud, turning dirty brown; perianth-lobes 2.5-3 x 2 mm, ovate, green-veined; anthers violet; capsule 0.9-1.1 cm, loculicidal; valves *c.* 1 x 1 cm, broadly ovate; seeds *c.* 2.5 mm, globose, black.

S; cultivated fields, alluvial soils. East Mediterranean region, Sinai.

5. **Bellevalia eigii** Feinbrun, Pal. J. Bot., Jerusalem ser., 1: 357, t. 17, f. 3 (1940).
Syn. *Bellevalia alexandrina* Feinbrun, Pal. J. Bot., Jerusalem ser., 1: 356, t. 17, f. 5 (1940).

Bulbous perennial 15-30 cm; bulb 2.5-4 cm diam.; leaves 3-6, 10-30 x 1.5-3.5 cm, lanceolate, prostrate, the margins ciliate; scapes 1-4; racemes 10-20 cm, cylindrical, 25-40- flowered; flowering pedicels 1.5-2.2 cm; fruiting pedicels 2-2.5 cm, ± horizontal; perianth 1-1.3 cm, tubular-campanulate, greenish-white, turning dirty brown; perianth-lobes 3-3.5 x 2 mm, ovate, green-veined; anthers violet; capsule 1.2-1.5 cm, short-stipitate, loculicidal; valves ovate-elliptic; seeds *c.* 2.5 mm, subglobose, black.

M, S; calcareous soils. Egypt, Palestine.

6. **Bellevalia longipes** Post in Post & Autran, Bull. Herb. Boiss. 3: 165 (1895).

Bulbous perennial 40-60 cm, to 75 cm in fruit; bulb 2.5-3 cm diam.; leaves 3-15, 12-25 x 2-3 cm, narrowly lanceolate; scape usually 1, 40-60 cm; raceme 15-35 cm, broadly conical, 20-45-flowered, very lax; flowering pedicels 4-10 cm, the lowermost longest, erecto-patent, often purplish; fruiting pedicels to 15 cm, rigid; perianth 0.9-1.2 cm, campanulate, dark violet in bud, turning greenish-brown; perianth-lobes 3-3.5 x 1 mm, oblong-ovate; anthers violet-purple; capsule 1.8-2.2 x 1.2 cm, oblong, the apex retuse, the base cuneate; seeds 3-3.25 mm diam., subglobose.

S; alluvial soils. Sinai, Palestine, Lebanon, Syria, southern Turkey, northern Iraq, western Iran.

7. **Bellevalia zoharyi** Feinbrun, Pal. J. Bot., Jerusalem ser., 1: 372, t. 18, f. 10 (1940).

Bulbous perennial 10-20 cm; bulb 1.2-3 cm diam.; leaves 3-5, 8-12 x 0.5-2 cm, lanceolate, prostrate, undulate, glaucous, the margins ciliate or scabrous; scapes 1-2, 5-8

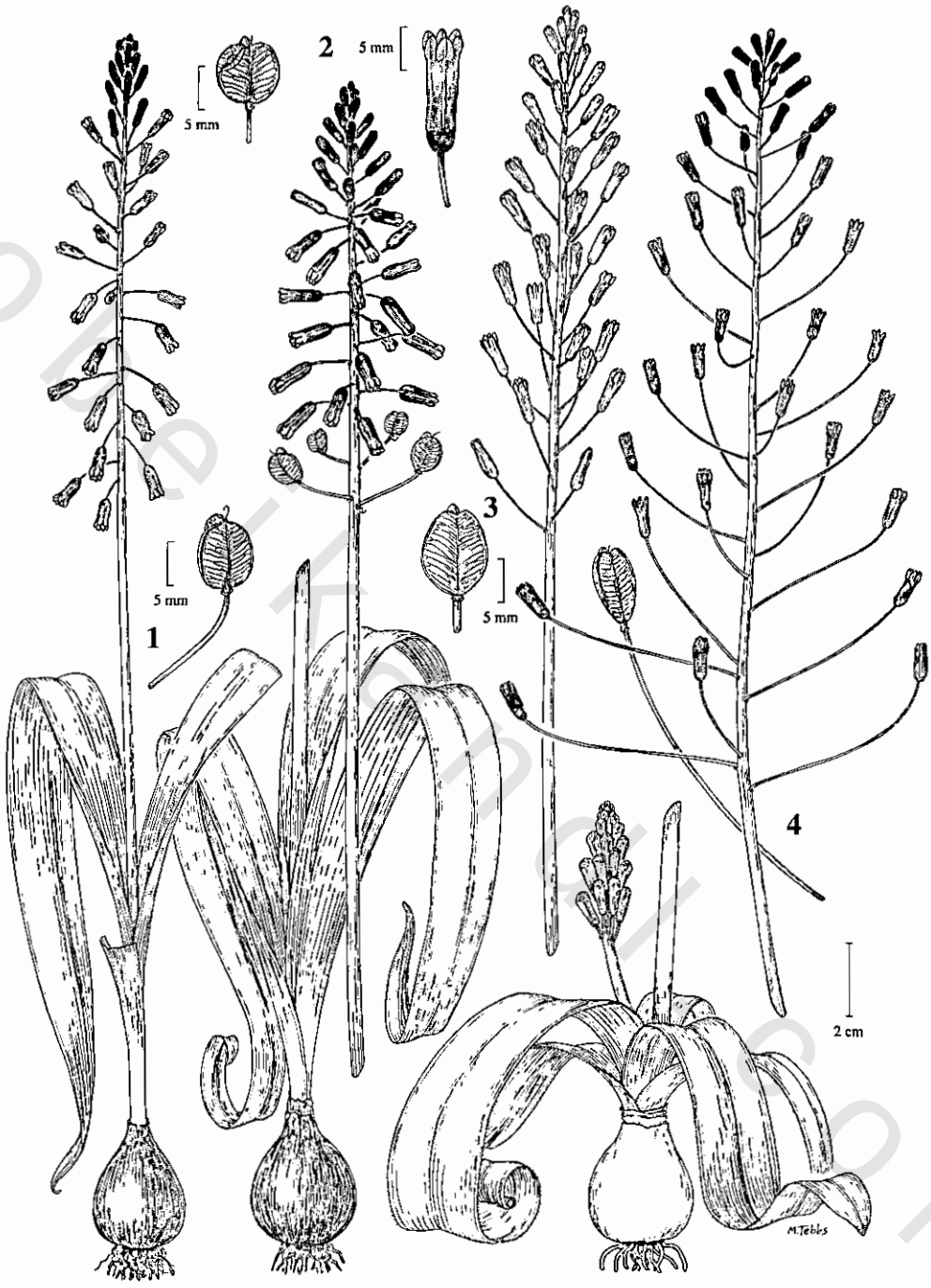


Plate 13. HYACYNTHACEAE: *Bellevalia macrobotrys* 1, habit; capsule (middle right). *Bellevalia trifoliata* 2, bulb with leaves, and inflorescence; flower (up right); capsule (up left). *Bellevalia eigii* 3, bulb with leaves and juvenile inflorescence, and mature inflorescence; capsule (middle leaf). *Bellevalia longipes* 4, inflorescence and capsule. Drawn by Margaret Tebbs.

cm; raceme 3.5-4 cm, broadly conical 15-35-flowered; flowering pedicels 1-1.8 cm, erecto-patent; fruiting raceme 4-5 x 5-6 cm, deltoid; fruiting pedicels 1.5-2 cm, thick, horizontal; perianth 8-9 mm, tubular-campanulate, white, without conspicuous veins, soon turning dirty white; perianth-lobes 2.5-3 x 1 mm; capsule 0.8-1.3 x 0.6-0.9 cm, cuneate at the base; seeds *c.* 2 mm, globose.

Two varieties occur in Egypt:

var. **zoharyi**

Capsule 0.8-1 cm, ovoid.

S; gravelly ground. Sinai, Palestine.

var. **pericarpa** (Feinbrun) Feinbrun, Fl. Palaest. 4: 67 (1986).
Syn. *Bellevalia zoharyi* Feinbrun, subsp. *pericarpa* Feinbrun, Pal. J. Bot., Jerusalem ser., 1: 373 (1940).

Capsule *c.* 1.3 cm, pyriform.

S; gravelly ground. Sinai, Palestine.

8. **Bellevalia romana** (L.) Rchb., Fl. Germ. Excurs. 105 (1830).
Syn. *Hyacinthus romanus* L., Mant. Alt. 224 (1771).

Bulbous perennial 20-40 cm; bulb 1.5-3 cm diam.; leaves 3-6, 15-40 x 1-1.5 cm, linear, ascending; scapes 15-30 cm; racemes 2-5 cm, oblong, 20-30-flowered; flowering pedicels 0.8-2 cm; perianth 0.8-1 cm, turbinate, gradually broadening from the base, white or slightly blue-flushed at anthesis, later brownish; perianth-lobes 4-5 x 1 mm, equalling or longer than the tube, linear-oblong, acute; fruiting raceme cylindrical; fruiting pedicels erecto-patent; capsule 1-1.5 x 1 cm; valves broadly elliptic; seeds 2.5 mm, spherical.

M (Bahig); cultivated ground. Southwestern France, Central and East Mediterranean region.

9. **Bellevalia flexuosa** Boiss., Diagn. Pl Orient., ser. 1, 13: 36 (1854).

Bulbous perennial 10-30 cm; bulb 1.25-2.5 cm diam.; tunics greyish-black, membranous; leaves 4-6(-8), 5-15 x 1-1.5 cm, linear-lanceolate, prostrate or erect, the margin ciliolate or scabrous; scapes 1-5, much shorter than the leaves; flowering raceme 3-5 cm; cylindrical, lax, 15-30-flowered; flowering pedicels 0.5-1.5 cm, erecto-patent, sometimes becoming horizontal or nodding; fruiting raceme cylindrical; fruiting pedicels 0.8-1.6 cm, horizontal to erecto-patent; perianth 0.7-1 cm, white, rarely pink or lilac in bud, white- and green-veined, turning greyish-brown at anthesis; perianth-lobes 3 x 2.5 mm, broadly ovate, yellow- or green-nerved; anthers violet-purple; capsule *c.* 1 x 0.8 cm, loculicidal; valves ± orbicular; seeds *c.* 2 mm, oblong-ovoid, black, lustrous.

Two varieties occur in Egypt:

var. **flexuosa**

Plant to 30 cm; leaves 4-5, 10-15 cm; scapes usually 2-4; perianth 7-9 mm.

M, De, S; sandy soils. Egypt, Palestine, Lebanon, Syria, Saudi Arabia.

var. **galalensis** Täckh. & Drar in Täckholm & Boulos, Publ. Cairo Univ. Herb. 5: 80 (1974).

Plant to 12 cm; leaves usually 2, 5-10 cm; scape usually 1; perianth 1 cm.

De (Qalala [Galala] Mountains); coarse sand and flint. Endemic.

NOTE: The holotype of *Bellevalia flexuosa* Boiss. var. *galalensis* Täckh. & Drar was collected by Schweinfurth in North Galala, Eastern Desert, Egypt, 1050 m (B).

10. **Bellevalia sessiliflora** (Viv.) Kunth, Enum. 4: 309 (1843).
Syn. *Hyacinthus sessiliflorus* Viv., Fl. Libyc. Spec. 21, t. 7, f. 5 (1824).

Bulbous perennial 8-15 cm; bulb 1.5-2.5 cm diam.; tunics membranous, greyish-brown; leaves 2-3, 8-25 x 1-2 cm, linear-lanceolate; scapes 1-4, 8-15 cm; raceme 2.5-5 cm, 15-40-flowered; flowers sessile, bracteate; perianth 5-6 mm, tubular-campanulate, pale blue, turning brown after anthesis; perianth-lobes *c.* 2 x 1.5 mm, ovate, acute; filaments *c.* 1 mm, white; anthers *c.* 1 mm, blue; capsule 1.2-1.5 x 1-1.2 cm, subglobose, papery, sessile, indehiscent, falling as a single unit; seeds *c.* 2 mm, globose, black.

M; sandy soils, barley fields. Libya, Egypt.

11. **Bellevalia desertorum** Eig & Feinbrun, Beih. Bot. Centralbl. 49 Abt. II: 666, f. 1 (1932).

Bulbous perennial 8-15 cm; bulb 2-3.5 cm diam.; leaves 3-5, 5-12 x 0.5-1.8 cm, linear-lanceolate, prostrate; scapes 1-3, 5-8 cm; raceme 2-4 cm, oblong, dense, 10-25-flowered; bracts *c.* 2 x 1.5 mm, ovate; flowering and fruiting pedicels 1-3 mm; flowers erecto-patent; perianth 0.8-1.2 cm, pale blue or light lilac; perianth-lobes *c.* 4 x 2.5 mm, ovate, obtuse; anthers purple to violet; capsule *c.* 1.2 x 1 cm, subglobose, winged, indehiscent, falling as a single unit; valves 0.8-1.2 cm, ± orbicular; seeds *c.* 2.5 mm, globose, black.

S; sandy soil. Sinai, Palestine.

12. **Bellevalia salah-eidii** Täckh. & Boulos, Publ. Cairo Univ. Herb. 5: 81, f. 11a (1974).

Bulbous perennial 40-50 cm; bulb 2.5-3.5 diam.; leaves 20-70 x 1-3 cm, linear-lanceolate, reddish at the base; scape 20-30 cm; raceme 12-20(-25) cm, 25-50-flowered; flowers subsessile; perianth 8-9 mm, white; capsule *c.* 2 cm, subsessile, indehiscent, falling as a single unit.

M (Hammam); sandy soil. Endemic.

NOTE: The holotype of *Bellevalia salah-eidii* was collected by Salah Eid, no. 8, in Hammam, Mariut, Egypt, 14 January 1966, (CAI).

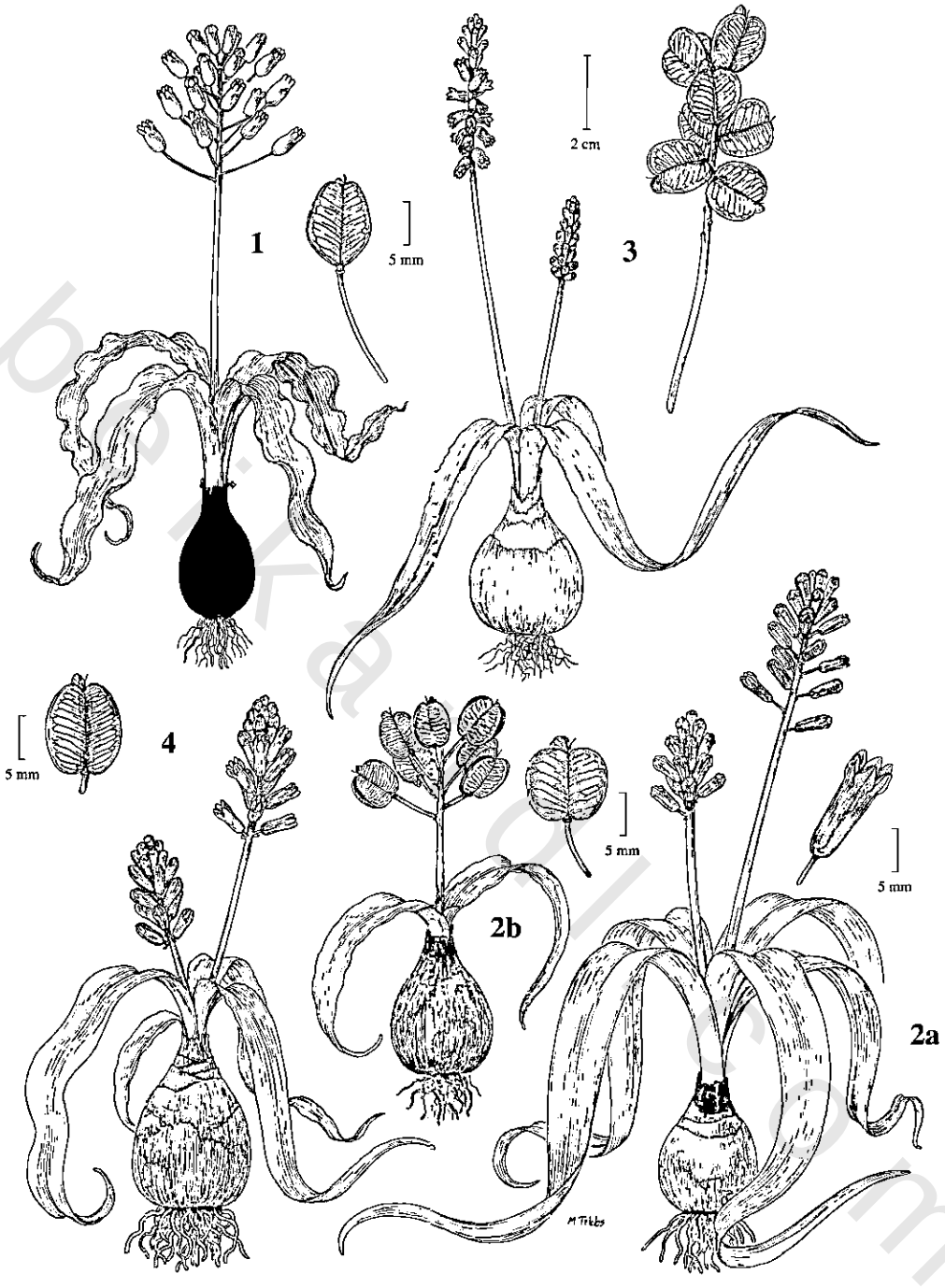


Plate 14. HYACYNTHACEAE: *Bellevalia zoharyi* 1, habit; capsule (right). *Bellevalia flexuosa* var. *flexuosa* 2a, habit; flower (right); capsule (left). *Bellevalia flexuosa* var. *galalensis* 2b, habit. *Bellevalia sessiliflora* 3, habit; fruiting inflorescence (right). *Bellevalia desertorum* 4, habit; capsule (up left). Drawn by Margaret Tebbs.

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6. **Leopoldia** Parl., nom. conserv.

Bulbous perennials; bulb tunicate; leaves all basal, linear to lanceolate, rather fleshy; scape erect; inflorescence a many-flowered, elongate, lax raceme; bracts small; upper flowers sterile, usually brightly coloured; lower flowers fertile, purple or violet in bud, changing to greenish-yellow or olive-green at anthesis; perianth 6-dentate, falling off after flowering; perianth of fertile flowers cylindrical-urceolate, ± zygomorphic, constricted at the throat, with subequal reflexed teeth; tube ± angular towards throat; stamens 6, included, distinctly 2-seriate; ovary 3-gonous, 3-locular; style 1, subulate; stigma minutely 3-lobed; capsule 3-quetrous, loculicidal, or indehiscent and deciduous; seeds 2 in each locule, globose, ovoid or pyriform, black, reticulate-rugose. About 25 species, Mediterranean region, southwest Asia, Caucasus.

Key mainly after Feinbrun-Dothan (1986).

1. Leaf 1; pedicels of fertile flowers 1-3 mm; perianth-tube ivory-coloured; throat and teeth dark purple to blackish; capsule indehiscent, deciduous at maturity 3. **L. eburnea**
+ Leaves 2 or more; pedicels of fertile flowers more than 3 mm; perianth-tube not ivory-coloured; capsule dehiscent, persistent 2

2. Perianth-teeth of fertile flowers pale yellowish, lighter in colour than tube; sterile flowers long-pedicellate, forming a conspicuous corymbose terminal tuft 1. **L. comosa**
+ Perianth-teeth of fertile flowers blackish-purple to black, much darker than tube; sterile flowers short-pedicillate 3

3. Flowering and fruiting racemes cylindrical; flowering and fruiting pedicels 3-6 mm; perianth of fertile flowers 6-8 mm; capsule-valves ± orbicular 2. **L. bicolor**
+ Flowering and fruiting racemes conical; lower flowering pedicels to 2 cm; lower fruiting pedicels to 3.5 cm; perianth of fertile flowers 0.8-1.1 cm; capsule-valves triangular, acute 4. **L. longipes**

1. **Leopoldia comosa** (L.) Parl., Fl. Palerm. 438 (1845).
Syns. *Hyacinthus comosus* L., Sp. Pl., ed. 1, 318 (1753).
Bellevalia pinardii Boiss., Diagn. Pl. Orient., ser. 1, 5: 68 (1844).
Muscari pinardii (Boiss.) Boiss., Diagn. Pl. Orient., ser. 1, 7: 110 (1846).
Muscari comosum (L.) Mill., Gard. Dict., ed. 8, no. 2 (1768).
Leopoldia holzmannii (Heldr.) Heldr., Bull. Soc. Nat. Moscou 53: 65 (1878).

Bulbous perennial 20-45 cm; bulb 1.5-2.5 cm diam., ovoid; leaves 3-4, 10-35 x 0.5-1.5 cm, linear; scape 10-20 cm; raceme 10-25 cm, cylindrical, with a conspicuous terminal tuft of corymbose long-pedicellate sterile flowers; pedicels of fertile flowers 0.5-1.2 cm, horizontal; perianth 7-9 mm, purple in bud, becoming greenish-yellow in the lower part of the tube, dirty brown above; perianth-teeth yellowish, lighter than the tube; capsule 7-8 mm, suborbicular, persistent; capsule-valves broadly ovate; seeds *c.* 2 mm, subglobose.

M, O, D, S; cultivated ground, sandy soils. Central and southern Europe, Mediterranean region, Sinai, eastwards to Iran, Caucasus.

2. **Leopoldia bicolor** (Boiss.) Eig & Feinbrun, Pal. J. Bot., Jerusalem ser., 4: 58 (1947).
Syn. *Muscari bicolor* Boiss., Fl. Orient. 5: 294 (1882).

Bulbous perennial 10-40 cm; bulb 1.5-2.5 cm diam.; leaves 4-6, 8-25 x 0.2-0.8 cm, linear, flaccid; scape 10-30 cm; raceme 3-12 cm, 20-50-flowered, cylindrical; flowering pedicels 3-6 mm, slender, horizontal or slightly reflexed; fruiting pedicels slightly elongate and thickened; fertile flowers 6-8 x 2-3 mm; perianth greenish-purple in bud, in flower greenish-yellow in the lower part, dirty brown in the upper; teeth and throat blackish-purple; sterile flowers 4-5 x 2.5-3 mm, dark violet, on shorter pedicels than the flower; capsule *c.* 8 x 8 mm, ± globose; seeds *c.* 2 mm, ± globose, black.

M, S; sandy soils. Egypt, Palestine, Lebanon.

3. **Leopoldia eburnea** Eig & Feinbrun, Pal. J. Bot., Jerusalem ser., 4: 58, t. 1 (1947).
Syns. *Muscari maritimum* Desf., Fl. Atlant. 1: 308 (1798).
Muscari eburneum (Eig & Feinbrun) D. C. Stuart, Notes Roy. Bot. Gard. Edinb. 30: 190 (1970).
Leopoldia maritima sensu Täckh., Stud. Fl. Egypt, ed. 2, 642 (1974).

Bulbous perennial 15-30 cm; bulb 2-2.5 cm diam.; leaf solitary, 25-35 x 1-2 cm, linear, the flaccid, margins ciliolate; scape 12-20 cm, rather thick; flowering raceme 5-8 cm, cylindrical, elongate to 12 cm in fruit; pedicels of fertile flowers 1-3 mm, slightly elongate and thickened in fruit; fertile flowers 6-8 mm, cylindrical, ivory-coloured, the teeth blackish-purple; sterile flowers subsessile, dense, oblong-cylindrical, dark violet; capsule indehiscent, deciduous at maturity; 0.8 x 1-1.2 cm, triquetrous, subglobose, the apex retuse; valves suborbicular, papery; seeds 2.25-3 x 1.5-2 mm, pyriform, rugose, black.

Dw, S; sandy soil. Egypt, southern Palestine.

4. **Leopoldia longipes** (Boiss.) Losinsk., Fl. SSSR 4: 410 (1935), subsp. **negevensis** Feinbrun & Danin in Feinbrun, Fl. Palaest. 4: 397 (1986).
Syn. *Muscari longipes* Boiss., Diagn. Pl. Orient., ser. 1, 13: 37 (1854), subsp. *negevensis* (Feinbrun & Danin) Hosni, Taeckholmia 12: 83 (1991).

Bulbous perennial 20-40 cm; bulb 3-6 cm diam.; leaves 3-5, 10-15(-20) x 0.5-1.2 cm, broadly oblong, falcate; flowering raceme 5-8 x 2-4 cm, conical, to 10-15 x 5-6.5 cm in fruit; flowering pedicels 0.5-2 cm, ± horizontal, elongate in fruit to 3.5 cm; fertile flowers 0.8-1.1 x 0.3 cm; perianth purplish in bud, turning greenish-yellow to greenish-brown during anthesis; perianth-teeth blackish-purple; sterile flowers few, short-pedicellate, violet; capsule *c.* 1 x 0.6 cm, conical, persistent; capsule-valves *c.* 1 x 0.6 cm, triangular, acute; seeds 2 x 1.5 mm, subglobose.

S (northern Sinai); rocky ground. Sinai, Palestine.

7. **Muscari** Mill.

Bulbous perennials; bulbs tunicate; leaves all basal, narrowly linear to filiform; scape erect, simple; inflorescence a lax or dense raceme or spike; bracts minute; pedicels generally shorter than flowers; terminal flowers sterile, usually differing in shape and colour from fertile flowers; fertile flowers obovoid to subglobose, shortly cylindrical or urceolate, mostly ± constricted under throat, white, violet, lilac, blue or purple, not changing in colour at anthesis; teeth short, ovate-deltoid, mostly reflexed; stamens 6,

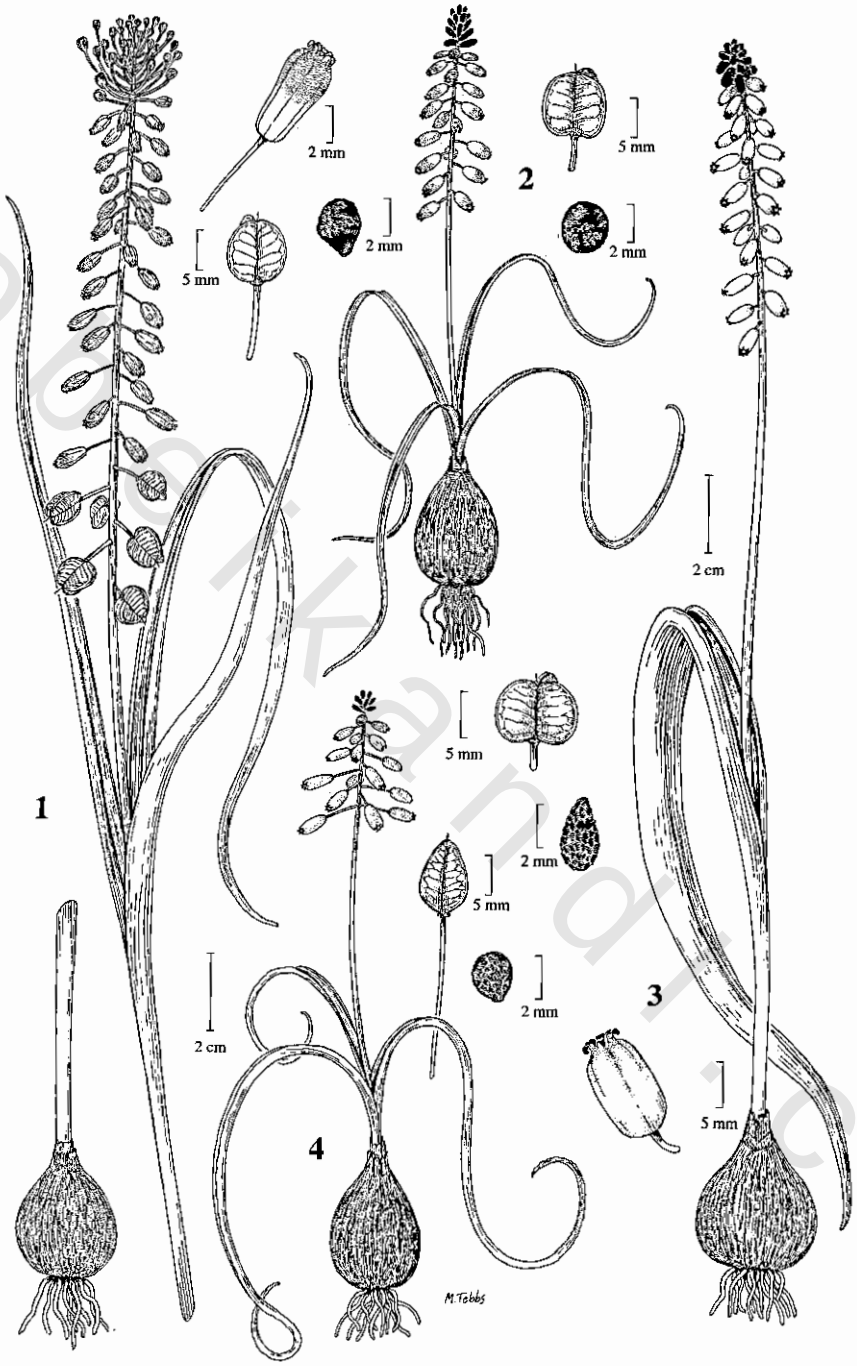


Plate 15. HYACYNTHACEAE: *Leopoldia comosa* 1, bulb and inflorescence with leaves; flower, capsule and seed (up right). *Leopoldia bicolor* 2, habit; capsule and seed (right). *Leopoldia eburnea* 3, habit; flower (down left); capsule and seed (middle left). *Leopoldia longipes* subsp. *negevensis* 4, habit; capsule and seed (middle right). Drawn by Margaret Tebbs.

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included, 1-seriate or obscurely 2-seriate, inserted at the middle of perianth-tube; ovary trigonous, 3-locular, with 2 ovules in each locule; style 1, filiform; stigma capitate; capsule triquetrous, loculicidal; seeds subglobose, reticulate, black. About 30 species, southern Europe, Mediterranean region, western Asia.

1. Perianth of fertile flowers lilac or pale blue with darker veins — 5. **M. parviflorum**
+ Perianth of fertile flowers white, blue or blackish-violet — 2

2. Perianth of fertile flowers deep blackish-violet — 1. **M. commutatum**
+ Perianth of fertile flowers white or blue — 3

3. Perianth of fertile flowers blue — 4. **M. salah-eidii**
+ Perianth of fertile flowers white — 4

4. Fertile flowers *c.* 1 cm; style 4 mm — 3. **M. longistylum**
+ Fertile flowers and style shorter — 5

5. Fertile and sterile flowers white — 2. **M. albiflorum**
+ Fertile flowers white or whitish; sterile flowers pale violet-blue — 6. **M. neglectum**

1. **Muscari commutatum** Guss., Pl. Rar. 145 (1826).
Syn. *Muscari inconstrictum* Rech. f., Ark. Bot., ser. 2, 2(5): 314, t. 3 (1952).

Bulbous perennial 10-25 cm; bulb 1.5-2.5 cm diam.; tunics blackish; leaves 10-20 x 0.15-0.3 cm, linear; raceme 2-4 cm, 10-20-flowered, ovoid, dense; pedicels of fertile flowers 2-6 mm, nodding; sterile flowers few; perianth of fertile flowers 5-7 mm, oblong-ovoid, not or slightly constricted at the throat, deep blackish-violet; perianth-teeth 2 x 1.5 mm, triangular-ovate, slightly recurved, concolourous; capsule 5-6 mm, subglobose; valves rounded at base.

S; stony ground. Sinai, Palestine, Lebanon, Syria, Turkey, Iran.

2. **Muscari albiflorum** (Täckh. & Boulos) Hosni, Taeckholmia 11: 54 (1988).
Syns. *Leopoldia albiflora* Täckh. & Boulos, Publ. Cairo Univ. Herb. 5: 50, f. 11 b (1974).
Muscari albiflorum (Täckh. & Boulos) Heller, Consp. Fl. Orient. 6: 32 (1991).

Bulbous perennial 10-20 cm; leaves 10-18 x 0.2-0.4 cm, linear; racemes 8-12 cm, 10-25-flowered, lax; pedicels 0.8-1 cm; fertile flowers patent or nodding, white; sterile flowers minute, white; capsule 4-5 x 5 mm, conical.

M (Sollum); sandy soil. Endemic.

NOTE: The type of *Leopoldia albiflora* was collected in Sollum, Egypt, spring 1965, Salah Eid, no. 12 (CAI).

3. **Muscari longistylum** (Täckh. & Boulos) Hosni, Taeckholmia 11: 55 (1988).
Syns. *Leopoldia longistyla* Täckh. & Boulos, Publ. Cairo Univ. Herb. 5: 81, f. 12a (1974).

Muscari longistylum (Täckh. & Boulos) Heller, Consp. Fl. Orient. 6: 33 (1991).

Bulbous perennial 30-40 cm; leaves 20-30 x 0.3-0.4 cm, linear; racemes 12-15 cm, 12-20-flowered; pedicels 2-4 mm; fertile flowers *c.* 1 cm, cylindrical, black-tipped; style 4 mm; sterile flowers few, small, subsessile, black; capsule unripe.

? S; sandy soil. Palestine, ? Sinai.

NOTE: The type of *Leopoldia longistyla* was collected in Gaza, Palestine, spring 1965, Salah Eid, no. 12a (CAI). The species is only known from the type collection from Gaza, and is to be looked for in Sinai.

4. **Muscari salah-eidii** (Täckh. & Boulos) Hosni, Taeckholmia 11: 55 (1988).
Syns. *Leopoldia salah-eidii* Täckh. & Boulos, Publ. Cairo Univ. Herb. 5: 81, f. 12 b (1974).
Muscari salah-eidii (Täckh. & Boulos) Heller, Consp. Fl. Orient. 6: 34 (1991).

Bulbous perennial 30-40 cm; leaf usually solitary, 20-40 x 1-2.5 cm; scape 30-40 cm, swollen and fleshy in the upper part; raceme 12-15 cm, many-flowered, cylindrical; flowering pedicels *c.* 1 mm; fertile flowers 5-5.5 x 1.5-2, mm, narrowly cylindrical, blue, with green-veined perianth-tube and blackish perianth-teeth; sterile flowers small, blue; fruiting pedicel *c.* 2 mm; capsule *c.* 7 x 8 mm, subglobose.

S (Rafah); sandy soil. Endemic.

NOTE: The type of *Leopoldia salah-eidii* was collected in Rafah, Sinai, spring 1965, Salah Eid, no. 15 (CAI).

5. **Muscari parviflorum** Desf., Fl. Atlant. 1: 309 (1798).

Bulbous perennial 10-20 cm; bulb 1-1.5 cm diam., ovoid; leaves 3-5, 5-10 x 0.2 cm, semiterete, ± filiform; raceme 1.5-3 cm, 6-12-flowered, cylindrical, lax; flowering pedicels 1-2.5 mm, erecto-patent to horizontal, subtended by a minute bract; fruiting pedicels to 3 mm, thickened; perianth of fertile flowers 3-4 x 2-2.5 mm, oblong-campanulate, lilac or pale blue with darker veins, slightly constricted above; teeth 0.5 mm, ovate, concolourous, recurved; anthers dark violet; sterile flowers few, minute; capsule 3-3.5 mm, sharply triquetrous; valves 3 x 3.5 mm, suborbicular; seeds 2 mm diam., subglobose, rugulose.

M; sandy ground, cultivated fields. Mediterranean region.

NOTE: *Muscari parviflorum* is the only autumn-flowering species.

6. **Muscari neglectum** Guss. in Ten., Syll. Fl. Neap., App. 5, 13 (1842).
Syns. *Muscari racemosum* (L.) Mill., Gard. Dict., ed. 8, no. 3 (1768), nom. reject.
Muscari atlanticum Boiss. & Reut., Pugill. Plant. Nov. 114 (1852).
Muscari letourneuxii Boiss., Fl. Orient. 5: 299 (1882).

Bulbous perennial 10-20 cm; bulb 1.2-2 cm diam., ovoid; tunic dark brown, membranous; bulbils usually present; leaves 3-6, 5-20 x 0.15-0.5 cm, linear; scape 5-15 cm; raceme 1.5-3.5 cm, cylindrical, 12-30-flowered; pedicels 2-4 mm, slender, patent,

becoming recurved; bracts 0.5-1 mm; perianth of fertile flowers 3-5 x 2-3 mm, oblong-ovoid, white or whitish; perianth-tube constricted towards apex; filaments 0.5 mm; anthers 1.5 x 1 mm, dark violet; sterile flowers few, small, pale violet-blue; capsule 5-6 mm, triquetrous; valves suborbicular, emarginate, distinctly nerved, pale brown; seeds *c.* 2 mm, subglobose, rugulose, black.

M, S; barley fields. Central and southern Europe, Mediterranean region, southwest Asia to Iran.

ASPARAGACEAE

L. Boulos

Description as for the genus *Asparagus*, the only genus in the family.

1. **Asparagus** L.

Rhizomatous perennials, scandent or erect shrubs or subshrubs, often spiny; stems erect or climbing, herbaceous or woody; roots often swollen and fusiform; leaves scale-like, reduced; modified leaf-like green branches, cladodes often present; flowers solitary, in clusters, racemes or in umbel-like inflorescences, bisexual or unisexual, regular, small; tepals 6, subequal, free or connate at base, white, yellow or green; stamens 6, inserted at the base of tepals; filaments free; anthers 2-thecous, introrse, dorsifixed, longitudinally dehiscent; ovary superior, 3-locular, with 2-12 ovules per locule; placentation axile; style short; stigma capitate or lobed; fruit a ± globose berry, usually 1-6-seeded by abortion; seeds black; endosperm present. About 300 species, Old World.

1. Cladodes capillary, soft — 3. **A. africanus**
\+ Cladodes spinescent, rigid — 2

2. Cladodes mostly solitary — 1. **A. stipularis**
\+ Cladodes always in fascicles of 2-6 — 2. **A. aphyllus**

1. **Asparagus stipularis** Forssk., Fl. Aegypt.-Arab. 72 (1775).
Syns. *Asparagus horridus* L.f., Suppl. Pl. 203 (1781).
Asparagus stipularis Forssk. var. *brachyclados* Boiss., Fl. Orient. 5: 338 (1882).
Asparagus stipularis Forssk. var. *tenuispinus* Holmboe, Veg. Cypr. 52 (1914).

Thorny shrub 40-80 cm; rhizome short, branched; roots slender, or thickened to form fusiform tubers; stems woody, intricately branched; branches angular; cladodes 0.3-2 x 0.15-0.2 cm, usually solitary, less often in groups of 2-3, linear, robust, rigid, spinescent at tip; leaves 3-8 x 2 mm, reduced to membranous, persistent, acuminate scales; flowers unisexual, 1-2(-6), in clusters at the base of cladodes; bracteoles 2-3, 1.5-2 mm, suborbicular, membranous; pedicels 2-3 mm, angular, jointed just below the middle; perianth greenish-white, campanulate; male flowers with 6 subequal oblong segments 2-2.5 mm; stamens 6; female flowers similar to male but smaller; berry 5-7 mm, subglobose, bluish-black; seeds 2-3, 3-3.5 mm diam., punctulate, black.

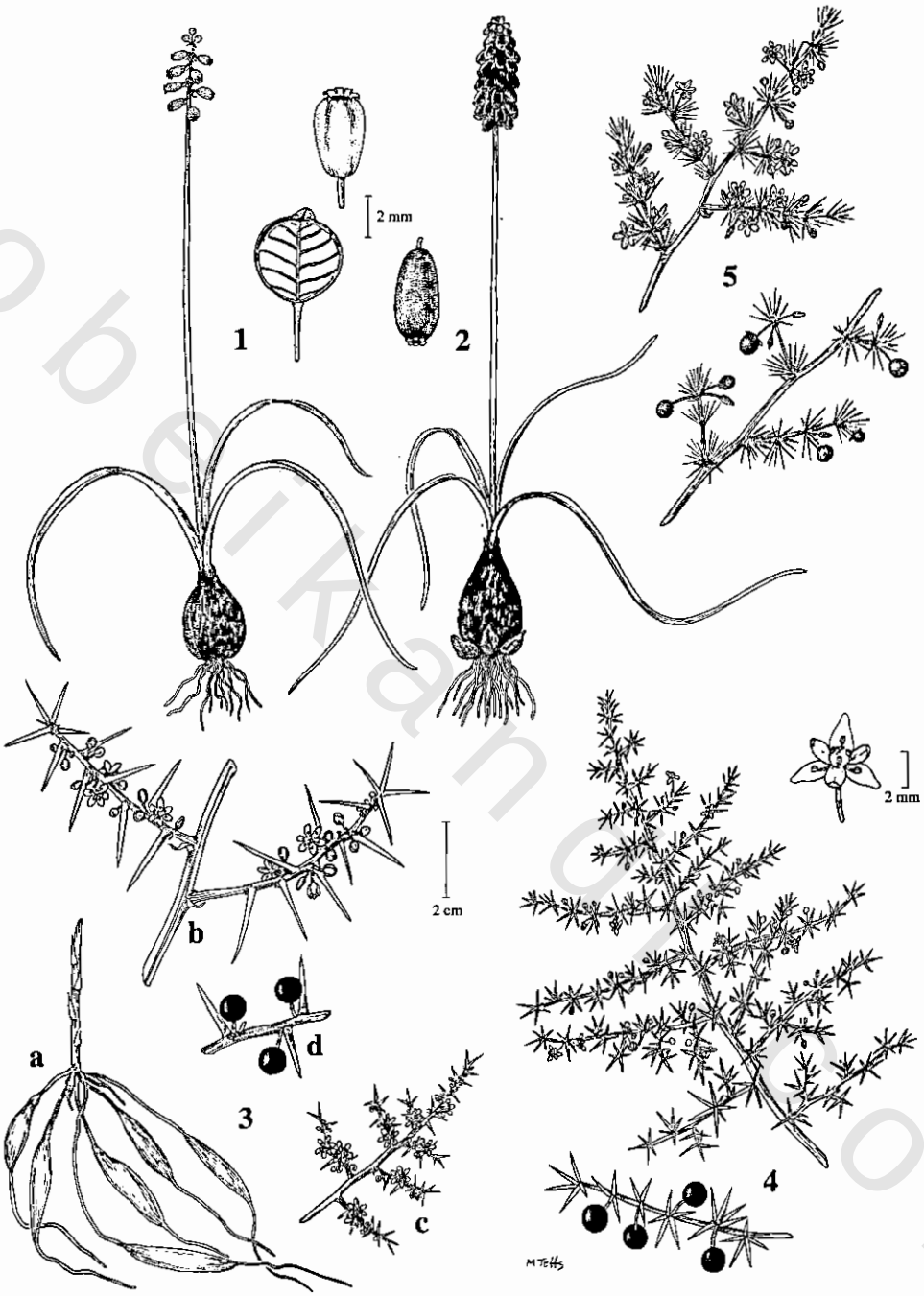


Plate 16. HYACYNTHACEAE: *Muscari parviflorum* 1, habit; flower (up right); capsule (middle right). *Muscari neglectum*, 2, habit; flower (middle left). ASPARAGACEAE: *Asparagus stipularis* 3, basal part with fusiform tubers (a); flowering branch with long cladodes (b); flowering branch with short cladodes (c); flowering branchlet with long cladodes (d). *Asparagus aphyllus* 4, flowering and fruiting branches; flower (up right). *Asparagus africanus* 5, flowering and fruiting branches. Drawn by Margaret Tebbs.

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O (Uweinat), M, De, S; dry rocky ground. Atlantic Islands, Mediterranean region, Sinai.

NOTE: The type of *Asparagus stipularis* was collected in Alexandria, Egypt, by Forsskål in October 1761 (C). The species is variable, known in forms with long and short cladodes, which have been described as different varieties; these are listed here as synonyms.

2. **Asparagus aphyllus** L., Sp. Pl., ed. I, 314 (1753).

Perennial 40-80 cm, woody at base; branches intricate, angular, scabridulous; leaves minute, deltoid, scale-like; cladodes 3-6, 0.5-1 cm, in a cluster, rigid, unequal, spreading, linear, angular, spinescent at tip; flowers 1-2; *c.* 2.5 mm, pedicels 2-3 mm, nodding, jointed below middle; perianth-segments *c.* 2.5 mm, stellate, the inner shorter than the outer, incurved; berry 6-7 mm, globose, blackish, 1-seeded; seeds *c.* 4 mm, globose, rugose, black.

M (Mersa Matruh); rocky ground. Sardinia, Sicily, Greece, Crete, North Africa, Palestine.

3. **Asparagus africanus** Lam., Encycl. 1: 295 (1783).

Climbing or scrambling perennial to 4 m, or low shrub; branches terete to angled, with spines 3-4 mm; terminal branches spineless; cladodes 0.3-1.2 cm, in clusters of 5-20, capillary, soft; flowers in clusters of 2-3, axillary and terminal; pedicels 3-8 mm, jointed below the middle; bracts *c.* 1.5 mm, lanceolate, soon deciduous; perianth-segments *c.* 4 mm, white to yellowish; stamens *c.* 3 mm; anthers yellow; ovary with 6-8 ovules in each cell; style *c.* 1 mm, 3-branched; berry 5-6 mm, spherical, red, 1-seeded; seeds *c.* 4 mm, rugose.

GE; hillsides, rocky ground. Southeast Egypt, tropical East Africa to South Africa, Arabia, eastwards to India.

NOTE: The occurrence of *Asparagus africanus* in Egypt needs to be confirmed by acquiring new collections. The above description is based on material from Arabia and Somalia.

ALLIACEAE

Brian Mathew

Bulbous perennials; bulbs tunicated; tunics membranous, coriaceous or fibrous; leaves basal or cauline, usually basally sheathing the stem, solid or fistulose; inflorescence an umbel, enclosed at first within a spathe; perianth with 6 free or shortly connate tepals; tepals with 1-3 median veins; stamens 6, free or basally connate; anthers ellipsoid or oblong, introrse, dorsifixed; ovary 3-locular, ovules 2-several per loculus; stigma entire or shortly 3-lobed; fruit a dry capsule; seeds black, angular or more or less globose. About 10 genera, 1000 species, mostly temperate regions of northern hemisphere, southern Africa, temperate South America.

1. Perianth segments free to base, or very slightly connate; style gynobasic 1. **Allium**
+ Perianth segments connate at base into a short tube; style terminal 2. **Nothoscordum**

1. **Allium** L.

Literature: Davis, P. H. 1984. Flora of Turkey and the East Aegean Islands 8: 98-211. University Press, Edinburgh.
Feinbrun-Dothan, N. 1986. Flora Palaestina 4: 74-99. Israel Academy of Sciences and Humanities. Jerusalem.
Stearn, W. T. in Walters, S. M. *et al.* (eds). 1986. The European Garden Flora 1: 233-246.
Maire, R. 1958. Flore de l'Afrique du Nord 5: 244-304. Lechevalier, Paris.
Mathew, B. 1996. A review of *Allium* section *Allium*. Royal Botanic Gardens, Kew.
Täckholm, V. & Drar, M. 1954. Flora of Egypt, vol. 3. Bull. Fac. Sci., Cairo Univ. 30: 58-136.
Wilde-Duyfjes, B. E. E. de. 1977. Revision of the genus *Allium* (Liliaceae) in Africa. Belmontia 7: 1-237.

Bulbous perennials, all parts of plant usually smelling of onion/garlic; bulbs rounded to ovoid, solitary or clustered and attached to a compact rhizome, often producing offsets; bulb tunics membranous, coriaceous or fibrous; leaves basal or cauline, if cauline then with a basal sheath clasping the stem, filiform, linear, lanceolate, lorate or elliptic, flat, terete or semi-terete and sometimes canaliculate, either solid or fistulose; inflorescence umbellate, enclosed at first within a caducous or persistent spathe; spathe entire or divided into 2 or more lobes or valves; perianth with 6 free or basally very shortly connate tepals, stellate, campanulate, urceolate or ovoid; tepals with 1 median vein; stamens 6, free or basally connate, often in 2 series, the outer 3 usually simple, the inner 3 simple or with 2 lateral sterile cusps on either side of the median fertile cusp; anthers ellipsoid or oblong, introrse, dorsifixed; ovary 3-locular, ovules 2-several per loculus; style gynobasic, stigma entire or shortly 3-lobed; fruit a loculicidal capsule; seeds black, usually compressed-triquetrous, sometimes ± globose. About 700 species, northern hemisphere.

1. Stamens with simple filaments 2
+ Stamens with inner filaments 3-cuspidate, with a sterile appendage on either side of the anther-bearing cusp (sect. *Allium*) 12

2. Leaves sheathing stem for more than 1/4 its length (sect. *Codonoprasum*) 9
+ Leaves sheathing stem for less than 1/4 its length 3

3. Leaf sheaths visible, but for only a short distance above ground level (sect. *Molium*) 4
+ Leaves apparently basal, the sheaths wholly subterranean (sect. *Melanocrommyum*) 18

4. Plant 10 cm or less; perianth segments scarious, silvery-white, suborbicular or broadly ovate; outer segments spreading, inner suberect 1. **A. blomfeldianum**
+ Plant 10-70 cm; perianth segments white, pink or straw-coloured, not markedly scarious; all segments similarly disposed 5

5. Leaves glabrous on upper and lower surfaces (margins may be scabrid) 6
+ Leaves hairy or papillose on sheaths and usually on both surfaces and margins 7

6. Pedicels 0.7-1 cm; perianth campanulate, usually pink 5. **A. roseum**
+ Pedicels 1.5-3.5 cm; perianth stellate at anthesis, white 2. **A. neapolitanum**

7. Hairs retrorse; perianth segments 6-7 mm — 3. **A. papillare**
\+ Hairs not retrorse; perianth segments 0.5-1.2 cm — 8

8. Umbel 2.5-4 cm diam., lax; perianth stellate, white or pink with age — 4. **A. trifoliatum**
\+ Umbel 4-5 cm diam., dense; perianth campanulate, straw-coloured, rarely pinkish — 6. **A. erdelii**

9. Perianth 6-7(-8) mm, urceolate-campanulate; anthers included — 7. **A. desertorum**
\+ Perianth 2-5 mm, campanulate; anthers exserted or subexserted — 10

10. Perianth segments 2-3 mm, white or cream — 10. **A. myrianthum**
\+ Perianth segments 3-5 mm, pink, greenish or white with darker mid-veins — 11

11. Anthers fully exserted — 9. **A. stamineum**
\+ Anthers subexserted — 8. **A. pallens**

12. Leaves flat or V-shaped, non-fistulose — 11. **A. ampeloprasum**
\+ Leaves terete or subterete, fistulose (sometimes channelled near leaf sheath at base) — 13

13. Bulb tunics membranous or coriaceous; if at all fibrous, the fibres longitudinal, not reticulate — 14
\+ Bulb tunics reticulate-fibrous — 16

14. Umbel spherical or broadly ovoid — 15
\+ Umbel conical or ovoid-fastigiate — 12. **A. curtum**

15. Spathe caducous; perianth *c.* 3 mm — 15. **A. mareoticum**
\+ Spathe persistent; perianth 3.5-6 mm — 14. **A. sphaerocephalon**

16. Stem 6-10(-15) cm, mostly subterranean; leaves 2-2.5 mm wide; perianth segments 6-7 mm — 13. **A. sinaiticum**
\+ Stem 15-30(-40) cm, for the most part above ground; leaves 0.5-2 mm wide; perianth segments 3.5-5 mm — 17

17. Stamens and style exserted — 16. **A. artemisietorum**
\+ Stamens and style included — 17. **A. barthianum**

18. Perianth segments deep purple — 21. **A. aschersonianum**
\+ Perianth segments white or pink with a green or purple mid-vein — 19

19. Plant 6-15 cm; perianth segments 4-4.5 mm — 18. **A. rothii**
\+ Plants 15-60 cm; perianth segments at least 5.5 mm — 20

20. Leaves 4-9, 1-2 cm wide; perianth segments narrowly oblong; filaments and anthers purple — 19. **A. tel-avivense**
\+ Leaves 2-3, 2-5 cm wide; perianth segments oblong, elliptic or oblanceolate; filaments white, anthers yellow — 20. **A. craveri**

Sect. **Molium** G. Don ex Koch, Syn. Fl. Germ., ed. 3, 715 (1857) pro parte
Sect. *Crommyum* Webb & Berthel. subsect. *Haplostemon* series Molia Boiss., Fl. Orient. 5: 231 (1882) pro parte

Bulb ovoid to subglobose; stem terete or angular; leaves flat or canaliculate, ± basal, the exposed part of the sheaths short; spathe usually persistent, 1-valved, the valve usually variously lobed; perianth stellate or campanulate; filaments simple; ovary with nectariferous pores; ovules 2 in each locule.

1. **Allium blomfeldianum** Asch. & Schweinf., Bull. Herb. Boiss. 1: 671, t. 20 (1893).

Bulb 1-1.5 cm diam., ovoid; outer tunics sub-coriaceous, brown or greyish-brown, splitting vertically into triangular sections; stem subterete to obscurely 2-angled, 3-10 cm; leaves 3-5, 3-9 mm wide in lower part, flat, linear, acute, keeled below, often coiled near the apex, ciliate on margins and mid-vein beneath, ± basal, the sheaths below ground or only just visible above ground; spathe papery, 1-valved, the valve split into 3-4 lobes, ovate, acuminate, ± equalling the pedicels, persistent; umbel 2-4 cm diam., spherical, many- flowered, dense; pedicels 0.8-1.5 cm; perianth with spreading outer and suberect inner segments; segments 6-8 mm, scarious silvery-white, suborbicular to broadly ovate, obtuse to subacute, persistent; stamens shorter than perianth; filaments white, flat, triangular; anthers included within the perianth, yellow; style included; capsule *c.* 4 mm.

M; sandy and stony places at low altitudes near the sea. Endemic.

NOTE: The type of *Allium blomfeldianum* was collected in Mersa Matruh, Egypt, 8 March 1890, Schweinfurth, no. 238 (Holo B, iso G, K, P).

2. **Allium neapolitanum** Cyr., Pl. Rar. Neap. 1: 13, t. 4 (1788).

Bulb 1-2.5 cm diam., broadly ovoid to subglobose; outer tunics membranous or sub-coriaceous; stem 3-quetrous, 20-50 cm; leaves 2-3, 0.5-7 mm wide in lower part, flat, linear, tapering gradually to the apex, keeled below, the upper and lower surfaces glabrous, scabrid on margins, ± basal with only short sheaths visible above ground; spathe 1-valved, sometimes 2-lobed, ovate, acuminate, shorter than pedicels, persistent; umbel nodding in bud, 5-10 cm diam., hemispherical to fastigiate, many-flowered, lax; pedicels 1.5-3.5 cm; perianth stellate at anthesis; segments 0.7-1.2 cm, white, elliptic-lanceolate, obtuse; stamens shorter than perianth; filaments white, flat, tapering to the apex; anthers included within the perianth, green; capsule *c.* 5 mm.

M, S; sandy and stony places. Widespread in the Mediterranean region, Sinai.

3. **Allium papillare** Boiss., Diagn. Pl. Orient., ser. 1, 13: 27 (1854).

Bulb 1-1.5 cm diam., ovoid; outer tunics coriaceous, grey-brown; stem 10-30 cm, ± terete; leaves 2-6, 2-6 mm wide in lower part, linear, canaliculate, retrorse-hairy, ± basal with only short sheaths visible above ground; spathe usually shorter than the umbel, 1-valved, the valve with 3-4 cuspidate lobes, persistent; umbel 2-5 cm diam., hemispherical to fastigiate, few- to many-flowered, lax to dense; pedicels 1-1.5 cm; perianth campanulate; segments 6-7 mm, white with a purple mid-vein, oblong-ovate or ovate, obtuse; stamens shorter than perianth; filaments flat, tapering to the apex; anthers included within the perianth, yellow; stigma obscurely 3-lobed; capsule *c.* 5 mm, subglobose.

S; sandy places. Mediterranean region, Sinai.



Plate 17. ALLIACEAE: *Allium trifoliatum* 1, habit; part of expanded flower (middle right). *Allium blomfeldianum* 2, habit. *Allium neapolitanum* 3, habit; part of expanded flower (down left). *Allium papillare* 4, habit; part of expanded flower (middle right). *Allium erdelii* 5, habit; part of expanded flower (down left). *Allium roseum* var. *tourneauxii* 6, bulb with leaves, and inflorescence; part of expanded flower (up). Drawn by Margaret Tebbs.

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4. **Allium trifoliatum** Cyr., Pl. Rar. Neap. 2: 11, t. 3 (1792) subsp. **hirsutum** (Regel) Kollmann, Israel J. Bot. 24: 204, f. 1 (1975).
Syns. *Allium hirsutum* Zucc., Abh. Akad. Wiss. (München) 3: 232, t. 2, f. 2 (1843), non Lam.
Allium subhirsutum L. var. *hirsutum* Regel, Acta Horti Petrop. 11: 301 (1890).

Bulb 1-1.2 cm diam., subglobose; outer tunics membranous; stem terete, 15-40 cm; leaves 2-5, 3-7 mm wide in lower part, flat, linear, ± basal, usually densely white-hairy, sometimes more sparsely so and rarely glabrous, tapering gradually to the apex, keeled below, the upper and lower surfaces glabrous, scabrid on margins, ± basal with only short sheaths above ground; spathe 1-valved, sometimes 2-lobed, persistent; umbel, 2.5-4 cm diam., hemispherical to fastigiate, lax; pedicels 1-3 cm; perianth stellate; segments 5-10 mm, white often with a purple or reddish mid-vein, sometimes becoming pinkish as they age, lanceolate, obtuse or subacute; stamens shorter than perianth; filaments white, subulate; anthers included within the perianth, yellow; style included; capsule 4-5 mm, enclosed in the perianth.

M, (Amria); rocky places. Mediterranean region.

5. **Allium roseum** L., Sp. Pl., ed. 1, 296 (1753) var. **tourneauxii** Boiss., Fl. Orient. 5: 274 (1882).

Bulb 1-1.5 cm diam., ovoid or subglobose, usually with numerous bulblets present; outer tunics membranous or sub-coriaceous, grey or brown with a pitted surface; stem 10-70 cm, ± terete; leaves 3-4, 3-7 mm wide in lower part, flat, linear, tapering gradually to the apex, glabrous, ± basal with only short sheaths visible above ground; spathe 1-valved, the valve with 3-4 lobes, shorter than pedicels, persistent; umbel 2.5-3.5 cm diam., hemispherical to fastigiate, many-flowered with no bulbils present; pedicels 0.7-1 cm. perianth campanulate; segments 7-8 mm, pink, elliptic-oblong, obtuse, the outer 3 sometimes emarginate or retuse, and often longer than inner 3; stamens shorter than perianth; filaments flat, narrowly triangular; anthers yellow; style included; capsule *c.* 4 mm, subglobose.

M, S; sandy places. Libya, Egypt, Palestine.

6. **Allium erdelii** Zucc., Abh. Akad. Wiss. (München) 3:236, t. 5 (1843).
Syns. *Allium erdelii* var. *roseum* Boiss., Fl. Orient. 5: 270 (1882).
Allium erdelii var. *hirtellum* Opphr., Bull. Soc. Bot. Genève, ser. 2, 22: 277 (1931).
Allium philistaeum Boiss., Diagn. Pl. Orient., ser. 1, 13: 26 (1854).

Bulb 0.8-1.7 cm diam., globose to ovoid; outer tunics grey-brown, coriaceous, inner tunics yellowish; stem 10-40 cm, terete; leaves 3-6, 4-8 mm wide in lower part, flat, narrowly linear-lanceolate, tapering to the apex, usually pilose on upper and lower surfaces, margins ciliate, ± basal with only short sheaths visible above ground; spathe 1, 3-4-lobed, shorter than or equalling the pedicels, persistent; umbel 4-5 cm diam., hemispherical to fastigiate, many-flowered, dense; pedicels 1.2-1.8 cm; perianth campanulate; segments 8-12 mm, cream, pale straw yellow or pinkish with a green or pink mid-vein, oblong-lanceolate, acute or subacute; stamens equalling or shorter than perianth; filaments tapering gradually from the base; anthers included to exserted from

perianth, yellow; ovary green or purple; style equalling perianth or exserted, stigma shortly 3-lobed; capsule 3-3.5 mm, enclosed by the persistent perianth.

M, S; in scrub, stony places. Libya, Egypt, Palestine, Syria.

Sect. *Codonoprasum* Reichenb. in Mössler, Handb., ed. 2, 1: 588 (1827).
Sect. *Crommyum* Webb & Berthel. subsect. *Haplostemon* series *Codonoprasa* Boiss., Fl. Orient 5: 254 (1882).

Bulb ovoid to globose; stem ± terete or angular; leaves sheathing the stem for up to 2/3 its length; spathe 2-valved, the valves unequal, with a broad base and a tail-like appendage; perianth cylindrical or campanulate; filaments simple; ovary with minute nectariferous pores or without pores; ovules 2 in each locule.

7. **Allium desertorum** Forssk., Fl. Aegypt.-Arab. 72 (1775).
Syn. *Allium modestum* Boiss., Diagn. Pl. Orient, ser. 1, 13: 33 (1854).

Bulb 1-2.3 cm diam., ovoid or oblong-ovoid; outer tunics greyish-black, coriaceous and splitting lengthways; stem 7-20 cm, often slightly flexuose; leaves 1-3, 1-3 mm wide, as long as or longer than the inflorescence, slightly 3-quetrous, fistulose, canaliculate, ribbed, ?smooth, sheathing the lower half of the stem; spathe 2-valved, persistent; the valves membranous with reddish veins, shorter to longer than the umbel; umbel 1.5-5 cm diam., laxly few- to many-flowered; pedicels unequal, 1-2(-2.4) cm; perianth narrowly campanulate-urceolate; segments 6-7(-8) mm, pale pink or nearly white with a reddish or green mid-vein, oblong-lanceolate, the tips acute and slightly curved outwards; filaments simple, expanded at the base and subulate at the apex; anthers included; style included; capsule *c.* 3.5 mm, depressed-globose;

M, De, S; calcareous desert soils. Egypt, Palestine.

NOTE: The type of *Allium desertorum* was collected in Cairo ("In desertis Káhirinis") in 1762 (Forsskål, no. 19, C).

8. **Allium pallens** L., Sp. Pl., ed. 2, 427 (1762).
Syns. *Allium coppoleri* Tin., Cat. Pl. Hort. Panorm. 275 (1827).
Allium paniculatum L. var. *pallens* (L.) Gren. & Godr., Fl. Fr. 3: 209 (1855).

Bulb 1-2 cm diam., ovoid or subglobose; outer tunics membranous, greyish-black, coriaceous and splitting lengthways); stem 12-40(-100) cm; leaves 3-4, 1-5 mm wide, shorter than the inflorescence, filiform to linear, fistulose, sheathing the lower half of the stem; spathe 2-valved, persistent, the valves wide at the base, extended into long slender appendages, longer than the umbel; umbel 1.5-4.5 cm diam., usually subglobose, sometimes somewhat fastigiate, laxly- to densely-flowered; pedicels subequal, 0.5-1.5 cm at anthesis; perianth narrowly campanulate; segments 3-5 mm, white, usually with a reddish or green mid-vein, oblong or oblanceolate, the tips truncate or rounded and sometimes apiculate; filaments simple, expanded at the base and subulate at the apex; anthers sub-exserted; style exserted; capsule *c.* 4 mm.

M, De, S; dry slopes, waste places, roadsides. Mediterranean Europe, Egypt, Palestine, Syria, Turkey.



Plate 18. ALLIACEAE: *Allium myrianthum* 1, habit; flower (up right). *Allium desertorum* 2, habit; flower (right). *Allium stamineum* 3, habit; flower and tepal with stamen (down left). *Allium pallens* 4, bulb with a leaf, and inflorescence; flower (up right). Drawn by Margaret Tebbs.

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9. **Allium stamineum** Boiss., Diagn. Pl. Orient., ser. 2, 4: 119 (1859) subsp. **stamineum**

Bulb 1-1.5 cm diam., ovoid; outer tunics membranous, greyish-black, splitting lengthways; stem 10-35 cm, straight or flexuose; leaves 2-4, 0.5-1 mm wide, nearly as long as or slightly exceeding the inflorescence, filiform, smooth, sheathing the lower 1/2 to 1/3 of the stem; spathe 2-valved, persistent, the valves wide at the base, tapering gradually into long slender appendages, longer than the umbel; umbel 3-7 cm diam., oblong to fastigiate, the pedicels at first pendent then becoming patent and finally erect; pedicels unequal, 1-4 cm at anthesis; perianth campanulate; segments 3.5-5 mm, pink or pale purple, usually with a darker reddish midvein, oblong or oblong- oblanceolate, obtuse to subacute or rounded; filaments simple, expanded at the base and subulate at the apex, shortly exserted; anthers fully exserted, yellow; style exserted; capsule *c.* 3 mm, depressed-subglobose, trigonous.

S; dry slopes and rocky places. Sinai, Palestine, Lebanon, Syria, Greece, Turkey, Iraq, Iran.

Another subspecies is also known in Egypt:

subsp. **decaisnei** (C. Presl) Kollmann, in Feinbrun-Dothan, Fl. Palaest. 4: 87 (1986).
Syn. *Allium decaisnei* C. Presl, Bot. Bemerk. 114 (1844).

Like subsp. *stamineum*, but flowers usually smaller, yellowish-green or greyish-green; segments 3-4 mm; filaments and anthers much exserted.

S; rocky places. Sinai, Palestine.

10. **Allium myrianthum** Boiss., Diagn. Pl. Orient., ser. 1, 5: 59 (1844).

Bulb 1-2.5 cm diam., ovoid; outer tunics membranous, brown; stem 0.3-1.5 m; leaves 2-4, 2-5 mm wide, shorter than the inflorescence, filiform or semi-cylindrical, fistulose, sheathing the lower 1/2 to 1/3 of the stem; spathe 2-valved, persistent, the valves wide at the base, tapering gradually into long slender appendages, as long as or longer than the umbel; umbel 1-5 cm diam., globose, many-flowered; pedicels filiform, subequal, 0.5-2.5 cm at anthesis; perianth campanulate; segments 2-3 mm, white or cream, oblong or oblong-lanceolate, obtuse; filaments simple, subulate, exserted; anthers well-exserted, yellow; style exserted; capsule *c.* 2 mm, depressed-subglobose, trigonous.

M, S; dry slopes and rocky places. Libya, Egypt, Syria, Lebanon, Turkey, Iraq, Iran.

Sect. **Allium**
Sect. *Alliotypus* Dumort, Fl. Belg. 140 (1827).
Sect. *Porrum* (Mill.) Reichenb. in Mössler, Handb., ed. 2, 1: 541 (1827).
Sect. *Crommyum* Webb & Berth. subsect. *Porrum* Boiss., Fl. Orient. 5: 229 (1882) p. p.

Bulb ovoid to subglobose; stem terete or angular; leaves flat or canaliculate, solid or terete and hollow, sheathing the stem for usually 1/2 to 2/3 its length; spathe often 1-valved and caducous, sometimes persistent and 2-valved; perianth ovoid, campanulate or urceolate; filaments in 2 whorls, the outer three usually simple, the inner three

3-cuspidate (rarely more), the median anther-bearing cusp usually shorter than the 2 thread-like lateral cusps; ovary with nectariferous pores; ovules 2 in each locule.

11. **Allium ampeloprasum** L., Sp. Pl., ed. 1, 294 (1753).
Syns. *Allium multiflorum* Desf., Fl. Atlant. 1: 288 (1798).
Allium mogadorense Willd. in Schult. & Schult. f., Syst. Veg. 7: 1004 (1829).
Allium getulum Batt. & Trabut, Bull. Soc. Bot. France 39: 75 (1892).
Allium tortifolium Batt. & Trabut, Bull. Soc. Bot. France 39: 338 (1892).
Allium ampeloprasum var. *combazianum* Maire, Bull. Soc. Hist. Nat. Afr. Nord. 25: 230 (1935).

Bulb 2-6 cm diam, ovoid or subglobose; outer tunics membranous, brownish; bulblets usually present and numerous, subglobose or helmet-shaped, sometimes with an acute or shortly acuminate apex, yellowish or pale brown, produced beneath the bulb tunics; stem 0.45-2 m, stout; leaves 4-10(-13), (0.3-)0.5-2(-4) cm wide, shorter than the inflorescence, sheathing the lower $^1/_3$ to $^1/_2$ of the stem, linear, non-fistulose, keeled, scabrid on the margin and keel, glaucous; sheaths glabrous; spathe 1-valved, ovate at base, abruptly narrowed to a long beak to about 10(-13) cm, caducous; umbel (3-)5-8(-9) cm diam., spherical, dense, normally with flowers only, but rarely with flowers and bulbils mixed; pedicels unequal, to 4.5 cm, smooth; bracteoles present, silvery-white, laciniate at the apex; perianth broadly campanulate or subspherical; segments (3.5-)4-5.5 mm, white, pink or deeper reddish-pink, sometimes with a darker green or purple mid-vein, with large sparse papillae on the outer surface, especially on the keel, the outer oblong-lanceolate, elliptic or elliptic-obovate, subacute, shortly mucronate, the inner ovate, spathulate or elliptic, obtuse, rounded or rarely truncate, equalling or shorter than the outer; stamens with anthers shortly exserted or sometimes equalling the segments; filaments white or purplish, strongly arching outwards, usually ciliate in the lower part, the outer ones simple and narrowly triangular or with an oblong base narrowed to a triangular apex, rarely with minute lateral cusps, the inner ones with the anther-bearing cusp a $^1/_3$ to $^1/_2$ as long as the widely expanded undivided basal part and about $^1/_2$ as long as the lateral cusps; lateral cusps much exceeding the segments; anthers yellow or purplish-red; style usually exserted; capsule ovoid or subglobose, 2.3-3.5(-4) mm long; seeds *c.* 2-3.5 mm.

O, M, S; fields and former areas of cultivation, vineyards and roadsides, sometimes rocky hillsides, cliffs, coastal beaches. Azores, Canary Islands, western and southern Europe, North Africa, Sinai, Palestine, Lebanon, Syria, Turkey, Causasus, Iraq, Saudi Arabia.

NOTE: *Allium ampeloprasum* has the ability to persist by both copious seed production and by vegetative means since its bulbs produce many small offsets (bulblets); some variants also produce bulbils in the inflorescence; the latter bulbiliferous variants have been described as var. *babingtonii* (Borrer) Syme, Engl. Bot. 9: 204 (1869) [syn. *A. babingtonii* Borrer] and var. *bulbiferum* Syme, op.cit. (1869) [syn. var. *bulbilliferum* Lloyd]. The former, from Cornwall, Scilly Islands, western Ireland & the Islands of Aran, has bulbils 0.8-1.5 cm long, while in the latter, which is recorded in the Channel Islands and Ile d'Yeu, northern France, they are 6-8 mm long. *Allium ampeloprasum* is thought to have given rise to some important crop plants, notably the leek and kurrat which are, however, rather distinct from the wild species; they are dealt with respectively under the names *Allium porrum* and *Allium kurrat* at the end of the *Allium* account

"Culinary *Allium* species" together with two other species: *Allium cepa* (onion) and *Allium sativum* (garlic). A third variant, the 'Great Headed Garlic' resembles *A. ampeloprasum* more closely and is cultivated for its bulbs, rather than leaves as in the leek and kurrat. The large bulbs produce many offsets, as in *A. ampeloprasum*, and it is these, and sometimes the fewer but larger main 'cloves' of the bulbs, which are used for culinary purposes as an alternative to garlic, although they are not as strongly flavoured.

12. **Allium curtum** Boiss. & Gaill., Diagn. Pl. Orient., ser. 2, 4:116 (1859) subsp. **curtum**

Bulb 1.5-3 cm diam., subglobose; outer tunics pale grey-brown, membranous, bulblets usually present, 3-4 mm, ovoid, yellowish or pale brown; stem (5-)15-30(-60) cm, smooth, rather stout, wiry; leaves 2-4, 1-2 mm wide, shorter than the inflorescence, subterete, canaliculate, fistulose, smooth or slightly scabrid, sheathing the lower 1/3 to nearly 1/2 of the stem; sheaths smooth; spathe much shorter than the umbel, split into 2-4 ovate, membranous whitish lobes, persistent; umbel 1.5-3 cm diam., ovoid-conical or ovoid-fastigiate, very dense; pedicels 0.2-1 cm, usually considerably elongate in the fruiting stage and becoming fastigiate, smooth; bracteoles absent; perianth ovoid-campanulate or ellipsoid-campanulate; segments 3-3.5 mm, purple with paler or white margins, lanceolate or oblong, obtuse and cucullate at apex, smooth; stamens with the anthers exserted or equalling the perianth; filaments ciliate at the base, the outer ones simple, triangular, the inner with the anther-bearing cusp usually longer than the lateral cusps; lateral cusps exserted from the perianth; anthers purple; style well exserted, purple or green; capsule *c.* 3 mm, broadly ovoid-conical or subglobose; seeds 2-2.5 mm.

M, S; sandy areas and rocky hillsides. Cyprus, Egypt, Palestine, Lebanon, Syria, southern Turkey.

Another subspecies is also known in Egypt:

Allium curtum Boiss. subsp. **palaestinum** Feinbr., Pal. J. Bot., Jerusalem ser., 3: 14 (1943) var. **palaestinum**.

Like *Allium curtum* subsp. *curtum* but differs in: perianth 4-5 mm, ovoid-oblong; segments green with white margins; anthers yellow; inner filaments with the middle cusp usually shorter than the lateral cusps.

S (Rafah); rocky places. Sinai, Palestine. Area of the species as for *Allium curtum* subsp. *curtum*.

13. **Allium sinaiticum** Boiss., Diagn. Pl. Orient., ser. 1, 13: 31 (1854).

Bulb 2-2.5 cm diam., ovoid; outer tunics brown, reticulate-fibrous, bulblets usually absent; stem 6-10(-15) cm, smooth, rather thick; leaves 2(-3), 2-2.5 mm wide, longer than the inflorescence, terete, fistulose, smooth, sheathing the lower third to two thirds of the stem, usually still present at anthesis; sheaths smooth; spathe 2-valved, the valves ovate, shortly mucronate, membranous and transparent with conspicuous veins, persistent; umbel 2-4 cm diam., spherical or hemispherical, fairly dense; pedicels 0.5-1.4 cm, smooth; bracteoles present, white, membranous; perianth campanulate; segments 6-7 mm, white with a reddish or green mid-vein, lanceolate, scabrid-papillose all over the outer surface, the outer subacute, inner three obtuse or subacute and shortly mucronate; stamens with included or partly exserted anthers; filaments ciliate in the lower half, the

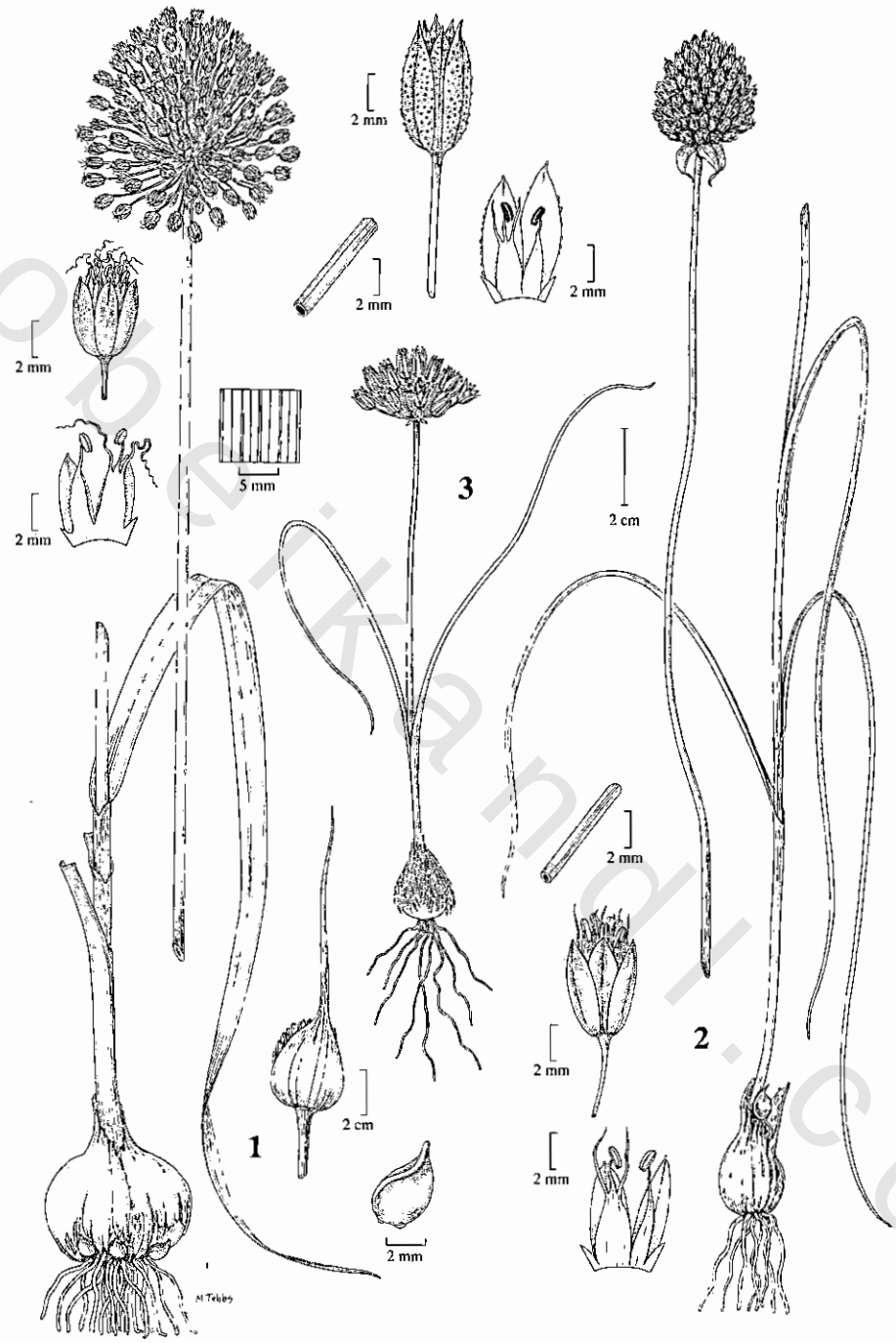


Plate 19. ALLIACEAE: *Allium ampeloprasum* 1, bulb with leaves and bulbils, and inflorescence; flower (up left); part of expanded perianth (middle left); part of leaf-blade (middle right); young inflorescence with spathe (down right); bulbil (further down right). *Allium sphaerocephalon* 2, bulb with leaves and bulbils, and inflorescence; cross-section of leaf-blade (middle left); flower and part of expanded perianth (down left). *Allium sinaiticum* 3, habit; cross-section of leaf-blade (up left); flower (up); part of expanded perianth (up right). Drawn by Margaret Tebbs.

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outer simple, very broad and triangular, the inner three with the anther-bearing cusp about a 1/4 to 1/3 as long as the very widely expanded ovate undivided basal part and 2/3 to almost as long as the lateral cusps; lateral cusps included or subexserted from the perianth; anthers purple before dehiscence; style included; capsule *c.* 4 mm, ovoid; seeds 3 mm.

S; desert sandy soils; Sinai, Palestine, northwest Saudi Arabia.

NOTE: The type of *Allium sinaiticum* was collected in Sinai, Egypt (G-BOISS).

14. **Allium sphaerocephalon** L., Sp. Pl., ed. 1, 297 (1753) subsp. **arvense** (Guss.) Arcangeli, Comp. Fl. Ital. 702 (1882).
Syns. *Allium arvense* Guss., Fl. Sic. Prodr. 1: 403 (1827).
Allium sphaerocephalum L. var. *viridi-album* Tin., Cat. Pl. Hort. Panorm. 275 (1827).

Bulb 1-2.5 cm diam., ovoid to subglobose; outer tunics brown or yellowish-brown, membranous to coriaceous, bulblets present, to 2 cm, white or yellowish-cream, flattened or concave on one surface, acuminate, sometimes carried on stipes under the leaf sheaths; stem 15-90 cm, smooth, rather thick; leaves 2-6, 1-4 mm wide, shorter than the inflorescence, subterete, canaliculate, fistulose, smooth or slightly scabrid on the margins, sheathing the lower 1/4 to 1/2 of the stem; sheaths smooth; spathe split into 2(-4) valves, the valves 1-2 cm long, ovate, shortly beaked, shorter than the umbel, persistent; umbel (1.5-)2-3.5(-6) cm diam., spherical or broadly ovoid, very dense, sometimes with bulbils present as well as flowers; pedicels 0.5-2 cm, smooth; bracteoles few, silvery-white; perianth ovoid to ovoid-cylindrical; segments 3.5-6 mm, white with a green or yellowish-green keel, narrowly ovate or lanceolate, smooth, obtuse or subacute, often mucronate; stamens with conspicuously exserted anthers; filaments minutely ciliate near the base, the outer 3 simple, triangular-subulate, the inner 3 with the anther-bearing cusp equalling to about 1/2 as long as the expanded undivided basal part and slightly longer to slightly shorter than the lateral cusps; lateral cusps exserted from the perianth; anthers purple or reddish-purple before dehiscence; style exserted; capsule 3.5-4 mm, broadly ovoid or subglobose.

M; dry stony places, cultivated and abandoned fields. Southern and southeast Europe, Egypt, Syria, Lebanon.

15. **Allium mareoticum** Bornm. & Gauba, Feddes Repert. 31: 396 (1933).

Bulb 1-2 cm diam., oblong-ovoid; outer tunics pale brown, membranous, extended to 3.5 cm into a short neck; bulblets *c.* 1 cm, few, produced on the bulb neck beneath the leaf sheaths; stem 12-25 cm; leaves 1-2 mm wide, linear-filiform, shorter than the inflorescence, semi-terete, fistulose, canaliculate, prominently ribbed (at least when dry), smooth, sheathing the lower 1/4 to 1/3 of the stem; sheaths smooth; spathe caducous, 'apparently 2-valved' (according to original description); umbel (1.5-)2-3 cm diam., globose, dense; pedicels unequal, to 1.2 cm; bracteoles present, rather conspicuous, somewhat laciniate, white-scarious; perianth campanulate, umbilicate at base; segments 3-4 mm, white with a pinkish or green mid-vein, oblong, obtuse and minutely apiculate, the outer 3 scabrid on the keel; stamens with exserted or subexserted anthers; filaments glabrous, the outer 3 simple, narrowly triangular, the inner 3 with the anther-bearing

cusp about a 1/4 as long as the expanded undivided basal part and a 1/3 as long as the lateral cusps; lateral cusps well exserted from the perianth; anthers apparently purplish; style included or very shortly exserted; capsule *c.* 2.5-3 mm, ovoid-globose; seeds not seen.

M; sandy and rocky places, calcareous hills. Endemic.

NOTE: *Allium mareoticum* was described from Egypt (?TEH). This appears to be a very rare plant in Egypt, much of its habitat having been destroyed due to urbanisation and agriculture.

16. **Allium artemisietorum** Eig & Feinbrun, Pal. J. Bot., Jerusalem ser., 3: 18 (1943).

Bulb 1-3 cm diam., oblong-ovoid; outer tunics brown, reticulate-fibrous, extended into a neck at the apex; bulblets few; stem 15-40 cm, smooth, often slightly flexuose; leaves 2-3, 1-2 mm wide, usually shorter than the inflorescence, filiform-terete, fistulose, smooth, sheathing the lower 1/4 of the stem, usually withering before anthesis; sheaths smooth; spathe 2-valved, the valves ovate, shortly mucronate, membranous, persistent; umbel (1)1.5-3(-4) cm diam., somewhat fastigiate-spherical, dense; pedicels 0.3-1.2(-2) cm, smooth; bracteoles present, white, membranous; perianth campanulate; segments 3.5-5 mm, white with a reddish or green mid-vein, ovate-oblong, subacute, the outer scabrid on the keel or sometimes all over the outer surface, the inner smooth or papillose; stamens with the anthers exserted; filaments glabrous, the outer 3 simple, triangular in the lower half, the inner 3 with the anther-bearing cusp about a 1/3 as long as the undivided basal part and slightly shorter to slightly longer than the lateral cusps; lateral cusps exserted from the perianth; anthers purple before dehiscence; style exserted; capsule *c.* 3 mm, ovoid; seeds *c.* 2.5 mm.

M (Mersa Matruh), S; sandy and rocky places. Egypt, Palestine, Saudi Arabia.

17. **Allium barthianum** Asch. & Schweinf., Bull. Herb. Boiss. 1 (9): 670 (1893).

Bulb 1-1.5 cm diam., oblong-ovoid; outer tunics yellow-brown, reticulate-fibrous, extended into a neck at the apex; bulblets few; stem about 15 cm, smooth; leaves 2-3, 0.5-1 mm wide, slightly shorter than or equalling the inflorescence, filiform-terete, fistulose, smooth, sheathing the lower 1/2 of the stem; sheaths smooth; spathe 2-valved, the valves ovate, shortly mucronate, scarious, white veined brownish-red, persistent; umbel 1.5-3 cm diam., spherical, dense; pedicels unequal, to 1 cm, smooth; bracteoles present, small, silvery-white; perianth cylindric-campanulate; segments *c.* 5 mm, white with a green or brown mid-vein, oblong-lanceolate, acute, the outer scabrid on the keel; stamens with anthers included; filaments glabrous, the outer 3 simple, triangular-subulate, the inner 3 with the anther-bearing cusp about a 1/3 to 1/2 as long as the undivided basal part and slightly shorter to slightly longer than the lateral cusps; lateral cusps included within the perianth; anthers purple before dehiscence; style included; capsule details unknown.

M; dry rocky and gravelly places. Libya, Egypt.

Sect. **Melanocrommyum** Webb & Berthel., Phyt. Canar. 3: 347 (1848).

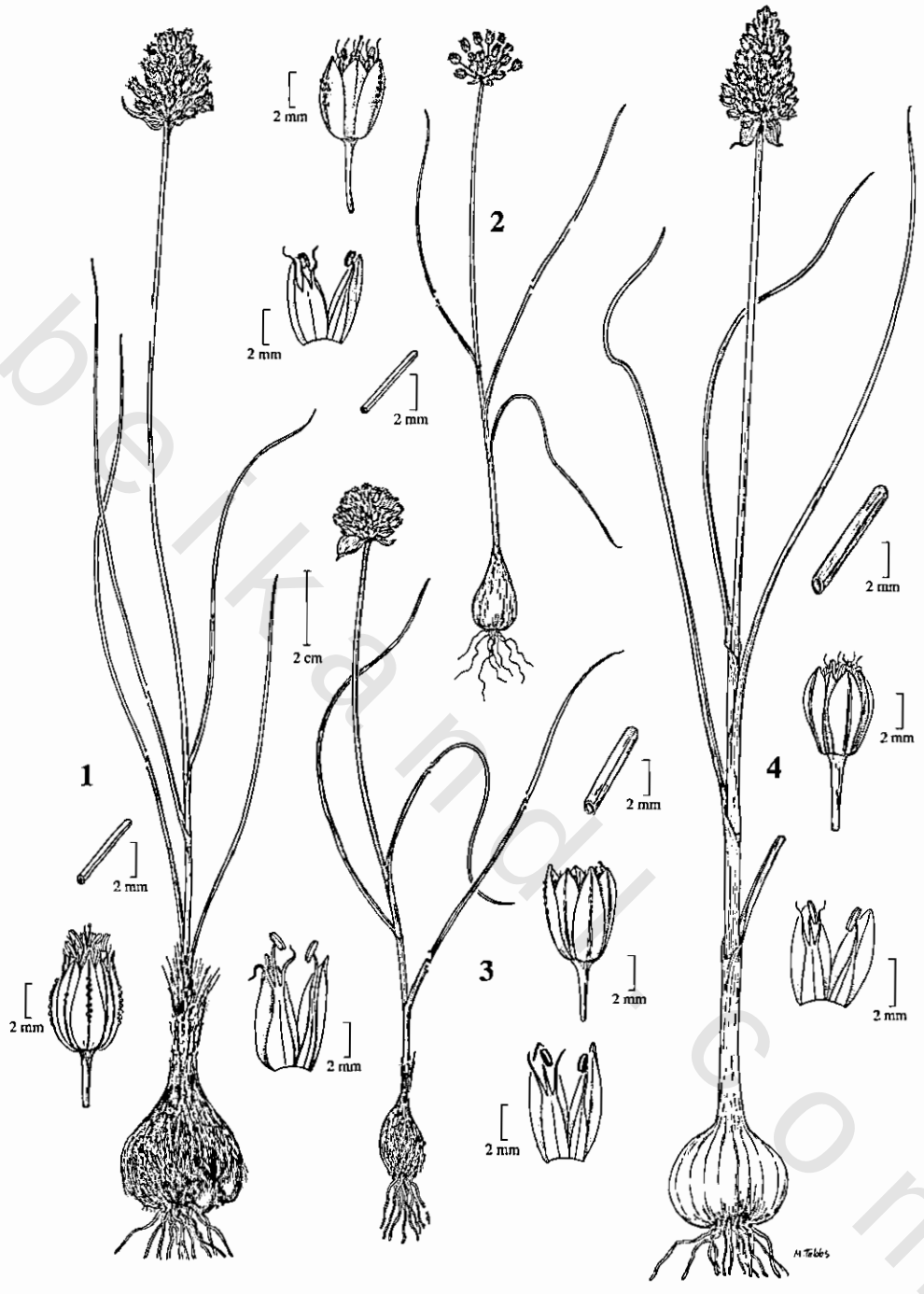


Plate 20. ALLIACEAE: *Allium artemisietorum* 1, habit; cross-section of leaf-blade and flower (down left); part of expanded perianth (down right). *Allium mareoticum* 2, habit; flower (up left); part of expanded perianth (middle left); cross-section of leaf-blade (down left). *Allium barthianum* 3, habit; cross-section of leaf-blade (up right); flower (middle right); part of expanded perianth (down right). *Allium curtum* 4, habit; cross-section of leaf-balde (up right); flower (middle right); part of expanded perianth (down right). Drawn by Margaret Tebbs.

Bulb subglobose; stem terete; leaves basal; spathe persistent, 1-valved, the valves becoming 2-4-fid with age; perianth stellate to open-campanulate, the segments ultimately shrivelling and twisting or reflexing; filaments simple; ovary without nectariferous pores; ovules 3-10 in each locule.

18. **Allium rothii** Zucc., Abh. Akad. Wiss. (München) 3: 235, t. 4 (1843).

Bulb 3-4 cm diam., ovoid; outer tunics coriaceous and splitting lengthways; stem 6-15 cm, stout; leaves several, 0.6-3 cm wide, as long as or longer than the inflorescence but usually prostrate, flat, lorate or lanceolate, undulate, glabrous, ± basal with no visible sheaths above ground; spathe 1, 2-4-lobed, persistent, shorter than the umbel; umbel 2.5-5(-6) cm diam., hemispherical, many-flowered, dense; pedicels 1.2-2 cm; perianth stellate; segments 4-4.5 mm, white with a reddish or green mid-vein, narrowly oblong, obtuse; filaments purple, simple, expanded at the base and tapering to the apex; anthers equalling the perianth, purple; style included; capsule *c.* 5 mm, globose.

S; stony, rocky places. Sinai, Palestine, Syria.

19. **Allium tel-avivense** Eig in Eig, Zohary & Feinbrun, The Plants of Palestine, Analytical Key, Jerusalem 75 (1931) (in Hebrew); Feinbrun, Pal. J. Bot., Jeruslaem ser. 4: 148 , t. 3A, f. 1 & 3 (1948).
Syn. *Allium aschersonianum* Barbey subsp. *tel-avivense* (Eig) Opphr. in Opphr. & Evenari, Bull. Soc. Bot. Genève, sér. 2, 31: 189, f. 7 (1941).

Bulb 2-3.5 cm diam., ovoid; outer tunics dark brown-black, subcoriaceous; stem 15-40 cm, stout; leaves 4-9, 1-2 cm wide, usually longer than the inflorescence, flat, lorate, sometimes undulate, scabrid on margins, ± basal with no visible sheaths above ground; spathe 1, 2-4-lobed, persistent, shorter than the umbel; umbel 2.5-7 cm diam., hemispherical to subspherical, many-flowered, dense; pedicels 1.2-3 cm; perianth stellate; segments to 1 cm, white with a reddish or green mid-vein, narrowly oblong, obtuse; filaments purple, simple, slightly expanded at the base and tapering gradually to the apex; anthers equalling the perianth, purple; style included; capsule *c.* 5 mm, globose.

M, De, S; stony (calcareous) places, soils, hillsides. Egypt, Palestine.

20. **Allium crameri** Asch. & Boiss. in Boiss., Fl. Orient. 5: 279 (1882).

Bulb 3-3.5 cm diam., ovoid; outer tunics brown or blackish-grey, ultimately fibrous; stem stout, 15-60 cm; leaves 2-3, 2-5 cm wide near the base, lorate-lanceolate, flat, undulate, crenulate or crisped, sometimes fimbriate, ± basal with scarcely any visible sheaths above ground, apex obtuse and shortly acuminate; spathe 1, 2-5-lobed, persistent, ± equalling the pedicels; umbel 4-8 cm diam., fastigiate or hemispherical, many-flowered, dense; pedicels 1-4.5 cm; perianth widely campanulate or stellate; segments 5.5-8 mm, white or pink with a green or purple mid-vein, oblong, elliptic or oblanceolate, subacute to obtuse; filaments white, flat, expanded at the base and tapering to the apex; anthers equalling or exerted from the perianth, yellow; ovary green or purple; style equalling perianth or exserted; capsule *c.* 0.8-1 cm, blackish or dark brown.

De, S; sandy and stony places. Endemic.

NOTE: Syntypes of *Allium crameri* were collected in Egypt near Cairo, Great Petrified Forest, 2 May 1880, Cramer *s.n.* (G); Bir el Fahm, 6 March 1881, Cramer *s.n.* [lectotype,

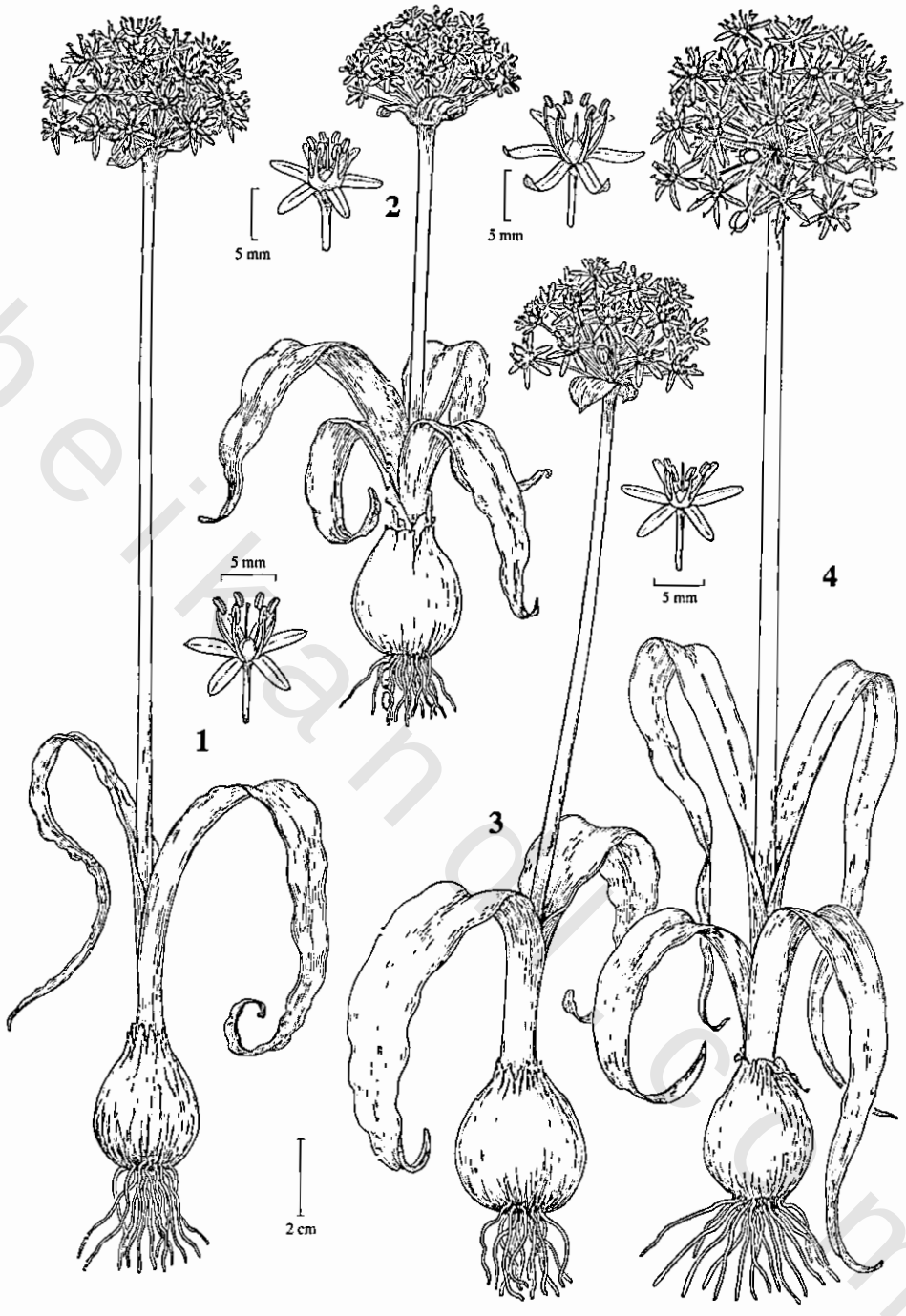


Plate 21. ALLIACEAE: *Allium aschersonianum* 1, habit; flower (middle right). *Allium rothii* 2, habit; flower (left). *Allium crameri* 3, habit; flower (right). *Allium tel-avivense* 4, habit; flower (up left). Drawn by Margaret Tebbs.

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selected by de Wilde Duyfjes (G)]; ditto, Sickenberger *s.n.* (MPU).

21. **Allium aschersonianum** Barbey in C. & W. Barbey, Herb. Lavant 163, t. 4 (1882).

Bulb 2-3 cm diam., subglobose to ovoid; outer tunics greyish; stem stout, 30-80 cm; leaves 2-6, 1.5-5 cm wide near the base, erect or suberect, shorter than the inflorescence, flat, lorate-lanceolate, sometimes slightly undulate, tapering to the apex, minutely scabrid on margins, ± basal with no visible sheaths above ground; spathe 1, 2-3-lobed, persistent; umbel 4-8 cm diam., hemispherical, many-flowered, dense; pedicels 1.8-2.8 cm; perianth stellate, becoming reflexed with age; segments 6-7 mm, deep purple, linear-oblong, obtuse; filaments deep purple, simple, expanded at the base and tapering to the apex; anthers exerted from the perianth, deep purple with grey-green pollen; ovary green or purple; style shorter to longer than the stamens; capsule 7-8 mm.

M, S; stony and sandy places, sometimes in cultivated land. Libya, Egypt, Palestine, Syria, southern Turkey.

NOTE: The type of *Allium aschersonianum* was collected in Mariut (Mariout), Egypt, by Barbey, no. 887 (lectotype, G).

Culinary **Allium** species

The following four culinary *Allium* species are cultivated in Egypt; see also note under *Allium ampeloprasum.*

Allium porrum L., Sp. Pl., ed. 1, 295 (1753). [Section **Allium**]
Syn. *Allium ampeloprasum* var. *porrum* (L.) J. Gay, Ann. Sci. Nat. ser.3, 8: 218 (1847).

Description as for *Allium ampeloprasum* but bulb poorly developed; bulblets few; leaves to 5 cm wide, with well-developed fleshy sheaths forming a false stem (*i.e.* the portion which is normally used for culinary purposes); umbel non-bulbilliferous, to 20 cm diam.; perianth white or pale pink.

NOTE: The leek (poireau) is commonly cultivated as a food plant. It is generally accepted that it has been developed from *Allium ampeloprasum*, probably many centuries ago, and there are now many cultivars. These have the same basic characteristics as *Allium ampeloprasum* although the bulb development is rather suppressed and it is the white, fleshy 'pseudostem' formed by the leaf sheaths which constitutes the edible part of the plant. For practical purposes it seems best to retain the binomial *Allium porrum* for this important crop plant.

Allium kurrat Schweinf. ex Krause, Notizbl. Bot. Gart. Berlin 9: 524(1926).
[Section **Allium**]

Very similar to *Allium porrum* but generally a smaller plant with much narrower and thinner leaves.

NOTE: Kurrat is, like leek (*Allium porrum*), known only as a cultivated plant. It is grown mainly in Egypt, Arabia, Palestine and Yemen for its leaves which are eaten raw or used for flavouring; unlike the leek it is the green part of the leaf which is normally eaten. The

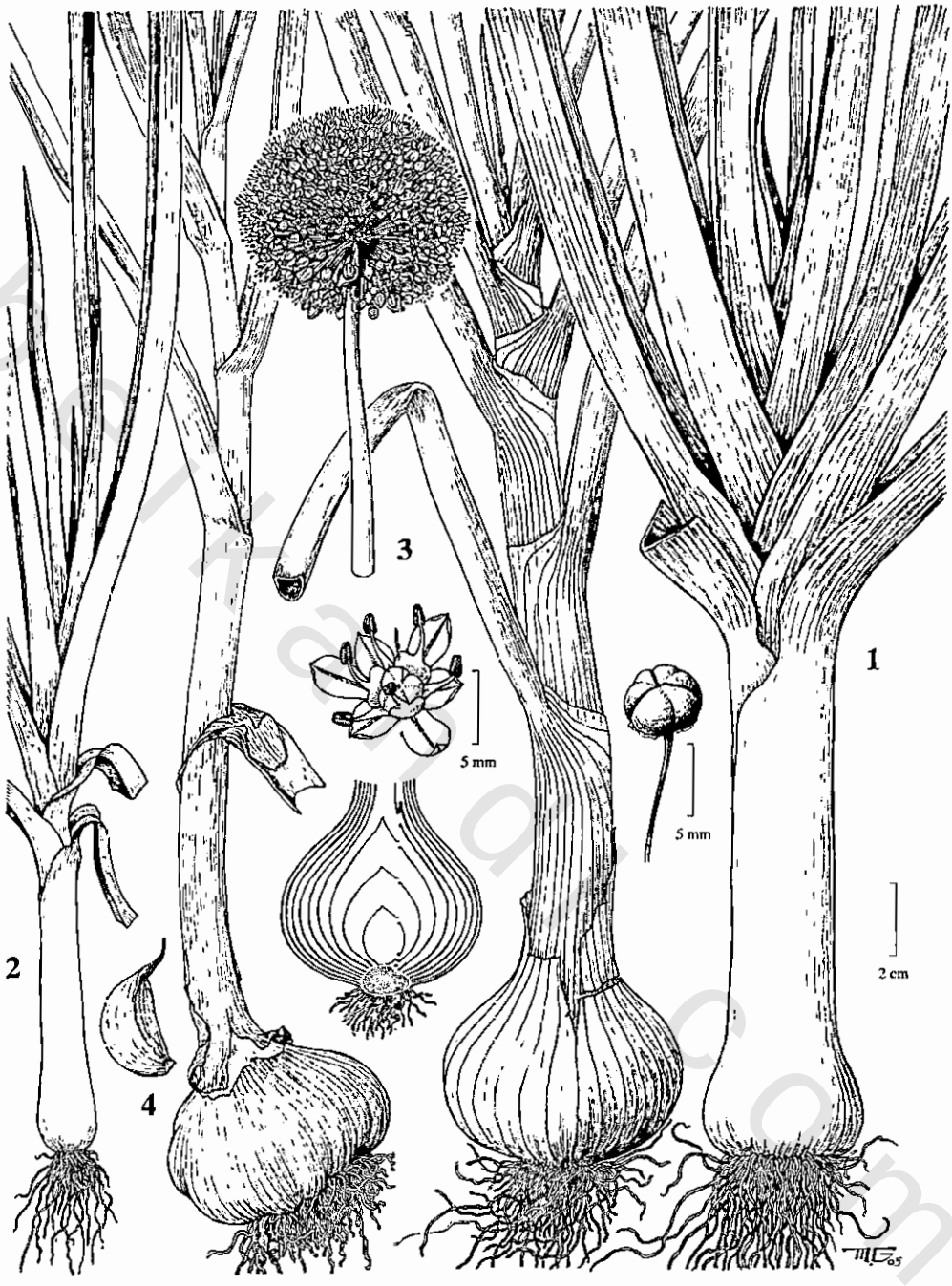


Plate 21a: ALLIACEAE: *Allium porrum* 1, basal part with leaves. *Allium kurrat* 2, basal part with leaves. *Allium cepa* 3, basal part with leaves; inflorescence (up left); flower (middle left); longitudinal section in bulb (down left); fruit (middle right). *Allium sativum* 4, basal part with leaves; bulblet (down left). Drawn by Magdy El-Gohary.

type of *Allium kurrat* was collected in Egypt, Schweinfurth (holotype B!).

Allium cepa L., Sp. Pl., ed. 1, 295 (1753). [Section **Cepa** (Miller) Prokh.]

Bulb globose, ovoid or flattened-globose, to 10 cm diam.; outer tunics membranous; stem to 1 m, stout, terete, hollow and inflated in the lower part; leaves up to 10, to 2 cm wide in lower part, basal or sheathing the lower part of the stem, semi-terete, hollow; spathe valves usually 3, shorter than the umbel; umbel 5-10 cm diam.; spherical, dense, with many flowers or with bulbils; pedicels 2-4 cm; perianth stellate; segments 3-4.5 mm, white with a green median vein; stamens exserted from perianth; anthers yellow; capsule *c.* 5 mm, depressed-subglobose.

NOTE: The commonly cultivated onion, of which there are many cultivars, is thought to have been derived from the Central Asiatic *A. oschaninii* B. Fedtsch. The cultivars are polyploids.

Allium sativum L., Sp. Pl., ed. 1, 296 (1753). [Section **Allium**]

Bulb to 8 cm diam., depressed-ovoid, consisting of a cluster of more or less equal bulbets ('cloves'); outer tunics membranous; stem to 1.2 m, solid, often coiling in the early stages of flowering; leaves 4-12, to 3 cm wide in lower part, sheathing the lower part of the stem, linear, flat, keeled beneath; spathe 1-valved, long-beaked, to 20 cm long, caducous; umbel 2.5-5 cm, with few flowers and with many bulbils, sometimes with bulbils only; perianth campanulate; segments 2-5 mm, white, pinkish or greenish; stamens usually included; outer filaments simple or toothed at base, inner filaments with a median anther-bearing cusp and 2-4 lateral sterile appendages exserted from the perianth; anthers yellow; capsules absent, normally a sterile plant.

NOTE: Garlic, which is a major crop plant throughout the Mediterranean region, is of obscure origin. Similar plants have been found in Asia in apparently wild situations and named as a species, *A. longicuspis* Regel, but they may be relics of cultivation. It has been cultivated in Egypt since ancient times.

2. **Nothoscordum** Kunth, nom. conserv.

Literature: Maire, R. 1958. Flore de l'Afrique du Nord 5: 243-244. Lechevalier, Paris.
Täckholm, V. & Drar, M. 1954. Flora of Egypt, vol. 3. Bull. Fac. Sci., Cairo Univ. 30: 267-268, as *Nothocordon*.
Guaglainone, R. 1972. Sinopsis de las especies de *Ipheion* Raf. y *Nothoscordum* Kunth (Liliaceas) de Entre Rios y regions Vecinas. Darwiniana 17: 159-240. (*Nothoscordum gracile* as *N. inodorum* pp. 201-209).

Bulbous perennials, not or only very slightly smelling of onions; bulbs rounded to ovoid, often producing offsets; outer bulb tunics membranous; leaves basal, linear with sheathing bases; inflorescence umbellate, enclosed at first within a spathe; spathe shortly tubular at base, divided into 2 lobes or valves; perianth with 6 tepals, connate at base into a tube; tepals spreading, 1-veined; stamens 6, basally adnate to tepals; anthers introrse, dorsifixed; ovary 3-locular, ovules 4-12 per loculus; style terminal, stigma entire; fruit a dry loculicidal capsule; seeds black, angular. 20 species, New World, naturalized elsewhere.

1. **Nothoscordum gracile** (Aiton) Stearn, Taxon 35(2): 338 (1986).

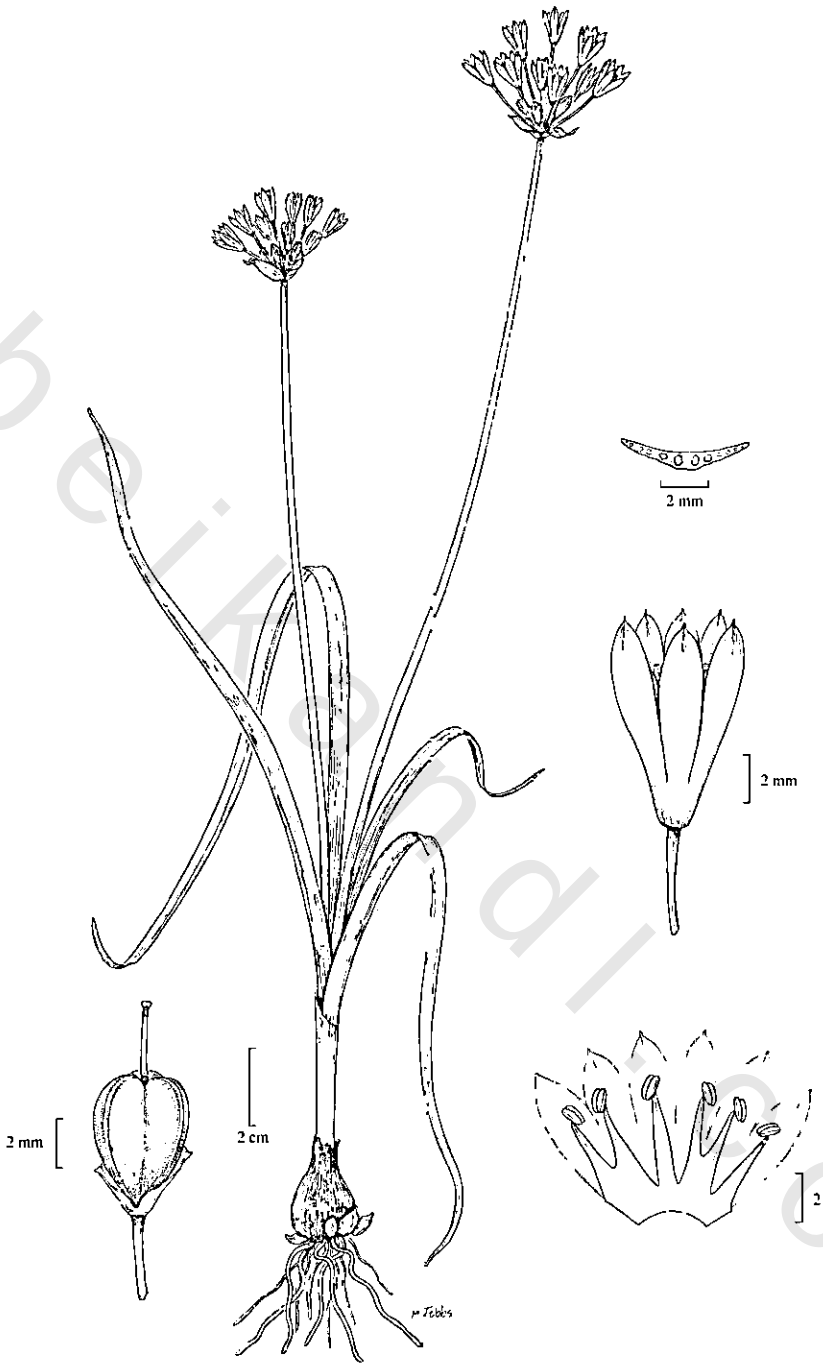


Plate 22. ALLIACEAE: *Nothoscordum gracile,* habit; cross-section in the leaf (up right); flower (middle right); expanded perianth with stamens (down right); capsule (down left). Drawn by Margaret Tebbs.

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Syns. *Allium gracile* Aiton, Hort. Kew, ed. 1, 1: 429 (1789).
Allium fragrans Vent., Pl. Cels 26 (1801).
Nothoscordum fragrans (Vent.) Kunth, Enum, Pl. 4: 457 (1844).
Allium inodorum, auct. non Aiton
Nothoscordum inodorum, auct. mult.

Bulb 1.5-2 cm diam., ovoid; outer tunics membranous, bulblets often numerous; leaves 6-10, basal, 20-40 cm, 0.4-1 cm wide, often slightly greyish-green, shorter than the inflorescence, linear, smooth; scape to 60 cm but often much less, smooth; spathe shortly tubular at base, 2-lobed, shorter than the umbel, persistent; umbel 2-4 cm diam., fastigiate, lax, with up to 15 fragrant flowers; pedicels unequal, 2-6 cm, smooth; perianth infundibuliform, 1-1.5 cm, shortly tubular at base; segments spreading, oblanceolate, obtuse, cream-white with a brownish or pinkish mid-vein, green on the exterior, 3-5 mm wide; stamens included, filaments simple, anthers brownish; style included; capsule 0.6-1 cm, obovoid.

N; edges of cultivation, roadsides, orchards. Naturalised in Egypt, native to temperate South America. Widely naturalised in temperate regions of the world and becoming a troublesome weed, increasing rapidly by seeds and bulblets.

DRACAENACEAE

L. Boulos

Trees, shrubs or xerophytic herbs with rhizomes; leaves spirally arranged, often in rosettes, linear to ovate, leathery to succulent, often with hard fibres; inflorescence axillary, racemes or panicles; pedicels articulate; bracts and bracteoles minute or absent; perianth of 6 segments, fused at base into a short or long tube; tips of lobes minutely hooked; stamens 6, opposite the tepals, inserted at the top of the perianth-tube; anthers 2-thecous, dorsifixed, longitudinally dehiscent; ovary superior, 3-celled; style simple; ovules 1 per cell; fruit a berry, sometimes hard and woody; seeds up to 3, globose or elongate. 2 genera, about 120 species, tropical and subtropical regions of the Old World.

1. **Dracaena** L.

Trees or shrubs; leaves in false rosettes, sessile, linear to lanceolate; inflorescence a large panicle; flowers 2 or more in each floral bract, white or pale green, fragrant; free parts of tepals spreading or recurved; filaments slender or thickened; fruit a berry, globose or sometimes lobed, red, orange or yellow; seeds 1-3. About 60 species, mainly in Africa, extending to Arabia, Socotra and Atlantic Islands.

1. **Dracaena ombet** Kotschy & Peyr., Pl. Tinn. 47 (1867).

Tree 2-4 m; trunk 20-40 cm diam., repeatedly forked; branches forming an umbrella-shaped crown; bark brownish; leaves in dense terminal rosettes, 40-60 x 2-3 cm, linear from a wide ovate base, gradually narrowed to an acute apex, thick, rigid, the margins smooth; panicle *c.* 50 cm, much-branched, glabrous; bracts minute, lanceolate; pedicels 2-4 mm, articulate at the middle; perianth-segments 4-6 x 1.5-2.5 mm, connate at the base for 0.5 mm; stamens 3-4 mm; filaments flattened; ovary oblong; stigma shallowly 3-lobed; berry 1-1.2 cm diam., usually 1-seeded; seed 5-6 mm diam., globose.

GE; rocky ground, 1400-2000 m. Southeast Egypt, Sudan (Red Sea hills), Ethiopia, Eritrea, Somalia, Djibouti.

NOTE: The leaves of *Dracaena ombet* yield a strong fibre locally used for rope-making. The stems yield a red resin used in folk medicine. The sweet fleshy part of the fruit is edible. The number of trees in Gebel Elba as well as in the Red Sea hills, Sudan, has much decreased during the last 50 years. Efforts to conserve *Dracaena ombet* in Gebel Elba have been initiated by Marwan El Azzouni [see Plant Talk 34: 38-39 (2002)].

IXIOLIRIACEAE

L. Boulos

Description as for the genus *Ixiolirion,* the only genus in the family.

1. **Ixiolirion** Herb.

Bulbous perennials with a leafy stem; leaves grass-like, linear; inflorescence a lax raceme or panicle; flowers conspicuous, actinomorphic; perianth lilac or blue, rarely whitish or pink, infundibular, 6-partite; perianth-segments free almost to the base, 3-veined, without a corona; stamens 6, included, connate to base of perianth; filaments subulate; anthers basifixed; ovary inferior, 3-locular; ovules numerous; style filiform; stigma 3-lobed, the lobes filiform; capsule loculicidal, coriaceous, oblong, narrowed at base; seeds ovoid. 3 species, southwest and Central Asia.

1. **Ixiolirion tataricum** (Pall.) Herb., Bot. Reg. 7, App. 37 (1821).
Syns. *Amaryllis tatarica* Pall., Reise 3: 727, t. D, f. 1 (1776).
Amaryllis montana Labill. Icon, Pl. Syr. 2: 5, t. 1 (1791).
Ixiolirion montanun (Labill.) Herb., Bot. Reg. 7, App. 37 (1821).
Ixiolirion pallasii Fisch. & C. A. Mey. ex Ledeb., Fl. Ross. 4: 116 (1852), nom. superfl.

Bulbous perennial 20-50 cm; bulb 1-1.5 cm diam., ovoid; tunics brownish; leaves 10-30 x 0.1-0.5 cm, narrowly linear, long-attenuate; flowers 4-15, lilac or blue; pedicels 1-4 cm, wiry; bracts 1-2.5 cm, lanceolate-subulate; perianth 3-3.5 cm; perianth-segments oblong-linear, the outer mucronate, the inner broader and obtuse; capsule 1.8-2.2 x 0.5 cm, oblong, narrowed at base; seeds 3-4 x 1-1.5 mm, ovoid, black.

S; sandy soils. Sinai, Palestine, Lebanon, Syria, Turkey, Arabia, Iran, Pakistan, Afghanistan to Central Asia and western Siberia.

AMARYLLIDACEAE

L. Boulos

Bulbous perennial herbs; leaves in a basal rosette, often distichous; petioles when present forming a false stem; blade simple, entire, linear to lanceolate or strap-shaped; scape

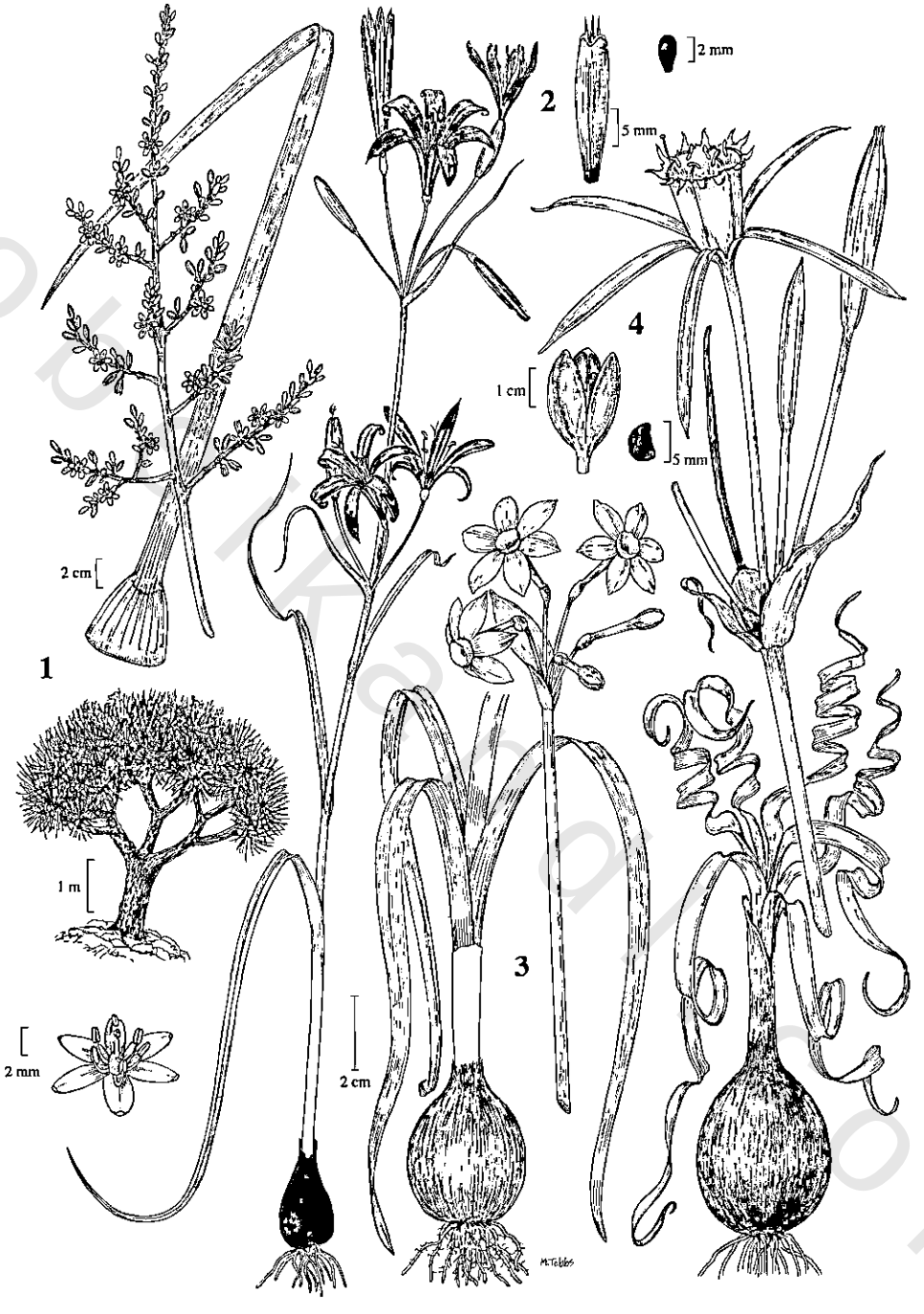


Plate 23. DRACAENACEAE*: Dracaena ombet* 1, habit; inflorescence and leaf (up); flower (down). IXIOLIRIACEAE: *Ixiolirion tataricum* 2, habit; fruit and seed (up right). AMARYLLIDACEAE: *Narcissus tazetta* 3, bulb with leaves, and inflorescence. *Pancratium tortuosum* 4, bulb with leaves, and inflorescence; capsule and seed (left). Drawn by Margaret Tebbs.

leafless; inflorescence umbel-like, subtended by an involucre of 1 or several free bracts; flowers conspicuous, bisexual, actinomorphic or slightly zygomorphic; tepals 6, equal or subequal, fused into a tube; some genera (ours) with a corona appearing as an extra whorl; stamens 6, inserted at the top of the tube; filaments free or united into a cup at the base; anthers dorsifixed, versatile, introrse, opening by longitudinal slits; ovary inferior, 3-celled, with 1-several axile ovules in each cell; style long, slender; stigma capitate or slightly 3-lobed; fruit a capsule, loculicidal, or a berry; seeds globose or flattened, black or greyish-green. About 65 genera, 750 species, warm temperate and tropical regions, especially South Africa and Andes.

1. Corona entire, crenulate or irregularly lobed; stamens inserted below corona — 1. **Narcissus**
+ Corona 12-dentate; stamens inserted at edge of corona in sinuses between teeth — 2. **Pancratium**

1. **Narcissus** L.

Bulbous perennials; bulb tunicate; outer tunics membranous, brownish; leaves linear; flowers several on a scape, rarely solitary, pedicellate, subtended by a spathe; perianth-tube short or long; perianth-segments subequal, white or yellow; corona campanulate or cup-shaped, entire, lobed or crenulate; stamens 6, inserted on the perianth-tube below corona; anthers linear to narrowly oblong; ovary inferior, 3-locular; ovules numerous; style filiform; stigma 3-lobed; capsule loculicidal, 3-valved; seeds subglobose, or angular, black. About 40 species, Mediterranean region, western Asia.

1. **Narcissus tazetta** L., Sp. Pl., ed. 1, 290 (1753).

Bulbous perennial 20-50 cm; bulb 3-4 cm diam., tunics thin, papery, dark brown, shining; leaves 3-6, 15-45 x 0.5-1 cm, strap-shaped, rather fleshy; scape 10-25 cm, 3-12-flowered; spathe 3-4 x 0.5-1 cm, papery, pale brownish; flowering pedicels 1.5-3.5 cm, angular, elongate to 5-7 cm in fruit; flowers fragrant; perianth-tube *c.* 2 x 0.5 cm; perianth-segments 1.2-1.8 x 0.5-1 cm, ovate-oblong, white, spreading or reflexed; corona 3-4 x 7-8 mm, yellow or orange, cup-shaped, entire or irregularly lobulate; stamens 2-seriate near the apex of perianth-tube; filaments 2 mm; anthers 7 x 1.5 mm, included; ovary 5-6 x 3-4 mm, oblong-ovoid; style 2 mm, included in corona; stigma shortly 3-lobed; capsule 1-1.5 x 0.8 cm, oblong-trigonous, rugulose; seeds *c.* 3 x 2 mm, irregularly angular, rugulose.

M, S; coastal sand dunes. Mediterranean region, Sinai, Caucasus, southwest Asia.

2. **Pancratium** L.

Bulbous perennials; bulb tunicate; outer tunics thin, membranous, brownish, with a long neck enclosing the base of leaves and scape; leaves linear; spathe 2-valved (bracts 2); flowers conspicuous, white, fragrant, several in loose umbels, sessile or pedicellate; perianth infundibuliform, perianth-segments subequal; corona conspicuous, cup-shaped, with 6 or 12 apical lobes; stamens inserted at the edge of corona in sinuses between teeth; filaments adnate to corona; anthers oblong-linear, dorsifixed, versatile; ovary inferior, 3-locular, ellipsoid; style elongate, slender; stigma capitate or slightly 3-lobed; capsule loculicidal, broadly ellipsoid-trigonous to subglobose, 3-valved; seeds numerous, compressed, angular, black. 16 species, Canary Islands, Atlantic shores of Portugal and

France, Mediterranean region, Sinai, tropical Asia, Africa.

1. Leaves 1.2-2.5 cm broad, not twisted (coastal sand dunes) 2
+ Leaves 4-8 mm broad, spirally twisted (desert sandy and gravelly soils) 3

2. Leaves with conspicuous papery-membranous sheaths at the base; flowers 6-11 per umbel; pedicels *c.* 2 cm; capsule 3-4 x 2-2.5 cm, broadly cylindrical to ellipsoid 3. **P. arabicum**
+ Leaves without papery-membranous sheaths at the base; flowers 3-6(-8) per umbel; pedicels 0.5-1 cm; capsule 2-3 x 1.5-2 cm, broadly ellipsoid to subglobose 2. **P. maritimum**

3. Perianth-tube 9-12 cm 1. **P. tortuosum**
+ Perianth-tube 2-3.5 cm 4. **P. sickenbergeri**

1. **Pancratium tortuosum** Herb., Ann. Nat. Hist., ser. 1, 4: 28 (1840).
Syn. *Pancratium tortifolium* Boiss., Diagn. Pl. Orient., ser. 1, 8: 18 (1849).

Bulbous perennial 40-60 cm; bulb 3.5-5 cm diam., globose with cylindrical neck; leaves 6-12, 12-40 x 0.4-0.8 cm, narrowly strap-shaped, spirally twisted, long-attenuate to an acuminate apex; base with scarious sheath; scape 20-30 cm; bracts 2; umbel 2-7-flowered; flowers fragrant; pedicel 2-3 mm; perianth 15-18 cm, white, perianth-tube 9-12 cm, greenish; perianth-segments 5-6 cm; corona 3 cm, cup-shaped, white, 12-lobed between the short free ends of the filaments; filaments 7 mm; anthers 5 mm, arcuate, versatile; ovary 1.5-1.2 cm, broadly ovoid; capsule 2.4-2.8 x 1.8-2 cm, broadly elliptic-ovoid; seeds 4-5 x 2.5-3 mm, angular, rugulose, black.

De, GE; desert sandy soil. Southeast Egypt, Sudan (Red Sea hills), western Saudi Arabia.

2. **Pancratium maritimum** L., Sp. Pl., ed. 1, 291 (1753).

Bulbous perennial 40-60 cm; bulb 4-6 cm diam., subglobose, with a long neck; leaves 35-60 x 1.2-2.5 cm, broadly strap-shaped, not twisted; scape usually 1, 10-30 cm, rather thick, compressed; bracts 2, 6-8 x 1-2.5 cm, united at the base, attenuate to an acuminate apex; flowers 3-6(-8), umbellate, fragrant; pedicels 0.5-1 cm, stout; perianth 10-15 cm; perianth-tube 8-10 cm, greenish; perianth-segments 4-5 x 0.5-1 cm, narrowly-oblong, acute, white, spreading; corona *c.* 4 cm, broadly cupular-infundibuliform, 12-lobed; lobes *c.* 8 mm, broadly deltoid, acute; filaments 4-5 mm, slender, adnate to the corona for most of their length; anthers 4-5 x 1.2 mm, yellow; ovary 1-1.5 x 0.5 cm, ellipsoid, glabrous; style 10-12 cm; stigma exserted, slightly 3-lobed; capsule 2-3 x 1.5-2 cm, broadly ellipsoid, to subglobose; seeds 1-1.2 x 1 cm, irregularly angular, compressed, black.

M, S; coastal sand dunes. Atlantic shores of Portugal and France, shores of the Mediterranean, Black and Caspian seas.

3. **Pancratium arabicum** Sickenb., Contrib. Fl. Egypte, Mém. Inst. Egypt. 4: 290 (1895).

Like *Pancratium maritimum,* but leaves with conspicuous papery-membranous sheaths at the base; flowers 6-11 per umbel; pedicels *c.* 2 cm; capsule 3-4 x 2-2.5 cm, broadly cylindrical to ellipsoid.

NOTE: Syntypes of *Pancratium arabicum* were collected by Sickenberger from Abu Qir, El-Menagel, near El-Mex, Alexandria, and from El-'Arish and Tell El-Sheikh, Sinai.

M, S (Alexandria - Abu Qir and El-Arish - Rafah); coastal sand dunes. Endemic.

4. **Pancratium sickenbergeri** Asch. & Schweinf. in Barb.-Boiss. & Barbey, Herb. Levant 158 (May 1882); Asch. & Schweinf. in Boiss., Fl. Orient. 5: 153 (July 1882).

Bulbous perennial 30-40 cm; bulb 3-4 cm diam., ovoid, with a long neck; leaves 8-20 x 0.4-0.8 cm, strap-shaped, glaucous, spirally curled; scape 10-20 x 0.3-0.6 cm; bracts 2, 2-3 x 0.8-1.2 cm, lanceolate, acuminate; umbel 4-8-flowered; flowers fragrant; pedicels *c.* 1.5 cm; perianth 6-7 cm; perianth-tube 2-3.5 cm; perianth-segments 3-4 x 0.5-0.7 cm, oblong-lanceolate, a conspicuous green mid-vein on the lower side; corona 12-lobed; lobes (teeth) 4-6 x 3 mm, triangular, acute; anthers *c.* 4 x 1 mm; ovary 1.5-2 x 0.5-0.6 cm, elliptic; capsule 2.5-3 x 1 cm, broadly elliptic.

D, S; sandy and gravelly desert soils. Egypt, Palestine, Arabia.

NOTE: Sickenberger, Contr. Flore d'Egypte, Mém. Inst. Egypt. 4: 292 (1901) describes two varieties of *Pancratium sickenbergeri*:

var. *desertorum* Sickenb.

Leaves 3-8 mm broad, appearing after the flowers; umbel-bracts 1 cm broad at base. Flowers appear in October, with scent of *Jasminum.*

var. *litorale* Sickenb.

Leaves 1 cm broad, appearing simultaneously with the flowers; umbel bracts 2 cm broad at the base. Flowers appear in September, with scent of *Sambucus nigra.* Täckhdm & Drar, Fl. Egypt 3: 363 (1954) comment on these two varieties: "It seems as if those characters are entirely dependent upon soil and water". They support their point of view by Sickenbeyer's observation that var. *desertorum,* when transfered to a garden, develops into var. *litorale.* In the present work, the above two varieties are chassified as synonyms to *Pancratium sickenbergeri.* Syntypes of *Pancratium sickenbergeri* were collected in El-'Arish, northern Sinai, and in the petrified forest in the desert east of Cairo.

PONTEDERIACEAE

L. Boulos

Annual or perennial herbs; stems rhizomatous, stoloniferous or erect, submerged, floating or creeping; leaves sheathed, usually stipulate, distichous or whorled, linear or petiolate; blades linear or orbicular flowers bisexual, zygomorphic to almost actinomorphic, solitary, paired or in spikes, umbel-like racemes or panicles; inflorescence subtended by 2 spathes, of which one is leaf-like; perianth petaloid, tubular or lobed, white, blue or yellow; perianth-segments 6, rarely 4 or 3; stamens 6, 3 or 1, inserted on the perianth; ovary superior, 3-locular, occasionally only 1 locule fertile;



Plate 24. AMARYLLIDACEAE: *Pancratium maritimum* 1, bulb with leaves, and inflorescence; capsule and seed (right). *Pancratium arabicum* 2, capsule. *Pancratium sickenbergeri* 3, bulb with leaves, and inflorescence; capsule (right). PONTEDERIACEAE: *Eichhornia crassipes* 4, habit. Drawn by Margaret Tebbs.

style 1, elongate; fruit a capsule, or 1-seeded nut, enclosed in a hardened anthocarp; seeds numerous or solitary. 9 genera, 25 species, mainly tropical America, 1 widely naturalized in the tropical and subtropical regions of the Old World.

1. **Eichhornia** Kunth, nom. conserv.

Annual or perennial herbs; stems floating, stoloniferous or creeping; leaves submerged, floating or emergent, basal or cauline, linear or differentiated into petiole and blade; petiole often inflated; blade linear or cordate; inflorescence a spike or panicle; spathes 2, the lower leaf-like, the upper scale-like; perianth 6-lobed; perianth-lobes subequal or the upper larger, blue or pink; stamens 6, 2-seriate; filaments with glandular hairs; anthers subequal, dorsifixed; fruit a capsule; seeds numerous. 7 species, tropical America.

1. **Eichhornia crassipes** (C. Mart.) Solms in A. & C. DC., Monogr. Phan. 4: 527 (1883).
Syn. *Pontederia crassipes* C. Mart., Nov. Gen. Sp. Pl. 1: 9, t. 4 (1823).

Aquatic perennial herb 15-50 cm, free-floating; stems rooting at the nodes; leaves 5-25 cm, in a rosette; leaf-blade 3-12 cm, suborbicular to rhomboid; petioles inflated, spongy; spike 5-18 cm, subtended by 2 bracts, 8-15-flowered; perianth 2.5-3 cm, zygomorphic, lilac-blue; perianth-segments 2.5-3 x 0.4-0.8 cm, unequal, elliptic; stamens inserted in the throat of the corolla; anthers yellow; stigma capitate; ovary sessile.

N, O, M; Nile, lakes, ponds, irrigation canals and drains. Native to Brazil, widely introduced and naturalized in tropical and subtropical regions of the world.

NOTE: In Egypt *Eichhornia crassipes* reproduces vegetatively and is rapidly invading most watercourses in the country.

IRIDACEAE

Brian Mathew

Perennials with corms or rhizomes; leaves equitant, ensiform or linear, basal or cauline; inflorescence a terminal spike or flowers solitary, tightly enveloped at first within bracts; perianth radially or bilaterally symmetric with 6 tepals, free or connate into a tube; stamens 3, opposite the outer perianth segments; anthers extrorse, basifixed; ovary 3-locular, ovules many; stigma 3-lobed, often petaloid; fruit a dry capsule; seeds compressed, angular or more or less globose. About 65 genera, 1800 species, worldwide but predominantly temperate regions of both hemispheres.

Literature: Feinbrun-Dothan, N. 1986. Flora Palaestina 4: 112-138. Israel Academy of Sciences and Humanities. Jerusalem.
Täckholm, V. & Drar, M. 1954. Flora of Egypt, vol. 3. Bull. Fac. Sci. Cairo Univ. 30: 446-523.

1. Flowers zygomorphic; inflorescence an elongate, lax spike; style branches not petaloid 3. **Gladiolus**
\+ Flowers actinomorphic, terminal, solitary or several produced in succession; style branches petaloid 2

2. Leaves equitant, ensiform; plant rhizomatous; perianth tube present — 1. **Iris**
+ Leaves canaliculate; plant with a corm; perianth tube absent — 2. **Moraea**

1. **Iris** L.

Perennials with rhizomes; leaves equitant, ensiform, basal and cauline; inflorescence a terminal cyme or 1-flowered, tightly enveloped at first within bracts; perianth-segments connate into a short tube, carried in 2 whorls, the outer 3 spreading or reflexed, the inner 3 smaller and erect or obliquely erect; stamens 3, opposite the outer perianth-segments; anthers extrorse, basifixed; ovary 3-locular, ovules many; style 3-branched, petaloid, each branch curving over a stamen; fruit a dry capsule; seeds large, ± globose, bearing a fleshy aril. About 300 species, north temperate regions.

1. **Iris mariae** Barbey, Österr. Bot. Zeitschr. 41: 207 (1891).

Rhizome stoloniferous, forming clumps; leaves 7-8, falcate, ensiform, 4-6 mm wide, greyish-green; stem 1-flowered, 15-30 cm (in flower); spathe membranous, longer than the perianth-tube; flower lilac to violet, the outer perianth-segments usually darker than the inner with a central dark violet, velvet-like signal zone and a median beard of blackish-purple hairs; outer segments 5 x 2.5-3 cm, oblong-ovate, the lamina recurved, inner segments 6-6.5 x 4 cm, obovate, erect with an incurved lamina; capsule erect.

S; sandy places. Sinai, southern Palestine.

2. **Moraea** Mill., nom. conserv.
Syn. *Gynandriris* Parl.

Perennials with tunicated corms; tunics reticulate-fibrous; leaves canaliculate, basal and cauline; inflorescence terminal, sometimes branched, with 1-several flowers tightly enveloped in the bud stage within membranous bracts; flowers short-lived (less than a day); perianth-segments free, carried in 2 whorls, the outer 3 spreading or reflexed, the inner 3 smaller and erect or suberect; stamens 3, opposite the outer perianth-segments; anthers extrorse, basifixed; ovary 3-locular, beaked at apex, ovules many; style 3-branched, petaloid; fruit a dry capsule; seeds small, globose-angular. About 120 species, Mediterranean region, tropical and subtropical regions, southern Africa.

1. Plant usually more than 10 cm; leaves often 2; flowers variable in colour in shades of blue or violet — 1. **M. sisyrinchium**
+ Plant small, usually less than 5 cm when in flower; leaves usually solitary; flowers pale greyish-blue — 2. **M. mediterranea**

1. **Moraea sisyrinchium** (L.) Ker Gawl. in Kon. & Sims, Ann. Bot. 1: 241 (1805).
Syns. *Iris sisyrinchium* L., Sp. Pl., ed. 1, 40 (1753).
Gynandriris sisyrinchium (L.) Parl., Nuov. Gen. Sp. Monocot. 49 (1854).

Corm subglobose, to 3 cm diam; leaves (1-)2, 10-50 cm, 3-5 mm wide, linear, canaliculate, deep green above, paler below, usually arcuate or coiled; stem 10-30(-45) cm, simple or few-branched, each inflorescence a condensed cyme comprising 1-6 flowers; bracts scarious, 4-6 cm long; flowers opening in the afternoon, 3-4 cm diam., blue or violet; outer perianth-segments 2-4 x 0.8-1.2 cm, spreading-recurved, with a central white or yellow mark and usually with darker spots or blotches, obovate; inner



Plate 25. IRIDACEAE: *Moraea mediterranea* 1, habit. *Moraea sisyrinchium* 2, habit. *Iris mariae* 3, habit. *Gladiolus italicus* 4, lower part with corm and leaves, and inflorescence; capsule (up left). Drawn by Margaret Tebbs.

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segments 2-3 x 0.4-0.6 cm, erect; style branches 0.8-2 cm, petaloid, lanceolate, 2-fid at apex; capsule to 2 cm, cylindrical-ellipsoid, with a conspicuous beak; seeds 1-2 mm, pyriform.

N, M, D, S; sandy and stony places. Mediterranean region, western Asia.

2. **Moraea mediterranea** Goldblatt in Novon, 8(4): 376 (1998).
Syns. *Gynandriris monophylla* Boiss. & Heldr. ex Klatt, Linnaea 34: 578 (1865-1866).
Iris sisyrinchium L. var. *monophylla* Heldr., Atti Congr. Intern. Bot. Firenze 234 (1876).
Iris sisyrinchium L. var. *minor* sensu Täckh., Stud. Fl. Egypt, ed. 2, 659 (1974).

Corm to 1.5 cm diam.; leaf usually solitary, sometimes two, 2 x 0.2-0.3 cm, linear, canaliculate, green above, paler below, often prostrate-coiled; stem 4-6 cm, usually simple, occasionally with 1-2 branches; bracts membranous, silvery-transparent; flowers 2-2.5 cm diam., pale greyish-blue; outer perianth-segments 1-2 x 0.4-0.5 cm, spreading-recurved, with a central yellow signal stripe and speckled or spotted darker; inner segments 1-1.5 x 0.2-0.4 cm, erect; style branches 5-6 mm, petaloid, shortly 2-fid at apex; capsule cylindrical-ellipsoid.

N, M, D, S, sandy and rocky places. Greece (Attica and Crete), Libya, Egypt.

3. **Gladiolus** L.

Perennials with corms; leaves equitant, ensiform, basal and cauline, the cauline reduced upwards, the upper bract-like; inflorescence spicate, simple or few-branched, distichous or secund; flowers zygomorphic; perianth-segments connate into a curved infundibuliform tube, ovate or lanceolate, usually with a narrow claw at the base; stamens 3, curved upwards and held beneath the upper, usually larger, perianth-segment; anthers extrorse, basifixed; ovary 3-locular, ovules many; style 3-branched, each branch expanded at the apex and papillose; fruit a dry capsule; seeds broadly pyriform, sometimes winged. About 180 species, East Mediterranean region, tropical African mountains, southern Africa.

1. **Gladiolus italicus** Mill., Gard. Dict., ed. 8, no. 2 (1768).
Syn. *Gladiolus segetum* Ker Gawl., Bot. Mag. 19: t. 719, (1804).

Plant to 1 m (in flower); corm flattened-globose, to 2 cm diam.; tunics fibrous; basal sheaths often tinged purple or reddish; leaves 3-6, erect, ensiform, the lowest 1.5-4 x 1-1.6 cm; inflorescence spicate, distichous, slightly zig-zag; spike lax with 5-15 flowers; bracts and bracteoles lanceolate, acute, the bract longer than the bracteole, the lowest almost leaf-like; flowers 3-5.5 cm, purple-red or bright pink; perianth-tube straight or very slightly curved; segments oblong-elliptic, the upper median slightly longer than the rest; the anther longer than the filament; capsule to 1 cm, broadly elliptic or subglobose.

O, M, S; barley fields, coastal and sandy plains. Mediterranean region, Sinai.

JUNCACEAE

Sven & Britt Snogerup

Perennial, usually rhizomatous, or annual herbs, glabrous or partly hairy; stems usually terete; leaves linear, the sheath closed or open, often auriculate; basal leaves sometimes reduced (cataphylls); inflorescence terminal, rarely pseudolateral; lower bracts usually herbaceous, each branch with membranous bract and adaxial prophyll; flower-bracteoles 2 or absent; flowers small, usually 2-8 mm, actinomorphic, hypogynous; perianth-segments 6, in 2 whorls, glumaceous, similar, free; stamens 6 in 2 whorls or inner whorl reduced; anthers 2-thecate, 4-sporangiate; pollen in tetrads; carpels 3, connate; ovary superior, 1-locular or 3-septate to 3-locular; style 1; stigmas 3; fruit a capsule; seeds 3 to many; endosperm starchy; embryo small; outer seed-coat hyaline, sometimes forming appendages, inner seed coat firm, brown to castaneous. 7 genera, *c.* 490 species, almost cosmopolitan, common from temperate to arctic regions, tropical mountains.

1. **Juncus** L.

Literature: Buchenau, F. 1890. Monographia Juncacearum. Bot. Jahrb. Syst. 12: 1-495.
Buchenau, F. 1906. Juncaceae in A. Engler, Das Pflanzenreich IV, 36 (25): 1-284.
Cutler, D. F. 1969. Juncales in C. R. Metcalfe, Anatomy of the Monocotyledons 4: 1-358. Oxford.
Snogerup, S. 1971. Juncaceae in K. H. Rechinger, Flora Iranica 75: 1-35. Graz.
Zahran, M. A., Kamal El-Din, H. & Boulos, S. 1972. Potentialities of fiber plants of Egyptian Flora in national economy. 1. *Juncus rigidus* C. A. Mey. and paper industry. Bull. Inst. Désert Égypte 22: 193-203.
Kirschner, J. *et al.* 2002. Juncaceae 1, 2, and 3. Species Plantarum: Flora of the World, parts 6, 7, 8. Canberra.

Perennial or annual herbs, totally glabrous; stems 1 or several; most basal leaves often bladeless or with small blade; leaves alternate, flat or terete; sheaths open, often with distinct auricles at the base of the blade; inflorescence borne singly, with a pair of bracteoles at the base of each flower, or in heads, without bracteoles; tepals 6 in 2 whorls, glumaceous, entire, persistent, ovoid to lanceolate; stamens 3-6; filaments filiform or flattened; ovary sessile; style 1; stigmas 3, filiform, twining; capsule many-seeded, usually ellipsoid to ovoid; outer seed coat scarious, sometimes forming 2 appendages; inner seed coat mostly brown, smooth to reticulate. About 315 species, almost cosmopolitan, rare in the tropics, with major diversity centres in western North America, Mediterranean region, Sino-Himalayan region, East Asia, southern Africa and Australasia.

1. Perennial, with conspicuous rhizomes or forming dense, rigid tussocks; leaves terete 2
\+ Annual, without rhizomes, with single stem or forming small tussocks; leaves flat or canaliculate 8

2. Leaves with conspicuous transverse septa 3
\+ Leaves not septate 4

3. Stem with only 1 leaf; long single leaf arising from short-shoots of the rhizome; leaves pluritubular 8. **J. punctorius**
\+ Stem with 3-5 leaves; long leaves absent from short-shoots of the rhizome; leaves unitubulose 9. **J. fontanesii** subsp. **pyramidatus**

4. Leaves acute but not pungent, with vascular bundles only in peripheric wall; flowers solitary, each with 2 involucral bracts 5
+ Leaves pungent, with vascular bundles in most of the transect; flowers in few-flowered heads, without involucral bracts 6

5. Stem leafy 4. **J. subulatus**
+ Stem leafless, with basal sheaths only 5. **J. inflexus**

6. Plant with strong, creeping and branching rhizome; inner tepals acute to obtuse, without wide apical auricles 3. **J. rigidus**
+ Plant densely caespitose, with abbreviated inconspicuous rhizome; inner tepals emarginate, with wide apical auricles 7

7. Capsule 4-6 mm, conical or obtuse at apex, with 80-120 seeds 1. **J. acutus**
+ Capsule 2.5-4 mm, pyramid-shaped at apex, with 25-75 seeds 2. **J. littoralis**

8. Flowers in lax inflorescences; inner tepals acute to apiculate; seeds 0.4-0.5 mm 6. **J. bufonius**
+ Flowers usually aggregate; inner tepals obtuse to acute; seeds 0.3-0.4 mm 7. **J. hybridus**

1. **Juncus acutus** L., Sp. Pl., ed. 1, 325 (1753).

Perennial 0.5-1.5 m, densely caespitose; rhizome abbreviated, inconspicuous; stems 2-6 mm thick, rigid, with 1-5 basal leaves; leaves 1.5-4 mm thick, shorter than stem, terete, pungent; vascular bundles distributed over most of the cross-section; auricles lacking; stems and leaves smooth or weakly striate; inflorescence 5-15 x 3-7 cm, usually dense, with many, few-flowered confluent heads; lowest 2 bracts leaf-like, pungent, the first 4-40 cm, including the sheath to 10 cm, forming an apparent prolongation of the stem; upper bracts small, not pungent, those of the heads ovate, light brown; tepals 2.5-4.5 mm, oblong, brown with broad hyaline margins, the inner with broad hyaline auricles and thus notched; capsule 3.5-6 mm, much exceeding the tepals, ± globose to ovoid or obovoid, glossy, straw-coloured to dark brown; seeds 1.1-2.5 mm, including the seed-coat, with 2 appendages.

Two subspecies occur in Egypt:

subsp. **acutus**

Capsule with conical apex, light to dark brown; inflorescence usually condensed; seeds 1.8-2.5 mm.

M, N, O, De, S; salt marshes, sand fields and dunes, Nile and canal banks. Coasts of western Europe, Mediterranean region, southwest Asia, Black Sea and southern Caspian region, introduced into Australia and New Zealand.

subsp. **leopoldii** (Parl.) Snogerup, Bot. Notiser 130: 187 (1978).
Syns. *Juncus leopoldii* Parl., Giorn. Bot. Ital. 2(1): 324 (1846).
Juncus acutus L. var. *leopoldii* (Parl.) Buchenau, Monogr. Junc. Cap. 421 (1875).

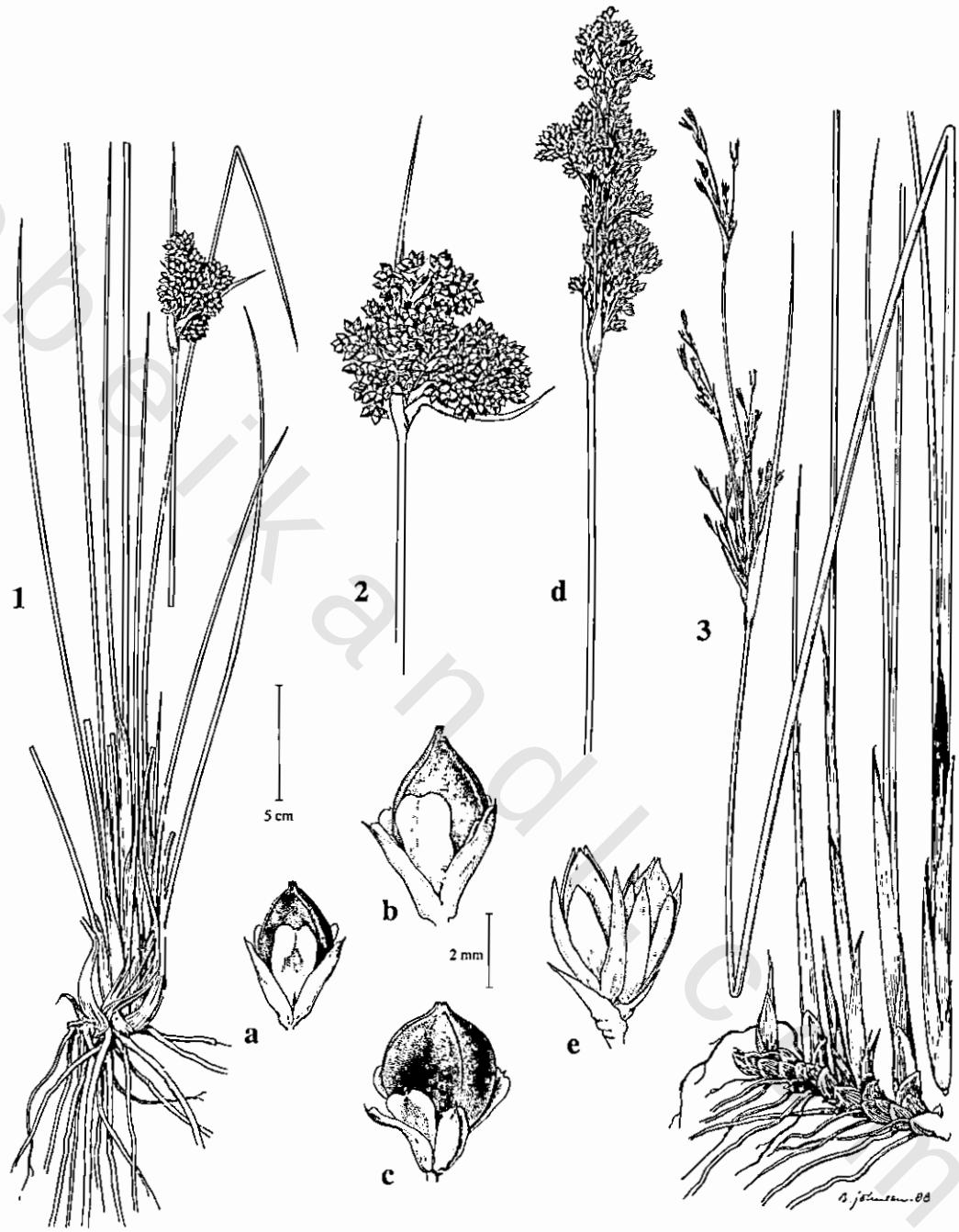


Plate 26. JUNCACEAE: *Juncus littoralis* 1, lower part and inflorescence; capsule (a). *Juncus acutus* 2, inflorescence; subsp. *acutus* (b), capsule with tepals; subsp. *leopoldii* (c), capsule with tepals. *Juncus rigidus* 3, habit; inflorescence (d); haed of two capsules (e). Drawn by Bent Johnsen.

oblikandlen

Capsule with obtuse to subconical apex, usually dark brown; inflorescence usually lax; seeds 1.1-1.4 mm.

O, Wadi Natrun; saline swamps and margins of watercourses. Atlantic Islands, Spain, Portugal, North Africa, northwest African coast, South Africa, temperate South America, western coast of Mexico, California, Nevada, Bermuda.

2. **Juncus littoralis** C. A. Mey., Verz. Pfl. Casp. Meer 34 (1831).

Perennial 0.5-1 m, densely caespitose; rhizome abbreviated, inconspicuous; stems 2-4 mm thick, rigid, with 2-6 basal leaves; leaves shorter than the stem, 1.5-3 mm thick, terete, pungent; vascular bundles distributed over most of the cross-section; auricles absent; stems and leaves smooth or weakly striate; inflorescence 5-20 x 2-7 cm, lax to ± dense, with 50-200 few-flowered heads; lowest 2 bracts leaf-like, pungent, with wide sheaths; the first 4-20 cm, including the sheath 2-7 cm, usually shorter than the inflorescence, forming an apparent prolongation of the stem; upper bracts small, those of the heads shorter than the flowers; tepals 2.5-3 mm, ovate to oblong, usually light brown below, dark brown to castaneous above, with broad scarious margins; outer tepals basally keeled and thickened by a spongy tissue; the inner usually higher, with broad apical auricles and thus notched; capsule 2.5-4 mm, exceeding the tepals, ± globose to trigonous-ovoid with a pyramid-shaped top, dark brown to castaneous above; seeds 1.5-2 mm including the seed-coat, with 2 appendages.

M, N, O (Wadi Natrun), De, (?S); sandy fields, dunes, canal banks, mostly in saline soils. Egypt, Palestine, northeast Spain, southern France, northern Italy, Greece, Black Sea coasts, south and southwest Caspian area, southern Anatolia.

3. **Juncus rigidus** Desf., Fl. Atlant. 1: 312 (1800).
Syns. *Juncus maritimus* Lam. var. *arabicus* Asch. & Buchenau in Boiss., Fl. Orient. 5: 354 (1882).
Juncus arabicus (Asch. & Buchenau) Adamson, J. Linn. Soc. Bot. 50: 10 (1935).

Perennial 0.5-1 m; rhizome to 1 cm thick, creeping, woody; often laxly caespitose by frequent rhizome forking; stems 2-5 mm thick, rigid, with 2-5 basal leaves; leaves shorter than the stem, 1.5-3 mm thick, terete, pungent; vascular bundles distributed over most of the cross-section; auricles absent; stems and leaves weakly striate; inflorescence 5-40 x 2-5 cm, lax, usually elongate, with (20-)50-150(-300) few-flowered heads; lowest 2 bracts leaf-like, pungent, with wide sheaths; the first 5-25 cm, including the sheath 2-5 cm, shorter than to much exceeding the inflorescence, forming an apparent prolongation of the stem; upper bracts small, those of the heads much shorter than the flowers; tepals 3.5-5 mm, narrowly ovate to oblong, acute to obtuse, light brown or, when young, herbaceous in central part, with broad scarious margins; capsule 3.5-5 mm, conspicuously exceeding or rarely equalling the tepals, narrowly trigonous-ovoid with a tapering trigonous apex, pale, light brown to straw-coloured; seeds 0.9-1.8 mm, including the seed-coat, with 2 appendages.

M, N, O, Dw, De, S, R; periodically or permanently wet depressions, margins of watercourses, salt marshes. Southern Anatolia, Cyprus, North Africa from Egypt to Morocco, Sinai, Palestine, Syria, Arabia, Iraq, Iran, Afganistan, southwest Pakistan, southern Africa.

NOTE: *Juncus rigidus* has been used for mat-making in Egypt since Neolithic times, and such mats were formerly widely spread in oriental countries, e.g. as prayer mats. Culms of this species were the most common writing implement in ancient Egypt. The seeds have been used as stomach medicine, like those of *J. acutus*. Recently, *J. rigidus* has also been tested as a potential raw material for the paper industry (Zahran *et al.* 1972). The plant is also grazed by camels, donkeys and goats in times of low fodder availability. The type of *Juncus maritimus* var. *arabicus* was collected in Sinai.

4. **Juncus subulatus** Forssk., Fl. Aegypt.-Arab. 75 (1775).
Syn. *Juncus multiflorus* Desf., Fl. Atlant. 1: 313 (1798), nom. illeg.

Perennial 0.3-1.2 m; rhizome to 6 mm thick, creeping and branching, with internodes 1-5 cm, mat-forming; stems 2-4 mm thick, smooth, with basal sheaths and 2-4 leaves; leaves to 60 cm, sometimes exceeding the inflorescence, terete, smooth, with vascular bundles only in subepidermal layer; central cavity with pith of asterisciform cells; auricles present; lowest bract 2-10 cm, shorter than the inflorescence; inflorescence 3-20(-40) cm, lax, many-flowered; flowers borne singly, with 2 involucral bracteoles; tepals 2.5-3.5 mm, equal, or outer slightly longer, ovate-lanceolate, the outer apiculate to acute, the inner obtuse, mucronate, pale light brown, with membranous margins; capsule 2.5-3 mm, ± equalling the perianth, trigonous-ovoid, obtuse with short mucro, dark castaneous-brown; seeds 0.5-0.7 mm, obliquely ovoid, slightly reticulate, apex appendiculate.

M, O, N, De; moist ground. Coastal areas of western and southern Europe, North Africa, including parts of the Sahara, eastern Black Sea and Caspian Sea regions, southwest and Central Asia.

NOTE: The type of *Juncus subulatus* was collected in Alexandria, Egypt, by Forsskål in April 1762, Forsskål no. 30 (C).

5. **Juncus inflexus** L., Sp. Pl., ed. 1, 326 (1753).

Perennial 0.5-1.2 m, densely caespitose; rhizome with very short nodes, stout; stems 1.5-3 mm thick, to 0.8-1 cm at the base, terete, leafless, with dark brown to castaneous basal sheaths, glaucous, with 10-22 conspicuous ridges; vascular bundles only in subepidermal layer, central cavity with interrupted pith of asterisciform cells; lowest bract usually 12-20 cm, much longer than the inflorescence; inflorescence 3-10 cm, pseudolateral, lax; flowers 30-100, solitary; tepals 3-4 mm, the outer usually longer, lanceolate, acuminate to apiculate, mostly castaneous with a broad green midrib, becoming stramineous in ripe fruit, the margins membranous; capsule 2.5-3.5 mm, trigonous-ovoid to ellipsoid, ± equalling the perianth, subacute, mucronate, pale brown to castaneous, often glossy; seeds 0.4-0.6 mm, obliquely ovoid, reticulate, without appendages.

S; wettest parts of wadis above 1500 m. Probably native throughout most of Eurasia, North and South Africa, introduced into North and South America, Java, Australia and New Zealand.

6. **Juncus bufonius** L., Sp. Pl., ed. 1, 328 (1753).

Annual 2-40 cm, caespitose or small 1-stemmed plants; stems erect to ± ascending, herbaceous, terete, thin, leafy throughout; leaves 1-12 cm, flat to subcanaliculate; auricles absent; upper leaves usually shorter than, or rarely exceeding the inflorescence;

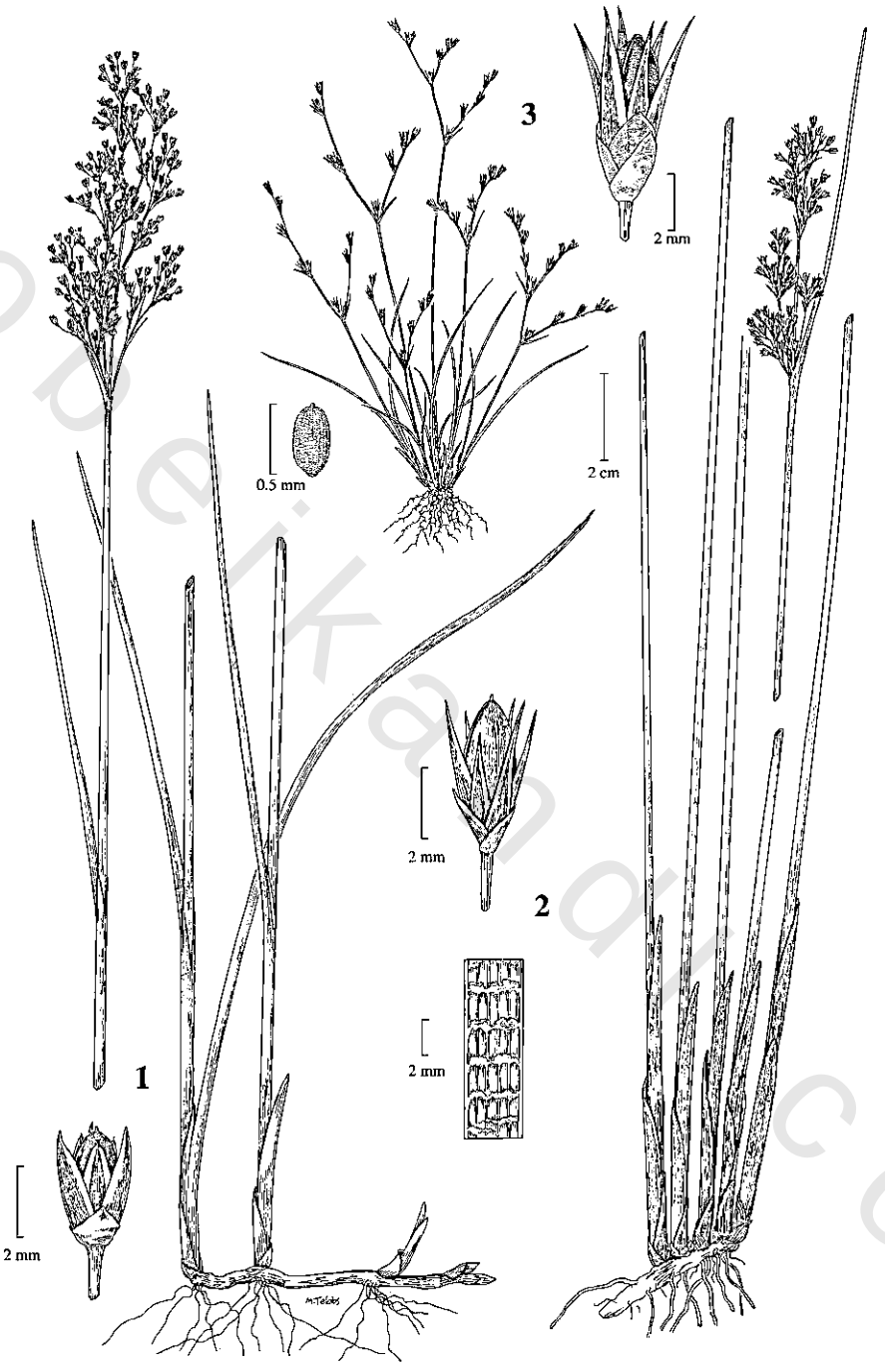


Plate 27. JUNCACEAE: *Juncus subulatus* 1, lower part and inflorescence; capsule with perianth and bracteoles (down left). *Juncus inflexus* 2, lower part and inflorescence; capsule with perianth and bracteoles (middle left); longitudinal section of stem showing the interrupted pith (down left). *Juncus bufonius* 3, habit; capsule with perianth and bracteoles (up right); seed (down left). Drawn by Margaret Tebbs.

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inflorescence 1/2-3/4 of plant height, usually lax, open, rarely contracted; branches erecto-patent; flowers solitary or seldom in few-flowered loose clusters; tepals 4-7 mm, unequal, lanceolate, the central band usually greenish, the margins broad, membranous; the outer tepals longer, acuminate; the inner acute to apiculate; stigmas 1-1.5 mm; capsule 3.5-5 mm, narrowly ovoid to subellipsoid, usually shorter than the inner tepals, acute to subacute, with a mucro 0.1-0.2 mm; seeds 0.4-0.5 mm, narrowly ovoid, almost smooth or very faintly reticulate, without appendages.

M, O, N, De, S; various permanently or temporarily wet places, irrigated fields and gardens. Cosmopolitan, though rare in tropical and arctic regions, uncertain where indigenous.

7. **Juncus hybridus** Brot., Fl. Lusit. 1: 513 (1804).
Syns. *Juncus mutabilis* Savi, Fl. Pis. 1: 364 (1798), nom. illeg., non Lam.
Juncus insulanus Viv., Fl. Cors. Prodr. 5 (1824).
Juncus ambiguus Guss., Fl. Sicul. Prodr. 1: 435 (1827).

Annual 5-20 cm, usually caespitose, seldom 1-stemmed; stems herbaceous, terete, leafy throughout; leaves 2-8 cm, 0.5-1 mm wide, flat to canaliculate, often equalling to exceeding the inflorescence; auricles absent in stem leaves, sometimes developed in lower bracts; lower bracts leaf-like, long; inflorescence usually 1/3-2/5 of plant height, many-flowered, of several 2-6-flowered fan-shaped clusters; tepals 4-7 mm, unequal, lanceolate, the central band pale green to stramineous, the margins broad, membranous, outer longest, acute to acuminate, the inner subobtuse to acute; stigmas 0.5-1 mm; capsule 3.5-4.5 mm, oblong-ellipsoid, subtrigonous, slightly shorter than inner tepals, subacute to obtuse; seeds 0.3-0.4 mm, ovoid, almost smooth or very faintly reticulate, without appendages.

M, N, O, De, S; open, temporarily or permanently wet soils in depressions and near watercourses, marshes, with fresh to brackish water. Probably native to southern Europe, Mediterranean region and southwest Asia, widespread and probably introduced into other warm temperate regions.

8. **Juncus punctorius** L. f., Suppl. Pl. 208 (1781).
Syns. *Juncus exaltatus* Decne., Ann. Sci. Nat. (Paris), sér. 2, 2: 16 (1834).
Juncus schimperi Hochst. ex A.Rich., Tent. Fl. Abyssin. 2: 338 (1851).

Perennial 0.4-1.1(-2.1) m, loosely caespitose, pale green; rhizome long, creeping, with internodes 0.5-2 cm; stems rigid; cauline leaf single, 20-40 cm, inserted in the upper part of the stem; separate rhizome leaves 0.5-1 m, all terete, plurituburlar, with a distinct central cavity, perfectly or imperfectly septate, septa distinct and visible externally; lower bract 1-3 cm, sheath-like, the blade reduced usually to 1 cm; inflorescence of 10-80 ± globose, 8-30-flowered heads on ± patent branches; tepals 2-2.5 mm, equal, ovate, acute to apiculate; capsule equalling to slightly exceeding the perianth, trigonous-ovoid, with a rostrum to 0.5 mm, dark brown, glossy; seeds *c.* 0.45 mm, ovoid, apiculate, 20-25-striate, without appendages.

N, S; near wells and permanent or temporary streams. Egypt, Palestine, Arabia, Iran, Pakistan, east, northeast and southern Africa.

9. **Juncus fontanesii** Gay. ex Laharpe subsp. **pyramidatus** (Laharpe) Snogerup in K. H. Rechinger, Fl. Iranica 75: 25 (1971).



Plate 28. JUNCACEAE: *Juncus hybridus* 1, habit; capsule with perianth and bracteoles (left). *Juncus punctorius* 2, lower part and inflorescence; capsule with perianth and bracteoles (middle left); cross-section of leaf (down left). *Juncus fontanesii* subsp. *pyramidatus* 3, habit; capsule with perianth (down right). Drawn by Margaret Tebbs.

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Perennial 25-60(-80) cm, densely to loosely caespitose; rhizome short; intravaginal shoots often present, above-ground stolons sometimes developed; stems 15-40 cm, erect to ascending; cauline leaves 3-5, 5-15 cm, 1.5-2.5 mm wide, unitubulose; auricles 1.5-3 mm, obtuse; lower bract 0.5-2.5 cm; inflorescence 5-7 cm, of 3-20 ± globose heads; heads 10-30-flowered; tepals 3-4 mm, ± equal, oblong-lanceolate, apiculate to acuminate, green to brownish, often suffused red, with narrow scarious margins; capsule 4.5-5 mm, narrowly pyramidal to subprismatic, conspicuously exceeding the perianth, gradually tapering to a rostrum 0.5-1.2 mm, pale brown to castaneous-brown; seeds 0.4-0.5 mm, pale brown.

O, N, S; open soils permanently or seasonally with fresh or slightly brackish water. Italy, Greece, Cyprus, Tunisia, Libya, Egypt, Palestine, Lebanon, Syria, Turkey, Iraq, Arabia.

PALMAE

L. Boulos

Trees, shrubs or climbers, bisexual, polygamous, monoecious or dioecious; stems usually covered with leaf-scars, unbranched or branched dichotomously; leaves usually with sheathing base; petiole sometimes armed with spines; blade pinnate, palmate or costapalmate (petiole extending into leaf-blade); leaflets of 1 or more folds; inflorescences axillary, solitary or grouped; flowers usually small, bisexual, unisexual or sterile male, 3-merous; tepals similar or differentiated into calyx and corolla, free or connate; stamens 3 to many, free or united; anthers basi-or dorsifixed; staminodes often present in female flowers; carpels usually 1-3, free, or ovary 3-celled; ovule 1 in each carpel or cell; fruit usually 1-seeded, rarely 2-10-seeded, usually with distinct epicarp, mesocarp and endocarp. About 200 genera, 2700 species, mainly in moist tropics and subtropics, a few in arid regions.

1. Leaves pinnate — 1. **Phoenix**
+ Leaves costapalmate — 2

2. Trunk dichotomously branched; petiole ligulate, armed; fruit to 8 x 6.5 cm, broadly cylindrical to subglobose — 2. **Hyphaene**
+ Trunk unbranched; petiole eligulate, unarmed; fruit to 4 x 3 cm, ovoid-ellipsoid — 3.**Medemia**

1. **Phoenix** L.

Literature: Täckholm, V. & Drar, M. 1950. Flora of Egypt 2. Bull. Fac. Sci., Cairo Univ. 28: 165-273.

Dioecious trees, solitary or clustered; trunk unbranched; leaves pinnate, the petiole armed with spines (modified leaflets); blade with numerous single-fold induplicate leaflets; inflorescence branched to 1 order; flowers borne singly in a spiral along the axis, each subtended by a bract; male flowers with 6 united tepals in 2 whorls; stamens 6, inserted on the inner tepals; female flowers with 3 outer tepals, connate into a cup; inner tepals 3, free, imbricate; staminodes 6, minute; carpels 3, free, with short recurved fleshy stigmas, usually only 1 carpel developing to fruit; fruit a berry, with smooth epicarp, fleshy mesocarp and thin membranous endocarp; seed 1, grooved longitudinally. About 15



Plate 29. PALMAE: *Phoenix dactylifera*, habit (down left); leaf-petiole: basal part armed with spines and upper part with leaflets (middle); female inflorescence bearing fruits (up left); male and female flowers (up middle); fruit showing seed and detached seed (down right). Drawn by Magdy El-Gohary.

species, Old World tropics and subtropics, extending to southern Europe and Aegean Islands.

1. **Phoenix dactylifera** L., Sp. Pl., ed. 1, 1188 (1753).

Dioecious trees to 25 m; trunk 30-60 cm diam., covered with old-leaf bases; crown of 25 leaves or more; leaves to 4.5 m, pinnate, stiff; petiole 0.5-1 m, armed with acanthophylls (spines) to 15 x 0.5 cm; leaflets *c.* 80 on each side of the rhachis, to 40 x 2 cm, stiff, sharply pointed; male inflorescence with peduncle to 60 cm; prophyll 35-45 x 8-12 cm; rachillas numerous, 20-30 cm; male flowers with calyx *c.* 2 mm; petals *c.* 8 x 3 mm; pistillode very small; flowering female inflorescence similar to the male, but growing into large fruit-bearing structure after anthesis; female flowers 4-5 mm diam., globose; calyx *c.* 2 mm; petals *c.* 4 x 4 mm, ± circular; carpels 2-3 mm; fruit 3-8 x 2-4 cm, of variable shapes, yellow, red, orange-brown to brownish-black; mesocarp fleshy, sweet, thick, or thinner and dry; seed 1.5-5 x 0.4-1 cm, with a conspicuous longitudinal furrow.

N, O, M, D, R, GE, S; alluvial and sandy soils, Nile and canal banks, fields; subspontaneous and cultivated. Native country unknown, possibly the oases of the Sahara, widely cultivated in the Middle East and dry regions of Africa, introduced into California, Queensland, Australia and elsewhere.

NOTE: Date palm, *Phoenix dactylifera,* constitutes one of the major features of the landscape in Egypt, whether in the Nile Valley, Delta or the oases. It represents one of the principal cash crops in the oases and some other regions in the Nile Valley with important date palm plantations. Apart from dates, practically every part of the tree is used, *e.g.* as building material, for making baskets, mats, cages, ropes, chairs, tables, beds, etc.

2. **Hyphaene** Gartn.

Literature: Täckholm, V. & Drar, M. 1950. Flora of Egypt 2. Bull. Fac. Sci., Cairo Univ. 28: 273-296.

Dioecious trees; trunk usually dichotomously branched, sometimes unbranched or prostrate; leaves costapalmate, sometimes asymmetrical; petiole usually long, semi-circular in cross-section, ligulate, armed; blade divided for ± 2/3 of its length into induplicate segments, with fibres between the segments; male and female inflorescences ± similar, but the male usually more slender and much branched than the female; male flowers in groups of 3, embedded in hairs, outer tepals 3, united into a tube below; inner tepals 3, united into a tube with imbricate lobes; stamens 6, inserted at the base of inner tepals; anthers basifixed; pistillode minute; female flowers solitary in the axil of each bract, much larger than the male, outer 3 and inner 3 tepals similar, free, imbricate, rounded; staminodal ring with 6 teeth, each tipped with minute empty anther; ovary globose, with 3 apical triangular subsessile stigmas, 3-celled, usually only 1 ovule developing; fruit borne on the enlarged pedicel; epicarp sometimes pitted; mesocarp fibrous; endocarp hard, bony. About 40 species, tropical and subtropical Africa, Madagascar, Palestine, Sinai, Arabia, southern Asia.

1. **Hyphaene thebaica** (L.) Mart., Hist. Palm. 3: 225, t. 131-133 (1838-1845).
   Syns. *Corypha thebaica* L., Sp Pl., ed. 1, 1178 (1753).
   Cucifera thebaica Delile Descr. Egypte, Hist. Nat. 145 (1814) t. 1, 2 (1826).
   Hyphaene sinaitica Furtado, Garden's Bull., Singapore 25: 306, f. 3 (1970).

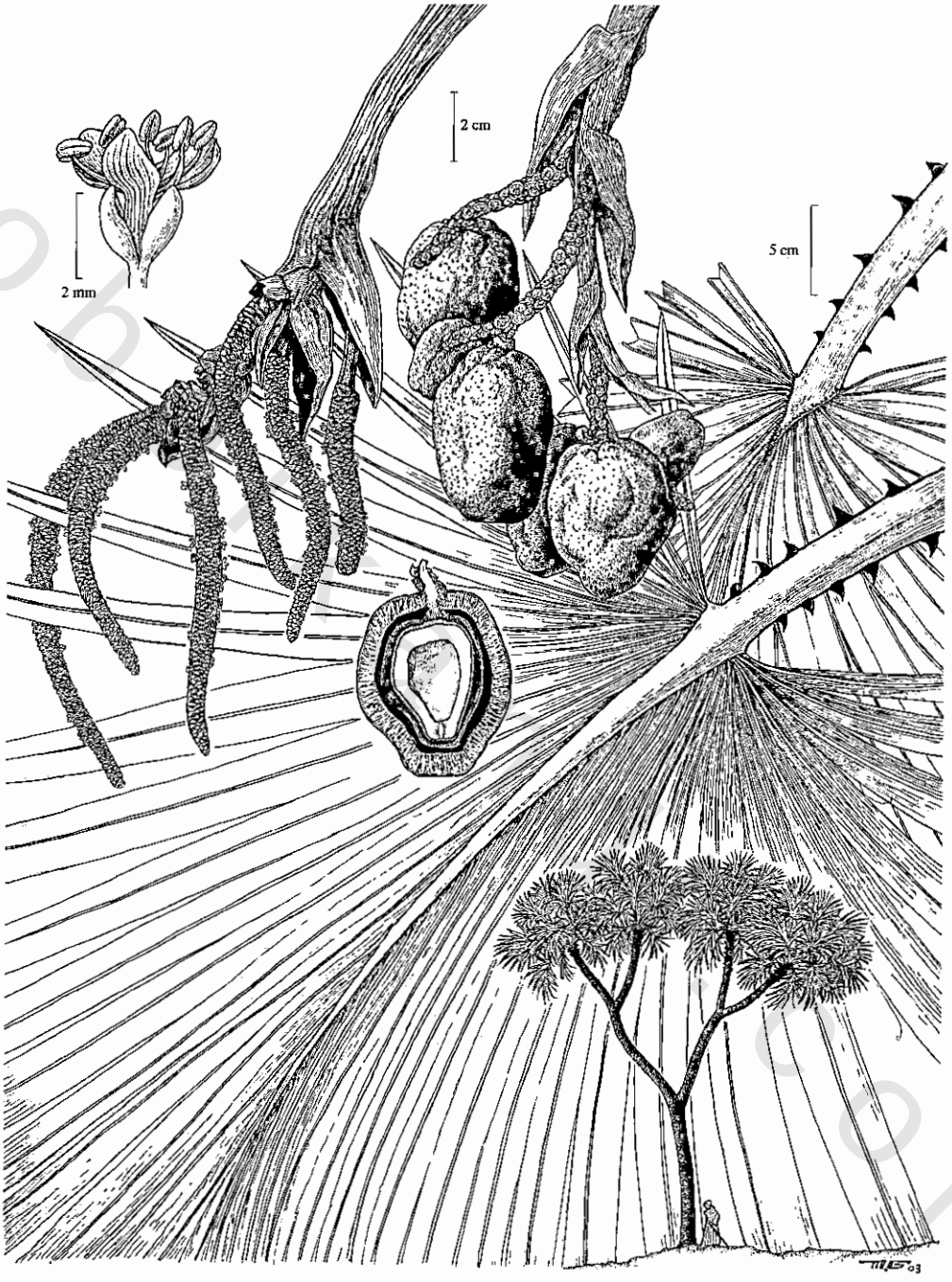


Plate 30. PALMAE: *Hyphaene thebaica*, habit (down right); leaf: upper surface (up right), lower surface (middle right); male inflorescence and male flower (up left); female inflorescence bearing fruits (up right); longitudinal section in fruit (middle). Drawn by Magdy El-Gohary.

Dioecious tree 5-15(-20) m; trunk 30-40 cm diam., dichotomously branched; crowns of 15-25 crowded fan-shaped leaves at the tips of branches; blades to 1 m diam., costapalmate, lobes 20-25, linear-lanceolate, acute; petiole 40-60 cm, ligulate, armed; male and female inflorescences similar; male flowers in groups of 3; female flowers solitary, ovary 3-locular, only 1 locule fertile; staminodes 6; fruit 5-8 x 4.5-6.5 cm, broadly cylindrical to subglobose, bumpy; epicarp smooth; mesocarp fibrous, sweet; endocarp hard, bony; seed 3-4 x 2.5-4 cm, ovoid-globose.

N (mainly Qena, Aswan, Nubia), O, De, R, S; alluvial and sandy soils. Egypt, Palestine, Arabia, Sudan, Ethiopia, Eritrea, Djibouti, Somalia.

NOTE: *Hyphaene thebaica* is often cultivated as an ornamental palm. The fruits are used in traditional medicine, a soft drink is made from the mesocarp.

3. **Medemia** (Mart.) Württemb. ex H. Wendl.

Literature: Täckholm, V. & Drar, M. 1950. Flora of Egypt 2. Bull. Fac. Sci. Cairo Univ. 28: 296-302.
Boulos, L. 1968. The discovery of *Medemia* palm in the Nubian Desert of Egypt. Bot. Notiser 121: 117-120.
Uhl, N. W. & Dransfield, J. 1987. Genera Palmarum 229-230. Allen Press, Lawrence, Kansas.
Gibbons, M. & Spanner, T. W. 1996. *Medemia argun* Lives. Principes 40 (2): 65-74.

Dioecious robust trees; trunk solitary, erect, unbranched, ringed with close leaf-scars; leaves costapalmate; petiole eligulate, unarmed; blade divided ± regularly into single-fold segments; inflorescences interfoliar, becoming pendulous; male inflorescence branched, bearing 1-7 rachillae at the tips of branches; female inflorescence bearing 1 rachilla; rachillae catkin-like, each bearing a spiral of rounded imbricate densely hairy bracts; male flowers 3 together, each with a spathulate membranous bracteole; calyx 3-lobed; corolla 3-lobed; stamens 6, borne at the base of the corolla-lobes; filaments elongate; anthers medifixed; pistillode small, 3-lobed; female flowers solitary, on a densely hairy pedicel, elongate after anthesis; sepals 3, imbricate, membranous; petals 3, similar to sepals; ovary globose; stigmas recurved; fruit ellipsoid-ovoid, on the elongate pedicel, usually developed from only 1 carpel; epicarp smooth, shiny, marked with scattered lenticels; mesocarp spongy and fragrant at maturity, later dry; endocarp thin, crustaceous; seed ellipsoid. 1 species, oases of Nubian Desert of southern Egypt and northern Sudan.

1. **Medemia argun** (Mart.) Württemb. ex H. Wendl., Bot. Zeit. 39: 90, 93 (1881).
Syns. *Hyphaene argun* Mart., Hist. Nat. Palm. 3: 227 (1838).
Medemia abiadensis H. Wendl., Bot. Zeit. 39: 93 (1881).

Dioecious robust solitary tree, 6-12 m; trunk 30-40 cm diam., unbranched, conspicuously ringed; crown of 25-50 leaves; leaves costapalmate; petiole eligulate, unarmed, with deeply split base; leaf-blade 0.9-1.2 m diam., very leathery, light green, divided ± regularly into single fold segments; open segments 2-3 cm broad (folded 1-1.5 cm); male flowers 3 together, each with a bracteole *c.* 5 x 3 mm, spathulate, acute, membranous; calyx 3-lobed, the lobes *c.* 3 x 2 mm; stamens 6, borne at the base of the corolla-lobes; filaments *c.* 3 mm; anthers *c.* 2 x 1 mm, medifixed; pistillode *c.* 1 mm, 3-lobed; female flowers solitary, on a densely hairy pedicel, elongate after anthesis; sepals 3, broadly ovate, imbricate; petals similar to sepals; ovary globose; stigmas recurved, very short; fruit to 4 x 3 cm, ovoid-ellipsoid; epicarp smooth, marked with scattered lenticels, dark

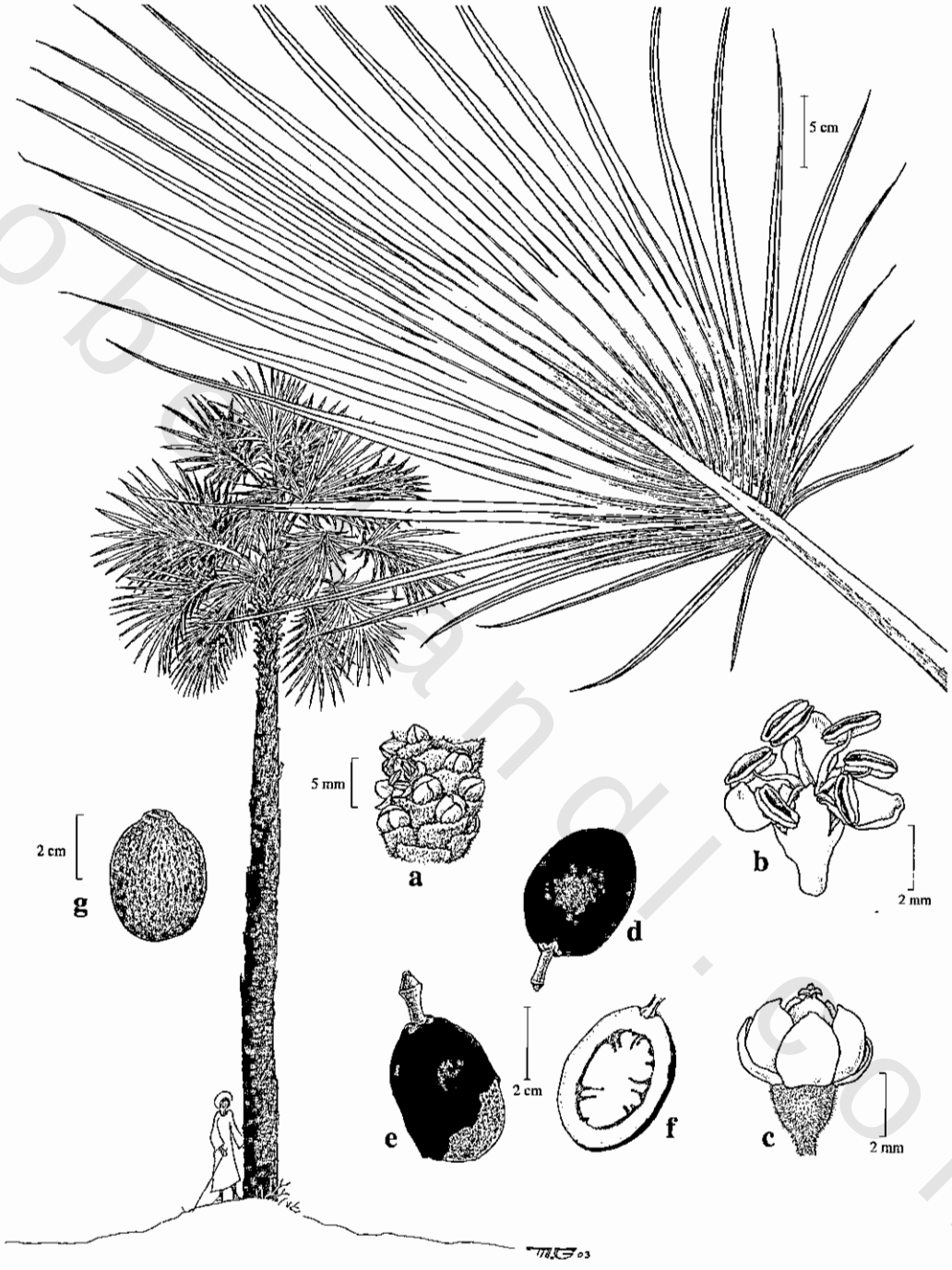


Plate 31. PALMAE: *Medemia argun*, habit (down left); leaf (up right); part of male inflorescence (a); male flower (b); female flower (c); fruit (d); fruit with part of epicarp removed (e); longitudinal section in fruit (f); fruit with all epicarp removed (g). Drawn by Magdy El-Gohary.

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purple to blackish, shiny; mesocarp spongy and fragrant, later dry; seed *c.* 3 x 2.5 cm, broadly ellipsoid.

O (Dungul and Nakhila); sandy soil. Distribution as for the genus.

NOTE: Täckholm & Drar (1950) gave an account of *Medemia argun* in ancient Egypt. Subfossil fruits were frequently found in ancient Egyptian tombs, dating back as far as the 5th Dynasty. The palm has not been recorded in the living state in Egypt until it was discovered in 1963 (Boulos, 1968). The palm has not been reported from Sudan since 1907. Uhl & Dransfield (1987) suggest that the palm appears to be on the verge of extinction if not already extinct, but in 1995 Gibbons & Spanner discovered a substantial population in Sudan (Gibbons & Spanner, 1996). Rafik Khalil and Dina Ali visited Dungul Oasis in the Nubian Desert of Egypt in April 2005 and reported several *Medemia* palms, of which two were bearing fruits (see colour photograph, p. 432)

ARACEAE

L. Boulos

Herbaceous perennials, terrestrial with rhizomes or tubers, or epiphytic, climbers or aquatics; leaves alternate, 1 to many, petiolate; petiole often with distinct basal sheath; blade simple or variously lobed; venation pinnate, pedate, palmate or rarely parallel; inflorescence a fleshy spadix, subtended by a bract-like spathe; spadix uniform with bisexual flowers, or monoecious with pistillate flowers at the base and staminate flowers above; sterile flowers often present; flowers numerous, minute, sessile, ebracteate; tepals 4-9, free or ± united, or forming cup-shaped perianth, or 0; stamens free or united into synandria; anthers sessile or on filaments, opening by lateral or apical slits or pores; ovary superior, 1 to many-celled, each cell with 1 to many ovules; stigma sessile, or on short conical style; fruit a berry, 1 to many-seeded; seeds minute to large; endosperm present or absent. About 110 genera, 2500 species, mainly humid tropics, some in subtropical, dry and temperate regions.

1. Free-floating aquatic	1. **Pistia**
+ Terrestrial	2
2. Leaves pedately dissected	4. **Eminium**
+ Leaves undivided	3
3. Leaves ovate-cordate to sagittate	2. **Arisarum**
+ Leaves linear to linear-lanceolate	3. **Biarum**

1. **Pistia** L.

Aquatic perennials, floating, stemless, with fibrous roots; reproducing vegetatively by stolons; leaves in a basal rosette, subsessile, pubescent, with parallel primary veins; inflorescence inconspicuous, hidden among leaf-bases; spathe tubular, the apical part erect, expanded; spadix reduced, adnate to spathe; flowers unisexual; perianth 0; male flowers 2-8, 1-seriate, on a short stipe, subtended by a basal cup, each flower of 2 united stamens in a synandrium; female flower 1, basal; ovary 1-celled; ovules numerous; style curved; fruit thin-walled, dehiscing by irregular splits; seeds numerous. 1 species, pantropical.

1. **Pistia stratiotes** L., Sp. Pl., ed. 1, 963 (1753).

Aquatic herbaceous perennial, floating, with fibrous roots; reproducing vegetatively by stolons; leaves 5-15 x 3-8 cm, oblong-oblanceolate, the apex rounded to truncate; pale green and more densely pubescent on the lower surface; main veins 5-8, winged beneath; spathe 1-1.4 cm, whitish-green, pilose; fruit 5 x 3 mm; seeds *c.* 2 x 1 mm, reddish-brown.

N; slow-flowing canals, pools. Pantropical.

NOTE: *Pistia stratiotes* was formerly restricted in Egypt to Fariskur in the Nile Delta. It has recently been recorded from several localities in the canals of northern regions of the Nile Delta, also reaching Embaba, near Cairo.

2. **Arisarum** Mill.

Herbaceous perennials, with tubers or rhizomes; leaves few, basal, appearing with the flowers, ovate-cordate to sagittate, long-petiolate, with a short basal sheath; scape purple-spotted, ± equalling the leaves; spathe marcescent; tube oblong; spadix shorter or equalling spathe and adnate to it at base; flowers unisexual; perianth 0; pistillate flowers 3-5, at base of spadix; staminate flowers just above the female in a lax spike; sterile flowers 0; staminate flowers short-pedicellate; stamen 1; anthers horseshoe-shaped; thecae dehiscing longitudinally; pistillate flowers with 1-locular ovary; ovules many; style conical; stigma hemispherical; berries aggregated; seeds ovoid. 3 species, Mediterranean region, Sinai.

1. **Arisarum vulgare** Targ. Tozz., Ann. Mus. Firenze 2(2): 67 (1810).
Syns. *Arum arisarum* L., Sp. Pl., ed. 1, 966 (1753).
Arum incurvatum Lam., Fl. Fr. 3: 538 (1778).
Arum veslingii Schott, Syn. Aroid. 4 (1856).
Arum libani Schott, Prodr. Syst. Aroid. 21 (1860).
Arum vulgare Targ. Tozz. var. *veslingii* (Schott) Engl. in A. & C. DC., Monogr. Phan. 2: 563 (1879).

Herbaceous perennial 15-25 cm; tuber 2-3.5 x 1.5-2 cm, ovoid; leaves 12-20 cm; petiole 8-12 cm, subterete, purple-spotted; blade 6-12 x 5-10 cm, ovate-cordate to -sagittate, apiculate; scapes 12-20 cm, purple-spotted; spathe 6-8 cm, cylindrical, with whitish and purplish longitudinal stripes; tube of the spathe as long as or slightly longer than the limb; spadix 5-7 cm, slender, curved upwards, exserted from the tube of spathe; pistillate flowers 3-7; staminate flowers 25-40; seeds 2-6, ovoid.

M, S; sandy soil. Mediterranean region, Sinai.

3. **Biarum** Schott, nom. conserv.

Herbaceous perennials, tuber globose, ovoid or discoid; tuber scarious scale-leaves conspicuous, concealing base of leaves and inflorescence; leaves all basal, usually, appearing after flowering, petiolate, entire; scape short; spathe withering before the fruit is ripe, the lower part with margins united to form a tube; spadix with a long appendage; flowers unisexual; perianth 0; female flowers widely separated from the male; sterile flowers usually present between male and female, or above the male; stamens 1-2; ovary 1-locular, 1-ovulate; berry 1-seeded, white or pale green, sometimes striped with purple.

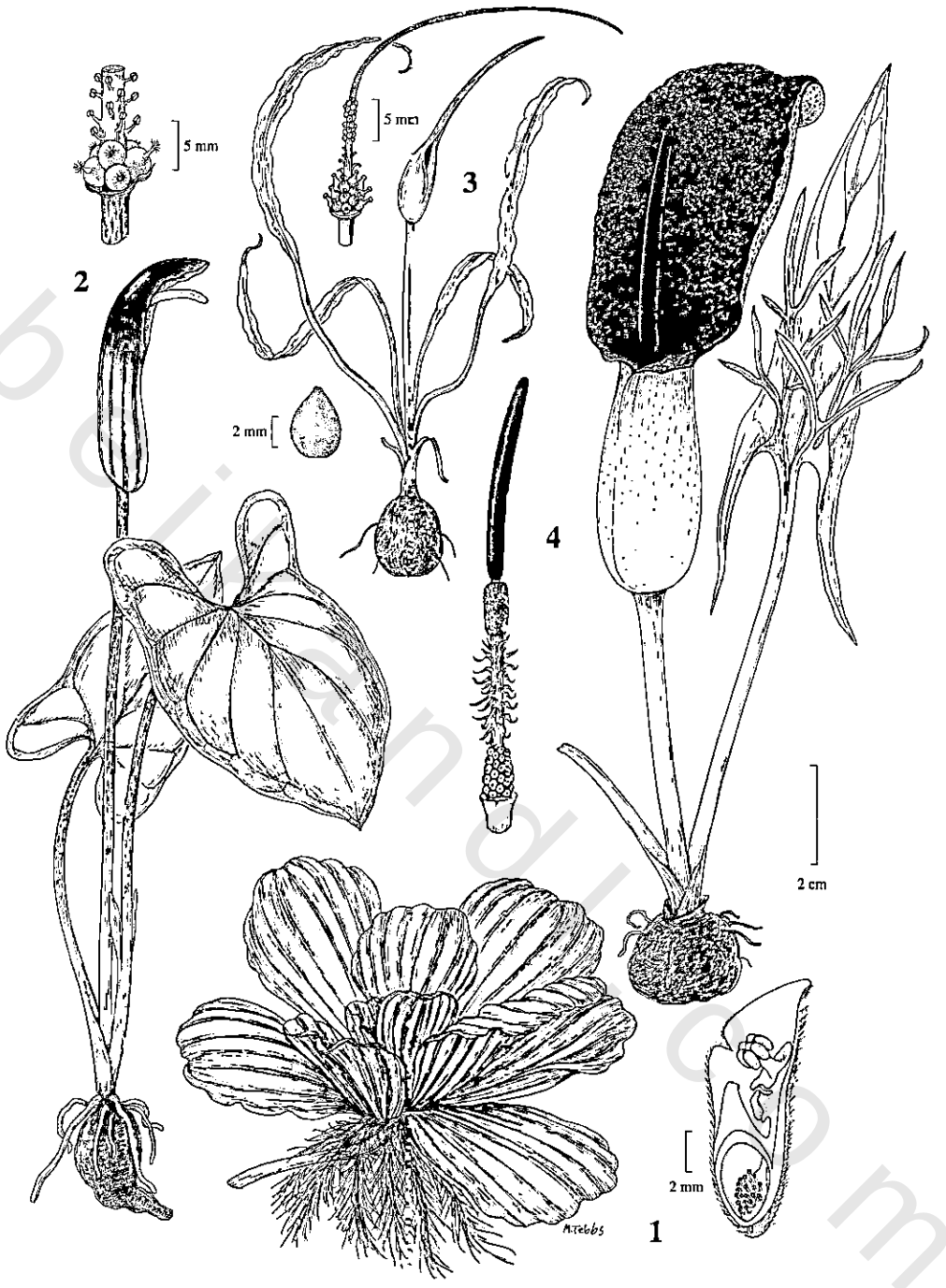


Plate 32. ARACEAE: *Pistia stratiotes* 1, habit; inflorescence (right). *Arisarum vulgare* 2, habit; lower part of inflorescence (up). *Biarum olivieri* 3, habit; inflorescence (up within). *Eminium spiculatum* 4, habit; inflorescence (left). Drawn by Margaret Tebbs.

About 15 species, Mediterranean region, southwest Asia.

1. **Biarum olivieri** Blume, Rumphia 1: 115 (1836).
Syns. *Biarum alexandrinum* Boiss., Diagn. Pl. Orient., ser. 1, 13: 6 (1853).
Biarum bovei sensu Täckholm, Stud. Fl. Egypt, ed. 2, 766 (1974), non Decne. (1835).
Ischarum alexandrinum (Boiss.) Schott, Syn. Aroid. 8 (1856).
Ischarum olivieri (Blume) Schott, Syn. Aroid. 8 (1856).
Leptopetion alexandrinum (Boiss.) Schott, Gen. Aroid., t. 8 (1858).

Herbaceous perennial 15-25 cm; tuber 1.5-2.5 cm diam., globose to ovoid; leaves 4-8; blade 12-18 x 0.2-1 cm, linear to linear-lanceolate, the margins slightly undulate; tube of spathe 1.5-2 x 0.8-1 cm, ovoid, whitish outside, purple inside, the margins connate upwards; limb of spathe 3-7 cm, linear-subulate, green or brownish; appendage of spadix 5-7.5 x 0.2 mm, slender, brownish-purple, with lighter spots; zone of pistillate flowers *c.* 1 x 0.8 cm, ovoid; zone of staminate flowers 0.6-1 x 0.4 cm, cylindrical; interspace between male and female flowers *c.* 1.5 x 0.3 cm, without or with few rudimentary sterile flowers; berry 5 x 4 mm, ovoid.

M, S; sandy soil. Egypt, Palestine.

4. **Eminium** (Blume) Schott

Herbaceous perennials; tuber flattened; leaves all basal, appearing before the flowers, long-petiolate, sheathing at base; blade hastate or pedatipartite; spathe marcescent, the basal part convolute into an ovoid-oblong tube; limb oblong to ovate-oblong, erect; spadix shorter than the spathe, elongate into a cylindrical appendage; flowers unisexual; perianth 0; pistillate flowers at the base of spadix; staminate flowers above; sterile flowers between male and female flowers; anthers 2; ovary 1-locular, 2-ovulate; stigma hemispherical; berry usually 1-seeded. 5 species, Mediterranean region, Sinai to Central Asia.

1. **Eminium spiculatum** (Blume) Schott, Synops. Aroid. 17 (1856).
Syns. *Arum spiculatum* Blume, Rumphia 1: 121 (1836).
Arum crassipes Boiss., Diagn. Pl. Orient., ser. 1, 13: 9 (1853).
Helicophyllum crassipes (Boiss.) Schott, Synops. Aroid. 22 (1856).
Eminium spiculatum (Blume) Schott var. *albo-virens* Engl., Pflanzenr. 73, IV, 23F: 131 (1920).
Eminium spiculatum (Blume) Schott subsp. *negevense* Koach & Feinbrun, Fl. Palaest. 4: 397 (1986).

Herbaceous perennial 25-40 cm; tuber 3-6 cm diam., depressed-globose; leaves 3-6, 20-35 cm; petiole 15-25 cm; blade pedatipartite; terminal lobe 5-8 x 2.5-5 cm, oblong-lanceolate, acute; lateral lobes 4-6, linear-lanceolate, undulate; scape 10-20 cm; spathe 20-25 cm, the basal part convolute into an oblong tube 6-8 x 2-3 cm, whitish-green outside, often with purplish spots; spathe-limb 6-10 x 4-6 cm, oblong-ovate, fleshy, dark purple, warty inside; appendage of spadix 6-8 x 0.5-0.8 cm, dark purple; interspace between pistillate and staminate flowers 5-6 cm; sterile flowers subulate-filiform; pistillate flowers yellowish, tuberculate; stigma sessile; staminate flowers sessile, orange-yellow; berries usually 1-seeded, white-reticulate.

M, S; sandy soil. Egypt, Palestine, Lebanon, Syria, Turkey, Iraq, Iran.

NOTE: The flowers emit an unpleasant smell which attracts beetles and flies. Feinbrun-Dothan, Fl. Palaest. 4: 397 (1986) enumerates two subspecies of *Eminium spiculatum:* subsp. *spiculatum* and subsp. *negevense* Koach & Feinbrun which seem to be variants from different habitats, resulting in different sizes of plants.

LEMNACEAE

L. Boulos

Plants reduced to small or minute leaf-like fronds, of which 2 or more together float on or below the water surface, propagation mostly vegetative by budding of daughter fronds from 1 or 2 reproductive pouches at the base of the frond; flowering and fruiting are rare in most species; fronds consist of a lower and upper epidermis and several layers inbetween, with conspicuous air spaces (except in *Wolffia*), with 0-21 veins and 0-21 roots originating at the node on the lower surface of the frond; roots surrounded at the base by a tubular sheath and enclosed by a cap at tip; no root hairs present; flowers 1-2 per frond, bisexual, petals 0; stamens 1-2; ovary bottle-shaped, with 1-7 ovules; style short; stigma funnel-shaped; ovules with 2 integuments; fruit 1-5-seeded, with a dry pericarp; seed ovoid, ribbed or smooth. 4 genera, 37 species, widely distributed, but especially in South America, southern Africa, southeast Asia and Australia.

1. Fronds rootless, veinsless — 3. **Wolffiella**
\+ Fronds with 1-21 roots, 1-21-veined — 2

2. Roots 1 per frond; veins 1-5(-7) — 2. **Lemna**
\+ Roots 2-21 per frond; veins 3-21 — 1. **Spirodela**

1. **Spirodela** Schleid.

Fronds ovate, suborbicular or lanceolate, floating on water surface; under favourable conditions producing rootless turions which sink to bottom of water body; roots 2-21; veins 3-21; frond tissue with anthocyanins and pigment cells; fronds surrounded at base by a 2-segment scale-like leaflet (prophyllum) covering the point of attachment of roots; ovary with 1 amphitropous or 2-5 anatropous ovules. 3 species, 1 in South and Central America, 2 of worldwide distribution.

1. Roots 7-21, of which 1(-2) perforate the prophyllum — 1. **S. polyrhiza**
\+ Roots 2-5, all perforating the prophyllum — 2. **S. punctata**

1. **Spirodela polyrhiza** (L.) Schleid., Linnaea 13: 392 (1839).
Syns. *Lemna polyrhiza* L., Sp. Pl., ed. 1, 970 (1753).
Lenticula polyrhiza (L.) Lam., Fl. Fr., 2: 189 (1778).
Lemna orbicularis Kit. ex Schult., Österr. Fl., ed. 2, 1: 64 (1814).
Lemna obcordata P. Beauv., J. Phys. Chim. Hist. Nat. Elément. 82: 113 (1816).
Lemna thermalis P. Beauv., J. Phys. Chim. Hist. Nat. Elément. 82: 102 (1816).

Lemna orbiculata Roxb., Fl. Ind., ed. 1832, 3: 565 (1832).
Lemna bannatica Waldst. & Kit. ex Schleid., Linnaea 13: 392 (1839).
Thelmatophace polyrhiza (L.) Godefroy, Flor. Lorr. 3 (1843).
Lemna major C. A. Mey. ex Griff., Not. Pl. Asiat. 3: 216 (1851).
Lemna transsylvanica Schur, Enum. Pl. Transsilv. 635 (1866).
Thelmatophace orbicularis Schur, Enum. Pl. Transsilv. 635 (1866).
Lemna polyrhiza L. var. *concolor* Kurz, J. Bot. 5: 115 (1867).
Spirodela atropurpurea Montandon, Guid. Bot. 309 (1868).
Lemna maxima Blatt. & Hallb., J. Indian Bot. 2: 49 (1922).
Spirodela maxima (Blatt. & Hallb.) McCann, J. Bombay Nat. Hist. Soc. 43: 158 (1942).
Spirodela polyrhiza L. var. *masonii* Daubs, Monogr. Lemnac., 13 (1965).

Free floating aquatic; fronds 1.5-9 x 1.5-8 mm, rounded or pointed at the tip, varying from 1 to 1 1/2 times as long as broad, thin, rarely gibbous, sometimes with red pigmentation on the lower surface and along the margins, with 7-12 prominent veins; roots 7-21, of which 1(-2) perforate the prophyllum; turions small, orbicular to reniform, brownish to olive-green, rootless, sinking to bottom of water body; fruit 1-1.5 x 1-1.2 mm, winged at the edges and near the top; seeds 1(-2) per fruit, 0.7-1 x 0.7 mm, 12-20-ribbed.

N, M; ponds, ditches and canals with slow-flowing water, rice fields. Tropical and warm regions of the world.

2. **Spirodela punctata** (G. Meyer) C. H. Thomps., Annual Rep. Missouri Bot. Gard. 9: 28 (1898).
Syns. *Lemna punctata* G. Meyer, Prim. Fl. Esseq. 262 (1818).
Lemna oligorrhiza Kurz, J. Linn. Soc., Bot. 9: 267 (1866).
Lemna melanorrhiza F. Muell. ex Kurz, J. Bot. 5: 115 (1867).
Lemna pleiorrhiza F. Muell. ex Kurz, J. Bot. 5: 115 (1867).
Spirodela oligorrhiza (Kurz) Hegelm., Lemnac. 147 (1868).
Spirodela oligorrhiza (Kurz) Hegelm. var. *genuina* Hegelm., Lemnac. 148 (1868).
Spirodela oligorrhiza (Kurz) Hegelm. var. *melanorrhiza* (F. Muell. ex Kurz) Hegelm., Lemnac. 148 (1868).
Spirodela oligorrhiza (Kurz) Hegelm. var. *pusilla* Hegelm., Lemnac. 149 (1868).
Spirodela oligorrhiza (Kurz) Hegelm. var. *pleiorrhiza* (F. Muell. ex Kurz) Hegelm., Lemnac. 149 (1868).
Spirodela oligorrhiza (Kurz) Hegelm. var. *javanica* Bauer ex Hegelm., Lemnac. 150 (1868).
Spirodela melanorrhiza (F. Muell. ex Kurz) Hegelm., Bot. Jahrb. Syst. 21: 287 (1895).
Spirodela pusilla (Hegelm.) Hegelm., Bot. Jahrb. Syst. 21: 287 (1895).
Spirodela pleiorrhiza (F. Muell. ex Kurz) Hegelm., Bot. Jahrb. Syst. 21: 288 (1895).
Spirodela javanica (F. A. Bauer ex Hegelm.) Hegelm., Bot. Jahrb. Syst. 21: 288 (1895).
Lemna pusilla (Hegelm.) Daubs, Monogr. Lamnac. 14 (1965).

Like *Spirodela polyrhiza,* but fronds 2-5 x 1-3 mm, obovate to reniform, obscurely 3-5-nerved; roots 2-5 per frond, all perforating the prophyllum.

N (Cairo region); stagnant water. Tropical and warm regions of the world.

2. **Lemna** L.

Aquatics, fronds floating on or below water surface, ovate, to oblong-lanceolate, two or more often cohering to form chains; daughter fronds budding from lateral pocket; veins 1-5(-7); no pigment cells present; crystal cells with raphids present; 1 root per frond; fronds not surrounded by a leaflet at base; floral pocket lateral, with spathe enclosing 2 staminate and 1 pistillate flowers; fruit 1-6-seeded; seeds ribbed. About 12 species, cosmopolitan but especially America.

1. Root-sheath laterally winged; root-cap sharply pointed; root to 3 mm; fronds lacking reddish colour 2. **L. aequinoctialis**
\+ Root-sheath unwinged; root-cap rounded; root usually longer than 3 mm; fronds usually with a reddish tinge or spots of anthocyanin 2

2. Lower surface of the frond often reddish and gibbous; veins 4-5(-7), originating independently from the node; ovary 1-7-ovulate 1. **L. gibba**
\+ Lower surface of the frond not reddish, or gibbous; veins usually 3; ovary 1-ovulate 3. **L. minor**

1. **Lemna gibba** L., Sp. Pl., ed. 1, 970 (1753).
Syns. *Lenticula gibba* (L.) Moench, Meth. 319 (1794).
Lenticula gibbosa Renault, Fl. Dep. Orne 40 (1804).
Telmatophace gibba (L.) Schleid, Linnaea 13: 391 (1839).
Telmatophace gibbosa (Renault) Montand, Guid. Bot. 308 (1868).
Lemna cordata Sessé & Moc., Pl. N. Hispan. La Naturaleze, ser. 2(1) App. 159 (1890).
Lemna parodiana Giardelli, Notas Mus. La Plata 2 (12): 97-100 (1937).

Free-floating aquatic; fronds 3-6 x 2-5 mm, broadly ovate, asymmetric, yellowish-green on the upper surface; vegetative and flowering fronds similar; lower surface of the frond to 4 mm thick, often reddish and gibbous, with large inflated hyaline cells and air spaces; veins 4-5(-7), originating independently from the node; root solitary; root-sheath 5 mm, unwinged; floral cavity lateral; spathe with 2 staminate and 1 pistillate flowers; ovary 1-7-ovulate; fruit 0.5-1 x 0.8-1.2 mm, with winged margins; seeds 1-5 per fruit, 0.7-0.9 x 0.4-0.6 mm, whitish, 8-16-ribbed.

N, O, M; canals, ditches, pools, rice fields. Cosmopolitan, except Australia.

2. **Lemna aequinoctialis** Welw., Apont. 55: 578 (1859).
Syns. *Lemna angolensis* Welw. ex Hegelm., J. Bot. 3: 112 (1865).
Lemna paucicostata Hegelm., Lemnac. 139 (1868).
Lemna paucicostata Hegelm. var. *membranacea* Hegelm., Lemnac. 141 (1868).
Lemna minima Blatt. & Hallb., J. Indian Bot. 2: 50 (1921).
Lemna blatterii McCann, J. Bombay Nat. Hist. Soc. 43: 153 (1942).
Lemna eleonorae McCann, J. Bombay Nat. Hist. Soc. 43: 153 (1942).
Lemna aoukikusa T. Beppu & J. Murata, Acta Phytotax. Geobot. 36: 25 (1985).

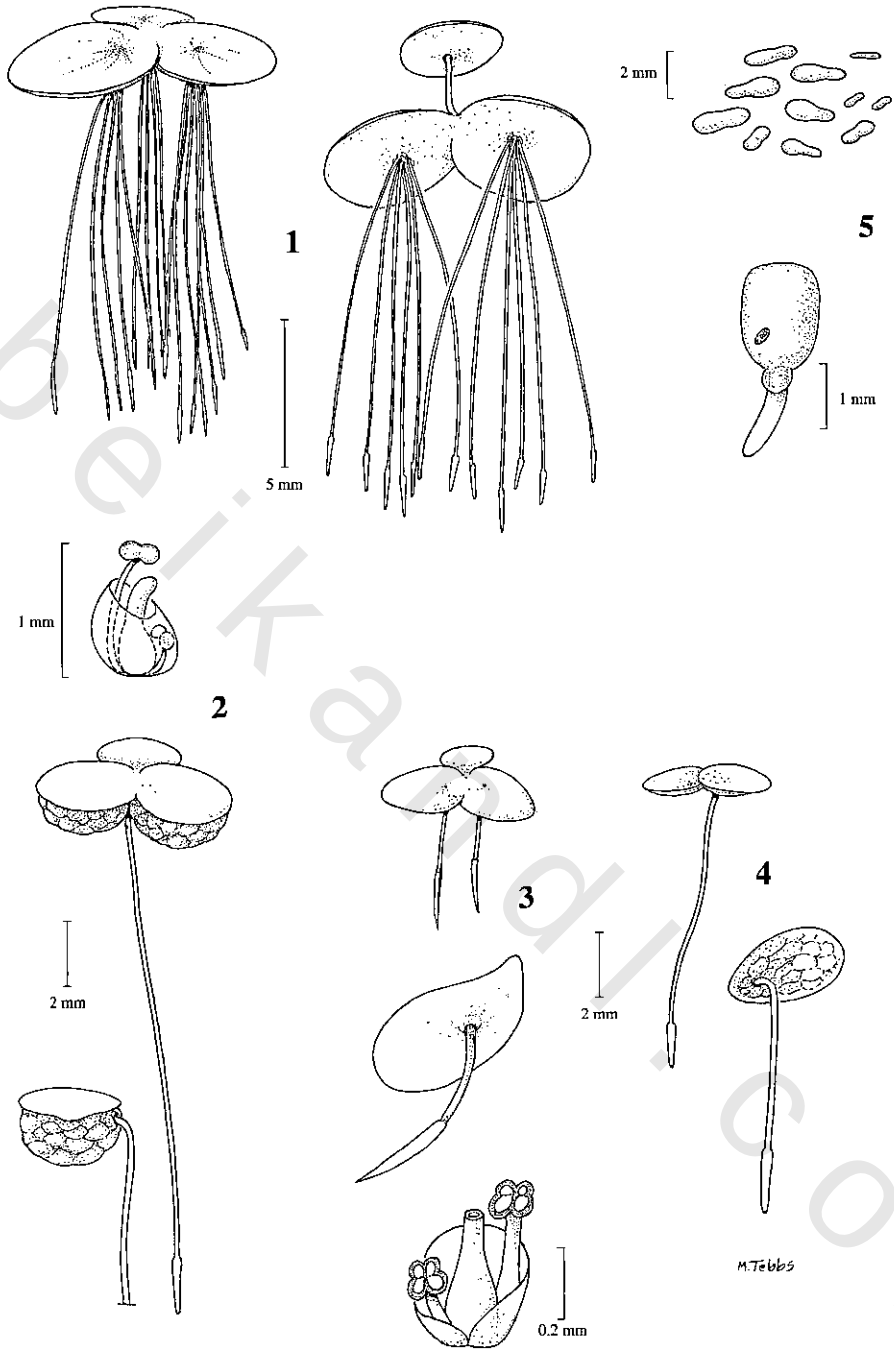


Plate 33. LEMNACEAE: *Spirodela polyrhiza* 1, habit of a cluster of 3 fronds viewed from above; fronds viewed from below (right). *Lemna gibba* 2, habit of fronds viewed from above; frond from side view (down left); floral pocket with staminate and pistillate flowers (up). *Lemna aequinoctialis* 3, habit of 3 fronds viewed from above; frond viewed from below (down); floral pocket with staminate and pistillate flowers (further down). *Lemna minor* 4, habit viewed from above and below. *Wolffiella hyalina* 5, habit; fertile frond (down). Drawn by Margaret Tebbs.

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Lemna perpusilla auct. afr. non Torrey (1843).

Free-floating aquatic; fronds 1-6 x 0.8-4 mm, lacking reddish colour; vegetative and flowering fronds similar, 3-veined; largest air spaces not wider than 0.3 mm; root to 3 mm; root-sheath laterally winged; root-cap sharply pointed; ovary with 1-ovulate; fruit 0.5-0.8 x 0.4-0.5 mm, not winged; seed 0.5-0.6 x 0.3-0.4 mm, 8-20-ribbed, brownish.

N, O; canals, pools, ditches. Cosmopolitan.

3. **Lemna minor** L., Sp. Pl., ed. 1, 970 (1753).
Syns. *Lenticular minor* (L.) Scop., Fl. Carniol., ed. 2, 213 (1772).
Lenticular vulgaris Lam., Fl. Fr. 2: 189 (1778).
Lemna vulgaris (Lam.) Lam., Encycl. 3: 464 (1792).
Lemna minima Thuill. ex P. Beauv., J. Phys. Chim. Hist. Nat. Elément. 82: 113 (1816).
Lemna minor L. var. *minima* (Thuill. ex P. Beauv.) A. Chev., Fl. Gén. Env. Paris 2: 256 (1827).
Lemna minor L. var. *oxymitra* Hegelm., Lemnac. 143 (1868).
Lenticula monorhiza Montandon, Guid. Bot. 308 (1868).
Hydrophace minor (L.) Bubani, Fl. Pyren 4: 23 (1897).
Lemna rwandensis De Sloover, Bull. Jard. Bot. Belg. 43: 366 (1973).

Free-floating aquatic; fronds 2-8 x 1.5-6 mm, oblong-ovate, almost symmetrical, flat, dark green, vegetative and flowering fronds similar, 3-veined; lower surface of the frond neither reddish, nor gibbous; largest air spaces rarely wider than 0.3 mm; root solitary, arising along a shallow groove; root-sheath unwinged; root-cap rounded; staminate flowers 2, each with 1 stamen; pistillate flower 1; ovary 1-ovulate; fruit 0.8-1 x 0.8-1.2 mm, with a narrowly winged margin; seed 0.7-1 x 0.4-0.6 mm, 10-16-ribbed, whitish.

N, O; canals, pools, ditches. Cosmopolitan, except Central and South America, introduced to Australia.

3. **Wolffiella** Hegelm.

Free-floating aquatics; fronds flat; fronds floating on the water surface orbicular to ovate, fronds floating below the water surface ribbon- to tongue-shaped; 2 or a few cohering together; at least one layer of air spaces present around the node; daughter fronds emerging out of a triangular flat pouch at the base; flowers originating in a cavity at the side of the median line on the upper surface of the frond. 10 species, Africa and America.

1. **Wolffiella hyalina** (Delile) Monod, Mém. Soc. Hist. Nat. Afr. Nord, hors sér. 2: 242 (1949).
Syns. *Lemna hyalina* Delile, Descr. Egypte, Hist. Nat. 75 (1814).
Wolffia delilii Schleid., Linnaea 13: 390 (1839).
Wolffia hyalina (Delile) Hegelm., Lemnac. 128, t. 4, f. 11-19 (1868).
Wolfiella monodii Ast, Bull. Inst. Fondam. Afr. Noire, sér. A, Sci. Nat. 30: 837 (1968).
Pseudowolffiella hyalina (Delile) Hartog & Plas, Blumea 18: 366 (1970).
Pseudowolffiella monodii (Ast) Hartog & Plas, Blumea 18: 366 (1970).

Aquatic, free-floating on water surface; fronds 1-3 x 0.8-2 mm, ovate to trapezoid, solitary or 2 cohering together; pigment cells absent; lower wall of the pouch elongate

into a ribbon-like appendage and bent vertically down; appendage 1-5 x 0.6-1.8 mm; flowers 1 per frond; seed 0.5-0.6 x 0.4 mm.

N, M, De; canals, ditches, pools. Tropical and subtropical Africa.

TYPHACEAE

L. Boulos

Description as for the genus *Typha,* the only genus in the family.

1. **Typha** L.

Literature: Boulos, L. 1962. *Typha elephantina* Roxb. in Egypt. Candollea 18: 129-135, f. 1-5.

Monoecious herbaceous perennials of marshes, river banks, canals, lakes, ditches and springs, with creeping rhizomes; upper part of stem emerging above water; leaves alternate, mostly basal, with long open sheath; lower leaves with shorter blades than the upper; blades linear; inflorescence spike-like, very dense-flowered, wind-pollinated; upper flowers staminate, the lower pistillate, often with a gap inbetween; bract subtending spikes usually falling off early; male flowers usually subtended by bracteoles or scales; perianth 0 or reduced to 3-6 bristles or slender scales; stamens (1)2-5(6-7), with free or united filaments; anthers basifixed; female flowers reduced to 1 pistil borne on a filiform long-hairy gynophore; ovary 1-locular, 1-ovulate; style long; stigma linear or lanceolate; sterile flowers with elongate ovary (carpopodium) between fertile flowers; fruit a minute 1-seeded follicle, with long hairs, attached to the persistent stalk, dispersed by wind. About 10 species, warm-temperate and tropical regions.

1. Leaves not keeled; blade flat or semilunar in cross-section — 1. **T. domingensis**
\+ Leaves keeled beneath; blade angular in cross-section — 2. **T. elephantina**

1. **Typha domingensis** (Pers.) Poir. ex Steud., Nomencl. Bot. 860 (1824).
Syns. *Typha australis* Schum. & Thonn. in Schum., Beskr. Guin. Pl. 401 (1827).
Typha angustata Bory & Chaub. in Bory, Expéd, Sci. Morée 3(2): 338 (1833).

Monoecious rhizomatous perennial 1.5-3 m; leaf-sheaths to 1.5 m, glabrous, striate; margins narrowly membranous, the apex slightly auriculate; leaf-blades to 1.2 m, 0.5-1.5 cm wide, linear, flat or semilunar in cross-section, the apex obtuse to subacute; peduncle exserted from the uppermost sheath for 25-40 cm, terete, striate; male and female spikes remote; male spikes 15-30 x 1-1.5 cm, cylindrical; male flowers subtended by bracteoles *c.* 4 x 0.2 mm, linear-lanceolate, membranous, the apex lacerate; stamens 3; anthers 3-4 together, 2-3 x 0.25 mm, linear-oblong; pollen grains single; female spikes 15-30 x 1.5-2 cm, cylindrical; female flowers subtended by whitish scabridulous hairs 5-6 mm; bracteoles *c.* 4 mm, filiform with flattened tips; ovary *c.* 1 x 0.25 mm, narrowly ellipsoid; style *c.* 1 mm, filiform; sterile flowers numerous, irregularly distributed throughout the spike; carpopodia *c.* 6 mm, tipped by a rudimentary style; fruit *c.* 1.5 mm, narrowly ovoid; seeds *c.* 1.25 mm, narrowly cylindrical, yellowish.

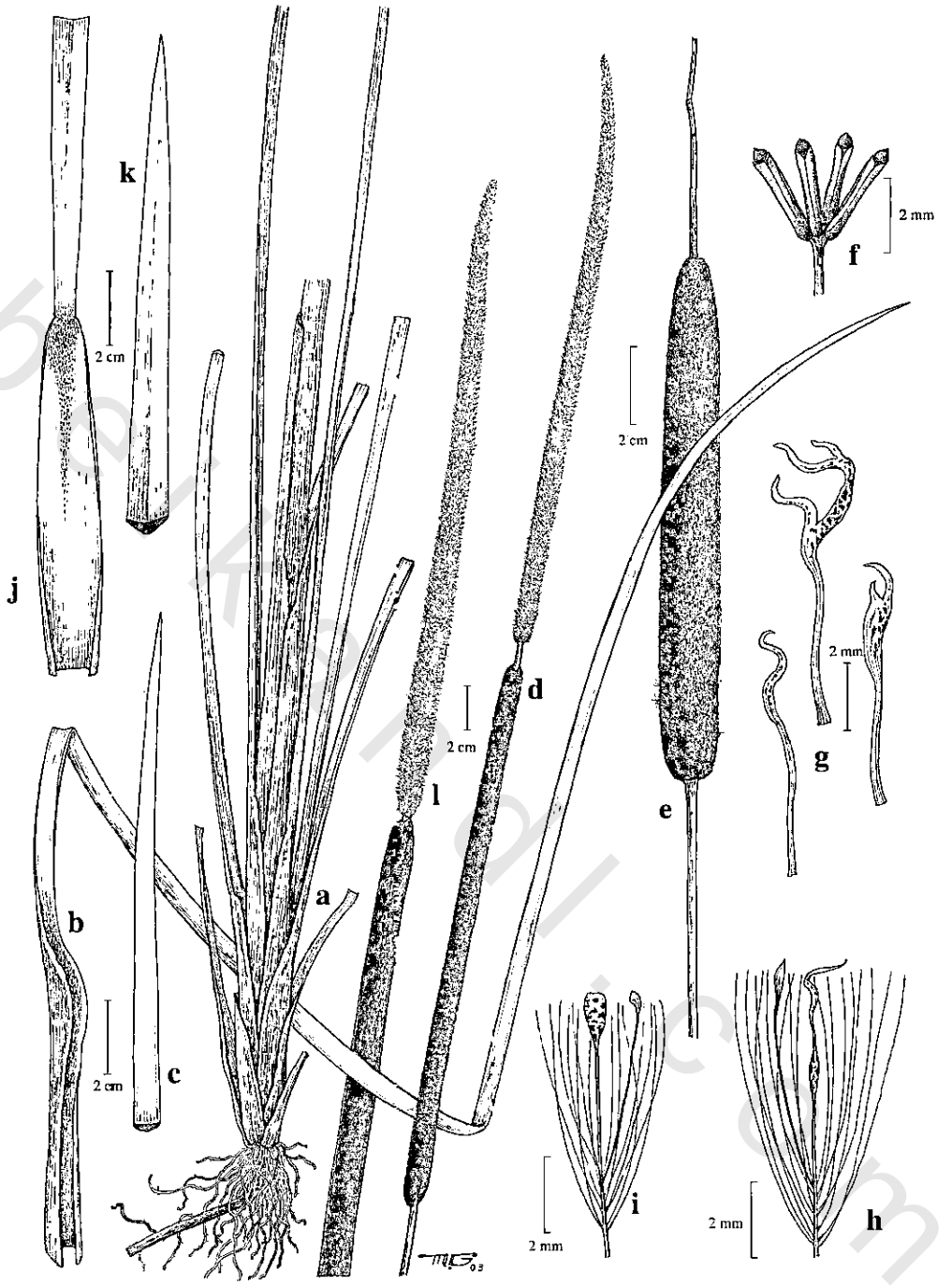


Plate 34. TYPHACEAE: *Typha domingensis*, lower part of the plant (a); upper part of leaf-sheath and blade (b); cross-section in upper part of the leaf-blade (c); inflorescence with upper mature male spike and lower immature female spike (d); mature female spike (e); male floret (f); male bracteoles (g); female floret with ovary and bracteole (h); sterile female floret with carpodium and bracteole (i). *Typha elephantina*, leaf-sheath and basal part of the blade (j); cross-section in upper part of the leaf-blade (k). inflorescence with upper mature male spike and lower immature female spike (l). Drawn by Magdy El-Gohary.

N, O, M, D, R, S; canals, ditches, springs, edges of lakes. Warm-temperate and tropical regions of the world.

2. **Typha elephantina** Roxb., Fl. Ind. 3: 566 (1832).

Like *Typha domingensis,* but plant to 4 m; leaves to 3 m long, 2-3 cm broad, keeled on the lower surface; blade angular in cross-section; stamen 1; pollen in tetrads.

O (Wadi Natrun), S; swamps, lakes. Algeria, Libya, Egypt, Palestine, Saudi Arabia, India, Ethiopia.

COMMELINACEAE

L. Boulos

Perennials or annuals; roots fibrous or tuberous; leaves cauline or basal, with closed sheath; blade sessile or petiolate, entire; inflorescence terminal, or terminal and axillary, leaf-opposed, of 1 to many cymes aggregated into thyrses, sometimes subtended by spathaceous bracts (spathes); flowers regular or bilaterally symmetrical, bisexual or male; sepals 3, free or fused, persistent; petals 3, free or fused, equal or unequal; stamens 6, all fertile or some reduced to staminodes, or absent, hypogynous or united with corolla; ovary superior, 2-3-locular, with 1-many ovules in each locule; style simple; stigma small or capitate; fruit a 2-3-valved dehiscent capsule, rarely indehiscent; seeds 1 to several per locule. About 40 genera, 630 species, temperate and tropical regions.

1. Inflorescences not enclosed in or subtended by leafy bracts (spathes) — 2. **Aneilema**
\+ Inflorescences enclosed in or subtended by spathes — 2

2. Flowers bilaterally symmetrical; stamens 3; staminodes 3; filaments glabrous — 3. **Commelina**
\+ Flowers regular; stamens 6; filaments bearded — 1. **Cyanotis**

1. **Cyanotis** D. Don, nom. conserv.

Succulent perennials with corms or tubers, or annuals; roots fibrous or tuberous; stems erect or creeping and rooting at lower nodes; leaves succulent, sessile, spirally arranged or distichous; inflorescences of terminal and axillary cymes, each cyme subtended by spathes and 2-ranked, rarely solitary, sessile or stalked flowers, usually with conspicuous herbaceous bracteoles; flowers regular, bisexual, small; calyx tubular below, persistent; corolla with a short tube, blue, purple, violet or pink; stamens 6, equal; filaments bearded; ovary 3-locular; ovules 2 per locule; capsule 3-valved, 3-locular, 6-seeded. About 45 species, tropical and subtropical regions of Africa, Asia and northern Australia.

1. **Cyanotis barbata** D. Don, Prodr. Fl. Nepal. 46 (1825).
Syn. *Cyanotis hirsuta* Fisch. & C. A. Mey., Ind. Hort. Sem. Petrop. 8: 57 (1842).

Erect herbaceous perennial, with a small corm; stems unbranched, with golden-yellow hairs; internodes 6-15 cm; leaf-sheath 1-2.5 cm, sparsely hairy; blade 12-20 x 0.5-1.2 cm, linear, ciliate along the margins; inflorescences in the upper nodes, with 2-3 cymes on unequal stalks in the leaf-axils; stalk 1.5-5 cm; spathe 1, 2-3 cm, folded along midrib,

broadest at base, purple-tinged, the margins ciliate; bracteoles oblique; calyx *c.* 5 mm; calyx-tube *c.* 1 mm; calyx-lobes *c.* 4 x 1 mm, linear-lanceolate; corolla *c.* 1 cm, purplish-blue; corolla-tube 5-6 mm, 1.2 mm wide at base, 4.5 mm at apex; corolla-lobes 4-5 mm, orbicular; filaments 1 cm, bearded; anthers 1 mm, yellow; ovary *c.* 1.4 mm, orange-yellow; style 1 cm; stigma minute; capsule 3-4 x 2.5-3 mm, hairy; seeds 1-1.2 x 0.6-1 mm, oblong-ovoid.

GE; alluvial soils. Tropical Africa, Yemen, India, Nepal, China, Myanmar.

2. **Aneilema** R. Br.

Literature: Faden, R. 1991. The morphology and taxonomy of *Aneilema* R. Brown (Commelinaceae). Smithson. Contr. Bot. 76: 1-166.

Herbaceous perennials or annuals; leaves spirally arranged or distichous, petiolate or sessile; inflorescences of terminal and axillary thyrses; bracteoles persistent; flowers pedicellate, bilaterally symmetrical, bisexual or male; sepals free, subequal; petals free; paired petals clawed, the outer usually different in size, shape and colour; staminodes 3, rarely 2, posterior; stamens 3, anterior; ovary 3- or 2-locular; capsule 3- or 2-locular, usually dehiscent; locules 1-6-seeded; seeds uniseriate; hilum linear. 64 species, pantropical, but especially tropical Africa.

1. **Aneilema aequinoctiale** (P. Beauv.) Kunth, Enum. 4: 72 (1843).
Syn. *Aneilema tecazzeanum* Hochst. ex. A. Rich., Tent. Fl. Abyss. 2: 343 (1851), pro parte.

Decumbent perennial; roots fibrous, slender; stems to 1 m, sparsely branched, with hooked hairs on the internodes and leaf sheaths; leaves petiolate or sessile; blade 4.5-12 x 2-5 cm, ovate to ovate-elliptic, densely pubescent; flowers in terminal lax thyrses, ovoid to cylindrical, with 4-10 cincinni; cincinni 4-6 cm, 10-flowered; bracteoles cup-shaped; pedicels 3.5-5 mm, elongate in fruit to 1.3 cm, puberulent; flowers 1.8-3 cm across, bisexual; sepals 5-8 mm, green, puberulent; paired petals *c.* 1.5 x 1.5 cm, yellow, the claw puberulent; lower petal 6-8 x 2-2.5 mm, oblong-elliptic, whitish-yellow, glabrous; filaments free; lateral filament straight, bearded; pollen orange; style *c.* 8 mm, white; stigma purple; capsule 0.8-1 x 0.4-0.5 cm, puberulent, apex truncate; dorsal locule 1-seeded; ventral locules 3-seeded or fewer by abortion; seeds 2-2.4 x 1.8-2 mm, ovoid, orange-brown, with blackish granules mainly around the hilum.

GE; damp hillsides. Southeast Egypt, Sudan, Ethiopia, southwards to Angola, Zimbabwe and South Africa, westwards to Guinea.

3. **Commelina** L.

Literature: Ogwal, E. N. A. 1990. A taxonomic investigation of the genus *Commelina* in Uganda. Mitt. Inst. Allg. Bot. Hamburg 23b: 573-592.

Herbaceous perennials or annuals; roots fibrous or tuberous; stems creeping, ascending or erect, branched; leaves distichous or spirally arranged; leaf-sheath usually closed, ciliate at the mouth; leaf-blades variable, mostly linear-lanceolate; inflorescences leaf-opposed; flowers borne in stalked, or rarely sessile, boat-shaped spathes; cincinni 1 or 2 per spathe, 2-9(-14)-flowered; flowers all bisexual or a few male; sepals 3, free or lower 2 laterally fused; petals 3, free; lower petal unclawed, reduced; upper 2 petals clawed, blue, lilac, mauve, yellow or orange; stamens 3, borne on lower side, filaments

glabrous; staminodes 3, borne on upper side, filaments reduced; ovary 3(-2)-locular; ovules 1-2 per locule or 0 by abortion; style filiform; stigma capitate, rarely 2-fid; capsule loculicidal, 3-locular, (1)2-6-seeded; seeds ellipsoid or globose, smooth, reticulate or furrowed; hilum linear. About 170 species, tropical and warm regions.

1. Flowers yellow — 1. **C. africana**
+ Flowers blue — 2

2. Leaf-blade 3-5 x 0.8-1.2 cm, usually undulate at the margins — 2. **C. forsskaolii**
+ Leaf-blade 5-15 x 2-5 cm, not undulate at the margins — 3

3. Upper part of leaf-sheath, pseudo-petiole and base of blade with stiff purplish or white hairs 3-7 mm — 4. **C. benghalensis**
+ Upper part of leaf-sheath and base of blade glabrous — 3. **C. latifolia**

1. **Commelina africana** L., Sp. Pl., ed. 1, 41 (1753).
Syns. *Commelina involucrosa* A. Rich., Tent. Fl. Abyss. 2: 342 (1851).
Commelina edulis A. Rich., Tent. Fl. Abyss. 2: 341 (1851).
Commelina cordifolia A. Rich., Tent. Fl. Abyss. 2: 341 (1851).
Commelina baccariana Martelli, Fl. Bogos. 87 (1886).

Perennial; roots tuberous, fusiform, fleshy; stems creeping to ascending; internodes 8-10 cm; leaf-sheath 0.8-3 cm, ciliate along the margins; leaf-blade 6-12 x 1-2 cm, lanceolate to linear-lanceolate, the base rounded or cordate, the apex acute to obtuse, the margins entire; cymes leaf-opposed; spathes 1-4.5 x 1-2.4 cm, free, folded along midrib, ciliate along the margins; peduncles 1-4 cm; lower cincinnus 0.8-1.2 cm, with (1-)3-5 bisexual flowers; upper cincinnus usually absent, if present then with 1(-3) male flowers; lower sepals 2.8-5 x 4-2 mm, obovate, yellow; upper sepal 2.6-5 x 1.2-2 mm, boat-shaped, incurved, white; lower petal 5-6 x 1.8-2 mm, linear-lanceolate, yellow; paired petals *c.* 4 x 6 mm, broader than long, with claw 3-4 mm, yellow; stamens with filaments 4-7 mm; anthers 1-1.5 mm; staminodes with filaments 3-4 mm; ovary *c.* 1.1 mm, pilose; style *c.* 5 mm; stigma capitate; capsule 5-6 x 3-4 mm, 3-locular, 3-5-seeded; seeds 2.2-3 x 1.3-2 mm, cylindric- rectangular, dark brown.

GE; moist hillsides. Tropical Africa, Saudi Arabia, Yemen, Australia.

NOTE: *Commelina africana* is a very variable species of which 12 varieties were listed by Brenan, Kew Bull. 19: 63 (1964). Faden, in Edwards *et al.* (eds), Fl. Ethiop. 6: 364 (1997), stated that it was difficult to maintain these varieties, of which 6 are supposed to occur in Ethiopia. He adds that there may be only 2 varieties, but even for these, there are intermediates. Boulos, Fl. Egypt Checklist 181 (1995) refers the Egyptian plants of this species to var. *lancispatha* C. B. Clarke in Dyer, Fl. Cap. 7: 10 (1897). However, in this treatment none of the described varieties is assigned to the Egyptian material of this species.

2. **Commelina forsskaolii** Vahl, Enum. Pl. 2: 172 (1805).

Glabrescent annual or short-lived perennial, often with subterranean cleistogamous flowers; roots fibrous; stems erect or creeping and rooting at lower nodes; internodes 4-8 cm; leaf-sheath 0.5-1.2 cm, ciliate along the margins; leaf-blades 3-5 x 0.8-1.2 cm, oblong-linear to linear-lanceolate, the margins usually undulate, the apex acute; cymes sub-terminal, leaf-opposed; spathes 1-1.2 x 1-1.3 cm, acute; peduncle 0.5-1.2 cm; lower

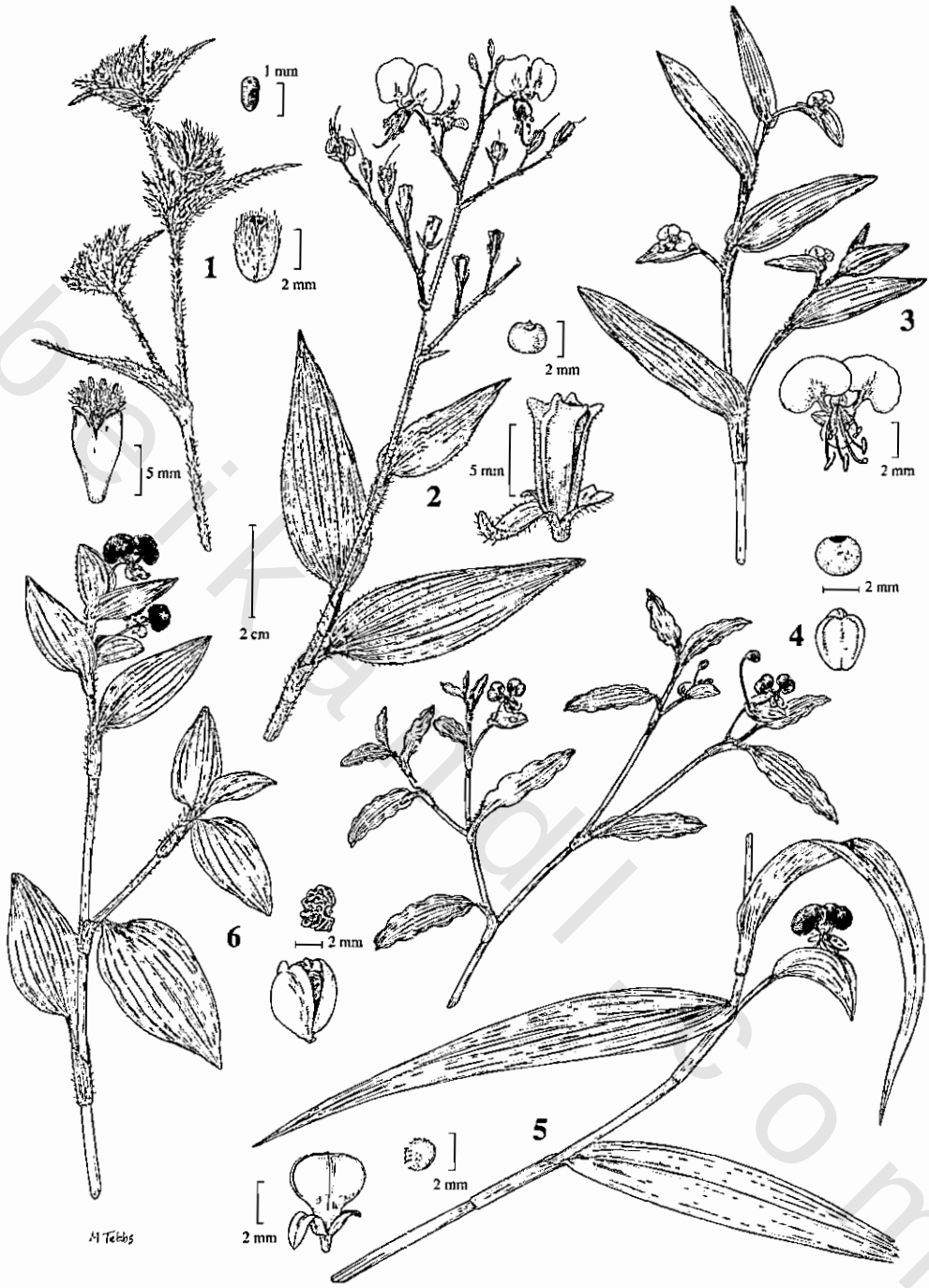


Plate 35. COMMELINACEAE: *Cyanotis barbata* 1, flowering branch; capsule (middle right); seed (up right); flower (down left). *Aneilema aequinoctiale* 2, flowering and fruiting branch; capsule and seed (right). *Commelina africana* 3, flowering branch; flower (right). *Commelina forsskaolii* 4, flowering branch; capsule and seed (up right). *Commelina latifolia* 5, flowering branch; capsule and seed (down within). *Commelina benghalensis* 6, flowering branch; capsule and seed (right). Drawn by Margaret Tebbs.

cincinnus enclosed in the spathe with the petals protruding; flowers few, bisexual; upper cincinnus with 1 male flower; lower sepals 3.5-4 x 2.5-3 mm, ovate-oblong, fused at base, pale blue; upper sepal 4 x 1.2 mm, elliptic, pale blue; lower petal 2.5-3 x 1 mm, lanceolate, pale blue; paired petals 5-7 x 7-9 mm, emarginate, with claw 2.5-3 mm; median stamen with filament 4 mm and anther 1.5 mm; lateral stamens with filaments 6-7 mm, winged at base; staminodes with filaments 3 mm; ovary 1 mm; style 8-9 mm; stigma capitate; capsule 4-5 x 2.5 mm, boat-shaped, 3-locular, locules usually 1-seeded; seeds 2-2.5 x 1.4-2 mm, ovoid; hilum linear, lateral.

De, GE; sandy and gravelly soils. Southeast Egypt, tropical Africa, Arabia, Socotra, India, Sumatra, Java.

3. **Commelina latifolia** Hochst. ex A. Rich., Tent. Fl. Abyss. 2: 342 (1851).

Perennial; rootstock fleshy; roots fibrous; stems to 50 cm, prostrate or ascending, rooting at lower nodes, glabrous; internodes 5-12 cm; leaf-sheath 1.5-3 cm, glabrous; leaf-blade 6-16 x 2-4.5 cm, lanceolate to ovate-lanceolate, the base clasping, the apex long-acuminate, the margins entire, glabrous; cymes leaf-opposed; spathes 2-3 x 1.5-2.8 cm, acute at apex, pedunculate, sparsely pubescent; peduncles 1-3.5 cm; lower cincinnus enclosed in the spathe; cincinnus peduncle 0.8-1 cm, with 5-8 bisexual flowers; pedicel 2.5-4 mm; upper cincinnus mostly absent, if present with 1(-2) staminate flowers; lower sepals *c.* 4 x 2 mm, obovate; upper sepal 3.2-4 x 1.2-1.4 mm, linear-lanceolate; lower petal *c.* 4.2 x 2 mm, linear-oblong; paired petals 7-7.5 x 0.9-1.1 cm, with claw 5-6 mm, blue; ovary 1.5 mm; style 0.8-1.2 cm; stigma capitate; capsule 5-6 x 5-6 mm, 2-loculed, 4-seeded, constricted between the seeds, dehiscent; seeds 2-2.5 mm, globose, tuberculate; hilum 1.5 mm, linear.

GE; rocky ground. Southeast Egypt, Sudan, Uganda, Kenya, Tanzania, Ethiopia, Cameroon.

4. **Commelina benghalensis** L., Sp. Pl., ed. 1, 41 (1753).

Perennial; stems erect or creeping-ascending, rooting at the nodes, often with subterranean cleistogamous flowers; internodes to 10 cm; leaf-sheath 0.5-3 cm, with purplish or white bristles 3-7 mm along free edges, otherwise glabrous, or with hooked hairs; leaf-blade 6-10 x 2.5-5 cm, ovate-lanceolate, acute; pseudo-petiole 0.3-1.5 cm, with a few purplish or white bristles 3-7 mm; cymes leaf-opposed; spathes 1.5-2.2 x 1.8-3 cm, broader than long, fused throughout their proximal margins; sessile or shortly pedunculate; lower cincinnus enclosed within the spathe, with 2-3 bisexual flowers; cincinnus peduncle 0.8-1 cm; pedicel 4-7 mm, protruding in flower, reflexed and enclosed within the spathe in fruit; upper cincinnus present, dominant, protruding from the spathe; cincinnus peduncle 1.5-2 cm, with 1 staminate flower; pedicel 4-8 mm; lower sepals 3.5 x 2.5 mm, oblong; upper sepal *c.* 3.5 x 1.5 mm, elliptic; lower petal blue; paired petals 0.7-0.85 x 0.9-1.1 cm, with claw 4-5 mm, blue; median stamen with filaments 5-7 mm; anther *c.* 2 mm, yellow; lateral stamens with filaments 5-7 mm; anthers 1.4 mm, blue; staminodes with filaments 4-4.5 mm, antherodes yellow; ovary *c.* 1.3 mm; style *c.* 1 cm; stigma capitate, blue; capsule 4.5-5.5 x 3 mm, 3-loculed, 3-5-seeded, dehiscent; seeds 2.5-5 x 1.5-2.2 mm, reticulate, variable in size; hilum 1-3 mm, linear.

N (naturalized as a weed), GE (rocky hillsides). Southeast Egypt, tropical Africa, Mauritius, Arabia, Socotra, India, Sumatra, Java.

GRAMINEAE

T. A. Cope

Annual or perennial herbs, sometimes with rhizomes or stolons; stems (culms) cylindrical, jointed, usually hollow in the internodes, closed at the nodes; branches subtended by a leaf and with a 2-keeled hyaline leaflet (prophyll) at the base; leaves solitary at the nodes, sometimes crowded at the base of the culm, alternate and 2-rowed, comprising sheath, ligule and blade; sheaths encircling the culm, the margins free, contiguous, overlapping or ± connate into a tube, frequently swollen at the base, the shoulders sometimes extended upwards into triangular or falcate auricles; ligule adaxial, at the junction of sheath and blade, membranous or reduced to a fringe of hairs, rarely absent; blades usually long and narrow, flat or sometimes inrolled or terete, usually passing gradually into the sheath, sometimes amplexicaul, rarely narrowed into a false petiole; inflorescence composed of spikelets arranged in a panicle or in racemes, the latter solitary, digitate or disposed along a central axis, usually terminal, sometimes (especially in Tribe 19 Andropogoneae) numerous, each subtended by a bladeless sheath (spatheole) and the whole flowering branch system condensed into a leafy false panicle; spikelets consisting of bracts distichously arranged along a slender axis (rhachilla); the 2 lowermost bracts (glumes) empty, the succeeding 1 to many bracts (lemmas) each enclosing a flower and opposed by a hyaline scale (palea), the whole (lemma, palea and flower) termed a floret; base of spikelet or floret sometimes with a horny downward prolongation (callus); glumes and lemmas often bearing 1 or more stiff bristles (awns); flowers usually bisexual, sometimes unisexual, small and inconspicuous; perianth represented by 2(-3), minute hyaline or fleshy scales (lodicules); stamens hypogynous, 1-6, rarely more, usually 3, with delicate filaments and 2-thecous anthers opening by a longitudinal slit or rarely a terminal pore; ovary 1-locular, with 1 anatropous ovule often adnate to the adaxial side of the carpel; styles usually 2, rarely 1 or 3, generally with plumose stigmas; fruit a caryopsis with thin pericarp adnate to the seed, rarely with free seed (e.g. *Sporobolus*); caryopsis commonly combined with various parts of the spikelet, or less often the inflorescence, to form a false fruit; seed with starchy endosperm, an embryo at the base of the abaxial face, and a point or line (hilum) on the adaxial face marking the connection between pericarp and seed. About 670 genera, 10,000 species, cosmopolitan.

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1. Creeping perennial with the spikelets enclosed in the uppermost sheath, visible only by virtue of the long protruding filaments and stigmas (*Pennisetum clandestinum*) Tribe 17. **Paniceae**
+ Not as above; some spikelets always exserted 2

2. Plant monoecious: either the female spikelets in numerous rows on an axillary spongy cob (rarely a single row) and the male in a branched terminal panicle (*Zea*) or the female spikelets enclosed in a shiny bony utricle and the male in a short raceme extruded from its terminal pore (*Coix*) Tribe 19. **Andropogoneae**
+ Plant with all or some of the spikelets bisexual 3

3. Spikelet urn-like, comprising 2 opposing densely hairy lemmas (rarely 3) fused into a tube, the 2 (or 3) paleas fused into a septum within the tube, and the whole embraced below by an inflated sheath; glumes absent Tribe 3. **Lygeeae**
+ Spikelet not as above, lemmas not fused into a tube 4

4. Spikelet 1- to many-flowered, breaking up above the ± persistent glumes, or if falling entire then not 2-flowered, with the lower floret male or barren and the upper bisexual, nor dorsally compressed; if 2-flowered and falling entire then strongly laterally compressed (*Holcus*); rarely gynodioecious with large plumose panicle (*Cortaderia*) 5
+ Spikelet 2-flowered, falling entire at maturity, with the upper floret bisexual and the lower male or barren and in the latter case often much reduced; spikelet usually dorsally compressed 24

5. Inflorescence a fragile cylindrical raceme with the spikelets sunk in hollows in the axis; glumes collateral, concealing the hollows Tribe 6. **Hainardieae**
+ Inflorescence not a fragile cylindrical raceme 6

6. Ovary (and caryopsis) with a fleshy hairy apical appendage, the styles arising from beneath it 7
+ Ovary (and caryopsis) without a fleshy hairy apical appendage; styles clearly terminal 9

7. Inflorescence a panicle (sometimes reduced to a loose raceme in depauperate specimens) Tribe 10. **Bromeae**
+ Inflorescence a spicate raceme with pedicels absent or up to *c.* 1 mm, or a false raceme with up to 3 spikelets at a node 8

8. Spikelet terete, shortly (*c.* 1 mm) pedicellate Tribe 9. **Brachypodieae**
+ Spikelet laterally compressed and sessile, or inflorescence a false raceme Tribe 11. **Triticeae**

9. Lemmas deeply cleft into 9 awned lobes or 6 lobes alternating with 5 awns Tribe 14. **Pappophoreae**
+ Lemmas entire or 2-lobed, awnless or 1- to 3-awned 10

10. Spikelet containing 1 fertile floret (except *Tetrapogon*), with or without 1 or 2 male or barren florets below it or 1 or more above 11
+ Spikelet containing 2 or more fertile florets 20

11. Glumes absent; paleas 1-keeled — Tribe 1. **Oryzeae**
+ Glumes, or at least one of them, well developed; paleas 2-keeled — 12

12. Spikelets arranged in 1-sided racemes or in short deciduous racemelets arranged along an axis (and the spikelets highly modified) — Tribe 16. **Cynodonteae**
+ Spikelets in panicles, these either open or contracted and spike-like — 13

13. Spikelet strictly 1-flowered — 14
+ Spikelet 2- to 3-flowered, or with a clavate mass of several reduced sterile lemmas above the fertile — 17

14. Lemma with 3 awns, these often connate below into a twisted column — Tribe 13. **Aristideae**
+ Lemma awnless or with a single awn — 15

15. Lemma indurate at maturity, awned from the tip — Tribe 4. **Stipeae**
+ Lemma hyaline or membranous at maturity — 16

16. Glumes longer and firmer than the hyaline lemma; lemma sometimes awned; caryopsis with adherent pericarp — Tribe 7. **Aveneae**
+ Glumes and lemmas similar in texture, the former often the shorter; lemmas always awnless; caryopsis with loose pericarp which on wetting swells and ejects the seed (*Sporobolus*) — Tribe 15. **Eragrostideae**

17. Spikelet with a clavate mass of several reduced sterile lemmas above the fertile — Tribe 8. **Meliceae**
+ Spikelet with the sterile lemmas below the fertile — 18

18. Florets 2, the lower well developed but male or sterile — Tribe 18. **Arundinelleae**
+ Florets 3, or if only 2 then the lower small, chaffy and vestigial — 19

19. Sterile lemmas small, chaffy and vestigial, the fertile hardened and shiny, shorter than the glumes (*Phalaris*) — Tribe 7. **Aveneae**
+ Sterile lemmas longer than the fertile, at least one of them transversely ridged or wrinkled, the florets exceeding the glumes — Tribe 2. **Ehrharteae**

20. Tall reed-like or tussock-forming grass; panicle large, plumose — Tribe 12. **Arundineae**
+ Slender grass; panicle not plumose — 21

21. Glumes shorter than the lowest lemma, the florets distinctly exserted; lemmas awnless or with a straight awn from the entire or 2-lobed tip — 22
+ Glumes longer than the lowest lemma, often as long as the spikelet and enclosing the florets — 23

22. Lemmas 1- to 3-nerved (9- to 11-nerved in *Aeluropus*); spikelets all fertile — Tribe 15. **Eragrostideae**
+ Lemmas 5-nerved, if 3-nerved then inflorescence a dichotomously branched panicle (*Cutandia*) or lemma clavate-hairy on the back (*Desmazeria*); sterile and fertile spikelets sometimes intermixed in the panicle (*Cynosurus*, *Lamarckia*) — Tribe 5. **Poeae**

23. Ligule a membrane; lemma awned from the back, rarely awnless Tribe 7. **Aveneae**
+ Ligule a line of hairs; lemma awned from the sinus of the prominently 2-lobed tip, rarely awnless Tribe 12. **Arundineae**

24. Spikelets solitary, rarely paired but then those of a pair alike; glumes membranous, the lower mostly the smaller and sometimes suppressed; upper lemma indurate, cartilaginous to crustaceous, usually awnless but sometimes mucronate Tribe 17. **Paniceae**
+ Spikelets typically paired with 1 sessile and the other pedicellate (the racemes always terminating in a triad of 1 sessile and 2 pedicellate spikelets), those of a pair usually dissimilar, rarely with the spikelets all alike; glumes as long as the spikelet and enclosing the florets, ± rigid and firmer than the hyaline or membranous lemmas; upper lemma often with a geniculate awn Tribe 19. **Andropogoneae**

Tribe 1. **ORYZEAE**

Ligule membranous; inflorescence a panicle, occasionally with simple raceme-like primary branches, the spikelets all alike, bisexual; spikelets 1- or 3-flowered, the 2 lowermost florets reduced to sterile lemmas, without rhachilla extension, mostly laterally compressed, disarticulating above the glumes (persistent in cultivated races); glumes absent or just discernible as obscure lips at the tip of the pedicel; lemma membranous to coriaceous, 5- to 10-nerved, entire, with or without a straight awn; palea resembling the lemma, 3- to 7-nerved; lodicules 2; stamens usually 6; stigmas 2; caryopsis narrowly cylindrical to ovoid.

1. Spikelets with 2 sterile lemmas below the fertile 1. **Oryza**
+ Spikelets strictly 1-flowered 2. **Leersia**

1. **Oryza** L.

Annual or perennial; panicle often with simple raceme-like primary branches; spikelets with 1 fertile floret and 2 sterile lemmas, strongly laterally compressed; sterile lemmas up to half the length of the spikelet, subulate to narrowly ovate, coriaceous; fertile lemma coriaceous, strongly keeled, clasping the lateral nerves of the palea, awned or awnless; stamens 6. About 20 species, tropics and subtropics.

1. **Oryza sativa** L., Sp. Pl., ed. 1, 333 (1753).

Annual; ligule of lower leaves 1.5-4.5 cm, membranous, acute; spikelets ovate, persistent; sterile lemmas oblong or narrowly ovate; fertile lemma awnless or with a very long flexuous awn.

N, O, M; cultivated cereal (Rice) grown in wet fields. Throughout the tropics and subtropics.

2. **Leersia** Sw., nom. conserv.

Perennial, rarely annual; panicle sometimes with simple raceme-like primary branches; spikelets 1-flowered without rudiments, strongly laterally compressed; lemma

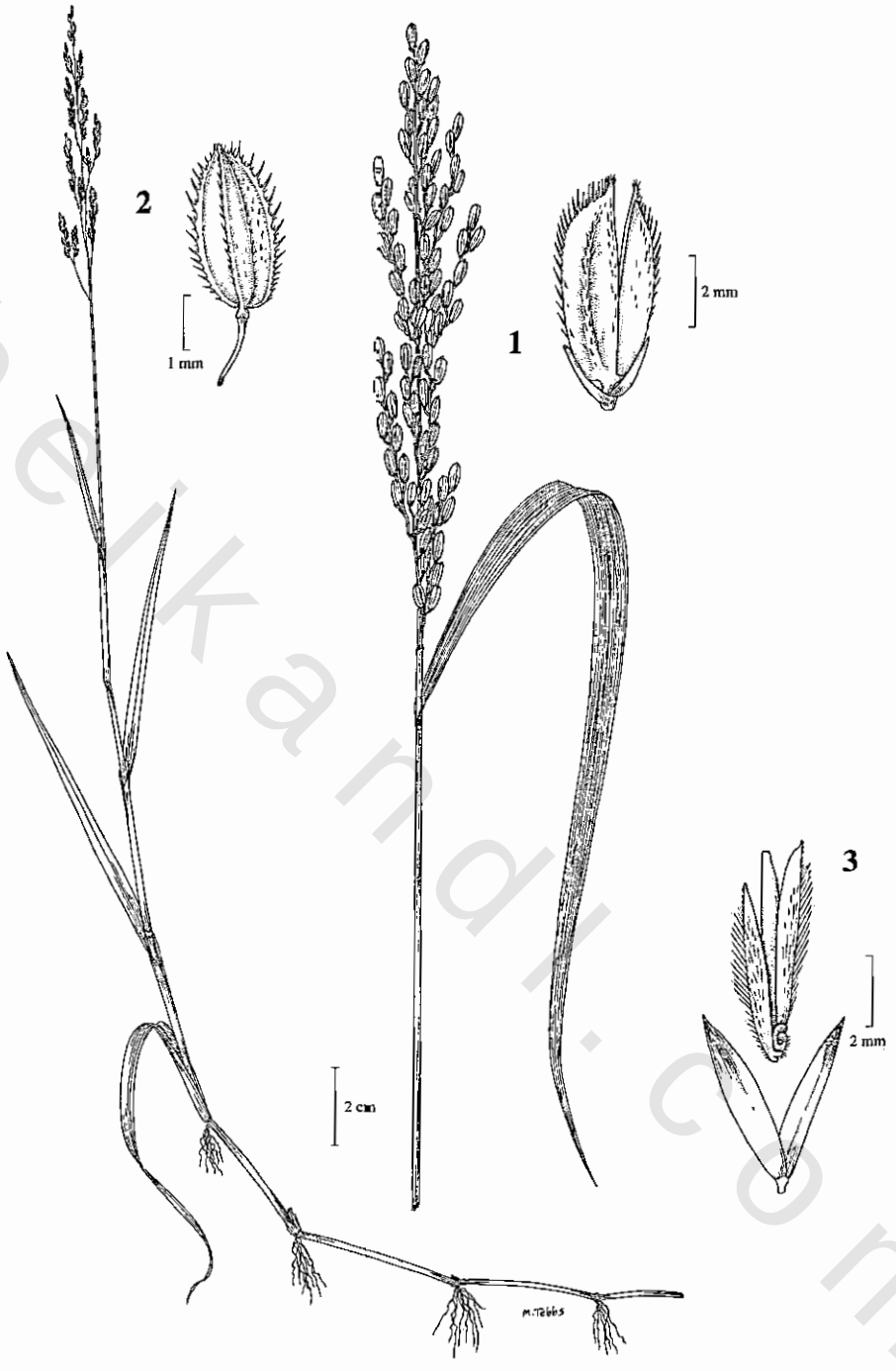


Plate 36. GRAMINEAE: *Oryza sativa* 1, inflorescence; spikelet (up right). *Leersia hexandra* 2, habit; spikelet (up right). *Ehrharta calycina* 3, spiketlet. Drawn by Margaret Tebbs.

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chartaceous to coriaceous, strongly keeled, clasping the lateral nerves of the palea, awnless; stamens 1, 2, 3 or 6. 18 species, tropical and warm temperate regions.

1. **Leersia hexandra** Sw., Prodr. 21 (1788).

Perennial; culms to 1 m, slender, often decumbent, ascending from a creeping rhizome, silky-pubescent at the nodes; leaf-blades 10-20 x 0.4-0.8 cm, flat, painfully retrorsely scabrid on the midrib beneath; ligule 1-2 mm, asymmetric, truncate or obliquely truncate; panicle 5-12 x 1-4 cm, narrowly elliptic to oblong; branches ascending; spikelets (3.2)3.4-4.8(5.2) x (1)1.2-1.4(1.7) mm, oblong, pale or purplish; lemma conspicuously pectinate-ciliate on the keel with hairs 0.2-0.8 mm, rarely spinulose.

N, O, M; canal banks, irrigation ditches, reed swamps and as a weed in rice fields. Throughout the tropics.

Tribe 2. **EHRHARTEAE**

Ligule usually a membrane, sometimes a line of hairs; inflorescence a panicle or sometimes a unilateral raceme; spikelets 3-flowered, the 2 lowermost florets reduced to sterile lemmas, rarely with rhachilla extension, laterally compressed, disarticulating above the persistent glumes; glumes membranous; sterile lemmas, or at least the upper, as long as the fertile floret, coriaceous, awned or awnless; fertile lemma firmly cartilaginous to coriaceous, 5- to 7-nerved, entire, awnless; palea nerveless or up to 2-nerved, rarely 3- to 5-nerved; anthers 1, 2, 3, 4 or 6; caryopsis ellipsoid.

3. **Ehrharta** Thunb., nom. conserv.

Annual or perennial; glumes minute to large; sterile lemmas often transversely wrinkled, the upper often narrowed to a hook at the base, the lower subequal or shorter. About 35 species, 25 in southern Africa, the rest from Indonesia to New Zealand.

1. **Ehrharta calycina** Sm., Pl. Icon. Ined., t. 33 (1790).

Rhizomatous perennial, or rarely annual, to 0.7(1.8) m; leaf-blades filiform or to 7 mm wide and flat or inrolled; panicle to 25 cm, narrow; spikelets 4-8 mm; glumes subequal, as long as or almost as long as the spikelet; sterile lemmas unequal, the lower shorter and narrower than the upper, loosely hairy on the back and sides, bearded at the base, the upper similar but beardless and with 2 appendages at the base, shortly awned from the rounded tip.

M (Ras el-Hekma); introduced in the early 1950s but probably no longer present. South Africa, Namibia.

Tribe 3. **LYGEEAE**

Ligule membranous; inflorescence a single terminal spikelet enclosed by a spatheole; spatheole inflated, many-nerved, acute or often bearing a reduced blade; spikelet 2 (3)-flowered, urn-like, protruding from the side of the spatheole, falling entire; glumes 0; lemmas many-nerved, fused below along opposing margins to form a cylindrical



Plate 37. GRAMINEAE: *Lygeum spartum*, habit; inflorescence (up left); spikelet (down left). Drawn by Margaret Tebbs.

coriaceous tube, the upper half chartaceous, free and divergent; paleas as long as the spikelet, fused back to back below and forming a transverse septum within the lemma tube, free above; lodicules 0; stamens 3; stigma 1, glabrous; caryopsis fusiform.

4. **Lygeum** L.

Description as for the tribe. 1 species.

1. **Lygeum spartum** Loefl. ex L., Gen. Pl., ed. 5, addend. pag. ult. post ind (p. '522') (1754).

Creeping perennial; rhizomes short, straight, tough and with very short internodes; culms to 70 cm, wiry, clothed at the base in brown glossy coriaceous scales; leaf-blades wiry, to 50 cm and 1.5 mm diam.; ligule 0.5-1.1 cm, bluntly pointed; spatheole 2.5-5.5 cm, with or without a reduced blade 0.3-2 cm; spikelet 3.5-5.5 cm; lemmas 2-3 cm, villous with silky hairs 1-1.5 cm; anthers to 1.5 cm; stigma 2-3 cm.

M, ?S; rocky and sandy places, often calcareous, plains, and salt marshes. Spain, Italy (incl. Sicily, Sardinia), Malta, Crete, Morocco, Algeria, Tunisia, Libya, Egypt, Kashmir (? introduced).

Tribe 4. **STIPEAE**

Ligule membranous; inflorescence an open or contracted panicle, the spikelets all alike; spikelets 1-flowered without rhachilla extension, terete to laterally or dorsally compressed, disarticulating above the persistent glumes; glumes longer than the floret, hyaline to membranous, 1- to 7-nerved, acute to long-acuminate; lemma rounded on the back, 3- to 9-nerved, membranous to crustaceous, terete to lenticular and often enclosing the palea, awned from the entire or 2-dentate tip; palea usually as long as the lemma, without keels; lodicules usually 3; caryopsis fusiform.

1. Callus pungent, densely bearded; spikelets laterally compressed or terete — 5. **Stipa**
+ Callus obtuse, scarcely distinct from the lemma, glabrous; spikelets dorsally compressed — 6. **Oryzopsis**

5. **Stipa** L.

Perennial or annual; floret fusiform, terete or slightly laterally compressed, the callus usually pungent, rarely obtuse, bearded; lemma firmly membranous to coriaceous, the margins usually overlapping, entire to shortly 2-lobed; awn persistent or deciduous, 1- or 2-geniculate with twisted column, sometimes plumose on the column or limb or both. About 300 species, temperate and warm temperate regions throughout the world.

1. Annual; awns eventually twisted together to form a tail at the summit of the panicle — 1. **S. capensis**
+ Perennial; awns not twisted together into a tail, but sometimes entangled — 2

2. Awn plumose to the naked eye for its whole length — 2. **S. arabica**
+ Awn scabrid or shortly pubescent for its whole length, if the latter then the hairs barely discernible to the naked eye — 3

3. Awn 20-25 cm, shortly pubescent — 3. **S. lagascae**
\+ Awn 6-10(13) cm, scaberulous — 4. **S. parviflora**

1. **Stipa capensis** Thunb., Prodr. Fl. Cap. 1: 19 (1794).
Syn. *Stipa tortilis* Desf., Fl. Atlant. 1: 99, t. 31, f. 1 (1798).

Annual 10-50 cm; panicle contracted, usually not fully exserted from the uppermost sheath; glumes hyaline, narrowly lanceolate-acuminate, unequal, the lower 1.6-2.4 cm, the upper 1.4-2.2 cm; lemma 5.5-8(9) mm including the 1.7-2.3(3.5) mm pungent callus; awn 6.5-10(13.5) cm, bigeniculate, with hairy column and scabrid limb, those of each panicle eventually twisted together to form a tail or spire at the summit.

N, M, D, R, S; desert and coastal sands and rocky slopes. Macaronesia, Mediterranean region, eastwards through southeast Europe and southwest Asia to Pakistan and northwest India, South Africa.

2. **Stipa arabica** Trin. & Rupr., Sp. Gram. Stipac. 77 (1842).
Syn. *Stipa barbata* auct. non Desf.

Densely tufted perennial to 0.7(1) m; panicle linear but not dense, 15-35 cm, not fully exserted from the uppermost sheath; glumes hyaline, narrowly lanceolate, subequal, (2.2)2.5-3.5(5) cm, long-acuminate; lemma (0.9)1-1.3(1.55) cm including the 1-1.5 mm acuminate pungent callus; awn (8)10-15(22) cm, bigeniculate, with shortly plumose column (hairs 0.5-1.3 mm) and long-plumose limb (hairs 2-4 mm).

S; stony soils. Sinai, Palestine, Turkey, Iraq, Iran, Afghanistan, Pakistan, northwest India, Georgia, Armenia, Azerbaijan, Turkmenistan, Tadzhikistan, China.

NOTE: The type of *Stipa arabica* was collected in Sinai in 1835 by Schimper (no. 107, holotype LE; isotypes BM, E, G, K, L, NY, W).

3. **Stipa lagascae** Roem. & Schult., Syst. Veg. 2: 333 (1817), based on *Stipa pubescens* Lag.
Syns. *Stipa pubescens* Lag., Gen. Sp. Pl. 3, no. 29 (1816), non R. Br. (1810).
Stipa letourneuxii Trabut, Bull. Soc. Bot. France 36: 405 (1889).
Stipa lagascae subsp. *pellita* Trin. & Rupr., Sp. Gram. Stipac. 71 (1842).

Densely tufted perennial to 75 cm; panicle 15-30 cm, contracted, often not fully exserted from the uppermost sheath; glumes 5-6 cm, hyaline, lanceolate, subequal, acuminate; lemma 1.75-2.25 cm including the (3)3.5-4 mm acuminate pungent callus; awn 20-25 cm, bigeniculate, minutely pubescent throughout.

N, M, D, S; sandy soils. Portugal, Spain, Italy, Sicily, Cyprus, Turkey, Morocco, Algeria, Tunisia, Libya, Egypt, Palestine, Iran, Azerbaijan.

NOTE: *Stipa lagascae* subsp. *pellita* has been recorded from Egypt, but according to Freitag (Notes Roy. Bot. Gard. Edinb. 42(3): 480 (1985)) the diagnostic character - long callus 3-4 mm compared with 2-3 mm in the West Mediterranean - is part of a continuous range of variation with no strong geographical bias.

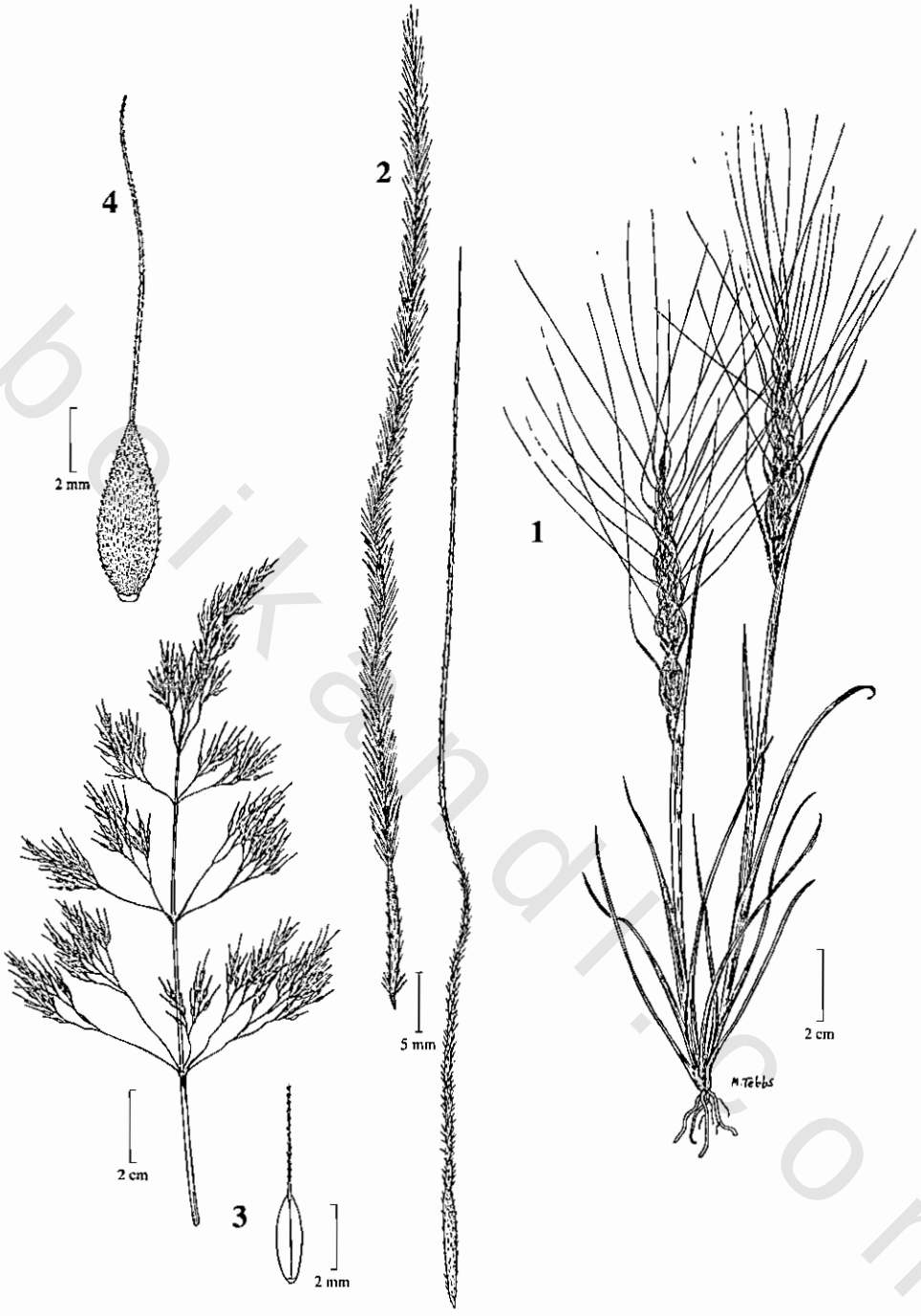


Plate 38. GRAMINEAE: *Stipa capensis* 1, habit; lemma with awn (left). *Stipa arabica* 2, lemma with awn. *Oryzopsis miliacea* 3, inflorescence; lemma with awn (down right). *Oryzopsis holciformis* 4, lemma with awn. Drawn by Margaret Tebbs.

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4. **Stipa parviflora** Desf., Fl. Atlant. 1: 93, t. 29 (1798).
Syn. *Stipa parviflora* subsp. *sinaica* Chrtek & Martinovsky, Webbia 24: 397 (1969).

Densely tufted perennial to 80 cm; panicle open or ± contracted and then not fully exserted from the uppermost sheath; glumes hyaline, unequal, the lower 1-1.25 cm, narrowly lanceolate-acuminate, the upper 5.5-6.5 mm, lanceolate, subacute; lemma 5-6 mm including the 0.9-1.2 mm pungent callus; awn (6)10-13 cm, inconspicuously bigeniculate, scaberulous throughout.

?O, M, De, S; sandy and stony soils. Spain, France, Morocco, Algeria, Libya, Egypt, Palestine, Syria, Iraq, Arabia, Iran.

NOTE: The type of *Stipa parviflora* subsp. *sinaica* was collected in Sinai, 'beginning of the El Raha Plain, in the mountains', in 1956 by Täckholm (*s.n.*, holotype CAI). This taxon is at the extreme end of the range of variation of the species, with awns only 6-8 (9.5) cm compared with 10-13 cm elsewhere. However, these short-awned variants are scattered throughout the range of the species and scarcely justify its partition into subspecies according to Freitag, Notes Roy. Bot. Gard. Edinb. 42(3): 416 (1985).

6. **Oryzopsis** Michx.
Syn. *Piptatherum* P. Beauv.

Perennial; floret narrowly lanceolate to ovate, dorsally compressed, the callus very short and obtuse; lemma coriaceous to bony, usually dark in colour, the margins seldom overlapping; awn deciduous, short and inconspicuous, straight, not twisted. About 35 species, temperate and subtropical regions of the northern hemisphere, especially southwest Asia.

1. Lemma glabrous except for 2 basal tufts of hairs; panicle-branches in whorls — 1. **O. miliacea**
\+ Lemma hairy on the back; panicle-branches not in whorls — 2. **O. holciformis**

1. **Oryzopsis miliacea** (L.) Asch. & Schweinf., Mém. Inst. Égypt. 2: 169 (1887).
Syns. *Agrostis miliacea* L., Sp. Pl., ed. 1, 61 (1753).
Piptatherum miliaceum (L.) Coss., Notes Pl. Crit. 129 (1851).

Tufted plant with wiry culms to 1.5 m; leaves flat; panicle lax, the branches in whorls, ascending or spreading; spikelets 3-4 mm, ovate to lanceolate; glumes 3-nerved; lemma 1.5-2 mm, obovate, glabrous except sometimes for 2 tufts of short hairs on the callus, obtuse, minutely 2-dentate; awn 3-4.5 mm, subterminal.

N, M, De, S; damp sandy ground in gardens and orchards. Macaronesian Islands, Mediterranean region, Sinai, eastwards to Iraq.

2. **Oryzopsis holciformis** (M. Bieb.) Hack., Akad. Wiss. Wien, Math.-Naturwiss. Kl., Denkschr. 1: 8 (1885).
Syns. *Agrostis holciformis* M. Bieb., Fl. Taur.-Caucas. 1: 54 (1808).
Piptatherum holciforme (M. Bieb.) Roem. & Schult., Syst. Veg. 2: 328 (1817).

Densely tufted plant with culms to 1.2 m; leaves flat or inrolled; panicle lax, the branches erect or spreading, mostly paired (rarely in whorls); spikelets ovate to broadly lanceolate, 0.8-1 cm; glumes 5- to 8-nerved; lemma 5-6 mm, ovate to broadly lanceolate, hairy on the back, acute; awn 0.6-1.4 cm, terminal.

S; stony soils. Southern Europe, southwest Asia, eastwards to Central Asia and China.

NOTE: The description above applies to subsp. *holciformis*, the only representative of the species in Egypt.

Tribe 5. **POEAE**

Ligule membranous; inflorescence a panicle or sometimes a single spicate raceme with the spikelets edgeways to the axis (*Lolium*), the spikelets all alike (except *Cynosurus*, *Lamarckia*); spikelets of (1)2 to many florets, mostly laterally compressed, disarticulating below each floret (except *Vulpia*, *Lamarckia*, *Ammochloa*); glumes persistent, usually not or scarcely exceeding the adjacent lemmas, mostly membranous; lemmas membranous to coriaceous, 5- to 7(13)-nerved (3-nerved in several genera), with or without a straight or curved awn from the tip or from between short apical teeth; ovary sometimes hairy, but not with a lobed appendage (*Ammochloa* with an unlobed appendage); lodicules 2; stigmas 2; caryopsis mostly ellipsoid; hilum linear or round; endosperm sometimes soft.

1. Fertile spikelets intermixed with sterile spikelets — 2
\+ Fertile spikelets not accompanied by sterile spikelets — 3

2. Fertile spikelet with 1 sterile companion, the latter persistent — 10. **Cynosurus**
\+ Fertile spikelet with several sterile companions, falling together — 11. **Lamarckia**

3. Inflorescence a capitate panicle — 20. **Ammochloa**
\+ Inflorescence an open or contracted panicle or an elongate raceme — 4

4. Inflorescence an elongate bilateral raceme, the spikelets sessile and edgeways on to the axis; lower glume absent (except in the terminal spikelet) — 8. **Lolium**
\+ Inflorescence a panicle, or if a raceme then both glumes present — 5

5. Perennial — 6
\+ Annual — 8

6. Lemmas rounded on the back — 7. **Festuca**
\+ Lemmas keeled on the back throughout — 7

7. Panicle contracted but neither lobed nor secund; lemmas subacute, not spinulose on the keel, or spikelets viviparous — 13. **Poa**
\+ Panicle lobed and secund; lemmas acuminate, spinulose on the keel — 14. **Dactylis**

8. Lemmas awned; pedicels not inflated — 9. **Vulpia**
\+ Lemmas awnless or if shortly awned then pedicels inflated — 9

9. Lemmas 5- to 11-nerved, if apparently 3-nerved then clavate-hairy below 10
\+ Lemmas 3-nerved, not clavate-hairy 14

10. Lemmas rounded on the back 18. **Catapodium**
\+ Lemmas keeled on the back throughout 11

11. Pedicels stout; inflorescence a 1-sided panicle with short stiff branches, or a raceme 17. **Desmazeria**
\+ Pedicels slender; inflorescence a panicle, open or contracted but not 1-sided 12

12. Lemmas orbicular to oblate 12. **Briza**
\+ Lemmas lanceolate to ovate or oblong 13

13. Panicle-branches not whorled; lemmas narrowly ovate in profile 13. **Poa**
\+ Panicle-branches whorled; lemmas lanceolate to narrowly oblong in profile 15. **Eremopoa**

14. Panicle-branches and pedicels slender, flexuous, persistent 16. **Sphenopus**
\+ Panicle-branches and pedicels stout, stiff, deciduous 19. **Cutandia**

7. **Festuca** L.

Perennial; leaves flat or inrolled, sometimes auriculate at the junction with the sheath; inflorescence an open or contracted panicle; spikelets 2- to several-flowered, ± laterally compressed; glumes subequal, narrow, the lower 1(3)-nerved, the upper 3-nerved; lemmas ± lanceolate, rounded on the back, membranous to thinly coriaceous, (3)5-nerved, with an awn or awn-point from the tip or rarely from just below it, sometimes awnless; floret-callus and rhachilla glabrous; stamens 3; ovary glabrous, or sometimes pubescent above; hilum linear, rarely oblong. About 450 species, temperate regions throughout the world.

1. **Festuca arundinacea** Schreb., Spic. Fl. Lips. 57 (1771), nom. conserv.
Syn. *Festuca elatior* L., Sp. Pl., ed. 1, 75 (1753), nom. dub. rejic.

Tufted plant to 1.8 m; leaves 0.3-1.2 cm wide, flat, with minutely hairy falcate auricles; sheaths glabrous; panicle 10-50 cm, lanceolate to ovate, loose or contracted; spikelets 3- to 10-flowered, 1-1.8 cm, elliptic to oblong; lower glume 3-6 mm; upper glume 4.5-7 mm; lemmas 6-9 mm, awnless or with a slender bristle to 4 mm from just below the hyaline tip; anthers 3-4 mm.

N; weed of waste ground, originally introduced to Ras el-Hekma in the early 1950s, presumably on trial as a fodder grass. Native to temperate Eurasia.

Imperfectly known species:

Festuca pinifolia (Hack. ex Boiss.) Bornm. is a native of Turkey and Lebanon that has been recorded from Egypt but almost certainly in error. It is a densely tufted plant with narrow pungent leaves up to 1 mm across, and the basal sheaths decay into a cushion of fibres. It should, perhaps, be sought in Sinai.

8. **Lolium** L.

Annual, biennial or perennial; leaves often auriculate at the junction with the sheath; inflorescence a stiff bilateral raceme, the spikelets sessile, alternate in opposite rows with 1 edge sunk in a hollow in the continuous axis; spikelets 3- to 12(22)-flowered, the uppermost floret reduced, the lower (inner) glume suppressed in all spikelets except the terminal and there similar to the upper; upper glume coriaceous, persistent, linear to oblong, (3)5- to 9(11)-nerved; lemmas membranous to coriaceous, rounded on the back, 5- to 9-nerved, awnless or with a straight awn from near the tip; hilum linear. 8 species, temperate Eurasia and North Africa.

The taxonomy of the genus *Lolium* is confused by the relative ease with which the species hybridize and introgress. Variation within individual species is such that no key can be constructed that will place every specimen with certainty.

1. Lemmas elliptic to ovate, very turgid at maturity especially towards the base; mature caryopsis not more than 3 times as long as wide 4. **L. temulentum**
\+ Lemmas oblong to lanceolate, not turgid at maturity; mature caryopsis more than 3 times as long as wide 2

2. Perennial with non-flowering shoots at anthesis; leaves flat or folded when young; spikelets 2- to 10-flowered (rarely more), usually awnless 1. **L. perenne**
\+ Annual without non-flowering shoots at anthesis, or if biennial or perennial then spikelets 11- to 22-flowered; leaves rolled when young 3

3. Spikelets 11- to 22-flowered, rarely less; glume always less than 1/2 as long as the spikelet; annual, biennial or short-lived perennial 2. **L. multiflorum**
\+ Spikelets 3- to 11-flowered; glume usually more than 1/2 as long as the spikelet; usually annual 3. **L. rigidum**

1. **Lolium perenne** L., Sp. Pl., ed. 1, 83 (1753).

Loosely to densely tufted perennial to 90 cm, sometimes the culms prostrate and rooting at the nodes; leaves flat or folded when young; raceme 3-30 cm, straight or slightly curved, stiff; spikelets 0.5-2 cm, 3- to 10(14)-flowered; glume 0.35-1.5 cm, 1/3 as long to as long as the florets, rarely exceeding them, 3- to 9-nerved, acute or obtuse; lemmas 3.5-9 mm, oblong to oblong-lanceolate, smooth, obtuse to subacute, usually awnless but rarely with an awn up to 8 mm; caryopsis more than 3 times as long as wide.

N, O, M, ?D, ?S; mostly in areas of cultivation. North Africa and temperate Eurasia.

2. **Lolium multiflorum** Lam., Fl. Franç. 3: 621 (1778).

Annual, biennial or short-lived perennial to 1.3 m; leaves rolled when young; raceme 15-35(45) cm, straight or slightly curved, stiff; spikelets 0.8-3 cm, (5)11- to 22-flowered; glume 0.5-1.4(1.8) cm, 1/4-1/2 the length of the spikelet, scarcely exceeding the lowest floret, 3- to 7-nerved, obtuse or slightly erose; lemmas 4-8 mm, oblong to oblong-lanceolate, smooth or minutely scaberulous, acute, obtuse or slightly bifid, usually awned, the awn to 1.5 cm, rarely awnless; caryopsis more than 3 times as long as wide.

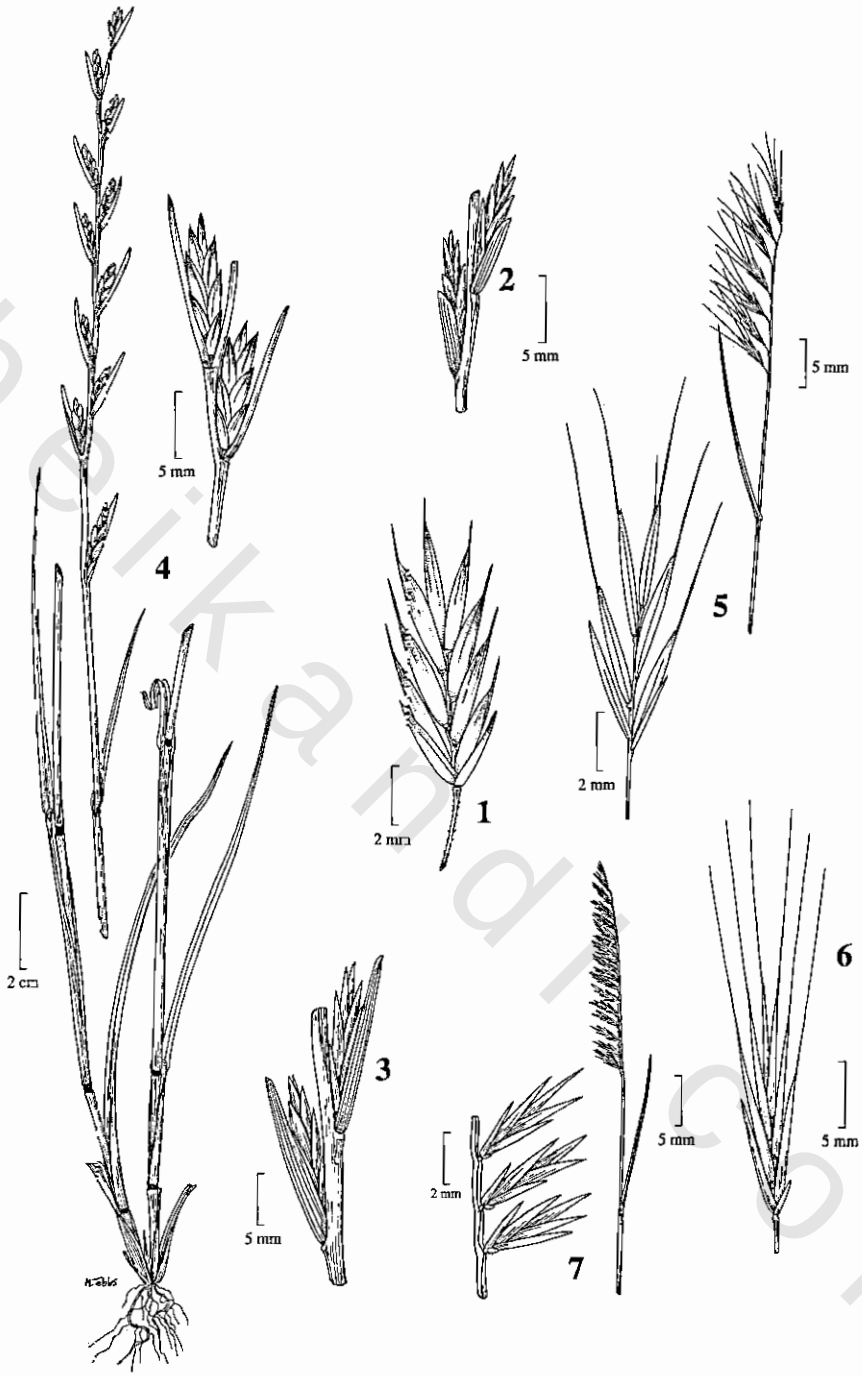


Plate 39. GRAMINEAE: *Festuca arundinacea* 1, spikelet. *Lolium perenne* 2, two spikelets. *Lolium rigidum* 3, two spikelets. *Lolium temulentum* 4, lower part and inflorescence; two spikelets (right). *Vulpia bromoides* 5, inflorescence; spikelet (left). *Vulpia myuros* 6, spikelet. *Vulpia pectinella* 7, inflorescence; three spikelets (left). Drawn by Margaret Tebbs.

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N, O, M, ?D, R, S; weed of cereals. Central and southern Europe, northeast Africa, southwest Asia, introduced weed to most temperate regions.

3. **Lolium rigidum** Gaudin, Agrost. Helv. 1: 334 (1811).

Annual to 70 cm; leaves rolled when young; raceme 3-30 cm, straight or curved, rigid, slender to very thick; spikelets 0.5-1.8 cm, 5- to 8(11)-flowered; glume 0.4-2(3) cm, 1/2 as long as the spikelet to exceeding the florets, 3- to 7(9)-nerved, obtuse or rarely acute to acuminate; lemmas 3.2-8.5(10.5) mm, oblong to oblong-lanceolate, glabrous to scaberulous, obtuse, acute or erose, usually awnless, rarely with an awn to 0.3(1) cm; caryopsis more than 3 times as long as wide.

N, O, M, ?D, ?S; cultivated fields and gardens. Southern Europe, Mediterranean region, eastwards to Central Asia, widely introduced as a weed.

4. **Lolium temulentum** L., Sp. Pl., ed. 1, 83 (1753).

Syns. *Lolium arvense* With., Arr. Brit. Pl., ed. 3, 2: 168 (1796).
Lolium temulentum var. *macrochaeton* A. Braun, Flora 17: 252 (1834).
Lolium temulentum var. *muticum* Boiss., Fl. Orient. 5: 681 (1884).
Lolium temulentum var. *leptochaeton* A. Braun, Flora 17: 252 (1834).
Lolium temulentum forma *macrochaeton* (A. Braun) Junge, Jahrb. Hamburg Wiss. Anst. Beih. 3, 30: 314 (1913).
Lolium temulentum forma *arvense* (With.) Junge, Jahrb. Hamburg Wiss. Anst. Beih. 3, 30: 314 (1913).
Lolium temulentum forma *muticum* (Boiss.) Rech.f., Fl. Aegaea 787 (1943).

Annual to 1.2 m; raceme 5-40 cm, erect, rigid; spikelets 0.8-2.8 cm, 2- to 10(15)-flowered; glume 0.7-3 cm, 3/4 as long as the spikelet to longer than the florets, 7- to 9 (11)-nerved, obtuse; lemmas 4.5-8.5 mm, elliptic to ovate, smooth, obtuse, very turgid at maturity, awnless or with an awn to 2.3 cm; caryopsis not more than 3 times as long as wide.

N, O, M, Dw, ?S; weed of cereals. Mediterranean region and southwest Asia, but widely introduced as a weed in other parts of Europe, Africa, and to all other continents.

NOTE: A very variable species sometimes divided into 2 or 3 varieties or forms, but these are of little taxonomic consequence and are sympatric throughout Egypt; var. *leptochaeton* has glumes not exceeding the uppermost florets and an awn that is very weak; it is sometimes amalgamated with var. *arvense* (syn. var. *muticum*) in which the glumes exceed the uppermost florets; var. *temulentum* (syn. var. *macrochaeton*) has glumes exceeding the uppermost florets and a stout awn. The variants all intergrade.

9. **Vulpia** C. C. Gmel.
Syn. *Ctenopsis* De Not.

Annual or very rarely perennial; inflorescence a ± secund contracted or spike-like panicle, sometimes reduced to a raceme; spikelets 3- to 13-flowered, the uppermost florets often reduced and male or sterile, breaking up below each fertile floret, laterally compressed, borne upon a short thickened pedicel; glumes often very unequal, narrow, the lower nerveless or 1-nerved, the upper 1- to 3-nerved; lemmas subulate-lanceolate, rounded on the back with incurved margins, finely (3)5-nerved, becoming rigid,

narrowed above into a fine straight awn; anthers 1-3; caryopsis linear; hilum linear. About 22 species, temperate and subtropical regions of the northern hemisphere, mostly introduced in the southern hemisphere but perhaps a few species endemic to South America.

1. Spikelets pectinate — 5. **V. pectinella**
+ Spikelets ± appressed to the panicle-branches — 2

2. Spikelets deciduous in triads — 4. **V. brevis**
+ Spikelets solitary, not falling in triads — 3

3. Lemma with pointed callus — 1. **V. fasciculata**
+ Lemma with rounded callus — 4

4. Lemma 1.3-1.9 mm wide; lower glume 2.5-5 mm, 1/2-3/4 as long as the upper — 2. **V. bromoides**
+ Lemma 0.8-1.3 mm wide; lower glume 1/10-2/5 as long as the upper — 3. **V. myuros**

1. **Vulpia fasciculata** (Forssk.) Samp., Lista Esp. Herb. Port. 24 (1913).
Syns. *Festuca fasciculata* Forssk., Fl. Aegypt.-Arab. 22 (1775).
Festuca uniglumis Sol. in Aiton, Hort. Kew 1: 108 (1789).
Vulpia uniglumis (Sol.) Dumort., Observ. Gramin. Belg. 101 (1824).
Vulpia membranacea auct., non (L.) Dumort.

Annual to 50 cm; inflorescence a rigid raceme or sparsely branched panicle 3-11 cm, slightly exserted from to partially embraced by the uppermost sheath; pedicels 3-7 mm, dilated distally; spikelets 1-1.8 cm (excluding the awns), the lower 2-5 florets fertile, the upper 3-6 florets much reduced and sterile; lower glume 0.1 -2.6 mm, less than 1/6 the length of the upper; upper glume 1-3 cm including the 0.3 -1.2 cm awn; lemmas 0.8-1.8 cm, glabrous or scabrid; awn to twice as long as the lemma; callus 0.5-0.8 mm, pointed; anther 1, 0.3-0.6 mm, slightly exserted at anthesis; ovary pubescent at the apex.

N, M, ?S; sandy soils. Coasts of western and southern Europe and the Mediterranean region, eastwards to the Caucasus.

NOTE: *Vulpia membranacea*, with which this species has been confused, is a more slender plant with fully exserted panicle and glabrous ovary. The type of *Festuca fasciculata* was collected in Egypt, Alexandria, in 1762 by Forsskål (no. 1260, holotype C).

2. **Vulpia bromoides** (L.) Gray, Nat. Arr. Brit. Pl. 2: 124 (1821).
Syns. *Festuca bromoides* L., Sp. Pl., ed. 1, 75 (1753).
Vulpia sciuroides (Roth) C.C. Gmel., Fl. Bad. 1: 9 (1806).
Vulpia dertonensis (All.) Gola, Malpighia 18: 366 (1904).

Annual to 50 cm; inflorescence an erect, sparsely branched panicle 1-11 cm, usually well exserted from the uppermost sheath; pedicels 0.5-3.5 mm; spikelets 0.65-1.15 cm (excluding the awns), most florets fertile but the uppermost 1-2(3) gradually reduced and male or sterile; lower glume 2.5-5 mm, 1/2-3/4 the length of the upper; upper glume 4.5-9 mm including the 0-2 mm awn; lemmas 0.45-0.8(1) cm (excluding the awn), usually

1.3-1.9 mm wide when flattened, glabrous to scabrid or rarely pubescent; awn about as long as the lemma; callus *c.* 0.2 mm long, rounded; anther 1, 0.3-0.6 mm, included at anthesis; ovary glabrous.

?M, ?S. *Vulpia bromoides* is unconfirmed in Egypt, but likely to occur in the Mediterranean coastal region, and perhaps in the mountains of Sinai. Western and Central Europe, Mediterranean region, mountains of tropical Africa.

NOTE: *Vulpia* can be difficult to name to species and it is quite possible that this species has been recorded in error. No extant herbarium specimens are known.

3. **Vulpia myuros** (L.) C. C. Gmel., Fl. Bad. 1: 8 (1805).
Syns. *Festuca myuros* L., Sp. Pl., ed. 1, 74 (1753).
Vulpia megalura (Nutt.) Rydb., Bull. Torrey Bot. Club 36: 538 (1909).

Annual to 65 cm; inflorescence an erect or nodding, sparsely branched panicle 5-35 cm, rarely a raceme, usually partially embraced by the uppermost sheath; pedicels 0.4-2 mm long; spikelets 0.6-1.05 cm (excluding the awns); most florets fertile but the uppermost 1-2(3) gradually reduced and male or sterile; lower glume 0.4-2.5 mm, $^1/_{10}$-$^2/_5$ the length of the upper; upper glume 2.5-6.5 mm including an awn 0-0.1 mm; lemmas 4.5-7.5 mm (excluding the awn), usually 0.8-1.3 mm wide when flattened, glabrous to scabrid; awn up to twice as long as the lemma; callus *c.* 0.2 mm long, rounded; anther usually 1, 0.3-0.8 mm, included at anthesis; ovary glabrous.

M, S; sandy soils. Western and Central Europe, Mediterranean region, eastwards through southwest Asia to Kazakhstan and Pakistan.

4. **Vulpia brevis** Boiss. & Kotschy in Boiss., Diagn. Pl. Orient. 3(4): 139 (1859).
Syn. *Festuca inops* Delile, Fl. Aegypt. Illustr. 52, no. 110 (1814), nom. nud., t. 63,1, ined.
Vulpia inops Hack., Flora 63: 476 (1880), based on the above.
Vulpia inops Hack. var. *strigosa* Hack., Flora 63: 476 (1880).

Dwarf annual to 6 cm; inflorescence a dense panicle 2-3 cm, exserted from or slightly embraced by the uppermost sheath; pedicels 2-3 mm, connate in groups of 3; spikelets 0.6-1 cm (excluding the awns), falling entire in groups of 3, the lowermost 1-2 florets fertile, the uppermost 2-6 sterile and reduced to their lemma; lower glume linear-lanceolate, as long as the spikelet, narrowed above into an awn as long as the body; upper glume similar but broader; lemmas *c.* 6 mm, glabrous or shortly hispid; awn 8-9 mm; callus 0.1-0.2 mm, rounded; anther 1, 0.5-0.75 mm, included at anthesis; ovary glabrous.

N, M, De; margins of sandy fields and on thin soils overlying limestone. Cyprus, Libya, Egypt, Palestine, Syria.

NOTE: The nomenclatural history of *Vulpia brevis* is confusing. The name *Festuca inops* first appeared in Delile, Fl. Aegypt. Illustr. on p. 52 under no. 110, but without a description. It was clearly intended that the species should be described since an illustration had been prepared, along with other new taxa, and designated plate 63, but the Flora ended with plate 62. When C. & W. Barbey published 'Herborisations au Levant' in 1882 they included a plate, rather poorly reproduced, as plate 8, from

photographs of the illusive plate 63 (as well as plate 64) which was at Montpellier. In the text they refer to the species as *Vulpia inops*, based on *Festuca inops* Delile. However, since the basionym was itself a nomen nudum and the new combination is likewise without a description, the epithet is still not valid. The earliest validation of the name was that of Hackel but this was predated by *Vulpia brevis*. C. & W. Barbey, in fact, admitted that their *Vulpia inops* was the same taxon as *V. brevis*. Hackel cited material from Alexandria, collected by Ehrenberg and Letourneux, as the basis of his name although 'type' material of *Festuca inops* came from Syria.

5. **Vulpia pectinella** (Delile) Boiss., Fl. Orient. 5: 631 (1884).
Syns. *Festuca pectinella* Delile, Ind. Sem. Hort. Monsp. 24 (1836).
Ctenopsis pectinella (Delile) De Not., Ann. Sci. Nat., ser. 3, 9: 325 (1848).
Vulpia patens Boiss., Diagn. Pl. Orient. 2(13): 62 (1854).

Annual to 15 cm; inflorescence a secund, pectinate raceme with stout concavo-convex axis 1.5-3 cm, rarely branched below, well exserted from the uppermost sheath; pedicels *c.* 0.2 mm; spikelets 3.4-5.5 mm, all florets fertile; lower glume minute, *c.* 0.5 mm, 1/6 the length of the upper; upper glume 3-3.5 mm, awnless; lemmas *c.* 3 mm, scabrid or pubescent, with an awn-point *c.* 1 mm; callus *c.* 0.1 mm, truncate; anthers 3, 0.3-0.4 mm, exserted at anthesis; ovary glabrous.

N, M, De, S; sand overlying limestone. ?Spain, Morocco, Algeria, Tunisia, Libya, Egypt, Palestine, Syria, Iraq.

10. **Cynosurus** L.

Annual or perennial; panicle spike-like or capitate, ± unilateral, bearing paired dimorphic spikelets, the lower (outer) of each pair sterile and concealing an inner fertile; fertile spikelet (1)2- to 5-flowered, laterally compressed, disarticulating below each floret; glumes subequal, narrow; lemmas coriaceous, rounded on the back, (3)5-nerved, scabrid above, acute, narrowly obtuse or bidenticulate, muticous, mucronate or awned; sterile spikelet reduced to pectinate-distichous scales (glumes and sterile lemmas), persistent on the panicle; caryopsis elliptic or oblong-elliptic in outline; hilum oblong or linear. 8 species, Europe, North Africa, southwest Asia.

1. Uppermost leaf-sheath often reaching or embracing the base of the panicle at anthesis; awns of sterile spikelets 1.5-2 cm, pinkish at the base 1. **C. coloratus**
\+ Uppermost leaf-sheath far below the panicle at anthesis; awns of sterile spikelets 0.5-1.5 cm, usually pallid 2. **C. echinatus**

1. **Cynosurus coloratus** Lehm. ex Nees, Fl. Afr. Austral. Ill. 439 (1841).
Syn. *Cynosurus callitrichus* Barbey, Herboris. Levant 165, t. 10, 1-8 (1882).

Annual to 20 cm; ligule to 1.5 cm; panicle *c.* 2.5 x 1 cm (excluding the awns), ovoid, ellipsoid or almost globose, embraced below by the uppermost sheath or only slightly exserted; fertile spikelets 4-7 mm, 1-flowered; glumes narrowly lanceolate, as long as the spikelet, narrower than the lemma, with an awn about as long as or shorter than the body; lemma 3.4-4 mm, scabrid above, 2-denticulate at the tip, awned in the sinus; awn 1.5-2 cm, pinkish to deep purple; anthers *c.* 0.5 mm; sterile spikelets comprising 9-13 scales, the upper broader than the lower, each with a long (*c.* 1.2 cm) awn.

M; calcareous sands. Crete, Libya, Egypt, Palestine, Syria, Cyprus.

2. **Cynosurus echinatus** L., Sp. Pl., ed. 1, 72 (1753).

Annual to 65 cm; ligule 0.4-1 cm; panicle 1-6 x 0.4-2.5 cm (excluding the awns), oblong to ovoid or subglobose, well exserted from the uppermost sheath; fertile spikelets 0.45-0.7(1) cm, 2- to 3-flowered; glumes narrowly oblong-acuminate, as long as the spikelet, about as wide as the lemmas, with an awn less than 1/5 the length of the body; lemmas 4-6.5 mm, scaberulous above, 2-denticulate at the tip, awned in the sinus; awn 0.5-1.5 cm, pallid or greenish, sometimes purplish; anthers 3-4 mm; sterile spikelets comprising 9-23 scales, the upper scarcely broader than the lower, each with a long (3.5-8 mm) awn.

M; calcareous sand. Macaronesia, southern Europe, Mediterranean region, eastwards to Central Asia.

11. **Lamarckia** Moench, nom. conserv.

Annual; inflorescence a condensed secund panicle bearing deciduous clusters of 3 sterile spikelets ± covering 2 smaller spikelets, one fertile and the other reduced; fertile spikelet 1-flowered (rarely more) plus an awned rudiment; glumes narrow, exceeding the lemma; floret raised on a long rhachilla-internode; lemma membranous, rounded on the back, 5-nerved, scabrid above, 2-dentate at the tip and awned in the sinus; sterile spikelets many-flowered, linear; lemmas membranous, empty, obtuse; hilum linear. 1 species, Mediterranean region, Sinai, eastwards to Afghanistan and Pakistan.

1. **Lamarckia aurea** (L.) Moench, Methodus, 201 (1794).
Syn. *Cynosurus aureus* L., Sp. Pl., ed. 1, 73 (1753).

Annual to 15(25) cm; uppermost leaf-sheaths slightly inflated; panicle 2-6 cm, usually golden-yellow but sometimes tinged with purple; pedicels villous; fertile spikelet 2-4 mm; glumes linear-lanceolate, as long as the spikelet; lemma 2-2.5 mm, ovate; awn 0.6-1 cm; sterile rudiment *c.* 0.5 mm, with an awn 4-7 mm; sterile spikelets 5-8 mm; glumes 3-3.5 mm, linear-lanceolate; lemmas ovate.

N, M, ?De, S; sandy and stony soils and areas of cultivation. Mediterranean region, Sinai, eastwards to Afghanistan and Pakistan.

NOTE: *Lamarckia aurea* is widely cultivated in Europe and elsewhere as an ornamental under the name 'Goldentop.'

12. **Briza** L.

Annual or perennial; inflorescence a loose or contracted panicle; spikelets several- to many-flowered, slightly laterally compressed or globose, ovate to rotund; glumes cordate to narrowly ovate, persistent, subequal, 3- to 9-nerved; lemmas closely imbricate, horizontally spreading, papery with broad scarious margins, orbicular to oblate, folded or flattened, gibbous on the back, 5- to 11-nerved, cordate at the base, awnless; palea sometimes much shorter than the lemma, lanceolate to orbicular, often winged on the keels; stamens 1-3; ovary glabrous; hilum round to elliptic; endosperm sometimes soft. 20 species, temperate Eurasia and South America.

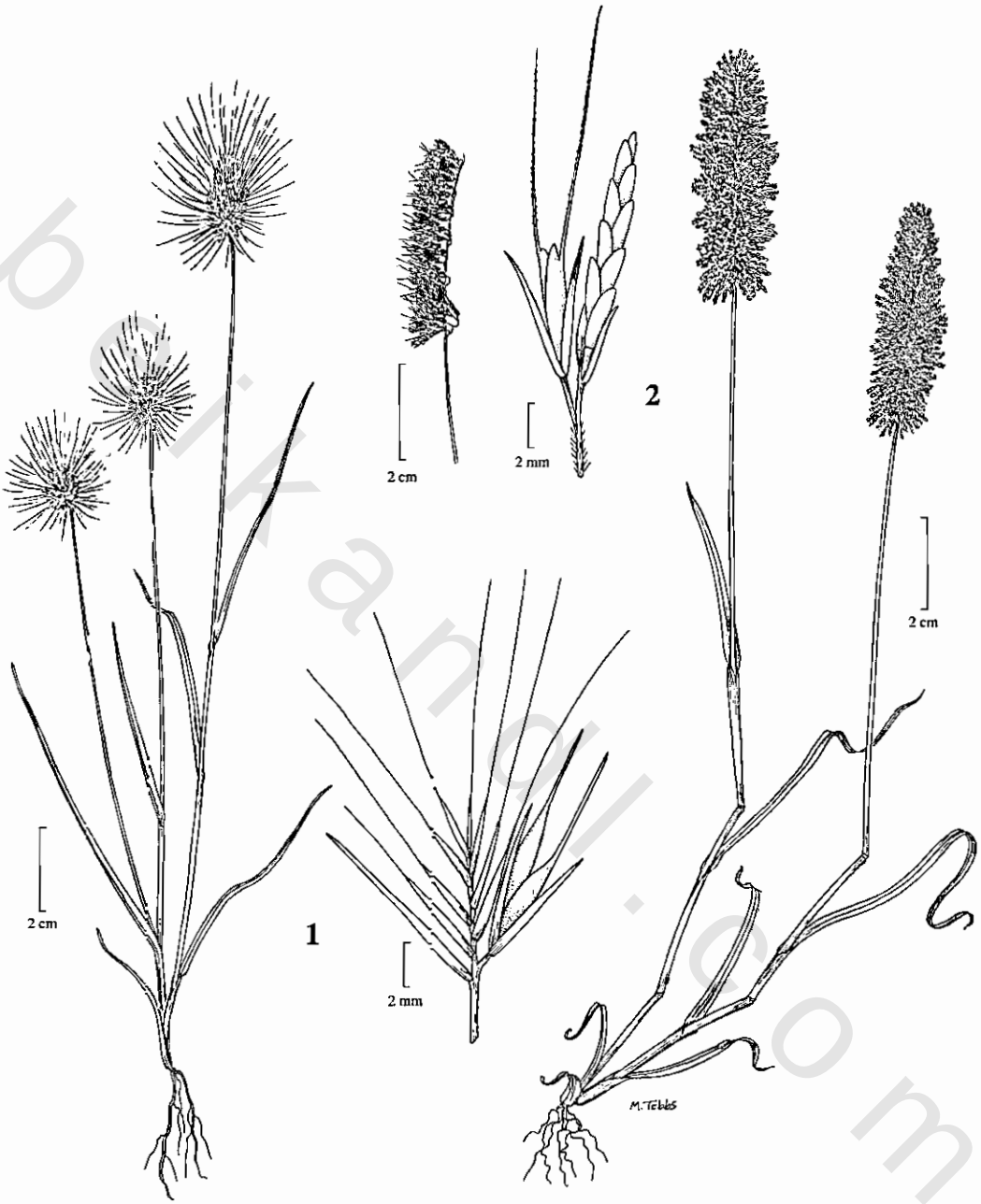


Plate 40. GRAMINEAE: *Cynosurus coloratus* , habit; spikelet-pair (down right). *Lamarckia aurea* 2, habit; spikelet-pair (left); inflorescence (further left). Drawn by Margaret Tebbs.

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1. Spikelets 3-5 mm, numerous in the panicle — 1. **B. minor**
+ Spikelets 1.4-2.5 cm, up to 12 in the panicle — 2. **B. maxima**

1. **Briza minor** L., Sp. Pl. , ed. 1, 70 (1753).

Annual to 60 cm, erect or geniculately ascending; panicle 4-20 cm, obovate in outline, loose and nodding, the numerous spikelets borne on capillary pedicels; spikelets 4- to 8-flowered, orbicular to triangular-ovate, 3-5 mm and as wide or wider, green or tinged with purple; lemma 2-3 mm, very broad, deeply convex on the back, glabrous, hardened and shining in the centre but with broad white membranous margins.

N, M; weed of cultivation. Western Europe, Mediterranean region, widely naturalized in many temperate regions.

2. **Briza maxima** L., Sp. Pl., ed. 1, 70 (1753).

Annual to 60 cm, erect or geniculately ascending; panicle 3-10 cm, oblong in outline, loose and nodding, bearing up to *c.* 12 spikelets on capillary pedicels; spikelets 7- to 20-flowered, 1.4-2.5 x 0.8-1.5 cm, ovate to oblong, pale green, silvery or suffused with reddish-brown or purple; lemma 6-8 mm, very broad, rounded on the back, hardened in the centre and bearing minute gland-tipped hairs, the margins broad, firmly membranous and appressed-hairy.

N; introduced decorative species. Mediterranean region, but escaping from cultivation and now widely naturalized in temperate regions.

NOTE: *Briza maxima* is an extremely attractive grass, widely cultivated as an ornamental (Large Quaking-grass).

13. **Poa** L.

Annual or perennial; basal leaf-sheaths occasionally thickened into a bulb-like structure; inflorescence an open or contracted panicle; spikelets 2- to several-flowered, laterally compressed; glumes equal or unequal, the lower 1(3)-nerved, the upper nearly always 3-nerved; lemmas keeled throughout, the keels glabrous or ciliate, herbaceous or membranous, often with hyaline margins that tend to inflex at maturity, 5- to 7-nerved but occasionally the intermediate nerves obscure, obtuse to acute, usually awnless; floret-callus often with a web of fine woolly hairs, the rhachilla glabrous; palea-keels scaberulous to stiffly ciliolate (almost smooth in some annual species); stamens 3, rarely 1; ovary glabrous; hilum round to oval. About 500 species, cool temperate regions throughout the world, extending through the tropics on mountain tops.

1. Perennial with bulbous base — 3. **P. sinaica**
+ Annual or short-lived perennial without bulbous base — 2

2. Panicle-branches spreading or deflexed after anthesis; spikelets with crowded florets; anthers 0.6-0.8(1) mm, 2-3 times as long as wide — 1. **P. annua**
+ Panicle-branches erecto-patent after anthesis; spikelets with rather distant florets; anthers 0.2-0.5 mm, scarcely longer than wide — 2. **P. infirma**

1. **Poa annua** L., Sp. Pl., ed. 1, 68 (1753).

Annual or short-lived perennial to 30 cm; leaf-blades 1-2(5) mm wide, flat or folded, flaccid, often transversely wrinkled; ligule 2-5 mm, blunt; panicle 3-8(12) cm, ovate or pyramidal in outline, loose or rather dense, the branches spreading or deflexed after anthesis, smooth; spikelets 0.3-1 cm, 3- to 5(10)-flowered, ovate or oblong, the florets close together and the rhachilla not visible between them; glumes 1.5-3 mm, unequal, the lower lanceolate to ovate, 1-nerved, the upper 2-4 mm, elliptic or oblong, 3-nerved; lemmas 2.5-4 mm, semi-elliptic or oblong in profile, obtuse, glabrous or sparsely to densely hairy on the keel and nerves, without wool on the callus; palea crispate-ciliate all along the keels, rarely smooth and glabrous; anthers 0.6-0.8(1) mm.

N, O, M, S; weed of fields and gardens. Cosmopolitan.

2. **Poa infirma** Kunth in Humb., Bonpl. & Kunth, Nov. Gen. Sp. 1: 158 (1816).

Annual to 25 cm; leaf-blades 1-2(4) mm wide, flat or folded, flaccid, smooth; ligule to 3 mm, blunt; panicle 0.5-10 cm, ovate-lanceolate in outline, loose, the branches erecto-patent after anthesis, smooth; spikelets (2)4- to 6-flowered, 2-4 mm, ovate or oblong, the florets distant with the rhachilla clearly visible between them; glumes 1-1.5 mm, unequal, the lower ovate, 1-nerved, the upper 1.3-2.5 mm, elliptic or oblong, 1- to 3-nerved; lemmas 2-2.5 mm, oblong in profile, obtuse, densely hairy on the keel and nerves, without wool on the callus; palea densely crispate-ciliate all along the keels; anthers 0.2-0.5 mm.

N, M, De; weed of fields and gardens. Mediterranean region, southern Europe, eastwards to the Himalaya and Central Asia; introduced to South America whence it was first described.

3. **Poa sinaica** Steud., Syn. Pl. Glumac. 1: 256 (1854).

Tufted perennial to 65 cm, clothed at the base in the hardened remains of old leaf-sheaths forming a bulbous swelling; leaves mostly basal; the blades 1.5-2.5 mm wide; folded; ligule 2-4 mm, pointed; panicle (3)6-13 cm, oblong or elliptic in outline, dense, the branches ascending, scaberulous; spikelets 4- to 7-flowered, 6-8 mm, oblong-elliptic; glumes unequal, elliptic, 3-nerved, the lower 3-4 mm, the upper 3.5-4.5 mm; lemmas 3.5-5 mm, oblong in profile, obtuse, hairy on the keel and marginal nerves, without wool on the callus (or rarely with just 1 or 2 strands); palea scabrid on the keels; anthers 1.5-2.5 mm.

De, S; dry mountains and rocky deserts. Egypt, Palestine, Syria, Turkey, Iraq, Arabia, Iran, Afghanistan, Pakistan, Azerbaijan, northwest India, western Himalaya.

NOTE: The type of *Poa sinaica* was collected in Sinai, St. Katherine, in 1835 by Schimper (no. 326; isotype K). In parts of its range, though not as far as is known in Egypt, the species is prone to proliferation of the spikelets. It is then extremely difficult to distinguish from *P. bulbosa* L. a species very prone to proliferation. In the non-proliferous state *P. bulbosa* has ample wool on the callus of the floret. Proliferous specimens are best distinguished according to the habitat from which they came, *P. sinaica* from xeric places, *P. bulbosa* from mesic places but not yet recorded from Egypt.

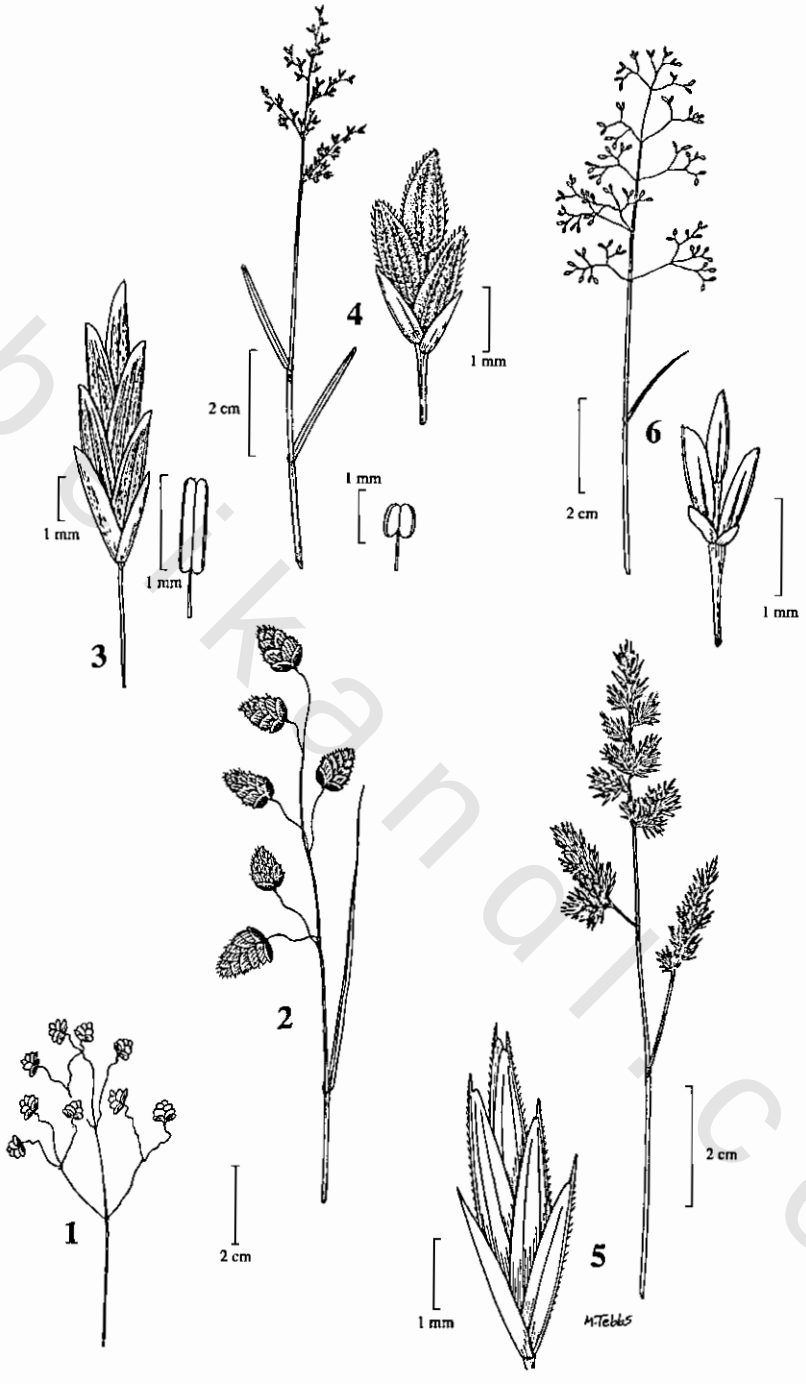


Plate 41. GRAMINEAE: *Briza minor* 1, inflorescence. *Briza maxima* 2, inflorescence. *Poa annua* 3, spikelet; stamen (right). *Poa infirma* 4, inflorescence; spikelet (up right); stamen (down right). *Dactylis glomerata* 5, inflorescence; spikelet (down left). *Sphenopus divaricatus* 6, inflorescence; spikelet (down right). Drawn by Margaret Tebbs.

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14 **Dactylis** L.

Tufted perennial, the non-flowering shoots strongly laterally compressed; inflorescence a contracted, lobed, 1-sided panicle, the spikelets subsessile in compact fascicles at the ends of the short (sometimes long) main branches; spikelets 2- to 5-flowered, strongly laterally compressed; glumes unequal, 1- to 3-nerved, keeled; lemmas thinly coriaceous with membranous margins, 5-nerved, keeled, spinously ciliate on the keel, entire or 2-toothed at the tip, mucronate to shortly awned in the sinus; stamens 3; ovary glabrous; hilum round; endosperm soft. 1 species, temperate Eurasia.

NOTE: *Dactylis* is a polyploid pillar complex with variable numbers of segregates recognized at species level. Apart from widespread polyploids, there are probably at least a dozen diploid enclaves in and around the Mediterranean region and Macaronesia, but it is doubtful if they warrant recognition above infraspecific level. No overall treatment is available for the complex and until it is more fully understood it is probably better to treat it as a single variable species while acknowledging that local, morphologically distinct races exist.

1. **Dactylis glomerata** L., Sp. Pl, ed. 1, 71 (1753).
   Syns. *Dactylis hispanica* Roth, Catal. Bot. 1: 8 (1797).
   Dactylis glomerata L. var *hispanica* (Roth) K. Koch, Syn. Pl. Germ. 808 (1837).
   Dactylis glomerata L. subsp. *hispanica* (Roth) Nyman, Consp. Fl. Eur. 819 (1882).

Coarsely tufted with culms to 1(2) m but usually not much over 50 cm; leaf-blades 10-45 x 0.2-1.4 cm, flat, glabrous; ligule 0.2-1 cm, pointed or lacerate; panicle 2-30 cm, oblong to ovate in outline, the branches close together and appressed or with the lower distant, spreading and bare of spikelets at the base; spikelets 5-9 mm, oblong or cuneate; glumes lanceolate to ovate, ciliate on the keel, finely pointed, the lower 3-3.5(4) mm, the upper 4-4.5(6) mm; lemmas 4-7 mm, lanceolate to oblong in profile.

N, M; rocky ground; introduced in areas of cultivation. Europe, temperate Asia, widely introduced as a fodder grass in temperate countries throughout the world.

NOTE: Two distinct morphotypes of *Dactylis glomerata* occur in Egypt. One of these is the tall, tussock-forming plant typical of much of Europe and probably introduced in the Nile Valley for pasture and hay. The other, found on the Mediterranean coast, is a much smaller plant with a narrow panicle of appressed branches and referred to in Egyptian literature as *Dactylis glomerata* var. *hispanica*, but elsewhere variously treated as a subspecies or even species.

15. **Eremopoa** Roshev.

Annual; inflorescence a panicle with whorled branches, the lowermost sometimes sterile; spikelets (1)2- to many-flowered, slightly laterally compressed; glumes unequal, the lower 1-nerved, the upper 3-nerved; lemmas lanceolate to narrowly oblong in profile, lightly keeled, herbaceous, indistinctly 5-nerved, obtuse to acuminate or mucronate; stamens 3; ovary glabrous; hilum round. 4-8 species, East Mediterranean region to western China.

1. Lemmas usually obtuse at the tip but sometimes abruptly acute or very shortly acuminate; anthers 1.4-2.6 mm — 1. **E. persica**
+ Lemmas usually acuminate and sharply pointed at the tip but sometimes only acute or subacute; anthers 0.3-0.7(1) mm — 2. **E. altaica**

1. **Eremopoa persica** (Trin.) Roshev. in Kom., Fl. URSS 2: 430 (1934).
Syns. *Poa persica* Trin., Gram. Gen. 373 (1830).
Festuca persica (Trin.) K. Koch, Linnaea 21: 410 (1848).

Erect or ascending, to 75 cm; leaf-blades 4-20 x 0.2-0.65 cm, flat; ligule 2.5-3.5 mm; panicle 6.5-27 cm, narrowly to broadly ovate in outline, loose to very loose, the branches capillary to somewhat stiff; spikelets 0.45-1.1 cm; lower glume lanceolate, 1.3-2.5 mm, acute; upper glume narrowly ovate, 2-3 mm, acute or subacute; lemmas 3-3.5 mm, glabrous or minutely hairy on the keel and marginal nerves below, scaberulous on the back, usually obtuse at the tip but sometimes abruptly acute to very shortly acuminate; anthers 1.4-2.6 mm.

S; sandy and stony soils. Throughout southwest Asia, eastwards to Pakistan and Central Asia.

2. **Eremopoa altaica** (Trin.) Roshev. in Kom., Fl. URSS 2: 431 (1934).
Syns. *Aira altaica* Trin., Mém. Sav. Étr. Acad. Pétersb. 2: 526 (1835) reprinted in Bunge, Verz. Altai Pfl. 8 (1836).
Nephelochloa altaica (Trin.) Griseb., Ledeb., Fl. Ross. 4: 367 (1852).
Festuca bellula Regel, Acta Hort. Petrop. 7: 594 (1881).
Eremopoa bellula (Regel) Roshev., Fl. URSS 2: 431 (1934).
Eremopoa songarica (Schrenk) Roshev., Fl. URSS 2: 431 (1934).

Erect or ascending, to 45 cm; leaf-blades 2-10 x 0.1-0.4 cm, flat; ligule 1-2.5 mm; panicle 3-20 cm, narrowly to broadly ovate in outline, moderately dense to very loose, the branches capillary to rather stiff; spikelets 3.4-6.5 mm; lower glume lanceolate, 1-2 mm, acute; upper glume 1.5-2.5 mm, narrowly ovate, acute or subacute; lemmas 2.5-3.5 (4.5) mm, glabrous or minutely hairy on the keel and marginal nerves below, scaberulous on the back, usually acuminate and sharply pointed at the tip but sometimes only acute or subacute; anthers 0.3-0.7(1) mm.

N, S; shady places among rocks. Throughout southwest Asia from Turkey and the Caucasus Mountains eastwards through Pakistan and the Himalayas to western China, southern Urals and Altai.

NOTE: Tzvelev, Zlaki SSSR 479 (1976) divides *Eremopoa altaica* into 3 subspecies: *altaica*, *oxyglumis* (Boiss.) Tzvelev, and *songarica* (Schrenk) Tzvelev. The last two are amalgamated under *E. songarica* by Mill, Fl. Turkey 9: 491 (1985). Clearly, there is still much disagreement about the number of species and their circumscriptions in this genus.

16. **Sphenopus** Trin.

Annual; inflorescence an ample panicle of small spikelets; spikelets 2- to 7-flowered, laterally compressed, borne on long narrowly clavate pedicels; glumes very unequal, membranous, nerveless, the lower minute, the upper well developed; lemmas membranous, keeled above, 3-nerved, obtuse to subacute; stamens 3; ovary glabrous; hilum round. 2 species, Mediterranean region, Sinai to Pakistan and Central Asia.

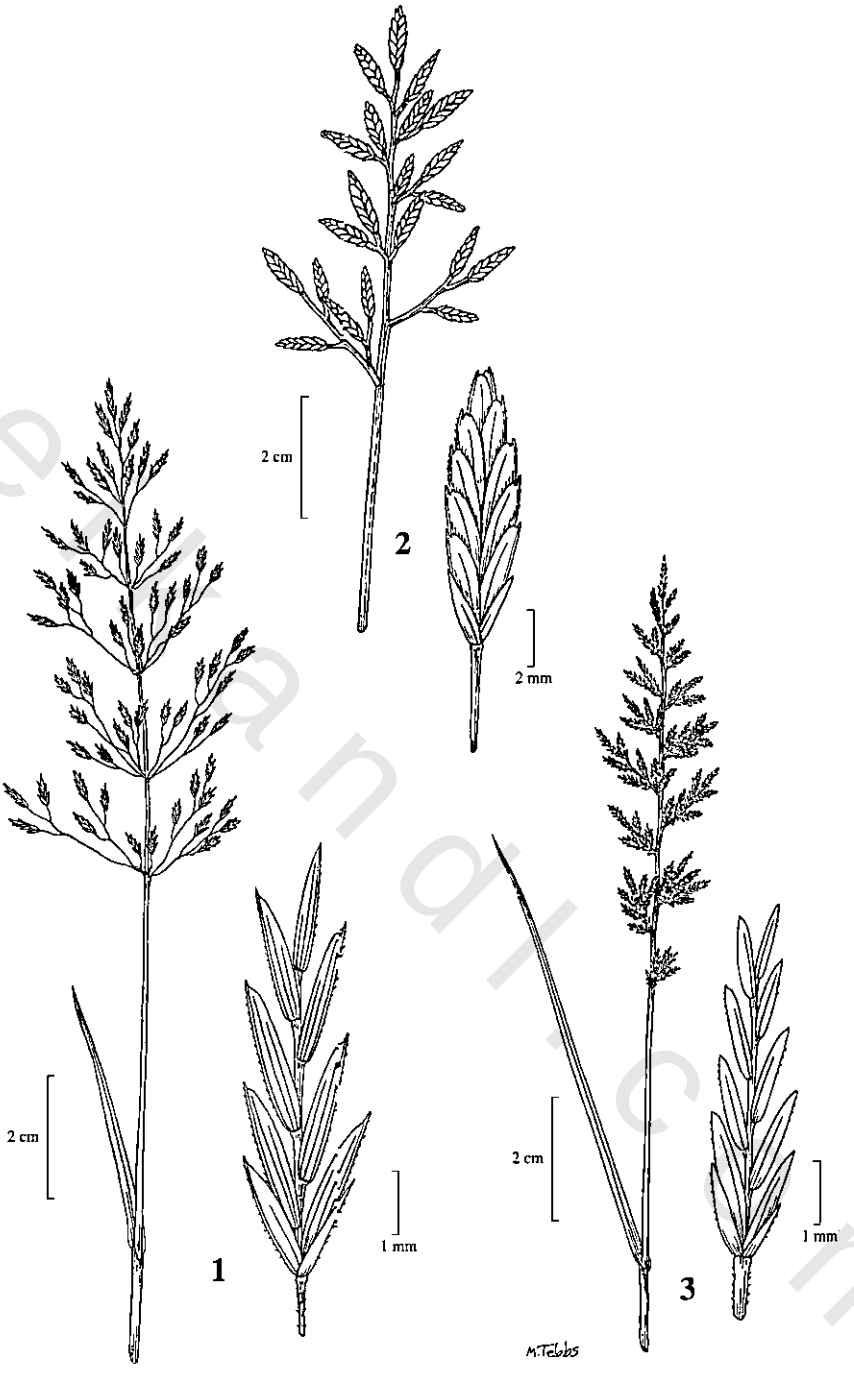


Plate 42. GRAMINEAE: *Eremopoa persica* 1, inflorescence; spikelet (right). *Desmazeria philistaea* 2, inflorescence; spikelet (right). *Catapodium rigidum* 3, inflorescence; spikelet (right). Drawn by Margaret Tebbs.

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1. **Sphenopus divaricatus** (Gouan) Rchb., Fl. Germ. Excurs. 45 (1830).
Syn. *Poa divaricata* Gouan, Ill. Observ. Bot. 4, t. 2,1 (1773).

Delicate plant to 30 cm, erect or ascending, often purplish below; leaf-blades 6-7 x 0.05-0.1 cm, usually inrolled, rarely flat; panicle broadly ovate in outline, the branches paired at each node of the main axis, widely spreading, capillary, trichotomously branched and rebranched; spikelets 2-3 mm, 2- to 3(5)-flowered; lower glume ovate-rotund, to 0.4 mm; upper glume 0.5-1 mm, oblong; lemmas 1.2-1.6 mm, narrowly oblong-ovate in profile, obtuse, rarely shortly mucronate; anthers 0.15-0.3 mm.

N, O, M, De, S; sandy and alluvial soils. Throughout the range of the genus.

17. **Desmazeria** Dumort.

Annual; inflorescence a 1-sided panicle with short stiff branches or reduced to a raceme; spikelets several- to many-flowered, on stout pedicels; glumes subequal, coriaceous, 3- to 5-nerved; lemmas narrowly ovate in profile, coriaceous, keeled, 5-nerved but the intermediate nerves often obscure, capitate-hairy below, subacute; stamens 3; ovary glabrous; hilum round. 4 species, Mediterranean region.

1. **Desmazeria philistaea** (Boiss.) H. Scholz subsp. **rohlfsiana** (Coss.) H. Scholz, Willdenowia 6: 291 (1971).
Syns. *Festuca rohlfsiana* Coss., Bull. Soc. Bot. France 19: 83 (1872).
Scleropoa philistaea var. *rohlfsiana* (Coss.) Asch. & Schweinf., Bull. Herb. Boissier 1: 676 (1893).
Cutandia philistaea var. *rohlfsiana* (Coss.) Maire & Weiller, Bull. Soc. Hist. Nat. Afr. Nord 30: 209 (1939).
Coelachyrum annuum Cope & Boulos, Kew Bull. 42: 919 (1987).

Culms to 25(45) cm, erect or ascending, purplish; ligule to 3 mm, pointed, lacerate; panicle 2.5-10 cm, ovate-oblong in outline; spikelets 0.7-1.1 cm, 5- to 9(12)-flowered, elliptic to oblong, greenish or purplish, with capitate-pubescent rhachilla; lower glume 3-3.5 mm, the upper *c.* 4 mm; lemma 3.5-4 mm, 3-nerved (the intermediate nerves absent or very obscure), with narrow to broad membranous margins, obtuse and muticous at the tip, sometimes emarginate and obscurely mucronulate.

M; fixed sand dunes and limestone hills. Tunisia, Libya, Egypt, Palestine, Syria.

NOTE: There are two variants of *Desmazeria philistaea*, currently accorded rank of subspecies, that occur in North Africa: subsp. *philistaea* has broad membranous margins to the lemma and tightly imbricate florets; subsp. *rohlfsiana*, on the other hand, has narrow membranous margins and loosely imbricate florets. Sherif & Siddiqi, Fl. Libya 145: 42 (1988), indicate that the former grows in Libya, Egypt, Palestine and Syria, while the latter occurs in 'N. Africa.' Most of the Egyptian and Palestinian literature, however, suggests that the Egyptian and southwest Asiatic taxon is subsp. *rohlfsiana* but the distinction between this and subsp. *philistaea* is so obscure as to be barely tenable. The type of *Coelachyrum annuum* was collected in Egypt, Agiba shore, west of Mersa Matruh by Boulos (no. 13654, holotype K, isotype CAI) but the authors of the taxon were misled by the apparent absence of intermediate nerves on the lemma, the capitate hairs in its lower half and the sub-racemose inflorescence, all of which are characteristic of *Cypholepis* Chiov., a genus now incorporated in *Coelachyrum* Hochst. & Nees (q.v.).

18. **Catapodium** Link
Syn. *Scleropoa* Griseb.

Annual; inflorescence a stiff 1-sided panicle, shortly branched below, ± racemose above; spikelets 3- to 10-flowered, lightly laterally compressed, borne on stout grooved pedicels; glumes subequal, 3-nerved, keeled; lemmas firmly membranous with hyaline margins, 5-nerved, rounded on the back (at least below), glabrous; stamens 3; ovary glabrous; hilum shortly oval. 3 or 4 species, Europe, North Africa, southwest Asia.

1. **Catapodium rigidum** (L.) C. E. Hubb. in Dony, Fl. Bedfordshire 437 (1953).
Syns. *Poa rigida* L., Cent. Pl. 1: 5 (1755).
Scleropoa rigida (L.) Griseb., Spic. Fl. Rumel. 2: 431 (1845).
Desmazeria rigida (L.) Tutin in A.R. Clapham, Tutin & E. F. Warb., Fl. Brit. Isles 1434 (1952).

Culms to 30 cm, erect or ascending; leaf-blades to 10 x 0.05-0.2 cm, flat or loosely inrolled; ligule 1-3 mm, blunt; panicle 1-8 cm, linear to ovate in outline, the main axis and branches 3-angled; spikelets 3.5-7 mm, narrowly oblong; glumes to 2 mm, the lower lanceolate, the upper elliptic; lemmas 2-2.5 mm, narrowly oblong in profile, obtuse at the tip; anthers *c.* 0.3 mm.

M, S; coastal sand. Western and southern Europe, North Africa, western Asia; introduced in North and South America, South Africa and Australia.

19. **Cutandia** Willk.

Annual; inflorescence a sparse panicle with stiffly divergent branches, these stout and, once the spikelet begins to break up, deciduous; spikelets several-flowered; glumes slightly to very unequal, ± keeled, rounded or emarginate to acuminate and sometimes awned at the tip; lemmas narrowly lanceolate in profile, membranous to subcoriaceous with hyaline margins, keeled, prominently 3-nerved, entire, emarginate or 2-toothed at the tip, with or without a mucro or awnlet from the sinus; stamens 3; ovary glabrous; caryopsis narrow with an apical appendage formed from the persistent style-base; hilum oval. 6 species, Mediterranean region to Central Asia.

1. Spikelets 5- to 12-flowered, narrowly ovate; glumes 3- to 5-nerved — 1. **C. maritima**
\+ Spikelets 2- to 4-flowered, oblong-linear; glumes 1-nerved — 2

2. Lemma-tip produced into a short awn, or at least mucronate; lemma 7-8.5 mm — 2. **C. memphitica**
\+ Lemma-tip acute, neither mucronate nor awned; lemma 4-5.5 mm — 3. **C. dichotoma**

1. **Cutandia maritima** (L.) Barbey, Fl. Sard. Comp. 72 (1885).
Syns. *Triticum maritimum* L., Sp. Pl., ed. 2, 128 (1762).
Sclerochloa maritima (L.) Sweet, Hort. Brit. 453 (1826).
Scleropoa maritima (L.) Parl., Fl. Ital. 1: 468 (1850).

Erect or ascending to 35 cm; leaf-sheaths inflated; panicle 1.5-16 cm, partly enclosed in the uppermost sheath, mostly with 1 spikelet and 1 or 2 branches at each node; spikelets 0.8-1.6(2.2) cm, narrowly ovate, 5- to 9(12)-flowered; glumes smooth, 3- to 5-nerved, obtuse to acute at the tip, sometimes mucronate, the lower 4-6.5 mm, the upper 5-7.5

mm; lemmas 5.5-9.5 mm, glabrous, obtuse to acute and apiculate; anthers 1.6-2.5 mm, exserted at anthesis.

M, De; mainly on coastal sand. Portugal, Spain, Balearic Islands, France, Corsica, Italy, Sardinia, Sicily, Greece, Crete, Algeria, Tunisia, Libya, Egypt, Palestine, Lebanon, Syria, Turkey.

2. **Cutandia memphitica** (Spreng.) Benth., J. Linn. Soc. Bot. 19: 118 (1881).
Syns. *Dactylis memphitica* Spreng., Bot. Gart. Halle, Nachtr. 1: 20 (1801).
Festuca memphitica (Spreng.) Boiss. ex Coss., Notes Pl. Crit. 183 (1851).

Erect or procumbent, to 40 cm; sheaths inflated; panicle 3-18 cm, partly enclosed in the uppermost sheath, mostly with 1 spikelet and 1 or 2 branches at each node; spikelets 0.7-1.05 cm, oblanceolate, 2- to 3(4)-flowered; glumes glabrous or faintly scaberulous, thickly 1-nerved, acute to acuminate and apiculate, the lower 2.7-4.5 mm, the upper 4.5-5.5 mm; lemmas 7-8.5 mm, glabrous, acuminate and with an awn 0.5-1.8 mm; anthers 1-1.4 (2) mm, exserted at anthesis.

N, O, M, De, Dw, R, GE, S; sandy, sometimes saline, soils. Mediterranean region, eastwards to Pakistan and Central Asia.

NOTE: *Dactylis memphitica* was described from Egypt but the holotype, which was kept in Berlin, has been destroyed.

3. **Cutandia dichotoma** (Forssk.) Batt. & Trab., Fl. Algérie, Monocot. 237 (1895).
Syn. *Festuca dichotoma* Forssk., Fl. Aegypt.-Arab. 22 (1775).

Erect or ascending to 30 cm; sheaths inflated; panicle 2-8 cm, partly enclosed in the uppermost sheath, mostly with 1 spikelet and 1 or 2 branches at each node; spikelets 0.75-1 cm, narrowly oblong, 2- to 3-flowered; glumes shortly asperulous, thickly 1-nerved, subacute at the tip, the lower 2.6-3.2 mm, the upper 2.9-3.4 mm; lemmas 4-5.5 mm, shortly asperulous, acute and neither mucronate nor awned; anthers (0.3)0.5-0.7 mm, included or exserted at anthesis.

N, M, De, S; sandy soils. Morocco, Libya, Egypt, Palestine, Syria, Cyprus, Turkey, Iraq, Iran, Arabia.

NOTE: The type of *Festuca dichotoma* was collected in Egypt, Alexandria, in 1762 by Forsskål (no. 1258, lectotype C).

20. **Ammochloa** Boiss.

Annual; inflorescence a capitate panicle of subsessile spikelets, exserted from or nestling among the basal sheaths, the spikelets associated with bractiform involucres derived from sterile spikelets; spikelets several-flowered, lightly laterally compressed, disarticulating above the glumes but not between the florets; glumes obliquely ovate, 1-nerved, asymmetrically winged on the keel; lemma broadly ovate, somewhat asymmetric, coriaceous with broad membranous margins, 5-nerved, rounded on the back, recurved-mucronate at the tip; stamens 3; ovary glabrous; caryopsis capped by the persistent style-base forming a beak as long as the grain; hilum round. 3 species, Mediterranean and southwest Asia eastwards to the Caucasus Mountains.

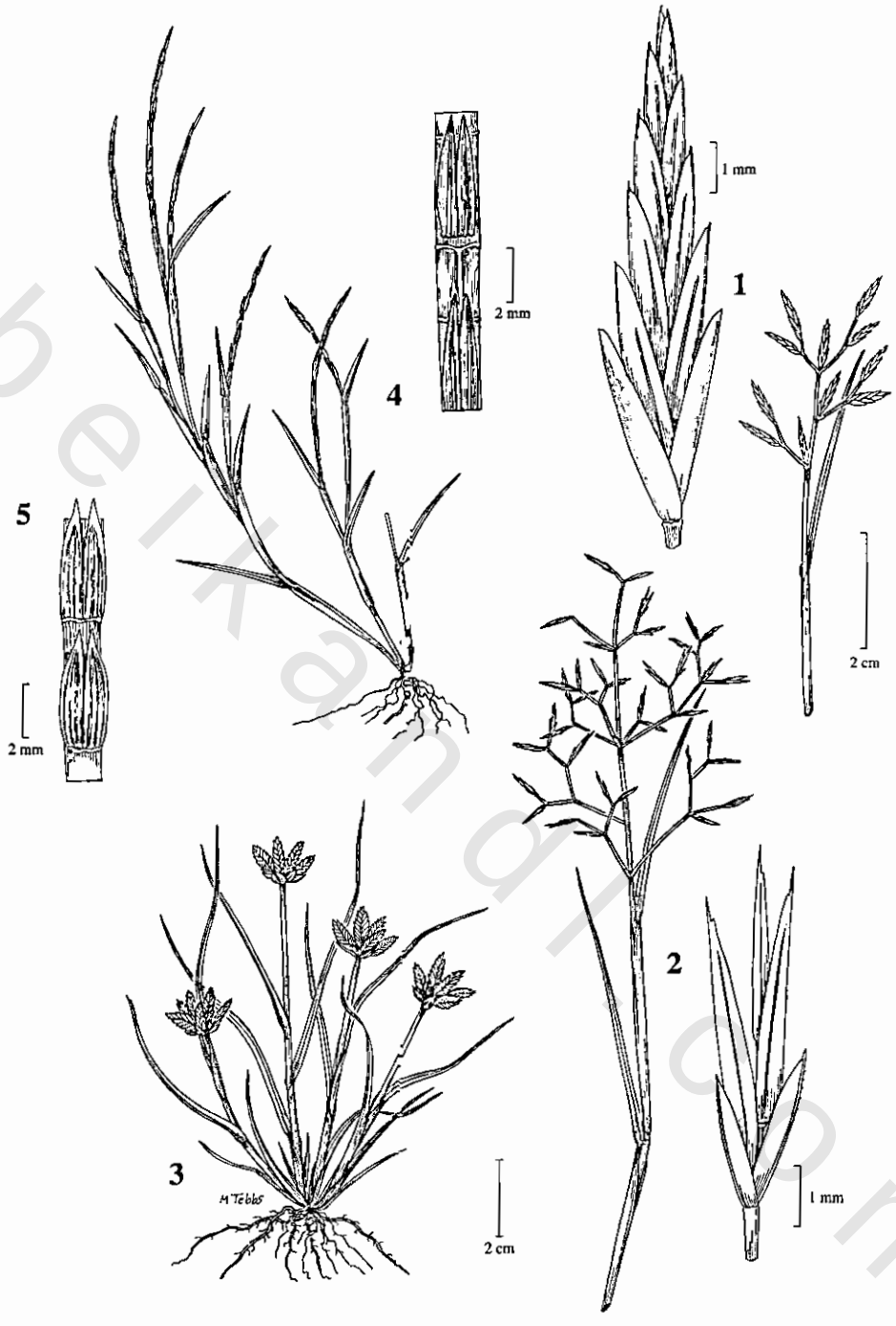


Plate 43. GRAMINEAE: *Cutandia maritima* 1, inflorescence; spikelet (up left). *Cutandia memphitica* 2, inflorescence; spiketet (right). *Ammochloa palaestina* 3, habit. *Parapholis incurva* 4, habit; two spikelets (right). *Parapholis marginata* 5, two spikelets. Drawn by Margaret Tebbs.

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1. **Ammochloa palaestina** Boiss., Diagn. Pl. Orient. 2(13): 52 (1854).
Syn. *Ammochloa subacaulis* Bal. ex Coss. & Durieu, Bull. Soc. Bot. France 1: 317 (1854).

Dwarf annual with subsessile panicles, or taller and to 12 cm; leaf-blades flat, often greatly overtopping the panicles; spikelets 4.5-8.5 mm, oblong, 7- to 15-flowered; lower glume 2.6-3 mm; upper glume 3.8-4.2 mm; lemmas 3.8-5.2 mm, pubescent on the back below; anthers 0.4-0.7 mm.

N, M, ?S; in sand among calcareous rocks. Spain, Morocco, Algeria, Tunisia, Libya, Egypt, Palestine, Turkey, Iraq, Arabia, Iran.

Tribe 6. **HAINARDIEAE**

Ligule membranous, glabrous; leaves not auriculate; inflorescence a single cylindrical bilateral raceme, tough or fragile, the spikelets alternate in 2 opposite rows, sessile and ± sunk in the rhachis, broadside on, all alike; spikelets 1- to 2-flowered, with or without a minute rhachilla-extension; glumes appressed to the rhachis, subequal and placed side by side, usually exceeding and covering the floret, coriaceous, strongly 3- to 7-nerved, obtuse or acute; lemma usually hyaline, 3- to 5-nerved, entire and awnless; caryopsis narrowly oblong; hilum round to narrowly oblong; endosperm sometimes soft.

21. **Parapholis** C. E. Hubb.

Annuals; racemes with fragile rhachis; spikelets 1-flowered; glumes 2, collateral, lanceolate to ovate, 3- to 5-nerved, sharply inflexed near their outer margin and with an asymmetric keel, this sometimes winged; lemma orientated with its side towards the rhachis, hyaline, 3-nerved, the lateral nerves very short and indistinct, awnless; ovary glabrous, lobed at the tip; endosperm liquid. 6 species, Mediterranean region, southwest Asia, 1 species extending eastwards to Pakistan.

1. Keel of glumes wingless; culms and racemes strongly curved — 1. **P. incurva**
\+ Keel of glumes distinctly winged; culms and racemes ± straight — 2

2. Plant usually to 15 cm, stout, with clustered racemes and usually straight culms and racemes; anthers less than 1 mm — 2. P. **marginata**
\+ Plant usually to 25 cm, slender with solitary racemes, and culms and racemes straight or nearly so; anthers more than 3 mm — 3. P. **filiformis**

1. **Parapholis incurva** (L.) C.E. Hubb, Blumea, suppl. 3: 14 (1946).
Syns. *Aegilops incurva* L., Sp. Pl., ed. 1, 1051 (1753).
Aegilops incurvata L., Sp. Pl., ed. 2, 1490 (1763), non *A. incurva* L.
Lepturus incurvatus (L.) Trin., Fund. Agrost. 123 (1820).
Lepturus incurvus (L.) Druce, List Brit. Pl. 85 (1908).
Pholiurus incurvatus (L.) Hitchc., Bull. U.S.D.A. 772: 106 (1920).
Pholiurus incurvus (L.) Schinz & Thell., Vierteljahrsschr. Naturf. Ges. Zürich 66: 265 (1921).

Erect or prostrate and curved-ascending annual, to 25 cm; uppermost leaf-sheath inflated; racemes solitary, 1-10 cm (sometimes more), each with 8-20 spikelets, usually strongly curved, rarely almost straight; spikelets 4-8 mm; glumes as long as the spikelet and

exceeding the internode, lanceolate-acuminate, glabrous, the keel wingless; anthers 0.5-0.9 mm.

N, O, M, S; sandy soils. Western Europe (coasts), Mediterranean region, southwest Asia to Pakistan.

2. **Parapholis marginata** Runem., Bot. Notiser 115: 8, t. 3D (1962).

Erect stout annual to 15 cm; uppermost leaf-sheath inflated; racemes to 5 cm, clustered, each with fewer than 10 spikelets, usually straight, sometimes curved; spikelets 4-5.5 mm; glumes as long as the spikelet and exceeding the internode, lanceolate-acuminate, scabrid-ciliolate on the margin, the keel conspicuously winged; anthers 0.5-0.8 mm.

N, O, M, D; sandy and stony soils. Balearic Islands, Sicily, Crete, Cyprus, Greek Islands, Egypt, Palestine, Lebanon.

3. **Parapholis filiformis** (Roth) C. E. Hubb., Blumea, suppl. 3 :14 (1946).
Syns. *Rottboellia filiformis* Roth, Usteri, Ann. Bot. 10 :38 (1794).
Lepturus filiformis (Roth) Trin., Fund. Agrost. 23 (1820).
Pholiurus filiformis (Roth) Schinz & Thell., Vierteljahrsschr. Naturf. Ges. Zürich 66: 265 (1921).

Erect slender annual to 25 cm; uppermost leaf-sheath scarcely inflated; racemes (3)10-25 cm, solitary, each with up to 25 spikelets, ± straight; spikelets 4.3-5.5 mm; glumes as long as the spikelet and exceeding the internode, lanceolate-acuminate, glabrous, the keel conspicuously winged; anthers 3.5-4 mm.

Unconfirmed in Egypt and possibly recorded in error. Mediterranean region.

Tribe 7. **AVENEAE**

Ligule membranous; inflorescence a panicle (rarely reduced to a raceme), the spikelets all alike (except *Phalaris paradoxa*); spikelets comprising 1 to several fertile florets, sometimes accompanied by sterile florets below or reduced florets above, laterally compressed or terete, disarticulating below each floret (falling entire in *Holcus*, *Polypogon*, *Alopecurus* and *Phleum*); glumes persistent, usually longer than the adjacent lemmas and often as long as the spikelet, commonly membranous and shining with thin hyaline margins; lemmas hyaline to coriaceous, often with thin shining margins, (3)5- to 11-nerved, typically with a dorsal awn, this often geniculate with twisted column; caryopsis mostly ellipsoid; hilum usually round to oval; endosperm sometimes soft, occasionally liquid.

1. Spikelets with 2 or more fertile florets, sometimes the uppermost reduced 2
\+ Spikelets with 1 fertile floret, sometimes with 1 or 2 sterile florets below it reduced to small chaffy scales; if 2-flowered with the florets ± equal in size but the lower fertile and the upper male, then spikelet falling entire 5

2. Spikelets 1.6-5 cm, pendulous in a large open panicle to 40 cm 22. **Avena**
\+ Spikelets not more than 7.5 mm 3

3. Awn with a ring of hairs at the junction of the twisted column and the clavate limb, fitting into a groove in the back of the lemma — 26. **Corynephorus**
\+ Awn without a ring of hairs, nor with a clavate limb, or quite absent — 4

4. Lemmas 2-toothed, the teeth often aristulate, and sometimes also with a dorsal awn — 23. **Trisetaria**
\+ Lemmas obtuse to acute, awnless or with a short awn-point from just below the tip — 24. **Rostraria**

5. Spikelets falling entire, 2-flowered with the florets ± equal in size — 25. **Holcus**
\+ Spikelets breaking up above the persistent glumes, or if falling entire then either strictly 1-flowered or falling in clusters — 6

6. Spikelets 2- to 3-flowered, the uppermost floret fertile, hard and shining, the 1 or 2 sterile florets below it reduced to small chaffy scales; rarely the spikelets falling in clusters — 27. **Phalaris**
\+ Spikelets strictly 1-flowered, the floret not hard and shining (if so, see Tribe 4. *Stipeae*), and unaccompanied by sterile vestiges; spikelets sometimes falling entire but never in clusters — 7

7. Spikelets breaking up above the persistent glumes — 8
\+ Spikelets falling entire — 12

8. Perennial — 9
\+ Annual — 10

9. Lemma hyaline, not compressed, less than 3 mm — 28. **Agrostis**
\+ Lemma thinly coriaceous, strongly laterally compressed and keeled, 0.8-1.2 cm — 29. **Ammophila**

10. Inflorescence an ovoid, softly and densely hairy head — 32. **Lagurus**
\+ Inflorescence a spike-like panicle, but not hairy — 11

11. Glumes swollen and slightly toughened below; lemma 1-awned or awnless — 31. **Gastridium**
\+ Glumes neither swollen nor toughened below; lemma 3-awned — 30. **Triplachne**

12. Spikelets shed with a basal stipe — 33. **Polypogon**
\+ Spikelets shed without a basal stipe — 13

13. Lemma dorsally awned — 34. **Alopecurus**
\+ Lemma awnless — 35. **Phleum**

22. **Avena** L.

Annual; inflorescence an open or rarely contracted panicle with large pendulous spikelets; spikelets 2- to 6-flowered, the lower 1-3 florets fertile, the remainder ± reduced, the terminal barren or vestigial; rhachilla disarticulating above the glumes and sometimes between the florets, or not at all in cultivated races; glumes lanceolate to ovate or elliptic, equal or almost so, rounded on the back, membranous to herbaceous, (3)7- to 11-nerved; lemmas lanceolate to ovate or oblong, shorter than or equalling the

glumes, rounded on the back, herbaceous, becoming hardened, 5- to 9-nerved, 2-dentate at the tip, with a geniculate (or rarely straight) awn from the back, or awnless in some cultivated races; stamens 3; ovary hairy; hilum linear. About 25 species, Mediterranean region, southwest Asia, extending to northern Europe, Central Asia, Ethiopia, widely introduced as weeds or cereals to other temperate regions.

1. Rhachilla continuous between the florets, these falling as a unit at maturity or not at all 2
+ Rhachilla articulated between the florets, these falling separately at maturity 3

2. Rhachilla not disarticulating above the glumes at maturity (but fracturing unevenly under pressure); glumes 2-2 5 cm; cultivated cereal 4. **A. sativa**
+ Rhachilla disarticulating above the glumes at maturity (and producing a smooth, obliquely elliptical scar at the base of the lowest lemma); glumes 2.5-5 cm; wild grass 5. **A. sterilis**

3. Tip of lemma with 2 acute teeth or these at most shortly mucronate 3. **A. fatua**
+ Tip of lemma with 2 awned teeth, the awns to 1.2 cm 4

4. Callus of first lemma long and pungent, the disarticulation-scar linear 2. A. **longiglumis**
+ Callus of first lemma short with oval scar 1. **A. barbata**

1. **Avena barbata** Pott ex Link, J. Bot. (Schrader) 2: 315 (1799).
Syn. *Avena alba,* auct. non Vahl

Culms to 1 m; panicle to 30(50) cm, erect, subsecund; spikelets 1.4-3 cm, 2- to 3-flowered, the rhachilla disarticulating at the base of each floret; callus of first lemma short with oval scar; glumes lanceolate, finely acute; lemmas 1.2 -2 cm, densely hairy in the lower 2/3, scabrid or asperulous above, narrowed upwards and finely 2-toothed at the tip, the teeth awned with a bristle 0.3-1.2 cm, neither with a lateral awnlet; central awn 3-6 cm, geniculate.

Two subspecies occur in Egypt:

subsp. **barbata**

Spikelets (1.8)2-3 cm ; lowermost lemma 1.6-2 cm.

N, O, M, D, S; weed of cultivation. Mediterranean region, Sinai, eastwards through southwest and Central Asia and Nepal.

subsp. **wiestii** (Steud.) Mansf., Kulturpfl. Beih. 2: 479 (1959).
Syn. *Avena wiestii* Steud., Syn. Pl. Glumac. 1: 231 (1854).

Spikelets 1.4-1.6(1.8) cm; lowermost lemma 12-1.4 cm.

N, O, M, D, S; weed of cereals. Lit-ya, Egypt, Palestine, Lebanon, Cyprus, Greece, Turkey, Iraq, Arabia, Iran, Afghanistan.

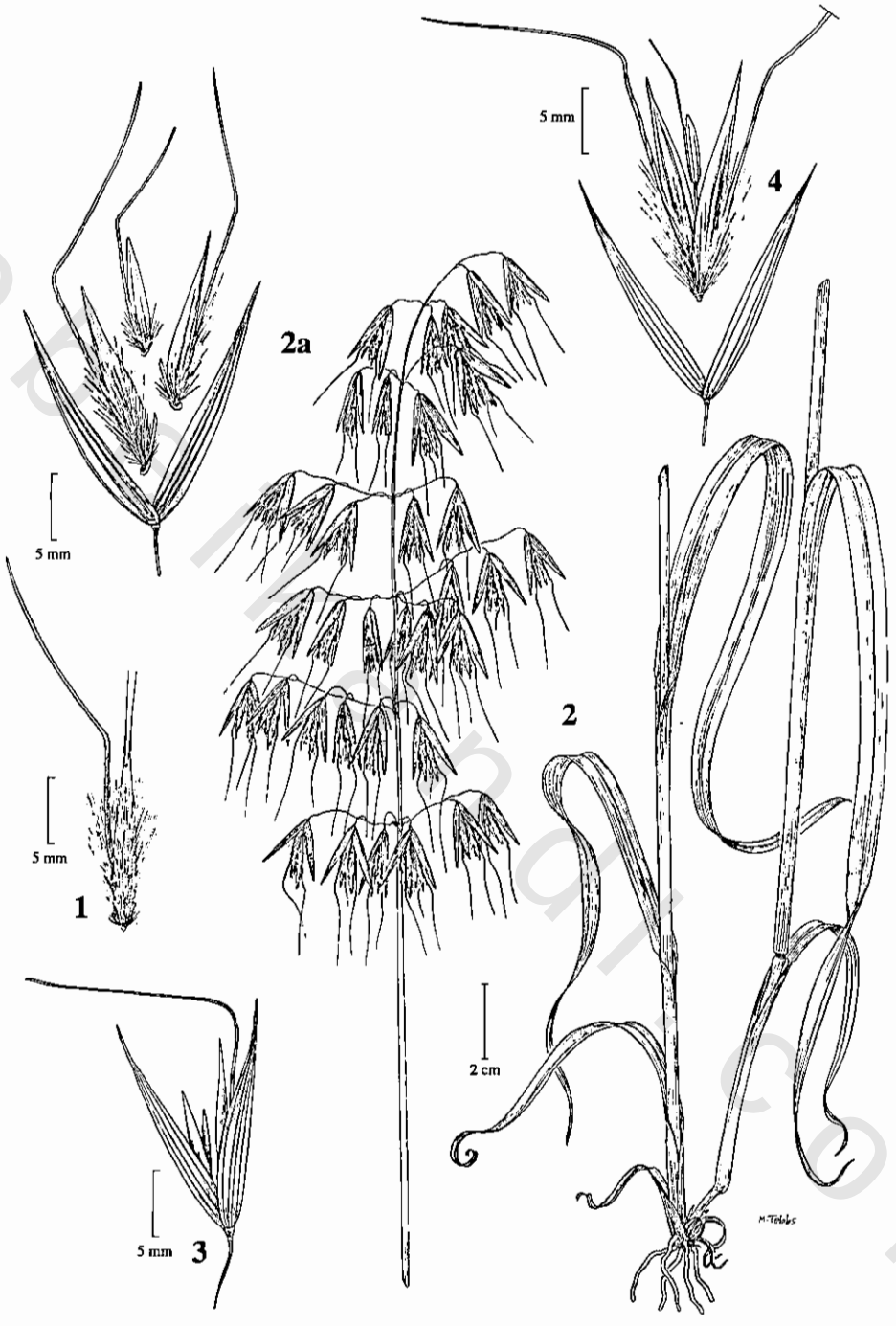


Plate 44. GRAMINEAE: *Avena barbata* 1, spikelet. *Avena fatua* 2, lower part and inflorescence ; spikelet 2a. *Avena sativa* 3, spikelet. *Avena sterilis* 4, spikelet. Drawn by Margaret Tebbs.

2. **Avena longiglumis** Durieu , Rev. Bot Receuil Mens. 1: 359 (1845).

Culms to 1.4 m; panicle to 30(40) cm, secund; spikelets 3-4.5 cm, 2- to 3-flowered, the rhachilla disarticulating at the base of each floret; callus of first lemma long and pungent, the disarticulation-scar linear; glumes lanceolate, acute; lemmas 2-2.5 cm, villous in the lower 1/2, narrowed upwards and finely 2-toothed at the tip, the teeth awned with a bristle 1-1.5 cm, each of which has a minute awnlet on one side; central awn 5-7 cm, geniculate.

M; near the coast. Portugal, Spain, Sardinia, Morocco, Algeria, Libya, Egypt, Palestine.

3. **Avena fatua** L., Sp. Pl, ed. 1, 80 (1753).
Syn. *Avena fatua* forma *deserticola* Hausskn., Mitt. Thüring. Bot. Ges. 13/14: 46 (1899).

Culms to 1.5 m; panicle 10-40 cm, nodding, narrowly to broadly pyramidal, loose; spikelets 1.8-2.8 cm, 2- to 3-flowered, the rhachilla disarticulating at the base of each floret; callus short with horseshoe-shaped disarticulation-scar; glumes lanceolate, finely acute; lemmas 1.4-2 cm, stiffly hairy in the lower 2/3, scabrid above, unequally and shortly 2- to 4-toothed at the tip, the teeth muticous or shortly mucronate; central awn 2.5-4 cm, geniculate.

N, O, M, De, S; weed of cultivation. Throughout the temperate Old World.

NOTE: Some of the many syntypes of forma *deserticola* are from Egypt. The taxon was placed in synonymy of *Avena occidentalis* Durieu by Baum (Oats Wild and Cultivated, p. 300 (1977)), a species said to differ from *A. fatua* by the heart-shaped rather than horseshoe-shaped callus of the third and fourth lemmas. The material of forma *deserticola* that has so far been seen has a 2-flowered spikelet making the critical (and, it seems, rather trivial) character impossible to see. The forma is best left in *A. fatua.*

4. **Avena sativa** L., Sp. Pl. , ed. 1, 79 (1753).

Culms to 1.5 m; panicle to 25(40) cm, patent or contracted and secund; spikelets 1.7-3 cm, 2- to 3-flowered, the rhachilla tough, not disarticulating either above the glumes or between the florets but fracturing unevenly under pressure; glumes broadly elliptic, acuminate; lemmas 1.2-2.5 cm, glabrous or sparsely hairy below, emarginate or minutely 2-dentate at the tip, the teeth muticous; central awn 1.5-4 cm, usually straight, often quite absent.

N, O, M, D, S; cultivated cereal (Oat) sometimes also found as an escape. Cultivated in most temperate countries.

5. **Avena sterilis** L., Sp. Pl., ed. 2, 118 (1762).

Culms to 1.2 m; panicle to 30 cm, pyramidal, nodding, loose; spikelets 2.5-5 cm 2- to 5-flowered, the rhachilla disarticulating below the lowermost floret only, the florets falling as a unit; callus of lowest lemma short with horseshoe-shaped disarticulation-scar; glumes narrowly lanceolate, finely acute; lemma 2-4 cm, hairy in the lower 2/3, pubescent or scabrid above, narrowed upwards and finely 2-dentate at the tip, the teeth muticous; central awn 4-8 cm, geniculate.

Two subspecies occur in Egypt:

subsp. **sterilis**

Spikelets 3-5 cm; lowermost lemma 2.5-4 cm.

N, O, M, D, S; weed of cereals. Mediterranean region, southwest Asia, eastwards to Pakistan and Central Asia.

subsp. **ludoviciana** (Durieu) Gillet & Magne, Nouv. Fl. Franç., ed. 3, 352 (1875).
Syn. *Avena ludoviciana* Durieu, Actes Soc. Linn. Bordeaux 20: 41 (1855).

Spikelets 2.5-3 cm; lowermost lemma 2-2.5 cm.

N, O, M, D, S; weed of cereals and vegetables. Mediterranean region, southwest Asia, eastwards to India.

23. **Trisetaria** Forssk.

Annual; panicle contracted to spike-like, rarely open or capitate; spikelets 1- to several-flowered, the rhachilla produced beyond the uppermost floret; glumes subequal or unequal, membranous with hyaline margins, the lower 1-nerved, shorter than the spikelet, the upper 3-nerved, mostly as long as the spikelet; lemmas membranous to thinly coriaceous, narrowly oblong to linear in profile, 5-nerved, weakly keeled or rounded on the back, 2-setulate at the tip though sometimes minutely so, with a straight or geniculate dorsal awn from above the middle, rarely awnless or awned from below the middle; callus well developed, shortly bearded; palea gaping, hyaline, sometimes narrow and inconspicuous; stamens 3; ovary glabrous. About 15 species, Mediterranean region to western Himalaya.

1. Central awn inserted in the upper 1/4 of the lemma, or sometimes quite absent — 2
\+ Central awn inserted at or below the middle of the lemma, always present — 3

2. Anthers 0.5-1 mm — 1. **T. linearis**
\+ Anthers 1.5-2.5 mm — 2. **T. koelerioides**

3. Panicle linear in outline; glumes subequal; awn inserted below the middle of the lemma — 3. **T. glumacea**
\+ Panicle oval in outline; lower glume much narrower than the upper; awn inserted at about the middle of the lemma — 4. **T. macrochaeta**

1. **Trisetaria linearis** Forssk., Fl. Aegypt.-Arab. 27 (1775).
Syn. *Trisetum lineare* (Forssk.) Boiss., Diagn. Pl. Orient. 2(13): 49 (1854).

Culms to 40 cm; panicle 5-15 cm, contracted, densely linear, not fully exserted from the uppermost sheath; spikelets 0.5-1 cm, 1-flowered (rarely a second floret present); glumes linear-lanceolate, aristulate, the lower 4.5-7 mm, the upper as long as the spikelet; lemma-body 3.5-7 mm, with apical setae 3-6 mm; central awn 0.85-1.5 cm, inserted in the upper 1/4 of the lemma, geniculate with twisted column; anthers 0.5-1 mm.

N, M, S; mobile dunes. Libya, Egypt, Cyprus, Palestine, Arabia, Iraq, Iran, Azerbaijan.

NOTE: The type was collected in Egypt, Alexandria, in 1762 by Forsskål (no. 118, holotype C).

2. **Trisetaria koelerioides** (Bornm. & Hack.) Melderis, Ark. Bot., ser. 2, 2: 292 (1952).
Syns. *Trisetum koelerioides* Bornm. & Hack., Verh. Zool.-Bot. Ges. Wien 48: 646 (1898).
Trisetaria koelerioides (Bornm. & Hack.) Melderis var. *aristata* (Bornm. & Hack.) Melderis, Ark. Bot., ser. 2, 2: 292 (1952).
Trisetaria koelerioides (Bornm. & Hack.) Melderis var. *longiaristata* Melderis, Ark. Bot., ser. 2, 2: 293 (1952).

Culms to 27 cm; panicle 5-15 cm, ccntracted, densely linear, not or slightly exserted from the uppermost sheath; spikelets 5.5-7.5 mm, 2-flowered (rarely the upper floret vestigial); glumes subequal, linear-lanceolate, muticous, as long as the spikelet; lemma-body 3.5-5 mm, muticous or with apical setae to 1 mm; central awn absent or up to 3 mm and straight without twisted cclumn; anthers 1.5-2.5 mm.

S; mobile dunes. Sinai, Palestine, Syria, Lebanon.

3. **Trisetaria glumacea** (Boiss.) Maire. Bull. Soc. Hist. Nat. Afr. Nord 33: 93 (1942).
Syn. *Trisetum glumaceum* Boiss., Diagn. Pl. Orient. 2(13): 49 (1854).

Culms to 20 cm; panicle 1.5-6.5 cm, contracted, densely linear, exserted from the uppermost sheath or slightly enclosed; spikelets 4-6 mm, 2-flowered; glumes subequal, lanceolate, acute, as long as the spikelet; lemma-body 2.5-3.5 mm, with apical setae to 1.5 mm; central awn 3.5-6 mm, inserted well below the middle of the lemma, geniculate with twisted column; anthers 1.4-1.7 mm.

M, S; sandy soil and amongst limestone rocks. Libya, Egypt, Palestine, Syria.

4. **Trisetaria macrochaeta** (Boiss.) Maire, Bull. Soc. Hist. Nat. Afr. Nord 33: 92 (1942).
Syn. *Trisetum macrochaetum* Boiss., Diagn. Pl. Orient. 2(13): 48 (1854).

Culms to 18 cm; panicle 3-9 cm, loosely contracted, ovate in outline, exserted from the uppermost sheath; spikelets 3-4.5 mm, 2-flowered; glumes unequal, as long as the spikelet, aristulate, the lower linear-lanceolate, the upper lanceolate; lemma-body 1.7-2.5 mm, with apical setae to 1.5 mm; central awn 5.5-8 mm, inserted at or slightly above the middle of the lemma, geniculate with twisted column; anthers 1-1.5 mm.

N, M, De; sandy and rocky ground. Libya, Egypt, Palestine.

24. **Rostraria** Trin.
Syn. *Lophochloa* Rchb.

Annual; inflorescence a lax or dense spike-like panicle; spikelets (1)2- to 5(10)-flowered, the rhachilla produced beyond the uppermost floret or not; glumes subequal or unequal, keeled, hyaline on the margins; lemmas membranous, narrowly oblong in profile, the uppermost exceeding the tips of the glumes, 5-nerved, hyaline on the margins, acute or obtuse, minutely 2-fid at the tip, with a straight or flexuous awn from just below the tip

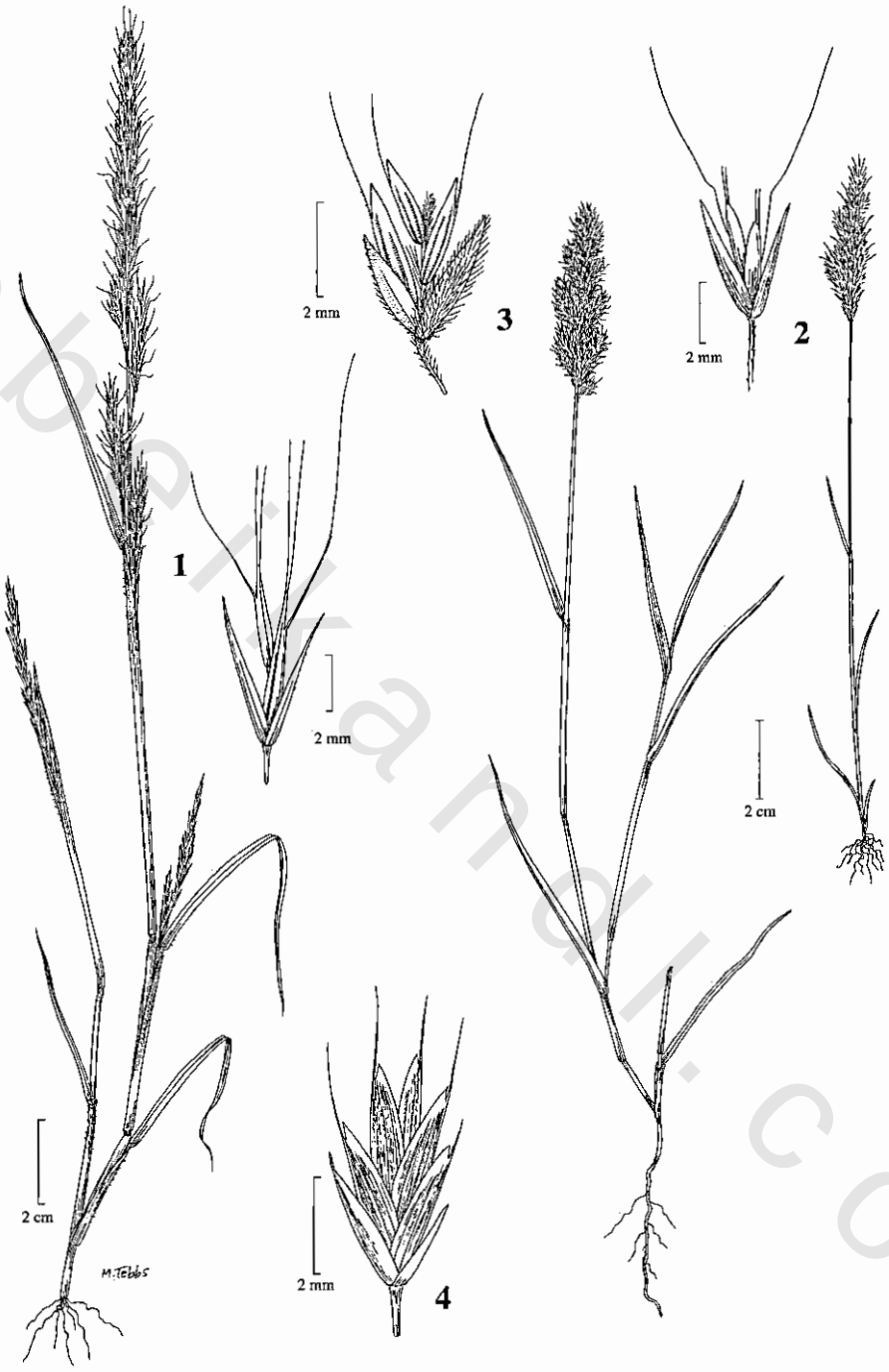


Plate 45. GRAMINEAE: *Trisetaria linearis* 1, habit; spikelet (right). *Trisetaria macrochaeta* 2, habit; spikelet (up left). *Rostraria pumila* 3, habit; spikelet (up left). *Rostraria cristata* 4, spikelet. Drawn by Margaret Tebbs.

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or at least from the upper 1/4; callus obscure, glabrous or shortly hairy; palea gaping; stamens 3; ovary glabrous. 10 species, temperate Eurasia and North Africa.

1. Glumes subequal, the lower minutely longer than the upper, the lower often (the upper sometimes) densely woolly — 1. **R. pumila**
+ Glumes unequal, the lower shorter and narrower than the upper — 2

2. Lemma distinctly obtuse — 2. **R. obtusiflora**
+ Lemma subacute — 3

3. Panicle oval in outline, bristly; lemma with stiff awn 3-5 mm — 3. **R. hispida**
+ Panicle oblong in outline, not bristly; lemma with slender awn usually less than 3 mm — 4

4. Lemma with ± terminal awn — 4. **R. cristata**
+ Lemma with dorsal, or at least clearly subterminal, awn — 5. **R. rohlfsii**

1. **Rostraria pumila** (Desf.) Tzvelev, Novosti Sist. Vyssh. Rast. 7: 48 (1971).
Syns. *Avena pumila* Desf., Fl. Atlant. 1: 103 (1798).
Trisetum pumilum (Desf.) Kunth, Révis. Gramin. 1: 102 (1829).
Koeleria sinaica Boiss., Diagn. Pl. Orient. 2(13): 53 (1854).
Koeleria pumila (Desf.) Domin, Repert. Spec. Nov. Regni Veg. 2: 31 (1906).
Koeleria pumila (Desf.) Domin var. *glabrescens* Täckh., Fl. Egypt 1, Bull. Fac. Sci. Fouad I. (Cairo) Univ. 17: 319 (1941).
Lophochloa pumila (Desf.) Bor, Grasses Burma Ceyl. Ind. Pak. 445 (1960).

Culms to 35 cm; panicle 1-6 cm, ovate-oblong in outline, lax and sometimes ± lobed; spikelets 2.5-3.5 mm, usually 4-flowered; rhachilla produced, densely villous with hairs to 1 mm; glumes 2.5-3 mm, subequal, elliptic, 3-nerved, acute, the lower shortly and densely villous all over with slightly crisped hairs, the upper less hairy and then usually only on the keel, or glabrous, or rarely hairy all over; lemmas 3-3.5 mm, glabrous, acute; awn 1.5-2.5 mm, subterminal.

N, M, D, ?R, GE, S; alluvial soils and as a weed of cultivation. Spain, Morocco, Algeria, Tunisia, Libya, Egypt, Arabia, Iraq, Iran, Afghanistan, Pakistan, India.

NOTE: The type of *Koeleria pumila* var. *glabrescens* was collected in El-Arish, northern Sinai, by Täckholm; that of *K. sinaica* from Sinai by Aucher-Eloy (no. 3061, isotype K).

2. **Rostraria obtusiflora** (Boiss.) Holub, Folia Geobot. Phytotax. 9: 271 (1974).
Syns. *Koeleria obtusiflora* Boiss., Diagn. Pl. Orient. 1(7): 121 (1846).
Lophochloa obtusiflora (Boiss.) Gontsch. in Kom., Fl. URSS 2: 338 (1934).

Culms to 15(45) cm; panicle 1-3(6) cm, cylindrical and dense; spikelets (2)4-5 mm, 3- to 5-flowered; rhachilla briefly produced, minutely pubescent; glumes unequal, glabrous or sparsely hairy, the lower 1.8-2.5 mm, 1-nerved, linear-lanceolate, acute to acuminate, the upper 2.4-3.5 mm, 3-nerved, elliptic to oblong, subobtuse to acute; lemmas 2.5-4 mm, glabrous or hairy, obtuse; awn to 1 mm, rigid, straight, subterminal, or absent.

S; sandy soils. Cyprus, Sinai, Lebanon, Iraq, Iran, Afghanistan.

NOTE: *Rostraria obtusiflora* is commonly divided into 2 subspecies according to size of spikelet and floret number: subsp. *amblyantha* (Boiss.) M. Dogan has spikelets to 2 mm and 3-4 florets. Egyptian material is all subsp. *obtusiflora* which has spikelets 4-5 mm, with 3-5 florets.

3. **Rostraria hispida** (Savi) M. Dogan, Notes Roy. Bot. Gard. Edinb. 40: 509 (1983).
Syns. *Festuca hispida* Savi, Fl. Pis. 1: 117 (1798).
Koeleria hispida (Savi) DC., Cat. Pl. Horti Monsp. 119 (1813).
Bromus hispidus (Savi) Savi, Bot. Etrusc. 2: 62 (1815).
Lophochloa hispida (Savi) Jonsell, Bot. J. Linn. Soc. 76: 321 (1978).

Culms to 15(30) cm; panicle 1-3 cm, ovoid, ellipsoid or shortly cylindrical, dense, bristly; spikelets 3.5-4 mm, 2- to 5-flowered; rhachilla glabrous, produced beyond the uppermost fertile floret and bearing a vestigial floret; glumes very unequal; the lower 2.5-3 mm, 1-nerved, subulate, the upper 3-3.5 mm, 3-nerved, elliptic; lemmas 3.5-4.5 mm, with a few long hairs on the back, 2-dentate at the tip; awn 3-5 mm, stiff, straight or curved, scabrid, subterminal.

?M; unconfirmed in Egypt. Algeria, Tunisia, Corsica, Italy, Sardinia, Sicily, Greece, Cyprus, Turkey.

4. **Rostraria cristata** (L.) Tzvelev, Novosti Sist. Vyssh. Rast. 7: 47 (1971).
Syns. *Festuca cristata* L., Sp. Pl., ed. 1, 76 (1753), non *Aira cristata* L., nec *Koeleria cristata* Pers.
Festuca gerardii Vill., Hist. Pl. Dauphiné 1: 249 (1786).
Festuca phleoides Vill., Hist. Pl. Dauphiné 1: 249 (1786), nom superfl., based on *Festuca gerardii* Vill.
Koeleria phleoides (Vill.) Pers., Syn. Pl. 1: 97 (1805).
Lophochloa phleoides (Vill.) Rchb., Fl. Germ. Excurs. 42 (1830).
Lophochloa cristata (L.) Hyl., Bot. Notiser 1953: 355 (1953).
Koeleria gerardii (Vill.) Shinners, Rhodora 58: 95 (1956), non *Koeleria gerrardii* Munro ex Benth. & Hook. (1847).

Culms to 60 cm; panicle 1-12 cm, cylindrical and dense or pyramidal and lax and ± lobed; spikelets 3-7.5 mm, 3- to 6(10)-flowered; rhachilla not produced, subglabrous or with hairs less than 0.5 mm; glumes unequal, glabrous or hairy, acute, the lower 2-3 mm, 1-nerved, narrowly lanceolate, the upper 2.5-3.5 mm, 3-nerved, elliptic; lemmas 2.5-3.5 mm, glabrous or sparsely hairy, the surface smooth or minutely papillose, acute at the tip; awn 1-3 mm, terminal or almost so.

N, O, M, D, S; desert sand and cultivated soils. Mediterranean region, southwest Asia, eastwards to northwest India.

5. **Rostraria rohlfsii** (Asch.) Holub, Folia Geobot. Phytotax. 9: 272 (1974).
Syns. *Trisetum rohlfsii* Asch., Verh. Bot. Vereins Prov. Brandenburg 21: 71 (1880).
Koeleria rohlfsii (Asch.) Murb., Acta Univ. Lund 36: 16 (1900).
Lophochloa rohlfsii (Asch.) H. Scholz, Willdenowia 6: 292 (1971).

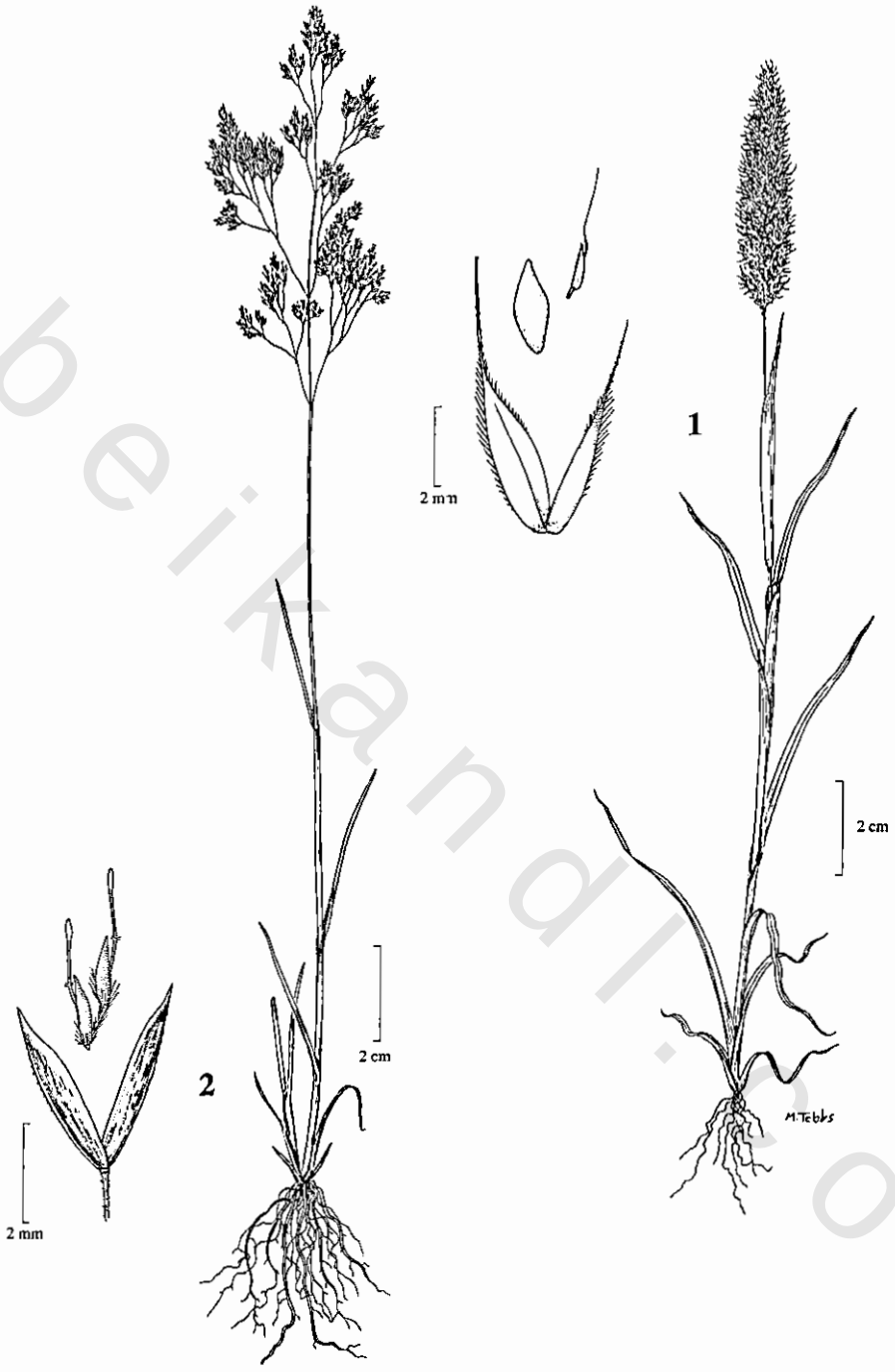


Plate 46. GRAMINEAE: *Holcus annuus* 1, habi:; spikelet showing florets detached from glumes (up left). *Corynephorus divaricatus* 2, habit; spikelet showing florets detached from glumes (down left). Drawn by Margaret Tebbs.

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Culms to 25 cm; panicle 5.5-9 cm, contracted, narrowly lanceolate in outline, dense and ± lobed; spikelets 4.5-5 mm, 3- to 4-flowered; rhachilla produced, shortly hairy; glumes unequal, ciliolate on the keel, acuminate; the lower 3-4 mm, 1-nerved, narrowly lanceolate, glabrous or pubescent on the flanks, the upper 3.5-4.5 mm, 3-nerved, glabrous on the flanks; lemmas 3-4 mm, glabrous or minutely pubescent, 2-dentate at the tip; awn 2.5-4 mm, clearly subterminal.

O (Bahariya); weed of cultivated fields and palm groves. Saharan region of Algeria, Tunisia, Libya, Egypt.

25. **Holcus** L., nom. conserv.

Annual or perennial; panicle moderately dense; spikelets laterally compressed, 2(3)-flowered, often with a short rhachilla-extension, falling entire, the lower floret fertile and usually raised upon a curved rhachilla-internode, the upper male; glumes subequal, enclosing the florets, papery, rarely awned, the lower 1-nerved, the upper 3-nerved; lemmas polished-cartilaginous, rounded on the back, indistinctly 3- to 5-nerved, obtuse to 2-dentate at the tip, the lower often awnless, the upper usually with a geniculate, hooked or straight awn from above the middle; endosperm sometimes soft. 6 species, Europe, North Africa, southwest Asia.

1. **Holcus annuus** Salzm. ex C.A. Mey., Verz. Pfl. Casp. Meer 17 (1831).
Syn. *Holcus setiglumis* Boiss. & Reut., Diagn. Pl. Nov. Hisp. 27 (1842).

Annual; culms to 85 cm, erect or geniculately ascending; panicle 2.5-6 cm, oblong-elliptic in outline, rather dense, ± lobed with short spreading branches; spikelets 3-3.9 mm, lanceolate; glumes ciliate on the keel, aristulate at the tip, the lower 2.5-2.8 mm with an awnlet 1.1-1.5 mm, the upper 3.2-3.9 mm with an awnlet 2.2-2.5 mm; lower lemma awnless; upper lemma with a subterminal awn 2 -2.3 mm.

N, M; sandy soils. Introduced, native to the Mediterranean region.

NOTE: Although the species was first collected in Egypt in 1923 by N. D. Simpson, who annotated the specimen (no. 2091, herb. K) with the words 'New to Egypt!' it was not included in any subsequent Flora or checklist until that of Cope & Hosni (1991). Its status in Egypt is still open to question, the assumption that it is a relatively recent introduction being based on nothing more than its date of first collection.

26. **Corynephorus** P. Beauv., nom. conserv.
Syn. *Weingaertneria* Bernh., nom. rejic. pro *Corynephorus*

Annual or perennial; panicle open or contracted; spikelets laterally compressed, 2-flowered plus rhachilla-extension, disarticulating above the glumes; glumes subequal, as long as the spikelet, the lower 1-nerved, the upper 3-nerved; lemmas thinly membranous, 1-nerved, rounded on the back, minutely 2-dentate at the tip, awned from near the base; awn divided into a brownish twisted column that is seated in a dorsal groove in the lemma, and a pallid clavate limb, with a ring of hairs at the junction; stamens 3; endosperm solid. 5 species, Western Europe, Mediterranean region, eastwards to Iran and the Caspian Sea.

1. **Corynephorus divaricatus** (Pourr.) Breistr., Procès-Verbaux Soc. Dauphin. Études Biol. Bio-Club, sér. 3, 17: 3 (1950).

Syns. *Aira divaricata* Pourr., Mém. Acad. Sci. Toulouse 3: 307 (1788).
Aira articulata Desf., Fl. Atlant. 1: 70 (1798).
Corynephorus articulatus (Desf.) P. Beauv., Ess. Agrostogr. 159 (1812).

Annual to 40(60) cm; panicle 2-10(20) cm, rather open with patent or erecto-patent branches, these bare of spikelets in the lower half; spikelets 3.5-4.5 mm, usually flushed with purple; glumes lanceolate, scabrid on the keel, acute, the lower a little shorter than the upper; lemmas 1.5-2 mm, shortly 2-dentate at the tip; callus with hairs 1/4-1/2 as long as the lemma; awn *c.* 2.5 mm.

M, S; coastal sands. Throughout the range of the genus.

27 **Phalaris** L.

Annual or perennial, in the latter case the lowest 1 or 2 internodes of the culm sometimes swollen into a pseudocorm; panicle spike-like to capitate; spikelets ovate, the 2 (rarely 1) lowermost florets reduced to rudimentary lemmas, breaking up above the persistent glumes (rarely the spikelets gathered into deciduous clusters of 1 fertile and up to 6 ± deformed sterile); glumes equal, exceeding and enclosing the lemma, keeled, the keel usually winged; sterile lemmas usually subulate and up to 1/2 the length of the fertile, rarely chaffy or minute fleshy scales, sometimes the lower reduced to an obscure knob; fertile lemma polished-coriaceous, the margins not overlapping, acute, awnless; palea coriaceous, 2-nerved but without keels; stamens 3. 15 species, north temperate zone, but mainly Mediterranean region, with a secondary centre in California, several species in South America.

1. Spikelets falling in clusters, one (rarely two) of the spikelets fertile and the remainder male or sterile, ± deformed and forming an involucre (if spikelets falling singly then fertile lemma quite glabrous) 2
\+ Spikelets not falling in clusters, the florets deciduous from the persistent glumes, all fertile; fertile lemma sparsely to densely hairy 3

2. Annual 1. **P. paradoxa**
\+ Perennial with swollen base to the culm 2. **P. coerulescens**

3. Annual 4
\+ Perennial 5

4. Sterile floret 1, either well developed (more than 0.5 mm) or obsolete (less than 0.3 mm); wing of glumes toothed or erose 3. **P. minor**
\+ Sterile florets 2, broad and chaffy, more than half as long as the fertile lemma; wing of glumes entire 4. **P. canariensis**

5. Plant with long creeping rhizomes; leaves variegated; panicle lobed 5. **P. arundinacea**
\+ Plant with short rhizomes and a bulbous swelling at the base of the culm; leaves not variegated; panicle cylindrical (rarely lobed at the base) 6. **P. aquatica**

1. **Phalaris paradoxa** L., Sp. Pl., ed. 2, 1665 (1763).
Syns. *Phalaris praemorsa* Lam., Fl. Franç. 3: 566 (1778).
Phalaris appendiculata Schult., Mant. 2: 216 (1824).

Phalaris paradoxa L. var. *praemorsa* (Lam.) Coss. & Durieu, Expl. Sci. Algérie 2: 25 (1854).

Annual to 1 m; panicle to 9 x 2 cm, dense, oblong in outline but tapering to a narrow base; spikelets falling from the inflorescence in clusters of 6 or 7, with 5 or 6 sterile, reduced or ± deformed spikelets forming an involucre about a single (rarely 2) fertile spikelet; glumes of fertile spikelet 5.5-8.2 mm, acuminate to subulate, winged above, the wing with a tooth-like projection near the middle; sterile florets of fertile spikelet obsolete; fertile floret 2.5-3.3 mm, glabrous or with a few short hairs near the tip.

N, O, M, Dw, S; canal banks, cultivated fields and waste ground. Mediterranean region, southwest Asia, widely introduced elsewhere as a weed.

NOTE: The sterile spikelets forming the involucre around the fertile are, for the most part, like smaller versions of the fertile, but they are sometimes considerably deformed and reduced to little clavate knobs (var. *praemorsa*). It is not unusual to find a gradation in the panicle from *praemorsa*-type at the base to *paradoxa*-type above. The variety is clearly of no taxonomic value. Baldini, Webbia 49: 265-329 (1995) recognised two species in Egypt, *P. paradoxa* and *P. appendiculata.* The distinction is based upon differences in length of sterile lemmas (0.2-0.4 mm in the former, 0.5-0.7 mm in the latter), panicle shape (obovate and cylindrical respectively) and anther length (2-2.5 mm and 1 mm respectively). The differences seem trivial, especially since intermediate anther lengths can be found, and the distinction between the taxa is unconvincing. The type of *P. appendiculata* is a specimen collected by Sieber from, presumably, the Nile Delta labelled *P. dentata* Sieber, but this name was never published.

2. **Phalaris coerulescens** Desf., Fl. Atlant. 1: 56 (1798).

Rhizomatous perennial; culms to 2 m, with the lowest 1 or 2 internodes swollen into pseudocorms; panicle 3-12 cm, ovate-oblong in outline, dense, tapering to a narrow base; spikelets falling from the inflorescence in clusters of 6 or 7, with 5 or 6 male or sterile spikelets forming an involucre about a single fertile spikelet; glumes of fertile spikelet 5-8 mm, oblong-acute, glabrous or hairy, broadly winged, the wing-margin erose-denticulate; sterile florets of fertile spikelet obsolete; fertile floret 2.5-5 mm, glabrous or with a few hairs towards the tip.

S; damp ground, usually in wadis. Macaronesia, Mediterranean region, Sinai, adventive in other parts of Europe and South America.

3. **Phalaris minor** Retz., Observ. Bot. 3: 8 (1788).

Annual to 1 m; panicle 1-6 cm, ovate-oblong in outline, dense; spikelets all alike, fertile, disarticulating above the persistent glumes; glumes 4-6.5 mm, oblanceolate, acute, broadly winged, the wing-margin usually erose-dentate, rarely almost entire; sterile florets very unequal, the lower obsolete; the upper 1-1.8 mm, subulate, rarely both obsolete; fertile lemma 2.7-4 mm, broadly lanceolate-ovate, pubescent.

N, O, M, Dw, S; weed of roadsides and cultivated ground. Mediterranean region, eastwards to northwest Himalaya; introduced weed in temperate countries throughout the world.

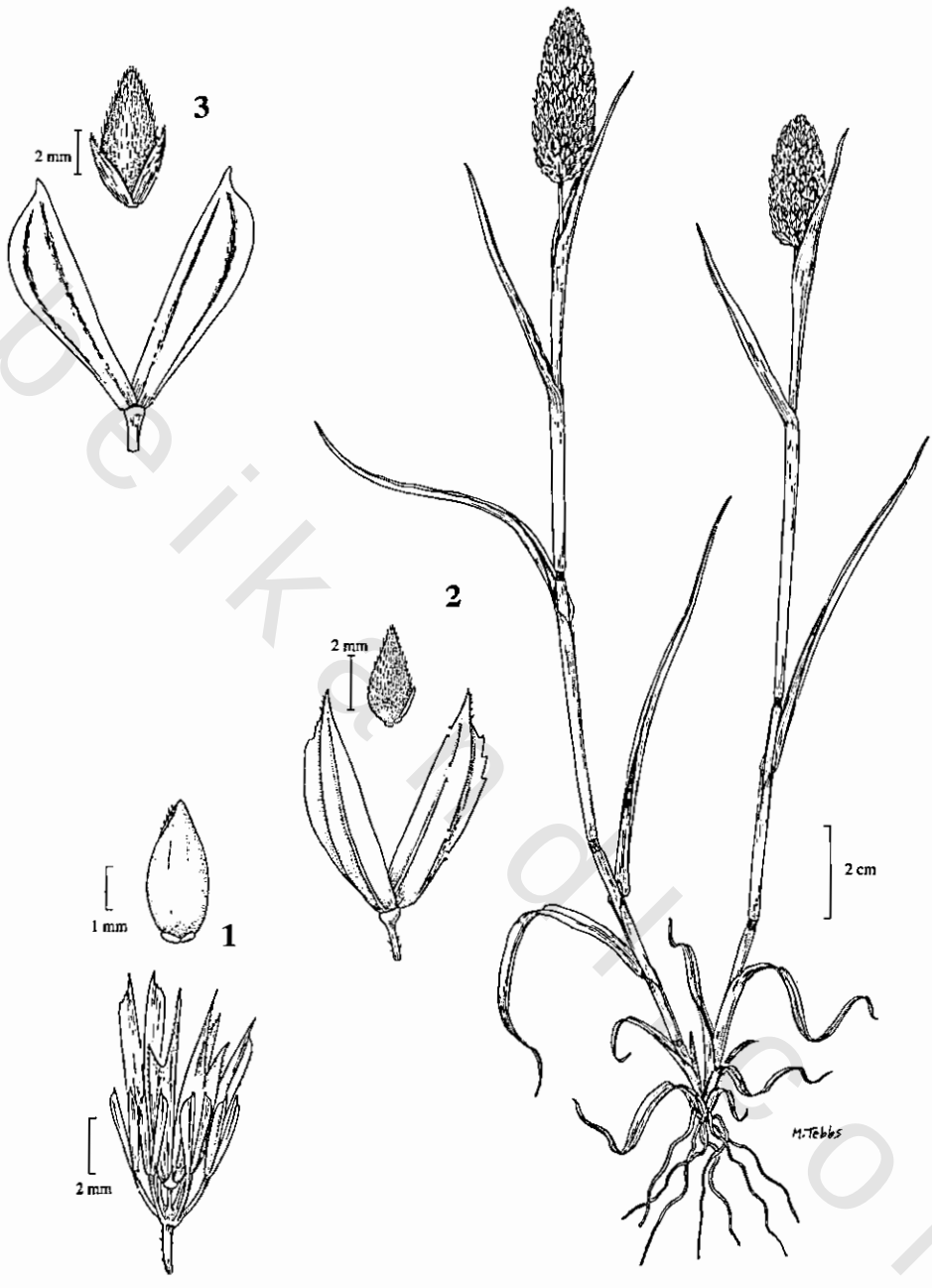


Plate 47. GRAMINEAE: *Phalaris paradoxa* 1, spikelet cluster with detached floret. *Phalaris minor* 2, habit; spikelet with detached floret (left). *Phalaris canariensis* 3, spikelet with detached floret. Drawn by Margaret Tebbs.

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4. **Phalaris canariensis** L., Sp. Pl., ed. 1, 54 (1753).

Annual to 1 m; panicle 1.5-5 cm, ovate-oblong in outline, dense; spikelets all alike, fertile, disarticulating above the persistent glumes; glumes 0.6-1 cm, oblanceolate, acute, pale green with darker longitudinal stripes, broadly winged, the wing-margin usually entire, rarely erose-denticulate; sterile florets 2, 2.5-4.5 mm, subequal, broad and chaffy, thinly pubescent; fertile lemma 4.8-6.8 mm, broadly lanceolate-ovate, densely appressed-pubescent.

N, M; weed introduced in bird seed. Probably native to Macaronesia and southern Europe but now so widely naturalized through its use as bird food that its native range is very uncertain.

5. **Phalaris arundinacea** L., Sp. Pl., ed. 1, 55 (1753).

Perennial with scaly creeping rhizomes; culms to 1.5 m; panicle 7-40 cm, dense, lobed or interrupted, with short branches to 5 cm, these spreading at anthesis but otherwise contracted about the main axis; spikelets all alike, fertile, disarticulating above the persistent glumes; glumes 3.5-7.5 mm, narrowly lanceolate, acute, wingless or the wing extremely narrow and inconspicuous; sterile florets 2, 1.2-2.3 mm, subequal, subulate, villous; fertile lemma 2.7-4.5 mm, lanceolate, sparsely pubescent.

NOTE: Egyptian material of *Phalaris arundinacea* is represented only by var. *picta* L., Sp. Pl., ed. 1, 55 (1753), which has leaves variegated with green and cream stripes. It is a widely cultivated variant of horticultural origin ('Ribbon-grass' or 'Gardener's Garters') unknown anywhere as a wild plant. It can be a very persistent weed once it has escaped from gardens.

6. **Phalaris aquatica** L., Cent. Pl. 1: 4 (1755).
Syns. *Phalaris tuberosa* L., Mant. Alt. 557 (1771).
Phalaris nodosa Murray, Syst. Veg, ed. 13, 88 (1774), nom. superfl., based on the above.

Tufted perennial with short rhizomes; culms to 1.5(2) m, the lowest internode often swollen into a pseudocorm; panicle (1.5)5-11(15) cm, cylindrical and spike-like, sometimes lobed at the base; spikelets all alike, fertile, disarticulating above the persistent glumes; glumes 4.4-7.5 mm, lanceolate-acute, broadly winged, the wing-margin entire; sterile floret 0.2-2.2 mm, usually 1, obsolete or well developed and subulate, pubescent, sometimes a second floret present, but this always obsolete and not exceeding 0.5 mm; fertile lemma 3.1-4.6 mm, lanceolate, pubescent.

M (Ras-el-Hekma); introduced in the early 1950s but probably no longer extant. Native to the Mediterranean region but widely introduced elsewhere.

28. **Agrostis** L.

Annual or perennial; panicle diffuse to contracted, rarely spike-like; spikelets 1-flowered, usually without rhachilla-extension, breaking up above the persistent glumes; glumes equal or unequal, as long as to much longer than the floret, membranous, 1-nerved, acute to acuminate, rarely awned; lemma hyaline to cartilaginous, thinner than the glumes, glabrous or hairy, rounded on the back, 3- to 5-nerved, truncate to minutely 4-denticulate

at the tip, the latter often with the nerves excurrent, with a geniculate or rarely only flexuous dorsal awn, or awnless; palea gaping, usually shorter than the lemma, often minute; callus glabrous to shortly pubescent, rarely bearded; endosperm sometimes liquid. About 220 species, temperate regions throughout the world and tropical mountains.

1. **Agrostis stolonifera** L., Sp. Pl., ed. 1, 62 (1753).
Syn. *Agrostis alba,* auct. non L.

Stoloniferous perennial without rhizomes, to 0.65(1.2) m; panicle 2-20(32) cm, open at anthesis, contracted before and after, the spikelets condensed about the branches and branchlets, the lower branches often naked below; spikelets 1.8-3 mm; glumes subequal or unequal, acute; lemma 1.3-2.1 mm, glabrous, the outer nerves sometimes excurrent; palea well developed, 3/5-3/4 the length of the lemma; awn to 3 mm long, but variable and often quite absent.

S; damp soils. Throughout Europe, temperate Asia, also widespread as an introduced weed.

29. **Ammophila** Host

Rhizomatous perennials with a deep and extensive root-system; leaves rigid, inrolled and pungent; panicle contracted and spike-like; spikelets 1-flowered with rhachilla-extension, strongly laterally compressed, disarticulating above the persistent glumes; glumes equal, a little longer than and enclosing the floret, chartaceous, acute, the lower 1-nerved, the upper 3-nerved; lemma thinly coriaceous, 3- to 5-nerved, sharply keeled, 2-denticulate at the tip and with a subapical mucro; callus bearded; ovary glabrous; hilum linear. 2 species, Europe, North Africa, east coast of North America.

1. **Ammophila arenaria** (L.) Link, Hort. Berol. 1: 105 (1827).
Syns. *Arundo arenaria* L., Sp. Pl., ed. 1, 82 (1753).
Psamma arenaria (L.) Roem. & Schult., Syst. Veg. 2: 843 (1817).

Culms to 1.2 m, stout; leaves to 60 cm, usually tightly inrolled and pungent, but to 6 mm wide when opened out; panicle 12-20 cm, oblong to cylindrical; spikelets 1-1.4 cm; glumes narrowly lanceolate, acute to acuminate, the lower 1.05-1.2 cm, the upper 1.1-1.3 cm; lemma 1.05-1.2 cm, lanceolate; callus-hairs 4-6 mm.

M, S; coastal sands. All around the coasts of Europe and the Mediterranean region to latitude 62°, but widely introduced as a very efficient sand-binder.

NOTE: The description above applies to subsp. *arundinacea* H. Lindb., Acta Soc. Sci. Fenn., ser. B, 1(2): 10 (1932) which differs from subsp. *arenaria* only by the longer callus-hairs and glumes only slightly (not distinctly) exceeding the floret; subsp. *arundinacea* has a narrower distribution than subsp. *arenaria*, being confined to the Mediterranean region, but the taxonomic distinction is scarcely worth maintaining.

30. **Triplachne** Link

Annual; panicle spike-like, cylindrical to ovoid or ellipsoid; spikelets 1-flowered with rhachilla-extension, laterally compressed, disarticulating above the persistent glumes;



Plate 48. GRAMINEAE: *Agrostis stolonifera* 1, habit; spikelet showing floret detached from glumes (right). *Ammophila arenaria* 2, spikelet showing floret detached from glumes. *Triplachne nitens* 3, habit; spikelet detached from glumes (up left). Drawn by Margaret Tebbs.

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glumes subequal, longer than the floret, membranous, 1-nerved, acute; lemma hyaline, gibbously ovate in profile, faintly 5-nerved, rounded on the back, truncate, with the 2 outer nerves excurrent as lateral awns and a geniculate dorsal awn from near the base; palea almost as long as the lemma; stamens 3; hilum sub-basal, round. 1 species, Macaronesia, Mediterranean region.

1. **Triplachne nitens** (Guss.) Link, Hort. Berol. 2: 241 (1833).
Syns. *Agrostis nitens* Guss., Fl. Sicul. Prodr. 1: 59 (1827).
Gastridium nitens (Guss.) Coss. & Durieu, Ann. Sci. Nat. (Paris), sér. 4, 1: 229 (1854).

Culms 25(30) cm, erect or geniculately ascending; panicle 1-5(6) cm; spikelets 3.5-4 mm; glumes lanceolate, scabrid on the keel, the lower 3.1-3.5 mm, the upper 3.7-4 mm; lemma 1.2-1.5 mm, ovate, villous on the back, the lateral awns about as long as the body; central awn 3.3-4 mm; callus shortly hairy.

M, S; sandy fields. Madeira, Portugal, Spain, Balearic Islands, Sicily, Greece, Crete, Morocco, Algeria, Libya, Egypt, Cyprus, Turkey.

31. **Gastridium** P. Beauv.

Annual; panicle spike-like; spikelets 1-flowered with or without a minute rhachilla-extension, strongly laterally compressed, disarticulating above the persistent glumes; glumes unequal, membranous above, indurate and gibbously swollen below to accommodate the floret, 1-nerved, acuminate; lemma cartilaginous, 5-nerved, rounded on the back, hairy or glabrous, truncate and denticulate at the tip, with a geniculate dorsal awn or awnless, the two states often mixed in the same inflorescence; stamens 3. 2 or 3 species, Europe and North Africa, eastwards to Iran and southeastwards to tropical Africa.

1. **Gastridium phleoides** (Nees & Meyen) C. E. Hubb., Kew Bull. 9: 375 (1954).
Syn. *Lachnagrostis phleoides* Nees & Meyen, Gramineae 14 (1841).

Culms to 60 cm; panicle to 18 cm, linear-oblong to lanceolate in outline, dense; spikelets (3.5)5-7.5 mm, linear-oblong, the rhachilla produced as a short slender hairy bristle; lower glume as long as the spikelet; upper glume *c.* 3/4 as long; awned lemma 1-1.3 mm, densely hairy all over, the awn 4-6(7) mm.

M; sandy soils. Macaronesia, Morocco, Algeria, Libya, Egypt, Palestine, Lebanon, Syria, Cyprus, Turkey, Iraq, Iran, Sudan, Ethiopia, Kenya.

32. **Lagurus** L.

Annual; panicle spike-like, ovoid to subcylindrical or subglobose, very dense and fluffy; spikelets 1-flowered with rhachilla-extension, laterally compressed, disarticulating above the persistent glumes; glumes subequal, longer than the floret, linear-lanceolate, membranous, 1-nerved, white-villous, acuminate to setaceously awned; lemma membranous, 5-nerved, rounded on the back, hairy at the base, with 2 long apical bristles and a geniculate dorsal awn from the upper third; palea shorter than the lemma; stamens 3; endosperm soft. 1 species, southwest Europe, Mediterranean region.

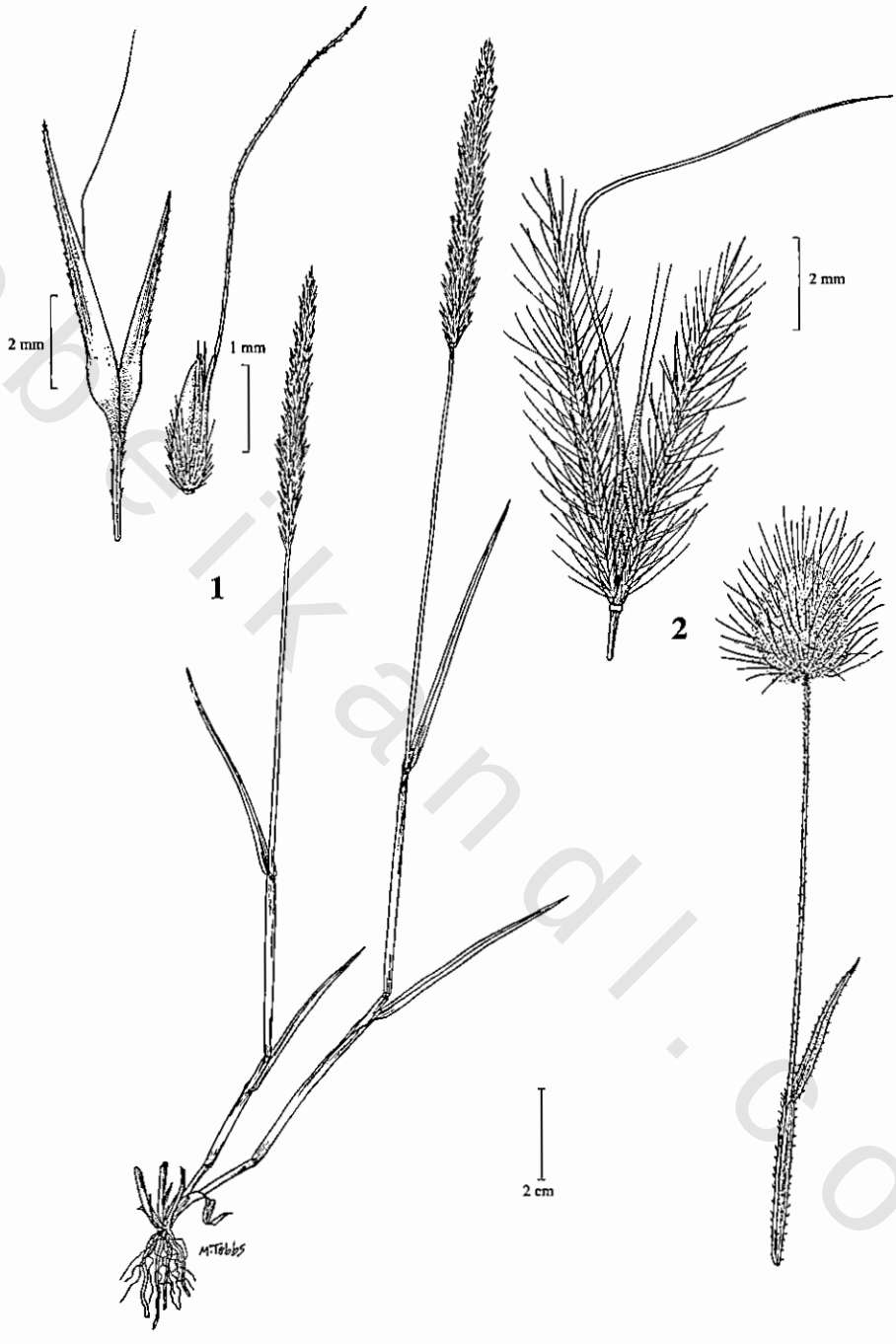


Plate 49. GRAMINEAE: *Gastridium phleoides* 1, habit; spikelet (up far left); enarged floret (up near left). *Lagurus ovatus* 2, inflorescence; spikelet (up left). Drawn by Margaret Tebbs.

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1. **Lagurus ovatus** L., Sp. Pl., ed. 1, 81 (1753).

Culms to 50 cm; leaf-sheaths inflated; blades broad and flat, greyish velvety-pubescent; panicle 0.5-6 cm, very softly and densely hairy; spikelets 7-9 mm (excluding the awns), those at the base of the panicle mostly sterile; glumes villous on the back, the setaceous tip with hairs *c*. 2 mm; lemma 3-5 mm, lanceolate, the apical bristles 2-6 mm, the central awn 0.8 -2 cm.

M; sand, especially near the coast. Native to southwest Europe and the Mediterranean region, but widely introduced as an ornamental both for its horticultural value and for flower arrangements for which it is often dyed bright colours.

33. **Polypogon** Desf.

Annual or perennial; panicle open or contracted and spike-like; spikelets 1-flowered without rhachilla-extension, laterally compressed, falling entire together with a basal stipe (this confusingly comprising all or part of what appears to be the 'pedicel'); glumes equal, longer than the floret, rounded on the back below, keeled above, chartaceous, ± scabrid, 1-nerved, entire to 2-lobed at the tip, often with a slender awn; lemma hyaline, 5-nerved, rounded on the back, the nerves sometimes excurrent from the ± truncate tip, awnless or with a subapical awnlet or a geniculate awn; palea 1/2 as long to as long as the lemma; stamens 3. 18 species, warm temperate regions and tropical mountains.

1. Perennial; glumes awnless — 3. **P. viridis**
\+ Annual; glumes awned — 2

2. Lemma often awned; glumes minutely ciliate above, slightly notched at the tip — 1. **P. monspeliensis**
\+ Lemma awnless; glumes densely ciliate above, 2-fid at the tip, the lobes to 1.5 mm — 2. **P. maritimus**

1. **Polypogon monspeliensis** (L.) Desf., Fl. Atlant. 1: 67 (1798).
Syns. *Alopecurus monspeliensis* L., Sp. Pl., ed. 1, 61 (1753).
Phalaris cristata Forssk., Fl. Aegypt.-Arab. 17 (1775).

Annual to 80 cm; panicle 1.5-16 cm, narrowly ovate to narrowly oblong, cylindrical or lobed, very dense and bristly; spikelets 2-3 mm excluding the awns; glumes slightly notched at the tip, scabrid below, minutely ciliate on the margins above, with a fine straight awn 4-7 mm; lemma about 1/2 the length of the glumes, smooth, awnless or with an awn to 2 mm.

N, O, M, D, R, S; cultivated areas and damp sand along canal banks. Europe, Mediterranean region, eastwards through much of temperate Asia.

NOTE: The type of *Phalaris cristata* was collected in Egypt, near Cairo, in 1762 by Forsskål (no. 68, holotype? C).

2. **Polypogon maritimus** Willd., Ges. Naturf. Freunde Berlin Neue Schriften 3: 422 (1801).
Syn. *Polypogon monspeliensis* (L.) Desf. var. *maritimus* Coss. & Durieu, Expl. Sci. Algérie 2: 70 (1854/5).

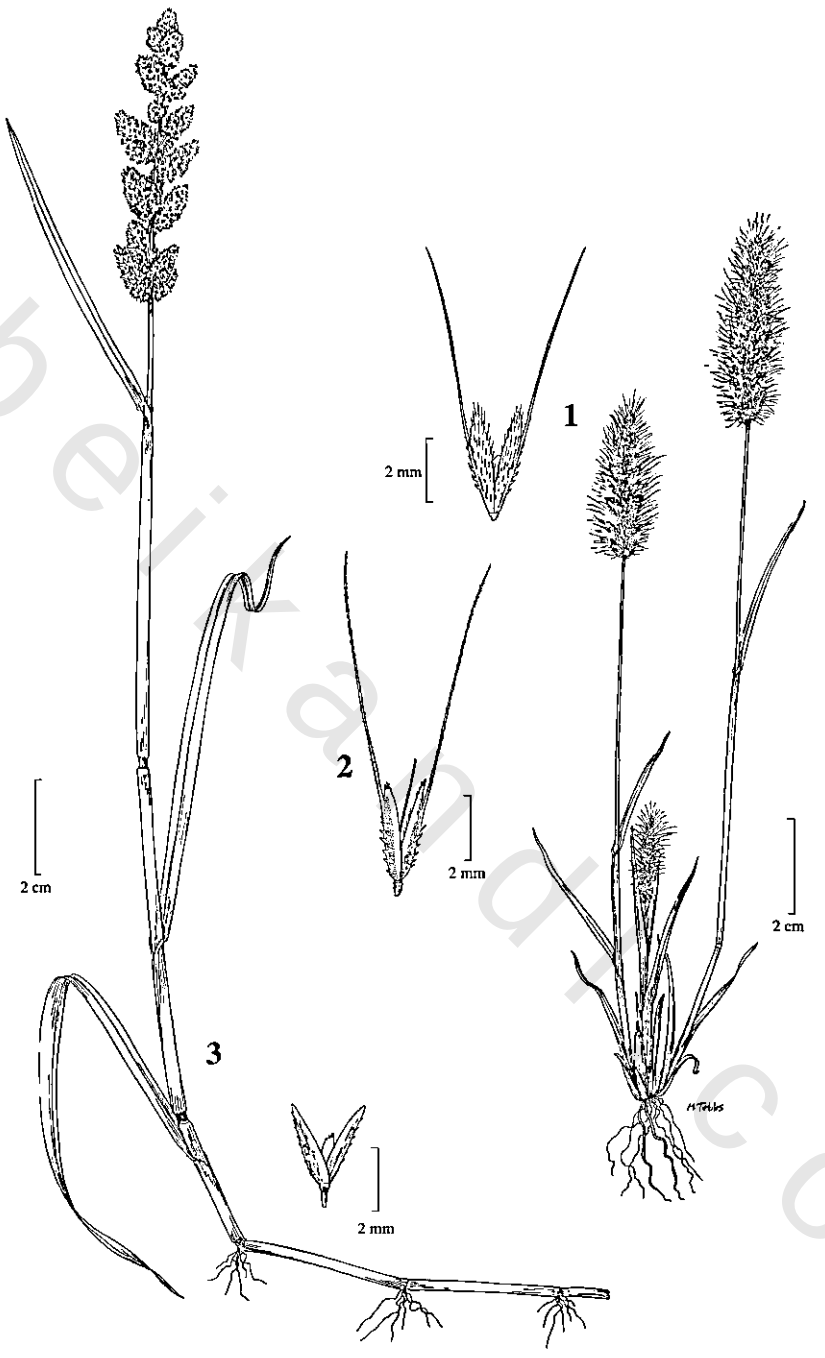


Plate 50. GRAMINEAE: *Polypogon monspeliensis* 1, habit; spikelet (up left). *Polypogon maritimus* 2, spikelet. *Polypogon viridis* 3, habit; spikelet (down right). Drawn by Margaret Tebbs.

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Annual to 25(40) cm; panicle 1-7 cm, oblong, sometimes lobed, very dense and bristly; spikelets 2-3.2 mm excluding the awns; glumes 2-fid at the tip with acute to acuminate lobes to 1.5 mm, spinously scabrid below, densely long-ciliate on the margins, especially above, with an awn 6-7 mm from the sinus; lemma to 1/2 as long as the glumes, smooth, awnless.

N, M, S; alluvial soils and coastal sand. Mediterranean region, eastwards through temperate Asia to Afghanistan

3. **Polypogon viridis** (Gouan) Breistr., Bull. Soc. Bot. France 110 (Sess. Extr.): 56 (1966).
Syns. *Agrostis viridis* Gouan, Hort. Monsp. 546 (1762).
Phalaris semiverticillata Forssk., Fl. Aegypt.-Arab. 17 (1775).
Agrostis verticillata Vill., Prosp. Hist. Pl. Dauphiné 16 (1779).
Agrostis semiverticillata (Forssk.) C. Chr., Dansk Bot. Ark. 4(3):12 (1922).
Polypogon semiverticillatus (Forssk.) Hyl., Uppsala Univ. Årsskr. 7: 74 (1945).

Stoloniferous perennial to 1 m; panicle 2-15 cm, pyramidal, lobed, dense, the branches subverticillate; spikelets 1.5-2.5 mm; glumes obtuse, scabrid on the back, otherwise glabrous, awnless; lemma *c.* 1 mm, denticulate, awnless.

N, O, M, D, R, S; cultivated and damp alluvial soils, often growing out over water. Europe, Mediterranean region, eastwards to Central Asia.

NOTE: The type of *Phalaris semiverticillata* was collected in Rashid (Rosetta) and Cairo, Egypt ('Rosettae & Kahirinae') in 1762 by Forsskål (no. 63, holotype C).

34. **Alopecurus** L.

Annual or perennial; panicle spike-like, ovoid or capitate to oblong or cylindrical; spikelets 1-flowered without rhachilla-extension, firmly laterally compressed, falling entire from the cupuliform tips of the short pedicels; glumes subequal, membranous to coriaceous, 3-nerved, often connate below the middle, usually ciliate on the keel, obtuse to acute or shortly awned at the tip; lemma membranous, 3-nerved, keeled, the margins often connate below, truncate or ± acute at the tip, with a straight or geniculate awn from the back, rarely awnless; palea minute or absent; stamens 3; stigmas pubescent, protogynous; styles connate below; ovary glabrous; endosperm sometimes liquid. 36 species, north temperate regions, South America.

1. **Alopecurus myosuroides** Huds., Fl Angl. 23 (Jan.-June 1762).
Syn. *Alopecurus agrestis* L., Sp. Pl., ed. 2, 89 (Sept. 1762).

Annual to 90 cm; upper leaf-sheaths slightly inflated; panicle 2.5-12 cm, elongate, tapering upwards; spikelets 4.5-7.5 mm; glumes acute, convergent at the tips, connate in the lower 1/3-1/2, narrowly winged on the keel, minutely hairy on the keel and on the nerves near the base; lemma as long as or slightly longer than the glumes, acute, the margins connate in the lower 1/3-1/2; awn 5-10 mm.

N, M, De; cultivated ground. Europe, temperate Asia, often a serious weed of agriculture.

35. **Phleum** L.

Annual or perennial; panicle spike-like, ovoid or capitate to cylindrical, the branches sometimes adnate to the main axis; spikelets 1-flowered, with or without rhachilla-extension, firmly laterally compressed, falling entire (or the floret sometimes falling before the glumes but these not persistent); glumes subequal, enclosing the floret, the margins overlapping but not connate, membranous, 3-nerved, truncate to acute, with a mucro or short stiff awn; lemma membranous, keeled, (1)3- to 7-nerved, the margins not connate, truncate to subacute, awnless or mucronate; palea as long as the lemma or almost so; stamens (2)3; ovary glabrous. 15 species, north temperate regions, South America.

1. Annual; panicle-branches free; spikelet with rhachilla-extension — 1. **P. subulatum**
\+ Perennial; panicle-branches adnate to the axis; spikelet without rhachilla-extension — 2. **P. pratense**

1. **Phleum subulatum** (Savi) Asch. & Graebn., Syn. Mitteleur. Fl. 2(1): 154 (1899).
Syns. *Phalaris subulata* Savi, Fl. Pis. 1: 57 (1798).
Phalaris tenuis Host, Icon. Descr. Gram. Austriac. 2: 36 (1802).
Phleum tenue (Host) Schrad., Fl. Germ. 191 (1806).

Annual to 30(45) cm; panicle 1-12 cm, cylindrical, the branches not adnate to the main axis; spikelets (1.5)2-4 mm, elliptic, with rhachilla-extension; glumes semi-elliptic, broadly hyaline on the margins and between the nerves, glabrous or ciliate on the keel, gradually narrowed into a short awn at the tip; lemma 1/3-1/2 the length of the glumes, covered with clavate hairs, denticulate at the tip.

?S; unconfirmed in Egypt. Western and Central Europe, Mediterranean region, eastwards to Central Asia.

2. **Phleum pratense** L., Sp. Pl., ed. 1, 59 (1753).

Tufted perennial to 1(1.5) m; panicle (3)5-14(20) cm, cylindrical, the branches adnate to the main axis; spikelets (3.5)4-5(5.5) mm, without rhachilla-extension; glumes oblong, broadly hyaline on the margins, stiffly pectinate-ciliate on the keel, the lower also ciliolate on the margins, truncate at the tip and produced into a straight or curved scabrid awn 0.8-1.7(2) mm; lemma 2/3-3/4 the length of the glumes, minutely hairy, very blunt at the tip.

N; introduced for fodder. Native to temperate Europe, widely introduced in temperate regions throughout the world as a fodder and pasture grass.

Tribe 8. **MELICEAE**

Ligule a membrane or sometimes absent; leaf-sheaths tubular; inflorescence a panicle, often contracted or spike-like; spikelets all alike, laterally compressed, (1)2- to many-flowered, the uppermost florets reduced and often contracted into a clavate appendage; rhachilla disarticulating below each fertile floret; glumes persistent, shorter than the spikelet (or the upper ± as long); lemmas membranous to herbaceous, often thin



Plate 51. GRAMINEAE: *Alopecurus myosuroides* 1, habit; spikelet (down left). *Phleum pratense* 2, lower part and inflorescence; spikelet (up right). Drawn by Margaret Tebbs.

and shining, 5- to 9-nerved, entire or 2-dentate at the tip, awnless or awned from just below the tip; lodicules fleshy; stamens 3; caryopsis with small embryo; hilum linear; starch grains compound.

36. **Melica** L.

Perennial; spikelets 2- to several-flowered, the lowermost 1-3 florets fertile, the upper 2-3 sometimes reduced to a clavate mass of sterile lemmas or these scarcely distinguishable from the fertile; glumes ± equal to very unequal, papery with hyaline tip, 3- to 5-nerved, rounded on the back, obtuse or acute; lemmas mostly coriaceous, sometimes membranous, often hyaline towards the tip, 5- to 9(13)-nerved, obtuse to acute or 2-dentate, sometimes mucronate; floret-callus glabrous. About 80 species, temperate regions throughout the world except Australia.

1. **Melica persica** Kunth, Révis. Gramin. 1: 122, 351, t. 89 (1830).

Rhizomatous plant to 50 cm, forming dense tufts to 45 cm across; leaf-blades 5-15 x 0.2-0.4 cm, these and the sheaths glabrous or densely pubescent; panicle 3.5-12 cm, spike-like, few-branched and secund to many-branched and cylindrical; spikelets 0.55-1.1 cm, gaping, with 1-2 fertile florets; lower glume 2.5-6.5 mm, broadly ovate, acute; upper glume lanceolate, as long as the spikelet, acute; first fertile lemma 4-7.5 mm, elliptic, strongly 7- to 9-nerved, pilose on the back with tubercle-based hairs 4-5 mm, acute at the tip; second fertile lemma (where present) shorter than the first, glabrous.

Represented in Sinai by two variants, treated by Davis, Fl. Turkey 9: 533-535 (1985) as subspecies, but their relationships and distribution have not been fully resolved:

subsp. **inaequiglumis** (Boiss.) Bor in Rech.f., Fl. Iranica 70: 255 (1970).
Syns. *Melica inaequiglumis* Boiss., Diagn. Pl. Orient. 1(7): 124 (1846).
Melica sinaica Fig. & De Not., Mem. Reale Accad. Sci. Torino, ser. 2, 12: 256 (1852).

Leaf-sheaths and blades glabrous.

subsp. **canescens** (Regel) P.H. Davis, Fl. Turkey 9: 534 (1985).
Syns. *Melica cupani* Guss. var. *canescens* Regel, Acta Horti Petrop. 8: 628 (1880).
Melica lanata Hochst. ex Steud., Syn. Pl. Glumac. 1: 289 (1854).

Leaf-sheaths and blades densely retrorse-pubescent.

S, 'Upper Egypt'; stony ground. Area of species: Europe, Mediterranean region, southwest and Central Asia to northwest India.

NOTE: *Melica sinaica* was described from Sinai, the type collected by Figari (holotype FT, isotypes K); *Melica lanata* was also described from Sinai, the type collected at St. Katherine by Schimper (no. 104, isotype K). A specimen collected by Parlatore, from 'Upper Egypt' would appear not to be from Sinai where all other specimens were collected.

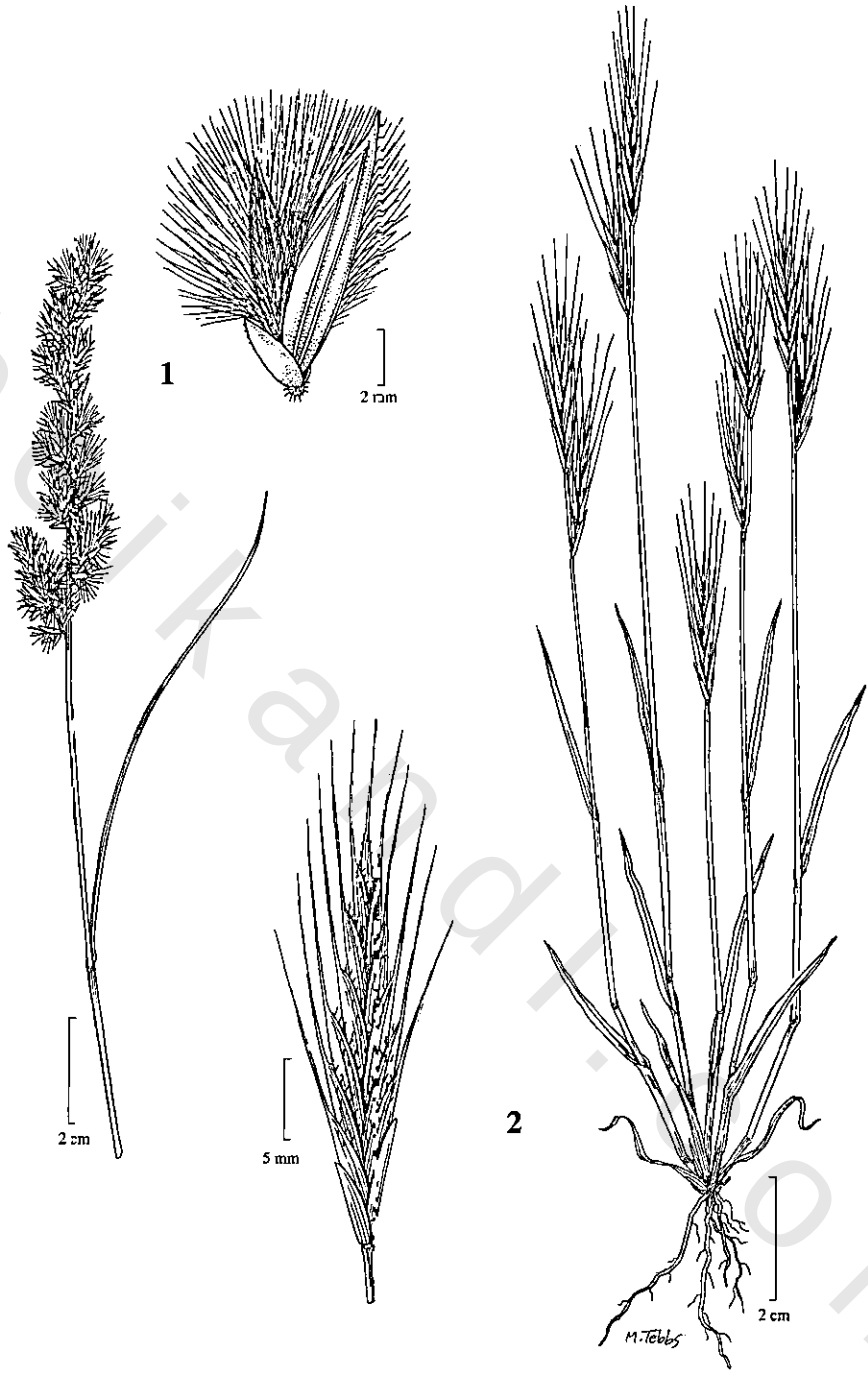


Plate 52. GRAMINEAE: *Melica persica* 1, inflorescence; spikelet (up right). *Brachypodium distachyum* 2, habit; spikelet (down left). Drawn by Margaret Tebbs.

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Tribe 9. **BRACHYPODIEAE**

Ligule a membrane; inflorescence a simple raceme (but with extremely short pedicels), the spikelets all alike, divergent from the axis or sometimes falcate; spikelets several-flowered, subterete or slightly laterally compressed, disarticulating beneath each floret; glumes persistent, membranous to herbaceous, shorter than the adjacent lemmas, distinctly 3- to 9-nerved, rounded on the back, obtuse to shortly awned; lemmas firmly membranous to herbaceous, sometimes coriaceous, 7- to 9-nerved, rounded on the back, obtuse to awned; ovary tipped by a small fleshy hairy appendage; caryopsis ellipsoid, hollowed on the hilar face.

37. **Brachypodium** P. Beauv.
Syn. *Trachynia* Link

Description as for tribe. 16 species, temperate Eurasia, extending southwards on tropical mountains and in Central and South America (Mexico to Bolivia).

1. **Brachypodium distachyum** (L.) P. Beauv., Ess. Agrostogr. 101, 155 (1812).
Syns. *Bromus distachyus* L., Cent. Pl. 2: 8 (1756).
Trachynia distachya (L.) Link, Hort. Berol. 1: 43 (1827).

Annual to 40 cm (but often much less), usually geniculately ascending; leaf-blades to 12 x 0.4 cm, flat, stiff, glaucous; raceme with 1-4(6) spikelets crowded at the top of the culm; spikelets 2-3(6) cm, lightly compressed, oblong-lanceolate, 10- to 16 (30)-flowered; glumes unequal, hairy or glabrous, acute, the lower 5-6 mm, 5-nerved, the upper 7-8 mm, 7-nerved; lemmas 0.75-1 cm, oblong-lanceolate, glabrous or with a few stiff bristles to pubescent, tipped with an awn to 1.5 cm; anthers 0.5-1 mm.

N, O, M, De, GE, S; sandy and gravelly soils, mostly as a weed of cultivation. Mediterranean region, southwest Asia to Pakistan and Central Asia.

Tribe 10. **BROMEAE**

Ligule a membrane; inflorescence a panicle, the spikelets all alike; spikelets with several to many fertile florets and with imperfect florets above, laterally compressed, disarticulating either below the lowest floret only or between the florets; glumes persistent, shorter than the lowest lemma, entire; lemmas herbaceous to coriaceous, 5- to 13-nerved, shallowly 2-dentate to deeply 2-fid, with a straight or recurved subapical awn, rarely awnless, sometimes with as many as 9 awns; ovary capped by a fleshy, hairy, lobed appendage, the stigmas subterminal; caryopsis narrowly elliptic to linear in outline, hollowed on the hilar face.

NOTE. *Bromeae* and *Triticeae* (q.v.) share the same unusual starch grains in the endosperm, rounded rather than either angular or compound. They also share the fleshy appendage on the ovary which is apparent even in immature specimens.

1. Lemmas 1(3)-awned; florets mostly falling separately 38. **Bromus**
+ Lemmas 5- to 9-nerved; florets falling in a cluster, the uppermost reduced to a tuft of awns 39. **Boissiera**

38 **Bromus** L.

Syns. *Ceratochloa* P. Beauv., *Serrafalcus* Parl., *Anisantha* K. Koch, *Triniusa* Steud., *Genea* (Dumort.) Dumort., *Bromopsis* (Dumort.) Fourr.

Annual or perennial; leaf-sheaths with margins connate for most of their length, usually hairy; panicle open or contracted, ample or scanty (very rarely, in impoverished plants, reduced to a single spikelet); spikelets cuneate to ovate; glumes herbaceous; lemmas herbaceous to subcoriaceous, sometimes with membranous margins, entire or shallowly 2-dentate to 2-lobed at the tip, mucronate or awned, the awn solitary (rarely 2 lateral awns also present), subapical; stamens (1)3. About 150 species, temperate regions of both hemispheres but mainly in the north.

NOTE: The genus *Bromus* is large and diverse and is sometimes broken up into separate genera. The characters that unite the species into a single genus are more compelling than those used to circumscribe the segregate genera, although the latter are perfectly acceptable at sectional level.

1. Lemmas strongly laterally compressed and keeled (Sect. *Ceratochloa*) — 1. **B. catharticus**
+ Lemmas rounded on the back — 2

2. Lemmas, or at least the uppermost in the spikelet, 3-awned; lemma-margin widened above the middle into a very distinct obtuse angle (Sect. *Triniusa*) — 2. **B. danthoniae**
+ Lemmas 1-awned, rarely awnless — 3

3. Spikelets ovate, lanceolate, elliptic or oblong, tapering towards the tip at maturity (but not at anthesis); lower glume (1)3- to 7-nerved; upper glume 5- to 9-nerved (Sect. *Bromus*) — 4
+ Spikelets oblong or cuneate, gaping at maturity; lower glume 1(3)-nerved; upper glume 3(5)-nerved — 12

4. Glumes ciliolate on the margins — 3. **B. aegyptiacus**
+ Glumes glabrous on the margins, sometimes hairy on the back — 5

5. Panicle dense, erect, the branches and pedicels much shorter than the spikelets — 6
+ Panicle lax, erect or nodding, at least some branches and pedicels as long as or longer than the spikelets — 9

6. Spikelets 2.5-4.5 cm (excluding the awns); lemmas 1.1-1.8 cm; awns 1.2-2 cm, twisted below and divaricate at maturity — 4. **B. alopecuros**
+ Spikelets 0.9-2.5(3) cm (excluding the awns); lemmas 0.5-1.2 cm; awns 0.4-1.5 cm, not or scarcely twisted below — 7

7. Panicle ovoid-cuneate or subverticillate; lemmas not more than 2 mm wide when flattened — 5. **B. scoparius**
+ Panicle ovoid to ovoid-oblong, sometimes with few spikelets; lemmas 3-5.5 mm wide when flattened — 8

8. Caryopsis shorter than the palea, concealed — 6. **B. hordeaceus**
+ Caryopsis longer than the palea, often visible beyond the tip of the lemma — 7. **B. lepidus**

9. Panicle lax, erect; the pedicels stout, mostly equalling or shorter than the spikelets 8. **B. lanceolatus**
+ Panicle lax, nodding; the pedicels mostly longer than the spikelets 10

10. Lemmas coriaceous with faint nerves, faintly to markedly rhombic with blunt apical teeth; margins of lemma not inrolled but overlapping the back of the adjacent lemma; awns usually reflexed at maturity 9. **B. japonicus**
+ Lemmas herbaceous with prominent nerves, evenly curved on the margins and with acute apical teeth; margins of lemma somewhat inrolled at maturity, not overlapping the back of the adjacent lemma but wrapped around the caryopsis, and lemmas slightly divaricate; awns straight or weakly divaricate at maturity 11

11. Panicle lax; lemmas 2-3 mm wide when flattened 10. **B. pectinatus**
+ Panicle somewhat contracted; lemmas 1-2 mm wide when flattened 11. **B. pulchellus**

12. Perennial; lemmas awnless or shortly awned (to 6 mm) (Sect. *Pnigma*) 12. **B. inermis**
+ Annual; lemmas conspicuously awned (Sect. *Genea*) 13

13. Lemma more than 2.3 cm; lower glume more than 1.4 cm; upper glume more than 2 cm 13. **B. diandrus**
+ Lemma less than 2.3 cm; lower glume less than 1.4 cm; upper glume less than 2 cm 14

14. Panicle drooping or secund, very lax, most branches and pedicels as long as or longer than the spikelets 15
+ Panicle erect, often very dense, most branches and pedicels shorter than the spikelets or spikelets subsessile 16

15. Panicle simple, drooping, the primary branches each bearing only 1 or 2 spikelets; lemmas more than 1.2 cm 14. **B. sterilis**
+ Panicle always compound, usually secund with the spikelets horizontal and parallel, the longer primary branches each bearing at least 4 spikelets; lemmas 1-1.2(1.4) cm 15. **B. tectorum**

16. Lemma less than 2 mm wide when flattened, terete with overlapping margins wrapped around the caryopsis; caryopsis outwardly curved and slightly twisted; awns recurved 18. **B. fasciculatus**
+ Lemma 2-3 mm wide when flattened, flat on the back with narrow inturned margins not wrapped around the caryopsis; caryopsis straight; awns straight 17

17. Panicle lax with thinly hairy axis; upper part of rhachilla straight, not twisted; the florets and awns all in the same alignment 16. **B. madritensis**
+ Panicle tightly congested with densely pubescent axis; upper part of rhachilla twisted; the uppermost florets therefore not aligned and their awns projecting in different planes 17. **B. rubens**

Sect. 1. **Ceratochloa** (P. Beauv.) Griseb.

Annuals or short-lived perennials; spikelets laterally compressed and keeled. Natives of the Americas, widely introduced for fodder.

1. **Bromus catharticus** Vahl, Symb. Bot. 2: 22 (1791).

Syns. *Festuca unioloides* Willd, Hort. Berol. 1: 3 (1803).

Ceratochloa unioloides (Willd.) P. Beauv., Ess. Agrostogr. 75, t. 15, 7 (1812).

Bromus unioloides Kunth in Humb., Bonpl. & Kunth, Nov. Gen. Sp. 1: 151 (1815), non *Festuca unioloides* Willd.

Bromus unioloides (Willd.) Rasp., Ann. Sci. Nat. (Paris) 5: 439 (1825), non Kunth (1815).

Bromus willdenowii Kunth, Révis. Gramin. 1: 134 (1829), based on *Festuca unioloides* Willd.

Tufted, short-lived perennial to 1 m; panicle 10-40 cm, oblong, lax; spikelets 1.6-4 cm, oblong-ovate, strongly laterally compressed; glumes narrowly lanceolate in profile, acuminate at the tip, the lower 1-1.5 cm, the upper slightly longer; lemmas 1.5-2 cm, narrowly lanceolate in profile, laterally flattened and sharply keeled, herbaceous with hyaline margins, 9- to 13-nerved, 2-dentate at the tip and with an awn-point up to 3 mm.

N, O, M, De; cultivated ground, introduced. Native to South America, widely introduced for winter forage ('Rescue Grass') and now found as an escape in most temperate countries.

Sect. 2. **Triniusa** (Steud.) Nevski

Annuals; lemmas with 3 awns.

2. **Bromus danthoniae** Trin. in C.A. Mey., Verz. Pfl. Casp. Meer 24 (1831).

Annual to 50 cm; panicle 4-12 cm, ovate, the branches short and ascending; spikelets 1.5-3.5(4.5) cm excluding the awns, elliptic or oblong-elliptic; lower glume 5-8.5 mm, lanceolate, 3- to 5-nerved; upper glume 6.5-9.5 mm, narrowly ovate, 7- to 9(11)-nerved; lemmas 0.8-1.2 cm, oblanceolate in profile, herbaceous with broad silvery-hyaline margins widened above the middle into a conspicuous obtuse angle, 9- to 11-nerved, minutely several-toothed at the tip, 3-awned (the lowermost often only 1-awned); awns subterminal, usually purple-tinged, the central 1-2.5 cm, strongly reflexed, the laterals 0.4-1 cm, erect or reflexed.

S; rocky hillsides. East Mediterranean region, Sinai, eastwards to Tibet and the Himalaya.

Sect. 3. **Bromus**

Annuals; spikelets ovate, lanceolate, elliptic or oblong, tapering towards the tip at maturity; lower glume 3- to 7-nerved; upper glume 5- to 9-nerved.

3. **Bromus aegyptiacus** Tausch, Flora 20: 124 (1837).

Annual to 40 cm; panicle 3-11 cm, oblong, the branches mostly shorter than the spikelets but some longer, ascending; spikelets 1.5-2.6 cm excluding the awns, oblong; lower glume 4-5.5 cm, lanceolate, 3-nerved, ciliolate on the margins; upper glume 5-6.5 mm, elliptic-ovate, 7-nerved, ciliolate on the margins; lemmas 6.5-8 mm, oblanceolate in profile, 7- to 9(11)-nerved, herbaceous with hyaline margins slightly expanded just above

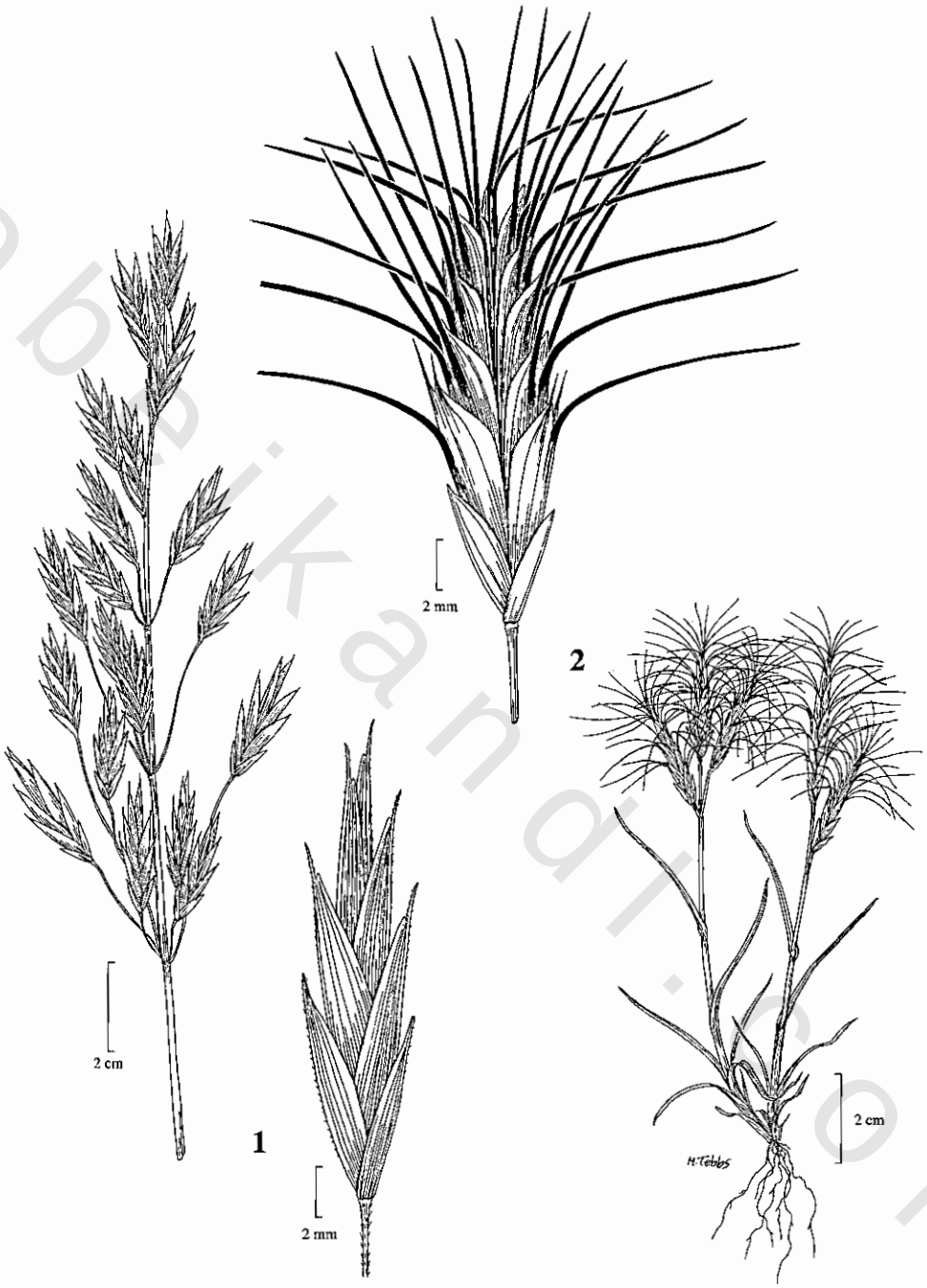


Plate 53. GRAMINEAE: *Bromus catharticus* 1, inflorescence; spikelet (down right). *Bromus danthoniae* 2, habit; spikelet (up left). Drawn by Margaret Tebbs.

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the middle into a faint obtuse angle, shallowly notched at the tip; awn 3.5-6 mm., subapical, straight, terete or triquetrous.

N, ?M, ?De. Endemic.

NOTE: The type of *Bromus aegyptiacus* is from Egypt but Tausch gave no further information. The species is part of a complex that includes *B. brachystachys* Hornung and *B. pseudobrachystachys* H. Scholz. The former appears to be known only from Central Europe although the name has been used in Egypt and elsewhere in southwest Asia. The latter accommodates nearly all material from Turkey, Syria, Palestine, Iraq, Iran and Afghanistan except that from Egypt. Scholz did not mention *B. aegyptiacus* where he described his new species, Bot Jahrb. Syst. 91: 462 (1972), so it is unclear how the two might differ. However, the ciliolate glume-margins of *B. aegyptiacus* seem to be absent from the other two species and are probably diagnostic.

4. **Bromus alopecuros** Poir., Voy. Barbarie 2: 100 (1789).
Syn. *Bromus alopecuroides* Poir., Encycl. Lam. Suppl. 1: 703 (1810).

Annual to 60 cm; panicle 6-15 cm, narrowly oblong-ellipsoid to almost linear, stiffly erect, the branches and pedicels short and stout, the spikelets crowded and often subsessile; spikelets 2.5-4.4 cm, narrowly oblong or narrowly lanceolate, hairy or glabrous; lower glume 6-9 mm, elliptic-oblong, 3- to 5-nerved; upper glume 0.7-1 cm, elliptic-oblong, 7- to 9-nerved; lemmas 1.1-1.8 cm, narrowly lanceolate, 9(11)-nerved, herbaceous with hyaline margins expanded above into an obtuse angle, deeply 2-fid at the tip, the teeth triangular or acuminate; awn 1.2-2 cm, inserted 4-5 mm below the tip of the lemma, flattened below, often basally twisted, clasping the spikelet at first but divaricate at maturity.

?N; unconfirmed in Egypt. Morocco, Algeria, Libya, Italy, Sicily, Greece, Crete, Turkey, Cyprus, Syria, Lebanon, Palestine.

5. **Bromus scoparius** L., Cent. Pl. 1: 6 (1755).
Syns. *Bromus scoparius* L. var. *psilostachys* Halácsy, Consp. Fl. Graec. 3: 399 (1904).
Bromus scoparius var. *stenantha* Stapf, Bull. Misc. Inform., Kew 1907: 369 (1907).

Annual to 50 cm; panicle 4-7 cm, very dense, cuneate at the base, rounded at the top, sometimes subverticillate, the branches and pedicels extremely short; spikelets 1-2.5(3) cm excluding the awns, narrowly elliptic-oblong, hairy or glabrous; lower glume 4-7 mm, lanceolate, 3- to 5-nerved; upper glume 4.5-8.5 mm, elliptic, 5- to 7-nerved; lemmas 0.6-1.1 cm, not more than 2 mm wide when flattened, narrowly oblanceolate in profile, herbaceous with evenly curved hyaline margins, 7-nerved, 2-dentate at the tip, the teeth 1.3-2.5 mm; awn 0.5-1.5 cm, arising from between the teeth, flattened below, erect at first, recurved at maturity.

N, M, S; cultivated ground and wadi beds. Europe, Mediterranean region eastwards to northwest India.

NOTE: The type of var. *stenantha* was collected on the M'amura coast, near Alexandria, Egypt, by Hume.

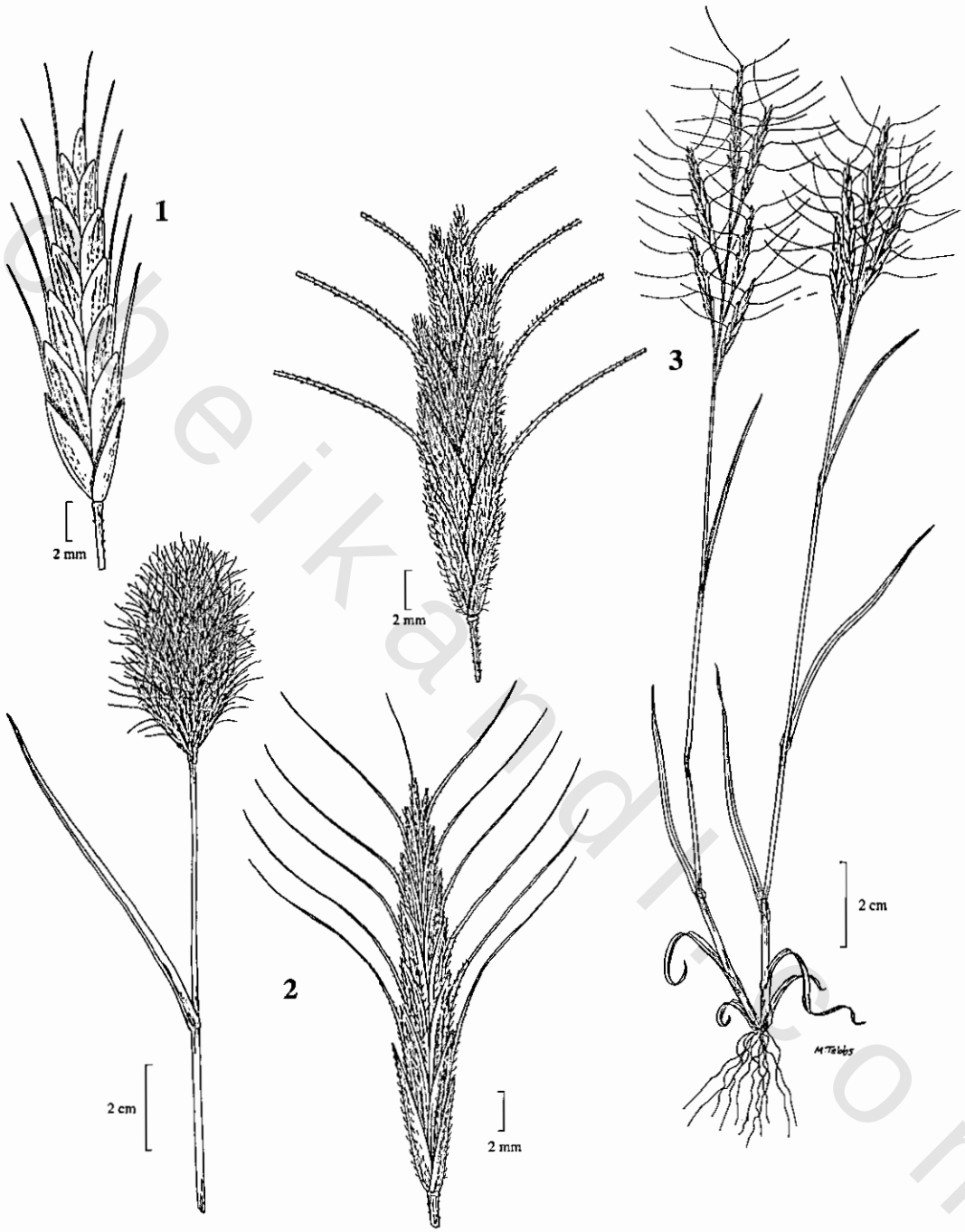


Plate 54. GRAMINEAE: *Bromus aegyptiacus* 1, spikelet. *Bromus scoparius* 2, inflorescence; spikelet (right). *Bromus lanceolatus* 3; habit; spikelet (left). Drawn by Margaret Tebbs.

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6. **Bromus hordeaceus** L., Sp. Pl., ed. 1, 77 (1753).
Syns. *Bromus mollis* L., Sp. Pl., ed. 2, 112 (1762).
Bromus javorkae Pénzes, Magyar Bot. Lapok 33: 23 (1934).

Annual to 1.2 m; panicle 2-18 cm, oblong, lax to very lax at first, becoming contracted and dense, the primary branches bearing 1-5 spikelets and shorter than these spikelets; spikelets 0.9-2.4 cm excluding the awns, narrowly ovate to oblong, glabrous to densely hairy; lower glume 5-9 mm, ovate to oblong, 3- to 7-nerved; upper glume 0.6-1.1 cm, elliptic, 5- to 7-nerved; lemmas 0.7-1.2 cm, 4.5-5.5 mm wide when flattened, narrowly oblanceolate in profile, herbaceous with hyaline margins slightly widened above into a faint obtuse angle, 7- to 9(11)-nerved, shallowly notched at the tip; awn 0.6-1 cm, arising from 0.7-1.9 mm below the tip, flattened below, straight or slightly divergent at maturity; caryopsis shorter than the palea.

N; roadside ditches and waste ground. Europe, western Asia, introduced into north and South America, Australia and other temperate regions.

NOTE: There is very little material of *Bromus javorkae* available and at the moment it is hard to see how it differs from the widespread and weedy *B. hordeaceus* L.; the ruderal habitat of *B. javorkae* in Egypt is strongly indicative of a weed rather than a rare endemic. As more specimens become available it will be easier to determine its true affinities but for now it is included in the more widespread taxon. The type of *Bromus javorkae* was collected in Egypt, near Cairo, in 1891 by Sickenberger (no. 2, holotype G).

7. **Bromus lepidus** Holmb., Bot. Notiser 1924: 326 (1924).

Annual to 70 cm; panicle 3-8 cm, erect, contracted at first, becoming looser and nodding, the primary branches bearing up to 3 spikelets each; spikelets 0.9-1.5 cm excluding the awns, lanceolate to oblong, mostly glabrous, rarely hairy; lower glume 3.5-5 mm, 3- to 7-nerved, ovate to oblong; upper glume 4.5-6 mm, ovate-elliptic to broadly elliptic, 5- to 7-nerved; lemmas 5-6.5 mm, 3-3.5 mm wide when flattened, oblanceolate in profile, herbaceous with hyaline margins slightly broadening above into a faint obtuse angle, 7-nerved, deeply 2-fid at the tip with a broad V-shaped sinus; awn 4-7(8.5) mm, arising from the sinus, terete, straight; caryopsis longer than the palea and often visible beyond the tip of the lemma.

NOTE: Cultivated in Prince Mohamed Aly's garden at Manial El Roda in the 1930s. The label stated that it was grown as a lawn grass, but its annual habit does not lend itself well to this kind of use. It is often spread as a contaminant of amenity grass and it may have arrived in Egypt in this way. It may well be extinct by now but it should still be sought wherever grass is sown. The species is itself of unknown wild origin and although it occurs over much of Europe it is nowhere a certain native.

8. **Bromus lanceolatus** Roth, Catal. Bot. 1: 18 (1797).
Syns. *Bromus macrostachys* Desf., Fl. Atlant. 1: 96, t. 19, f. 2 (1798).
Bromus lanuginosus Poir., Encycl. Lam. Suppl.1: 703 (1810).

Annual to 65 cm; panicle 6-16 cm, rather narrow, the branches short, stout and erect, usually shorter than the spikelets or the lowermost somewhat longer; spikelets 2.5-4 cm excluding the awns, narrowly elliptic, glabrous or hairy; lower glume 7-9 mm,

lanceolate, 3(5)-nerved; upper glume 0.9-1.1 cm, narrowly ovate, 5(9)-nerved; lemmas 1.1-1.4 cm, narrowly elliptic in profile, herbaceous with broad hyaline evenly curved margins, 7- to 9-nerved, 2-dentate at the tip, the teeth acuminate, 1-2.5 mm; awn, 1.5-2.5 cm, subapical, flattened below, becoming reflexed and twisted at maturity.

N; rocky hillsides. Europe, Mediterranean region, eastwards to Central Asia.

9. **Bromus japonicus** Thunb. in Murray, Syst. Veg. ed. 14 :119 (May-June 1784) and Fl. Jap. 52, t. 11 (Aug. 1784).
Syn. *Bromus patulus* Mert. & W.D.J. Koch in Röhl., Deutschl. Fl., ed. 3, 1: 685 (1823).

Annual to 90 cm; panicle 6-20 cm, very lax and spreading, the branches and pedicels very long, filiform and flexuous; spikelets 1.2-3(3.5) cm excluding the awns, ovate to oblong-lanceolate, glabrous or hairy, the florets not divergent at maturity; lower glume 4.5-6 mm, lanceolate, 3-nerved; upper glume 5-7.5 mm, 7-nerved, ovate; lemmas 0.75-1 (1.2) cm, oblanceolate in profile, coriaceous with hyaline margins faintly to strongly widened above into an obtuse angle, the margins not inrolled, overlapping the back of the adjacent lemma, indistinctly 7-nerved, minutely 2-dentate at the tip, the teeth blunt, triangular; awn 1-1.5 cm, subapical, flattened below, becoming reflexed at maturity.

M, De, S; sandy soils. Central Europe, eastwards to Japan, introduced into the rest of Europe, North America and elsewhere.

10. **Bromus pectinatus** Thunb., Prodr. Fl. Cap. 1: 22 (1794).
Syns. *Bromus adoensis* Hochst. ex Steud., Syn. Pl. Glumac. 1: 326 (1854).
Bromus japonicus Thunb. subsp. *sinaicus* Hack., Allg. Bot. Z. Syst. 1903: 167 (1904).
Bromus japonicus Thunb. subsp. *sinaicus* var. *incanus* Hack., loc. cit.
Bromus sinaicus (Hack.) Täckh. in Täckh. & Drar, Fl. Egypt 1: 153 (1941).

Annual to 80 cm; panicle 5-25 cm, lax and nodding or erect with ascending branches, often somewhat 1-sided; spikelets 1.3-3 cm excluding the awns, lanceolate, hairy or glabrous, the florets slightly divergent at maturity; lower glume (5)5.5-8(9.5) mm, narrowly lanceolate, (1)3-nerved; upper glume 0.7-1.1 cm, elliptic-lanceolate, 3- to 5 (7)-nerved; lemmas 0.75-1.5 cm, 2-4 mm wide when flattened, narrowly lanceolate in profile, herbaceous with hyaline margins evenly curved or obscurely obtusely angular above, the margins inrolled and wrapped around the caryopsis, conspicuously 5- to 7-nerved, acutely 2-dentate at the tip; awn 0.7-1.7 cm, arising from 2-3 mm below the tip, slender with flattened base, straight or weakly divergent at maturity.

S; sandy and rocky ground. Northeast tropical Africa, eastwards through Sinai to Arabia and southwards to South Africa.

NOTE: Due to confusion with *B. pulchellus* (q.v.) the distribution of this species both within and outside Egypt is not yet completely clear. The types of subsp. *sinaicus* vars. *sinaicus* and *incanus* were collected in Sinai in 1902 by Kneucker (whereabouts uncertain).

11. **Bromus pulchellus** Fig. & De Not., Mem. Reale Accad. Sci. Torino, ser. 2, 12: 260 (1852).

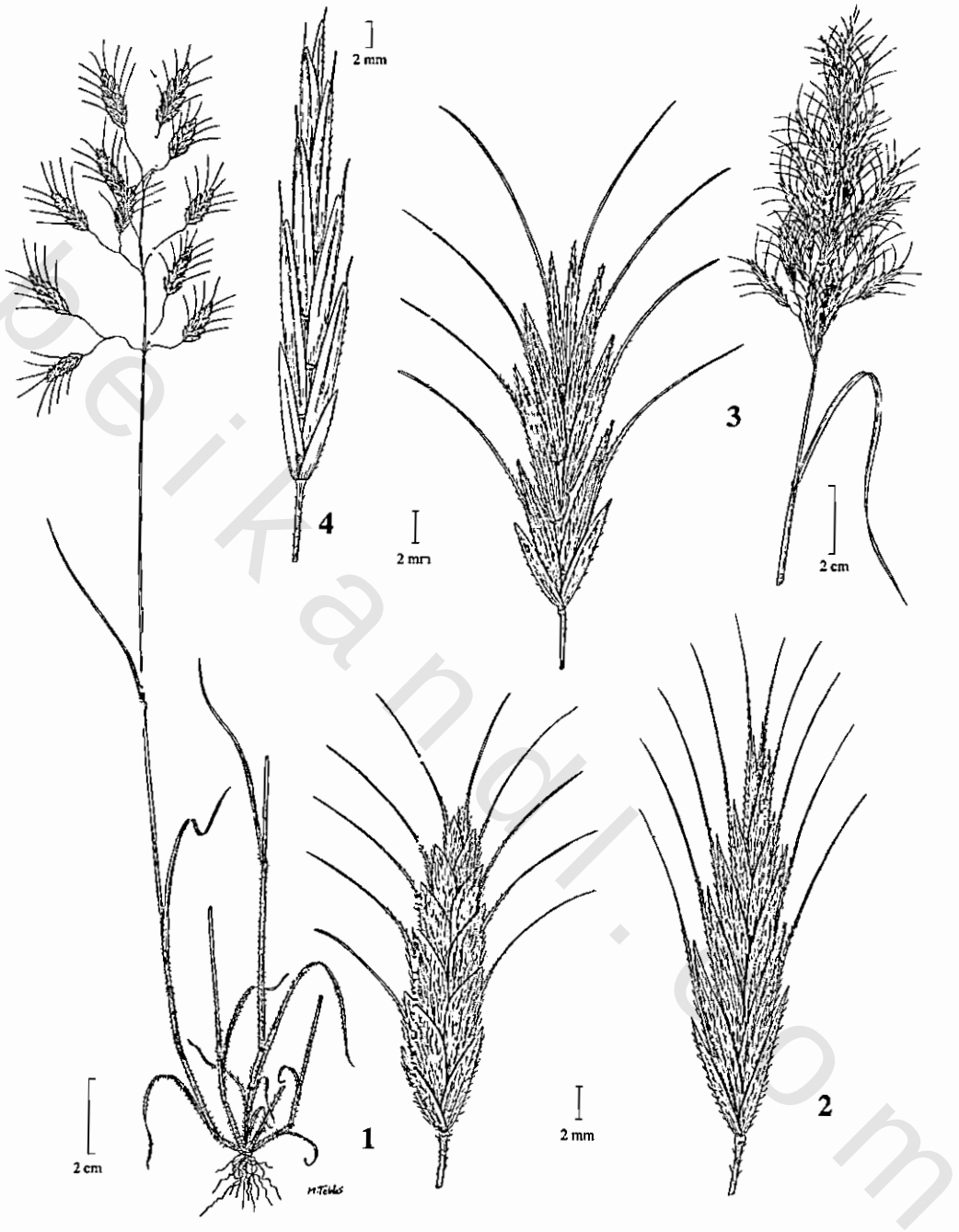


Plate 55. GRAMINEAE: *Bromus japonicus* 1, habit; spikelet (down right). *Bromus pectinatus* 2, spikelet. *Bromus pulchellus* 3, inflorescence; spikelet (left). *Bromus inermis* 4, spikelet. Drawn by Margaret Tebbs.

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Very similar to *Bromus pectinatus*, but differing by the somewhat denser panicle, lemmas only 1-2 mm wide when flattened, and awn strongly divaricate or reflexed at maturity.

S; sandy and gravelly soils. Sinai, Iran, eastwards to Pakistan, Afghanistan and Central Asia.

NOTE: *Bromus pulchellus* is barely tenable, being distinguished only by minor characters. It has been confused with *Bromus pectinatus* over much of its range and its distribution is not yet properly known. The type was collected in Sinai in 1869 by Figari (holotype FT).

Sect. 4. **Pnigma** Dumort.

Perennials; spikelets oblong or cuneate, gaping at maturity; lower glume 1-nerved; upper glume 3-nerved.

12. **Bromus inermis** Leyss., Fl. Halens. 16 (1761).
Syn. *Bromopsis inermis* (Leyss.) Holub, Folia Geobot. Phytotax. 8: 167 (1973).

Rhizomatous perennial; culms to 1.2 m, solitary or loosely tufted; panicle 10-20 cm, usually rather dense, occasionally loose and open; spikelets 1.5-3(3.5) cm, narrowly oblong, gaping at maturity; glumes narrowly lanceolate, glabrous; the lower 3.5-8 mm, 1-nerved; the upper 0.6-1.1 cm, 3-nerved; lemmas 0.95-1.3 cm, oblong-lanceolate in profile, herbaceous with hyaline margins, 5- to 7-nerved, usually glabrous, sometimes sparsely hairy below, rarely appressed-hairy all over, shortly and bluntly 2-dentate at the tip, awnless or with a subapical awn-point to 1.5 mm, rarely with a more substantial awn to 6 mm.

N; introduced agricultural weed. Native over much of Europe and temperate Asia.

Sect. 5. **Genea** Dumort.

Annuals; spikelets oblong or cuneate, gaping at maturity; lower glume 1-nerved; upper glume 3-nerved.

13. **Bromus diandrus** Roth, Bot. Abh. Beobacht. 44 (1787).

Annual 0.9(1.2) m; panicle 15-25 cm, contracted with ascending branches at first, sometimes becoming very lax and open, the branches mostly bearing only a single spikelet (rarely 2 or 3); spikelets (2.8)3.5-5(5.5) cm excluding the awns, cuneate and gaping at maturity; lower glume 1.5-2.5 cm, narrowly lanceolate to subulate, 1-nerved; upper glume 2-3.5 cm, narrowly lanceolate, 3-nerved; lemmas (2.1)2.4-3.2(3.5) cm, lanceolate in profile, herbaceous with hyaline margins, 7-nerved, coarsely scabrid on the back, 2-dentate at the tip, the teeth to 6 mm; awn 3-6.5 cm, subapical, straight at maturity.

Two varieties occur in Egypt:

var. **diandrus**
Syns. *Bromus gussonii* Parl., Rar. Pl. Sicilia 2: 8 (1840).

Anisantha diandra (Roth) Hyl., Uppsala Univ. Årsskr. 7: 3 (1945).
Bromus villosus, auct. non Forssk.

Panicle lax, spreading, broadly ovate; branches mainly longer than the spikelets; base of lemma, in profile, contracted just above the callus; callus blunt with oval scar; anthers 0.7-5.9 mm; $2n$ =56.

var. **rigidus** (Roth) Sales, Edinb. J. Bot. 50: 9 (1993).
Syns. *Bromus rigidus* Roth, Bot. Mag. (Römer & Usteri) 4(10): 21 (1790).
Bromus maximus Desf., Fl. Atlant. 1: 95 (1798).

Panicle contracted, stiffly erect, narrowly ovate; branches mainly shorter than the spikelets; base of lemma, in profile, continuous with the callus; callus pointed with elliptic scar; anthers to 0.7 mm; $2n = 42$.

N, O, M, De, S; cultivated fields. Native to Central Europe, Mediterranean region, southwest Asia, widely introduced as a weed in temperate regions.

14. **Bromus sterilis** L., Sp. Pl., ed. 1, 77 (1753).

Annual to 0.9(1.25) m; panicle 8-26 cm, contracted with ascending branches at first, becoming lax and very open with drooping branches, these simple or the lowermost with 2 spikelets; spikelets 2-4.3 cm excluding the awns, cuneate and gaping at maturity; lower glume 0.75-1.3 cm, narrowly lanceolate, 1(3)-nerved; upper glume 1.1-2 cm, lanceolate, 3(5)-nerved; lemmas 1.45-2.2 cm, narrowly lanceolate in profile, herbaceous with hyaline margins, 7-nerved, coarsely scabrid on the back, 2-dentate at the tip with narrow teeth 0.9-2.6 mm; awn 1.5-3.5 cm, subapical, straight at maturity; callus blunt with ± circular to sometimes oval scar.

Unconfirmed in Egypt. Europe, southwest Asia, widely introduced as a weed in temperate regions.

15. **Bromus tectorum** L., Sp. Pl., ed. 1, 77 (1753).

Annual to 60 cm; panicle 1-21 cm, becoming lax, nodding and secund, the spikelets horizontal and parallel, the longer branches bearing at least 4 spikelets each; spikelets cuneate and gaping at maturity, 1.5-3.5 cm excluding the awns, with 1-2 fertile and up to 14 sterile florets, hairy or glabrous; upper rhachilla internodes slightly twisted and adjacent lemmas therefore not quite distichously aligned; glumes with silvery-hyaline margins, the lower narrowly elliptic to narrowly lanceolate, 0.5-1.3 cm, 1- to 3-nerved, the upper narrowly lanceolate to narrowly oblong-lanceolate, 0.7-1.8 cm, 3- to 5-nerved; lemmas linear-lanceolate in profile, 1-1.2(1.4) cm, herbaceous with silvery-hyaline margins, (5)7- to 9-nerved, 2-dentate at the tip; awn arising from 2.5-6 mm below the tip, 1.2-2.7 cm, straight or rarely slightly curved outwards at maturity; sterile lemmas becoming shorter and with fewer nerves, the uppermost narrowly lanceolate, 1-nerved.

Two subspecies occur in Egypt:

subsp. **tectorum**

Lower glume 1-nerved; callus of each fertile floret well differentiated, the florets therefore falling separately.

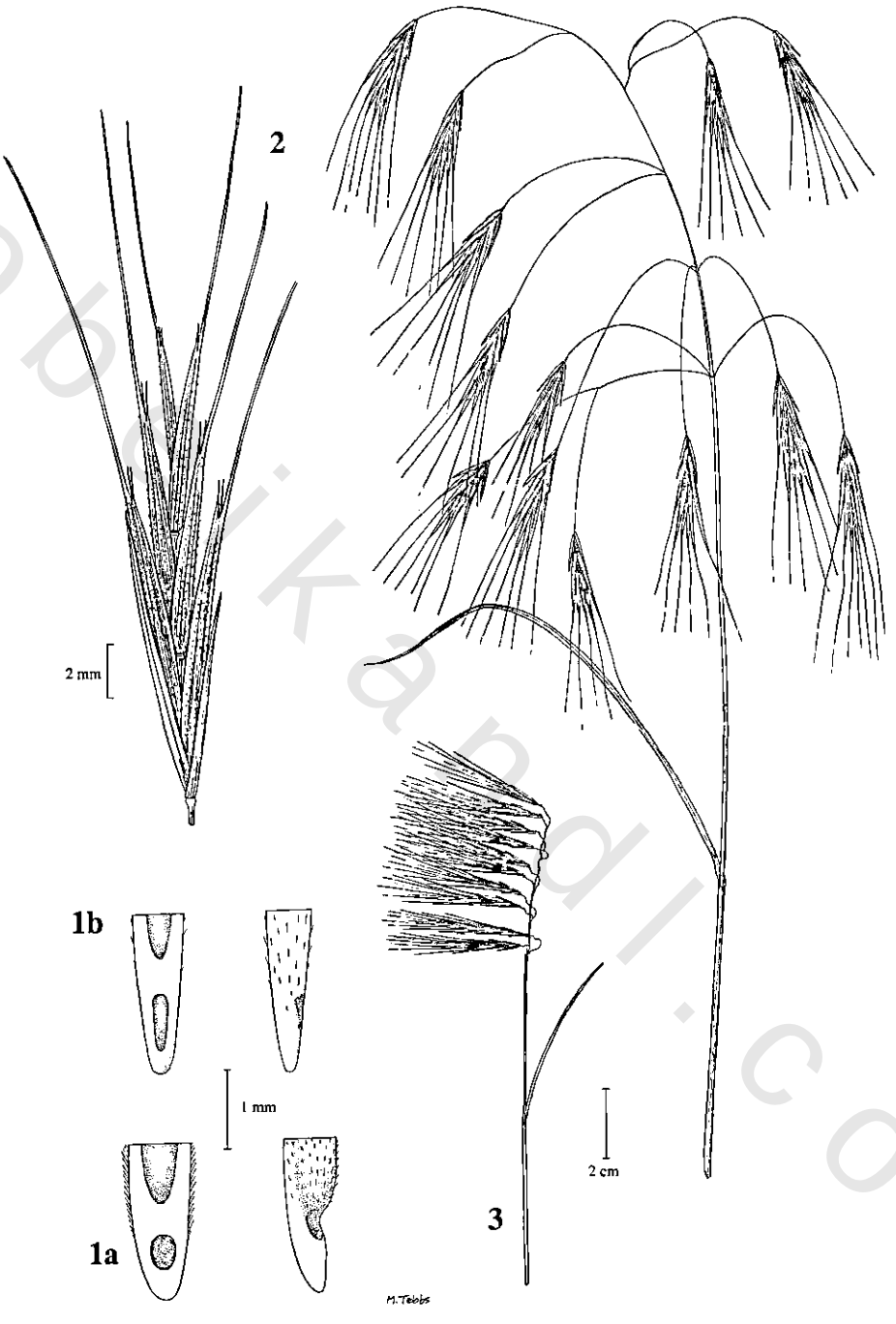


Plate 56. GRAMINEAE: *Bromus diandrus* var. *diandrus* 1a, basal part of lemma in face view and profile. *Bromus diandrus* var. *rigidus* 1b, basal part of lemma in face view and profile. *Bromus sterilis* 2, inflorescence; spikelet (up left). *Bromus tectorum* 3, inflorescence. Drawn by Margaret Tebbs.

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S; rocky gullies and desert sands. Throughout the temperate Old World.

subsp. **lucidus** Sales, Flora Veg. Mundi 9: 32 (1991).
Syn. *Bromus sericeus* Drobov, Repert. Spec. Nov. Regni Veg. 21: 39 (1925).

Lower glume 3-nerved; callus well differentiated in the lowermost floret only, the florets therefore falling together as a unit.

S; sandy soil over rock. Southwest and Central Asia.

NOTE: Two species, *Bromus tectorum* and *B. sericeus*, have been amalgamated by Sales, Flora Veg. Mundi 9: 32 (1991), and the enlarged species subsequently resegregated into subspecies that almost, but not quite, follow the original circumscriptions. Emphasis is now placed on spikelet disarticulation rather than simply on number of nerves in the glumes and some specimens have been reassigned. Not all available material has been assessed, so the distributions of the subspecies both within and beyond Egypt are not yet fully known. Specimens from M and De have yet to be re-examined.

16. **Bromus madritensis** L., Cent. Pl. 1: 5 (1755).
Syns. *Bromus villosus* Forssk., Fl. Aegypt.-Arab. 23 (1775).
Bromus haussknechtii Boiss., Fl. Orient. 5: 648 (1884).

Annual to 60(75) cm; panicle lax, erect, 4-14 cm, loosely to densely contracted with thinly hairy axis, the branches shorter than the spikelets and bearing only 1 or 2 spikelets each; spikelets (1.9)2.5-4 cm excluding the awns, cuneate and gaping at maturity, the part of the rhachilla straight, not twisted, the florets and awns all in the same alignment; lower glume 0.6-1.1 cm, lanceolate-subulate, 1-nerved; upper glume (0.8)1-1.45(1.6) cm, linear-lanceolate, 3-nerved; lemma 1.3-2 cm, narrowly oblong-lanceolate in profile, 2-3 mm wide when flattened, herbaceous with hyaline margins, the margins inturned but not wrapped around the caryopsis, 7-nerved, scabrid to densely pubescent on the back, 2-toothed at the tip with narrow apical teeth 0.7-2 mm; awn 1.5-2.5 cm, subapical, straight or slightly divergent at maturity; caryopsis not twisted above.

N, M, De, S; sandy soils and cultivated ground. Southern and western Europe, Mediterranean region, southwest Asia to Afghanistan.

NOTE: The type of *Bromus villosus* was collected in Alexandria, Egypt, in 1762 by Forsskål (no. 89, holotype C).

17. **Bromus rubens** L., Cent. Pl. 1: 5 (1755).
Syn. *Bromus madritensis* subsp. *rubens* Douin in Bonnier, Fl. Ill. France 12: 52 (1934).

Very similar to *Bromus madritensis* but panicle tightly congested with densely pubescent axis; upper part of rhachilla twisted, the uppermost florets therefore not aligned and their awns projecting in different planes

N, O, M, Dw, S; sandy soils and cultivated ground. Southern and western Europe, Mediterranean region, southwest Asia to Iran.

18. **Bromus fasciculatus** C. Presl, Cyper. Gramin. Sicul. 39 (1820).
Syn. *Bromus fasciculatus* var. *alexandrinus* Thell., Repert. Spec. Nov. Regni Veg. 5: 161 (1908).

Annual to 25 cm; panicle 2-5 cm, stiffly erect, fairly dense with rigid branches shorter than the subsessile spikelets; spikelets 1-2 cm, cuneate and gaping at maturity, hairy or glabrous; glumes narrowly lanceolate, the lower 6-8 mm, 1-nerved, the upper 0.8-1.1 cm, 3-nerved; lemmas 1.1-1.2(1.5) cm excluding the awns, 1-2 mm wide when flattened, herbaceous with hyaline margins, the margins inrolled and wrapped around the caryopsis at maturity, 2-toothed at the tip, the teeth to 3 mm; awn 1-1.5 cm, subapical, scabrid, recurved at maturity; caryopsis slightly twisted above.

N, M, D, R, GE, S; sandy and stony soils. Balearic Islands, Corsica, Italy, Sardinia, Sicily, Greece, Crete, Cyprus, Algeria, Libya, Egypt, Palestine, Lebanon, Syria,Turkey, Iraq, Arabia, Iran.

NOTE: The type of var. *alexandrinus* was collected in Egypt, Alexandria, in 1876 by Sickenberger (holotype Z, isotype K).

39. **Boissiera** Hochst. ex Steud.
Syn. *Bromus* L. Sect. *Boissiera* (Hochst. ex Steud.) P.M. Sm.

Annual; leaf-sheaths connate for most of their length; panicle densely contracted, obovate, the spikelets shortly pedicellate; spikelets terete, disarticulating above the glumes but not between the florets, the lower florets fertile, the upper sterile and reduced to a tuft of awns; glumes membranous; lemmas chartaceous to coriaceous, prominently 11- to 13-nerved, 5-9 of the nerves excurrent as divergent or recurved awns; stamens 3. 1 species, Mediterranean region, southwest Asia, eastwards to Central Asia.

NOTE: The genus is perhaps better regarded as a section of *Bromus* unless the latter is itself split into segregate genera. However, the multi-awned lemmas and florets falling in a cluster would be extreme, even for *Bromus*, and a significant departure from the norm of a single awn and separately deciduous florets (at least in the lower part of the spikelet).

1. **Boissiera squarrosa** (Banks & Sol.) Nevski, Acta Univ. Asiae Mediae, ser 8b, Bot. 17: 30 (1934).
Syns. *Pappophorum squarrosum* Banks & Sol. in Russell, Nat. Hist. Aleppo, ed. 2, 2: 244 (1794) non *Bromus squarrosus* L. (1753).
Pappophorum pumilio Trin., Mém. Acad. Imp. Sci. St.-Pétersbourg, sér. 6, Sci. Math. 1: 92 (1830).
Boissiera bromoides Hochst. ex Steud., Syn. Pl. Glumac. 1: 200 (1854), nom. superfl., based on *Pappophorum pumilio* Trin.
Boissiera pumilio (Trin.) Hack., Akad. Wiss. Wien, Math.-Naturwiss. Kl., Denkschr. 50: 9 (1885).
Bromus pumilio (Trin.) P.M. Sm., Feddes Repert. 79: 338 (1969).

Culms to 20(40) cm; panicle 3.5-6(9) cm; spikelets 1.5-4 cm excluding the awns, narrowly oblong; lower glume 6-7 mm, narrowly lanceolate, 1- to 3-nerved; upper glume 6.5-8 mm, 5- to 7-nerved, lanceolate; lemmas 1.05-1.2(1.3) cm, oblong, hairy or glabrous, hyaline at the tip; awns to 2 cm.

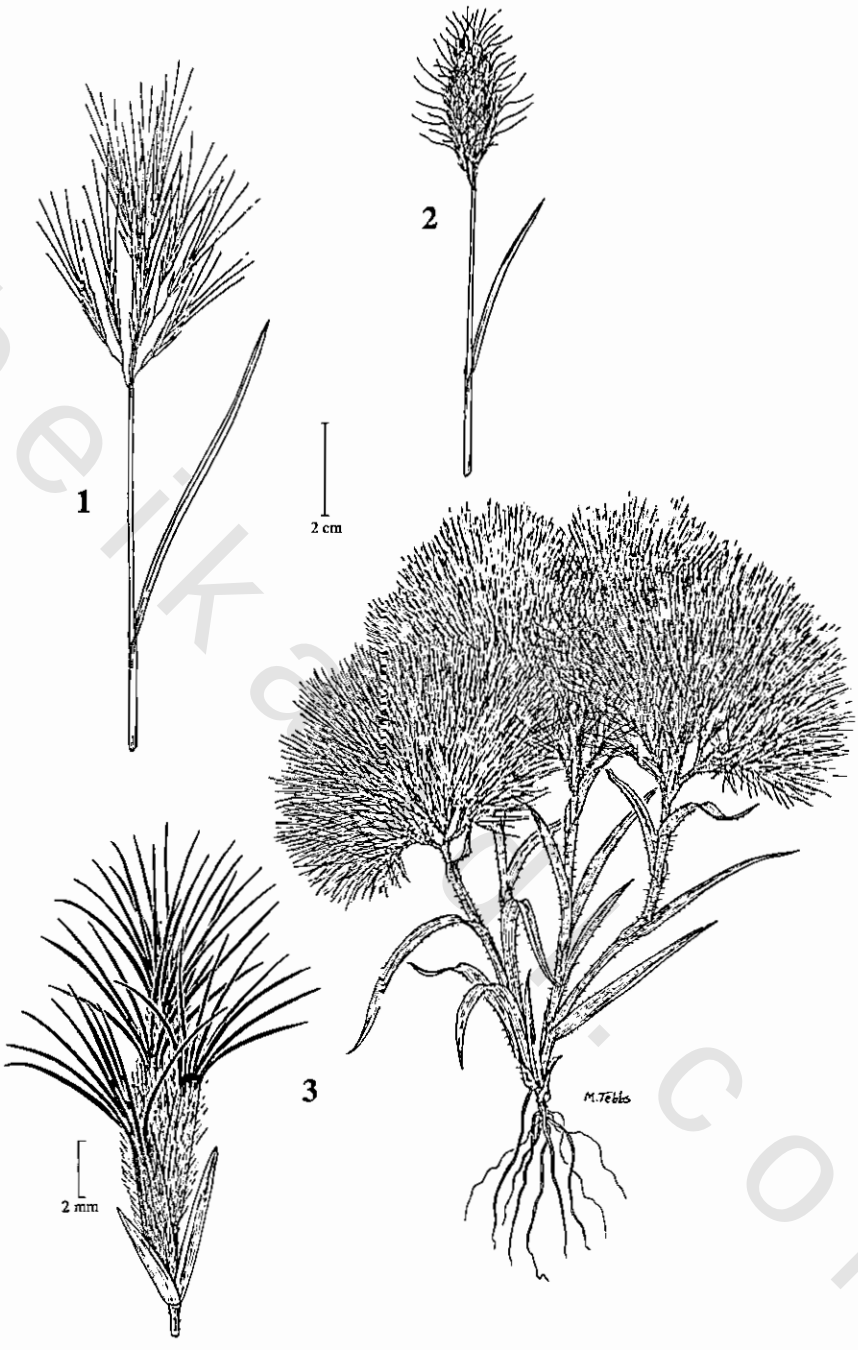


Plate 57. GRAMINEAE: *Bromus madritensis* 1, inflorescence. *Bromus fasciculats* 2, inflorescence. *Boissiera squarrosa* 3, habit; spikelet (left). Drawn by Margaret Tebbs.

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N, De, S; sandy and stony soils. Distribution as for the genus.

NOTE: If the species is included in *Bromus* (Sect. *Boissiera*), it should be called *B. pumilio*. A specimen of *Boissiera bromoides* was collected in Sinai in 1835 by Schimper (no. 402, K), but the name is superfluous being based on *Pappophorum pumilio* from Iran.

Tribe 11. **TRITICEAE**

Ligule a membrane; leaf-blades often auriculate at the base; inflorescence a single bilateral raceme or quasi-raceme, the spikelets alternate in two opposite rows, simple or in groups of 2-3 at each node, broadside to the rhachis and sessile, all alike (except in *Hordeum* and *Aegilops*); rhachis tough or fragile, in the latter case disarticulating at the base of the internode (except in some *Aegilops* species); spikelets 1- to many-flowered, the apical florets reduced, laterally compressed, disarticulating below each floret if the rhachis is tough; glumes persistent, usually shorter or narrower than the adjacent lemmas usually coriaceous, sometimes awn-like; lemmas coriaceous, 5- to 11- nerved, with or without a straight or recurved awn from the tip; ovary tipped by a small fleshy hairy appendage; caryopsis ellipsoid, hollowed on the hilar face; hilum linear.

1. Perennial	2
+ Annual	3
2. Glumes keeled to the base; spikelets pectinate on the raceme	44. **Agropyron**
+ Glumes not keeled (except sometimes above); spikelets not pectinate	40. **Elymus**
3. Spikelets in groups of 2 or 3 at each node of a quasi-raceme	4
+ Spikelets borne singly at each node of a true raceme	6
4. Spikelets in triads at each node	43. **Hordeum**
+ Spikelets in pairs at each node	5
5. Raceme-rhachis tough	41. **Taeniatherum**
+ Raceme-rhachis fragile	42. **Crithopsis**
6. Glumes rounded on the back throughout	47. **Aegilops**
+ Glumes keeled from base to apex or sometimes rounded on the back below	7
7. Glumes acuminate, the nerves convergent at the tip	45. **Eremopyrum**
+ Glumes obtuse to 2-dentate, the outer nerves separated at the tip	46. **Triticum**

40. **Elymus** L.

Syns. *Elytrigia* Desv., *Roegneria* K. Koch, *Thinopyrum* Á. Löve

Perennial; raceme linear, dense, the spikelets borne singly (rarely in groups of 2-4), sessile or shortly pedicellate, appressed to the rhachis, this usually tough, sometimes fragile; spikelets 3- to 9-flowered, laterally compressed; glumes opposite or rarely collateral, lanceolate to narrowly oblong, firmly membranous to coriaceous, the lower usually $^1/_2$ the length of the adjacent lemma, distinctly 3- to 9-nerved (rarely the lower

1-nerved), the nerves parallel or convergent, usually keeled above, obtuse to shortly awned; lemmas coriaceous, 5-nerved, rounded on the back or keeled only above the middle, obtuse to acute or 2-dentate, muticous or awned, the awn sometimes long and recurved. About 150 species, mostly in Asia but extending through temperate latitudes of both hemispheres.

NOTE: Sometimes split into numerous segregate genera on the basis of the chromosome complements of individual species, but these 'genera' can rarely be circumscribed morphologically and therefore have little practical value.

1. Rhachis fragile, disarticulating at maturity between the spikelets at the base of the internode 1. E. **farctus**
+ Rhachis tough, not disarticulating at maturity 2

2. Plant tufted, without rhizomes; rhachilla fragile, the florets falling separately from the persistent glumes 2. E. **elongatus**
+ Plant with long creeping rhizomes; rhachilla tough, not disarticulating between the florets, these falling as a unit from the persistent glumes 3. E. **repens**

1. **Elymus farctus** (Viv.) Runem. ex Melderis, Bot. J. Linn. Soc. 76: 382 (1978).
Syns. *Triticum junceum* L., Cent. Pl. I: 6 (1755), non *Elymus junceus* Fischer (1806).
Triticum farctum Viv., Ann. Bot. (Genoa) 1(2): 159 (1804).
Agropyron junceum (L.) P. Beauv., Ess. Agrostogr. 102, 146 (1812).
Elytrigia juncea (L.) Nevski, Trudy Bot. Inst. Akad. Nauk SSSR, ser. 1, Fl. Sist. Vyss. Rast. 2: 83 (1936).

Rhizomatous perennial; culms to 60 cm, rigid, glabrous; leaf-blades 2-5 mm wide, ± convolute or flat with inrolled margins, rigid, glaucous, densely pubescent on the ribs above, glabrous beneath; raceme 15-25 cm; rhachis fragile, disarticulating at the base of each internode, glabrous on the main angles; spikelets 1.5-2 cm, falling entire with the rhachis internode; glumes 1-1.8 cm, indurate-coriaceous, narrowly lanceolate or oblong, 5- to 12-nerved, asymmetrically keeled, glabrous, obtuse; lemmas 1-1.8 cm, glabrous, obtuse; anthers 0.4-1 cm.

M, S; coastal sand dunes. All around the coasts of Europe and the Mediterranean Sea, eastwards to the Black Sea.

NOTE: *Elymus farctus* is a polyploid complex ranging from diploids to octoploids, the different elements variously treated as subspecies or varieties, or a mixture of both as in the following key (selected characters only):

Rhizomes long; palea keels scabrid-ciliate throughout:
Anthers 6-8 mm; tetraploid (northern and western Europe) subsp. *boreali-atlanticus*
Anthers 1-1.2 cm; hexaploid, octoploid (subsp. *farctus*, Mediterranean region):
Leaf-sheaths glabrous subsp. *farctus* var. *farctus*
Leaf-sheaths pubescent subsp. *farctus* var. *sartorii*
Rhizomes short or 0; palea-keels scabrid-ciliate above only:
Rhizomes 0; tetraploid (East Mediterranean region) subsp. *rechingeri*
Rhizomes short; diploid (subsp. *bessarabicus*, East Mediterranean region to Black Sea):



Plate 58. GRAMINEAE: *Elymus farctus* 1, lower part and inflorascence; spikelet (down right). *Taeniatherum caput-medusae* 2, habit; spikelet-pair (up left). Drawn by Margaret Tebbs.

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Ligule 2-2.5 mm; rhachilla internodes much longer than lower spikelets — subsp. *bessarabicus* var. *bessarabicus*

Ligule 0.5-1 mm; rhachilla internodes as long as or slightly longer than lower spikelets — subsp. *bessarabicus* var. *striatulus*

According to some authorities the species is represented in Egypt by subsp. *farctus* (as var. *sartorii*) and subsp. *rechingeri*. Material corresponding to the latter is definitely present, and is recognised by the palea-keels scabrid only in the upper half and almost complete lack of rhizomes; supporting characters are the culms swollen at the base, glumes 4- to 5-nerved (not 5- to 12-nerved) and short (*c.* 0.5 mm rather than up to 2.5 mm) ligule. Most of the remaining material seems to be the unlikely subsp. *boreali-atlanticus* (strong rhizomes; anthers up to 8 mm) and subsp. *bessarabicus* (as var. *striatulus*; like subsp. *rechingeri* but rhizomes shortly creeping and culms not swollen). The present situation is very unsatisfactory and the infra-specific classification needs to be looked at again. The subspecies and varieties within *E. farctus* are best ignored for now.

2. **Elymus elongatus** (Host) Runem., Hereditas 70: 156 (1972).

Syns. *Triticum elongatum* Host, Icon. Descr. Gramin. Austriac. 2: 18, t. 23 (1802).

Agropyron elongatum (Host) P. Beauv., Ess. Agrostogr. 102 (1812).

Elytrigia elongata (Host) Nevski, Trudy Bot. Inst. Akad. Nauk SSSR, ser. 1, Fl. Sist. Vyss. Rast. 1: 23 (1933).

Elytrigia elongata (Host) Nevski var. *haifensis* Melderis, Ark. Bot., ser. 2, 2: 304 (1952).

Tufted perennial without rhizomes; culms to 75 cm, robust, usually glabrous; leaf-blades 2.5-5 mm wide when flattened, usually inrolled, very rigid, sparsely spinulose and with scattered short bristles on the prominent ribs above, glabrous beneath; raceme 10-25 cm, erect, lax, especially below; rhachis tough, glabrous or spinulose-ciliate on the main angles; spikelets 1.4-2.5 cm, the rhachilla fragile and the florets falling separately from the persistent glumes; glumes indurate-coriaceous, 3- to 9-nerved, without keels, glabrous, obtuse, truncate or emarginate at the hyaline tip; lemmas 0.9-1.1 cm, glabrous, obtuse or apiculate; anthers 2.5-5.5 mm.

M, S; damp sandy soils. Southern and southeast Europe, Mediterranean region, southwest Asia, eastwards to Iran.

NOTE: *Elymus elongatus* is a polyploid complex of taxa ranging from diploids to decaploids. Egyptian material is all referable to subsp. *elongatus* which is characterized by the glabrous (not ciliate) leaf-sheath margins, glabrous (not spinulose-ciliate) main angles of the rhachis internodes, and diploid chromosome number ($2n = 14$).

3. **Elymus repens** (L.) Gould, Madroño 9: 127 (1947).

Syns. *Triticum repens* L., Sp. Pl., ed. 1, 86 (1753).

Agropyron repens (L.) P. Beauv., Ess. Agrostogr. 102, 146, 180, t. 20, f. 2 (1812).

Elytrigia repens (L.) Nevski, Trudy Bot. Inst. Akad. Nauk SSSR, ser. 1, Fl. Sist. Vyss. Rast. 1 14 (1933).

Rhizomatous perennial; culms to 1.2 m, slender, erect or geniculately ascending; leaf-blades 0.3-1 cm wide, usually flat, glabrous or loosely hairy; raceme 5-15(20) cm, lax or

dense, erect and straight; rhachis tough, scabrid along the margins; spikelets 0.8-1.7 cm, the rhachilla tough and the florets falling as a unit from the persistent glumes; glumes 0.5-1.5 cm, herbaceous, lanceolate to lanceolate-oblong, 3- to 7-nerved, acute, mucronate or shortly awned at the tip; lemmas 0.6-1.1(1.3) cm, glabrous and smooth, acute, awnless or with a subulate tip, rarely with an awn to 6 mm; anthers 3.5-6 mm.

Not yet recorded in Egypt. Native to northwest and Central Europe, Mediterranean region, eastwards through temperate Asia to Japan, introduced into many other parts of the world, and often a serious weed (Couch).

NOTE: Apparently, *Elymus repens* is not cultivated in Egypt; the rhizomes, which are sold in markets under the name 'Negil hindi,' are imported. It is used in herbal medicine as a decoction, duiretic, emollient and depurative.

41. **Taeniatherum** Nevski

Annual; raceme narrowly oblong, dense, the spikelets sessile in pairs on a tough glabrous rhachis; spikelets 2-flowered, the lower floret fertile, the upper ± rudimentary; glumes collateral, connate at the base, narrowly subulate and awn-like, rigid, scabrid; lemma lanceolate, broadly rounded on the back, 5-nerved, attenuate into a long flexuous scabrid awn flattened at the base. 1 species, Mediterranean region, eastwards to Pakistan.

1. **Taeniatherum caput-medusae** (L.) Nevski, Trudy Sredne-Aziatsk. Gosud. Univ., ser. 8b, Bot. 17: 38 (1934).
   Syns. *Elymus caput-medusae* L., Sp. Pl., ed. 1, 84 (1753).
   Elymus crinitus Schreb., Beschr. Gräs. 2: 15, t. 24, f. 1 (1772).
   Hordeum crinitum (Schreb.) Desf., Fl. Atlant. 1: 113 (1798).
   Hordeum caput-medusae (L.) Coss. & Durieu, Expl. Sci. Algérie 2: 198 (1856).
   Taeniatherum crinitum (Schreb.) Nevski, Trudy Sredne-Aziatsk. Gosud. Univ., Ser. 8b, Bot. 17: 38 (1934).
   Taeniatherum caput-medusae var. *crinitum* (Schreb.) Humphries, Bot. J. Linn. Soc. 76: 343 (1978).
   Taeniatherum caput-medusae subsp. *crinitum* (Schreb.) Melderis, Notes Roy. Bot. Gard. Edinb. 42: 81 (1984).

Culms to 50 cm, erect or geniculately ascending; leaf-blades soft, flat or loosely inrolled, 1-3 mm wide, hairy above; raceme 3-7 cm (excluding the awns); glumes 2-3.5(6) cm, erect or divaricately ascending; lemma-body 0.8-1.2 cm, glabrous or scabrid; awn (4)7-12(15) cm, (0.3)0.8-1.2 mm wide at the base, becoming coiled on drying.

S; desert sandy soils. Distribution as for the genus.

NOTE: *Taeniatherum caput-medusae* is a complex of completely intergrading elements scarcely worth recognizing, as discussed by Humphries, Bot. J. Linn. Soc. 76: 340-344 (1978). Egyptian material is referable to *Taeniatherum crinitum* by virtue of its short raceme in comparison with culm height and divaricately ascending glumes, but Humphries considers this as just about worthy of varietal rank.

42. **Crithopsis** Jaub. & Spach

Annual; raceme dense, narrowly oblong, the spikelets sessile in pairs on a fragile hairy rhachis; spikelets 2-flowered, the lower floret fertile, the upper ± rudimentary; glumes opposite, linear, 1- to 5-nerved, awned at the tip; lemma broadly rounded on the back, awned at the tip. 1 species, Libya, Egypt, Crete, Cyprus, Turkey, Syria, Palestine, Iraq, Iran.

1. **Crithopsis delileana** (Schult.) Roshev., Zlaki 319 (1937).
   Syns. *Elymus geniculatus* Delile, Descr. Egypte Hist. Nat. 174 (1814), non Curtis (1790).
   Elymus delileanus Schult. & Schult. f., Mant. 2: 424 (1824), based on the above.
   Elymus rhachitrichus Jaub. & Spach, Ill. Pl. Orient. 4: t. 321 (1851).

Culms to 35 cm, usually geniculately ascending; leaf-blades to 3 mm wide, scabrid, sparsely hairy above; raceme 2-3.5 cm (excluding the awns); glumes 1.5-2.1 cm including the awn, imperceptibly passing into the 5 mm awn; lemma *c.* 7 mm, minutely scabrid on the back, scattered spinulose-scabrid towards the tip, with a flattened apical awn 4-7 mm.

M; damp ground near wells. Distribution as for the genus.

NOTE: The type of *Elymus geniculatus* was collected in Egypt, near Alexandria, in 1800 by Delile (holotype MPU).

43. **Hordeum** L.

Annual or perennial; inflorescence an oblong to linear quasi-raceme with triads of 1 central fertile spikelet and 2 male or barren lateral spikelets, all pedicellate or the central sessile, the rhachis fragile (all sessile on a tough rhachis in cultivated races); central spikelet 1-flowered with bristle-like rhachilla-extension, dorsally compressed; glumes collateral, narrowly lanceolate, 3-nerved and flat or awn-like, not connate at the base; lemma rounded on the back, obscurely nerved, acuminate to a conspicuous awn; lateral spikelets usually smaller than the central and often reduced to a bunch of 3 awns representing the 2 glumes and the lemma. About 40 species, temperate regions throughout the world.

1. Raceme-rhachis tough, not breaking up at maturity (cultivated cereal) 1. **H. vulgare**
\+ Raceme-rhachis fragile, readily breaking up at the base of each internode at maturity (wild grass) 2

2. Robust annual; awn of fertile lemma stout, 4-14 cm 2. **H. spontaneum**
\+ Slender annual; awn of fertile lemma slender, not more than 3 cm 3

3. Glumes of central spikelet glabrous 3. **H. marinum**
\+ Glumes of central spikelet long-ciliate 4. **H. murinum**

1. **Hordeum vulgare** L., Sp. Pl., ed. 1, 84 (1753).
   Syns. *Hordeum distichon* L., Sp. Pl., ed. 1, 85 (1753).
   Hordeum hexastichon L., Sp. Pl., ed. 1, 85 (1753).

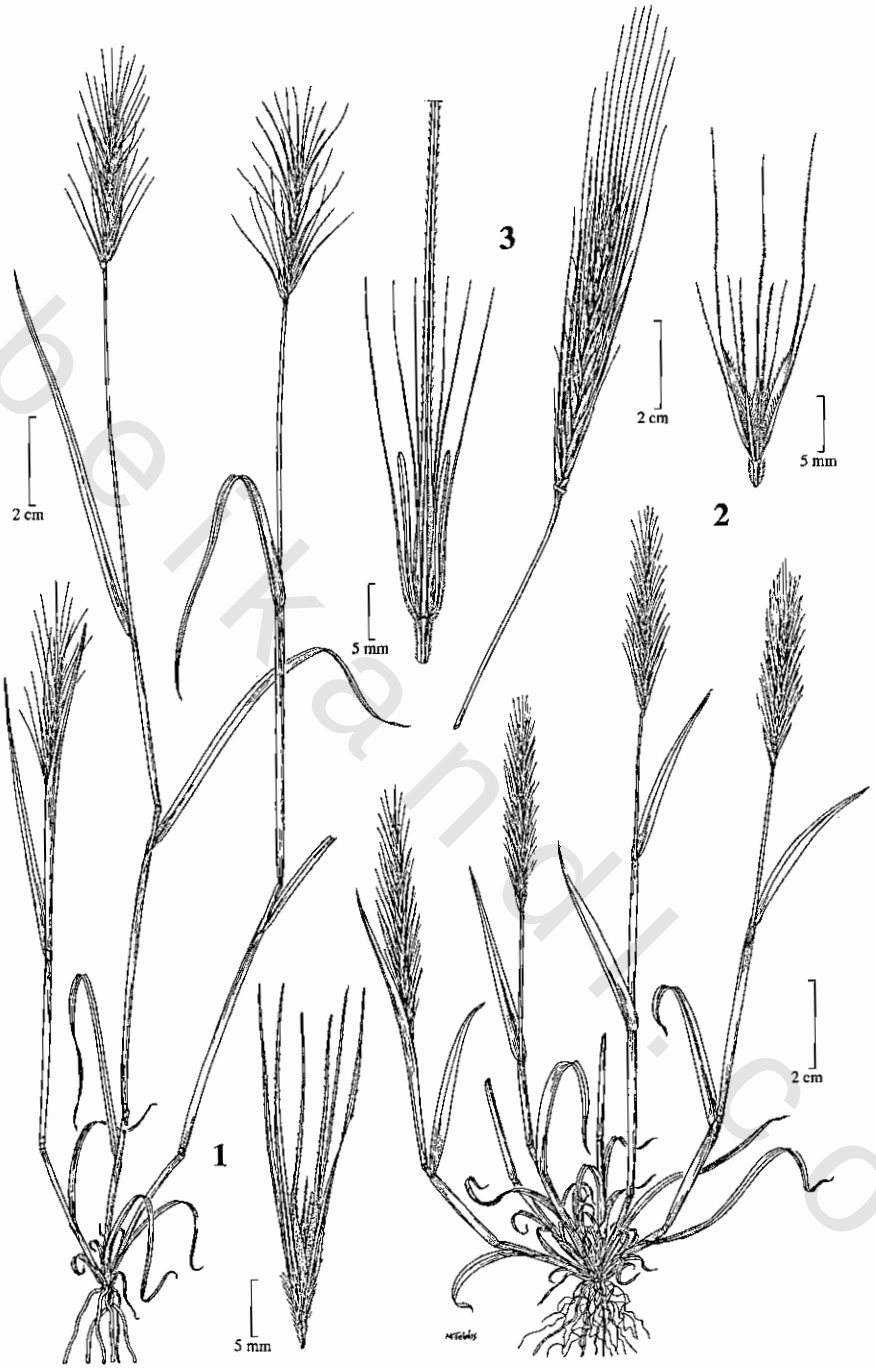


Plate 59. GRAMINEAE: *Crithopsis delileana* 1, habit; spikelet-pair (down right). *Hordeum murinum* subsp. *glaucum* 2, habit; spikelet-triad (up right). *Hordeum spontaneum* 3, inflorescence; spikelet-triad (left). Drawn by Margaret Tebbs.

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Hordeum sativum Pers., Syn. Pl. 1: 108 (1805).
Hordeum tetrastichum Stokes, Bot. Mat. Med. 1: 166 (1812).

Annual; culms to 90 cm; raceme 6-12 cm excluding the awns, oblong-linear, dense; rhachis tough; triads with only the central spikelet fertile (2-rowed) or with all three fertile (4- and 6-rowed); glumes 1-3 cm; lemma of fertile spikelet *c.* 1 cm, ovate-lanceolate, chartaceous to coriaceous, glabrous on the back, scabrid towards the tip, attenuate to an awn to 15 cm; lemmas of lateral spikelets (where infertile) smaller, obtuse, awnless.

N, M, D, S; cultivated cereal (Barley) often escaping into the wild. Cultivated throughout temperate regions of the world.

NOTE: In 2-rowed barley only the central spikelet of each triad is fertile, the alternation of triads on opposite sides of the axis giving the 2 rows. In 6-rowed barley all three spikelets of a triad are fertile and the alternating triads are densely packed. In 4-rowed barley the raceme is much laxer than in 6-rowed and the lateral spikelets of alternating triads are in the same line, thus giving only 4 rows. Many varieties of all three basic types have been grown in Egypt.

2. **Hordeum spontaneum** K. Koch, Linnaea 21: 430 (1848).

Robust annual to 70 cm, erect or geniculately ascending; racemes 4-9 cm excluding the awns, laterally compressed; rhachis densely hairy on the margins, fragile; central spikelet sessile; glumes 1.3-2.3 cm including the long terminal awn, narrowly linear- lanceolate, densely silky-hairy; lemma 1.2-1.4 cm, ovate-lanceolate, glabrous, with a stout, very scabrid awn 4-14 cm; anthers 2.5-3 mm; lateral spikelets male or vestigial, sessile; glumes resembling those of the central spikelet; lemma 7-9 mm, rounded-obtuse.

M, S; desert pastures. Mediterranean region, Sinai, southwest Asia to Pakistan and Central Asia.

3. **Hordeum marinum** Huds., Fl. Angl., ed. 2, 1: 57 (1778).

Annual to 40(60) cm, erect or geniculately ascending; raceme (1)1.5-5 cm, oblong to ovate in outline; rhachis shortly ciliate on the margins, fragile; central spikelet sessile; glumes to 2.6 cm, setaceous, awn-like above, scabrid; lemma 6-8 mm, narrowly ovate, smooth, tapering above into an awn to 2.4 cm; anthers 1.3-1.5 mm; lateral spikelets pedicellate, barren; glumes to 2.6 cm, subulate or slightly swollen below, awn-like above, sometimes the inner expanded below into a broad or narrow wing.

Two subspecies occur in Egypt:

subsp. **marinum**

Inner glume of lateral spikelets expanded below into a broad or narrow wing.

N, O, M, S; alluvial soils. Europe, Mediterranean region, southwest and Central Asia.

subsp. **gussoneanum** (Parl.) Thell., Vierteljahrsschr. Naturf. Ges. Zürich 52: 441 (1908).
Syns. *Hordeum geniculatum* All., Fl. Pedem. 2: 259, t. 91, 3 (1785).

Hordeum hystrix Roth, Catal. Bot. 1: 23 (1797).
Hordeum gussoneanum Parl., Fl. Palerm. 1: 246 (1845).

Inner glume of lateral spikelets subulate or slightly swollen below, not winged.

N, M; sandy and alluvial soils. Mediterranean region, southwest Asia to Pakistan and Central Asia.

4. **Hordeum murinum** L., Sp. Pl., ed. 1, 85 (1753).

Annual to 50 cm, erect or geniculately ascending; raceme 2-7(12) cm, oblong in outline, firmly compressed; rhachis sparsely ciliate on the margins, fragile; central spikelet sessile or with a pedicel to 1.8 mm; glumes lanceolate, to 2.6 cm including the long terminal awn long-ciliate below; lemma 0.7-1.2 cm, lanceolate, scabrid above, tapering to an awn 1.8-3(5) cm; anthers 0.2-1.4 mm; lateral spikelets pedicellate, well developed, male or barren; glumes slightly unequal, the inner lanceolate, ciliate below, the outer setaceous, both long-awned and 1.6-3 cm including the awn; lemma 0.7-1.1 cm, tapering to an awn 1-4 cm; rhachilla-extension slender or stout.

Two subspecies occur in Egypt:

subsp. **leporinum** (Link) Arcang., Comp. Fl. Ital. 805 (1882).
Syn. *Hordeum leporinum* Link, Linnaea 9: 133 (1835).

Leaves green; anthers of central spikelet 0.7-1.4 mm; rhachilla-extension of lateral spikelets slender, green.

N, O, M, D, S; sandy fields, damp ground and canal banks. Mediterranean region, eastwards to eastern Asia.

subsp. **glaucum** (Steud.) Tzvelev, Novosti Sist. Vyssh. Rast. 1971: 67 (1971).
Syn. *Hordeum glaucum* Steud., Syn. Pl. Glumac. 1: 352 (1854).

Leaves glaucous; anthers of central spikelet 0.2-0.5 mm; rhachilla-extension of lateral spikelets stout, orange-brown.

N, O, M, D, S; desert sand and as a weed of cultivation. Mediterranean region, eastwards to India.

NOTE: The type of *Hordeum glaucum* was collected in Sinai in 1835 by Schimper (no. 383, isotypes K).

44. **Agropyron** Gaertn.

Perennial, with or without rhizomes; leaf-blades flat or inrolled; raceme broadly linear to narrowly oblong in outline, the spikelets borne singly, divergently or pectinately arranged on a tough rhachis; spikelets 3- to 10-flowered, strongly laterally compressed, the rhachilla disarticulating above the glumes and between the florets; glumes linear to narrowly ovate, indurate, 1- to 5-nerved, keeled to the base, tapering to an acuminate or shortly awned tip in which the nerves converge; lemmas keeled, glabrous or pilose, tapering to an acuminate or shortly awned tip. About 15 species, Mediterranean region, southwest and Central Asia to China, Australia and New Zealand.

1. **Agropyron cristatum** (L.) Gaertn., Novi Comment. Acad. Sci. Imp. Petrop. 14: 540 (1770).
Syns. *Bromus cristatus* L., Sp. Pl., ed. 1, 78 (1753).
Triticum cristatum (L.) Schreb., Beschr. Gräs. 2: 12, t. 23, 2 (1772).

Culms to 70 cm, glabrous or pubescent; leaf-blades 1.5-3 mm wide, scabrid or pilose above, glabrous beneath, or pubescent on both sides; raceme ovate to narrowly elliptic in outline, 1.5-5 cm, sometimes purple-tinged; rhachis hairy; glumes 3-5 mm long with an awn 2-3 mm; lemmas 5-7 mm long, glabrous or sparsely pilose on the back, with an awn 3-4 mm.

M; sandy soils. Central and eastern Europe, temperate Asia, eastwards to Siberia and Tibet.

45. **Eremopyrum** (Ledeb.) Jaub. & Spach

Annual; raceme oblong to suborbicular in outline, the spikelets solitary at the nodes and pectinately arranged on a fragile rhachis (tough in one species); spikelets several-flowered, strongly laterally compressed, falling entire with the rhachis-internodes (florets falling separately when rhachis tough); glumes equal, asymmetrically keeled, coriaceous with membranous margins, mostly 5-nerved, acute or tapering to an awn; lemmas coriaceous, 5-nerved, acute or tapering to an awn. 5 species, North Africa, Turkey, eastwards to Pakistan and Central Asia.

1. Palea shorter than the body of the lemma, shallowly 2-fid with a sinus 0.1-0.8 mm deep, the teeth acute, awnless; glumes acute or acuminate, sometimes awned to 6 mm — 1. **E. bonaepartis**
\+ Palea at least as long as the body of the lemma, deeply cleft at the tip with a sinus 0.6-1.8 mm deep, the teeth acuminate or awned; glumes clearly awned, the awn 0.25-1 cm — 2. **E. distans**

1. **Eremopyrum bonaepartis** (Spreng.) Nevski, Kom., Fl. URSS 2: 663 (1934).
Syns. *Triticum bonaepartis* Spreng., Bot. Gart. Halle 1: 40 (1801).
Triticum squarrosum Roth, Neue Beytr. Bot. 128 (1802).
Hordeum hirsutum Bertol., Misc. Bot. 1: 11 (1842).
Eremopyrum squarrosum (Roth) Jaub. & Spach, Ill. Pl. Orient. 4: t. 320, 2 (1851).
Agropyron kotschyanum Boiss. & Hohen. in Boiss., Diagn. Pl. Orient. 2 (13): 69 (1854).
Agropyron squarrosum (Roth) Boiss., Fl. Orient. 5: 668 (1884).
Eremopyrum confusum Melderis, Anz. Österr. Akad. Wiss., Math.-Naturwiss. Kl. 101: 15 (1964).
Eremopyrum bonaepartis susbp. *hirsutum* (Bertol.) Melderis, Notes Roy. Bot. Gard. Edinb. 42: 81 (1984).

Culms 30 cm, erect or geniculately ascending; leaf-blades 1-4 mm, flat; raceme 1.5-4 cm, oblong; spikelets 3- to 5-flowered; glumes 0.4-2 cm (including the awn when present), straight, lanceolate, glabrous, scabrid or hairy on the flanks, awnless or shortly awned (to 6 mm); lemmas linear-lanceolate, shortly exceeding the glumes, glabrous, scabrid or hairy, awnless or with an awn to 6 mm; palea shorter than the body of the lemma, shallowly 2-fid with a sinus 0.1-0.8 mm deep, the teeth acute, awnless.

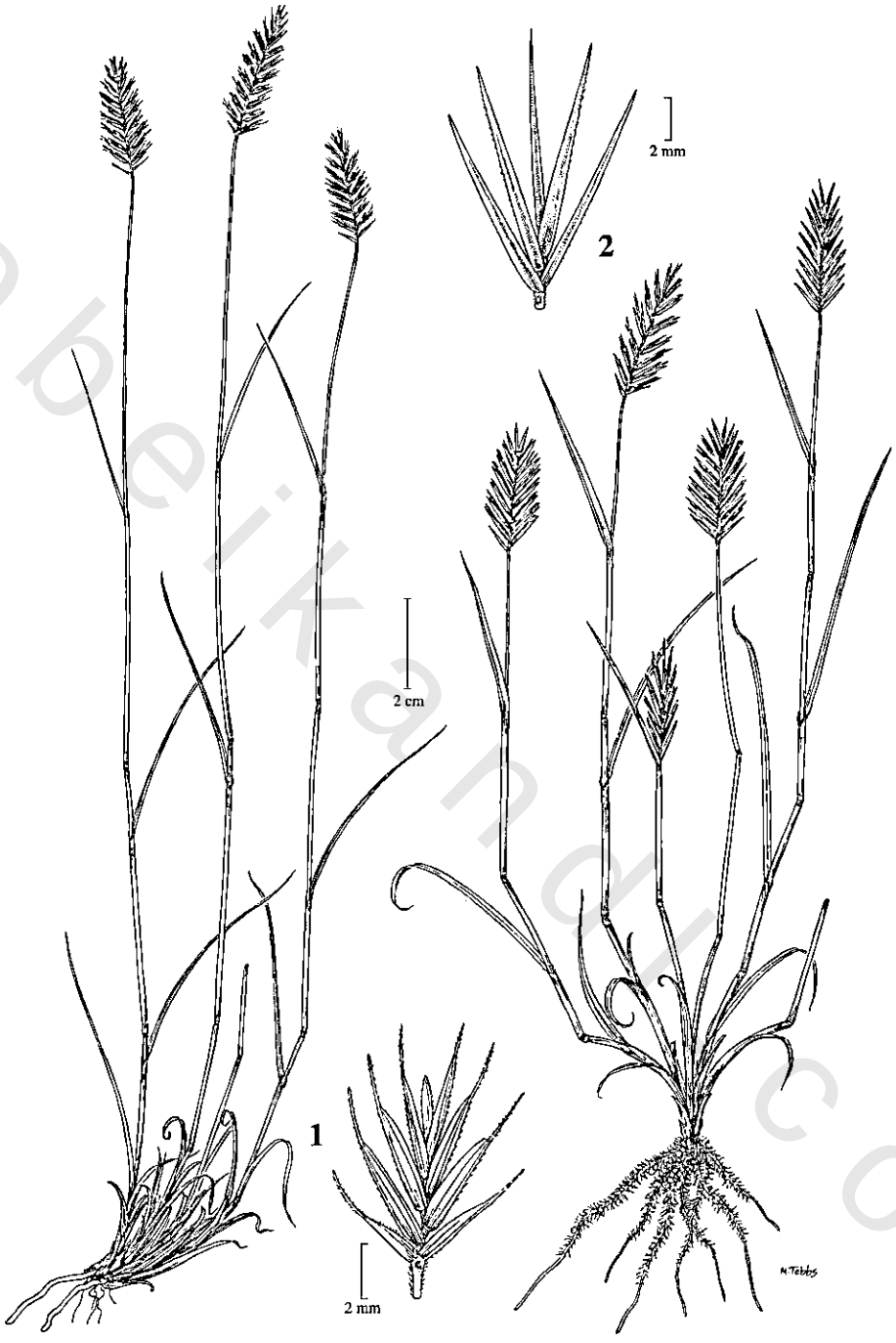


Plate 60. GRAMINEAE: *Agropyron cristatum* 1, habit; spikelet (down right). *Eremopyrum bonaepartis* 2, habit; spikelet (up left). Drawn by Margaret Tebbs.

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S; rocky ground. Mediterranean region, Sinai, eastwards to Afghanistan and southern Central Asia.

NOTE: Melderis, Notes Roy. Bot. Gard. Edinb. 42: 81 (1984) assigned Sinai material to subsp. *bonaepartis*, a variant confined to the western part of the range (North Africa, Sinai, Syrian Desert, Iran) and distinguished from subsp. *hirsutum* by minor spikelet and chromosome characters. Frederikson, Nord. J. Bot. 11: 271-285 (1991), however, did not recognize any segregate taxa in a very detailed survey of the genus.

2. **Eremopyrum distans** (K. Koch) Nevski, Kom., Fl. URSS 2: 665 (1934).
Syn. *Agropyron distans* K. Koch, Linnaea 21: 426 (1848).

Culms to 25 cm, erect or geniculately ascending; leaf-blades flat, 2-3 mm wide; raceme oblong, 2.5-5 cm; spikelets 3- to 5-flowered; glumes 1-2 cm including the 0.25-1 cm awn, narrowly lanceolate, slightly curved, villous on the flanks; lemmas narrowly lanceolate, as long as or slightly exceeding the glumes, densely villous, with an awn 2-7 mm; palea at least as long as the body of the lemma, deeply cleft at the tip with a sinus 0.6-1.8 mm deep, the teeth acuminate or awned.

?S. East Mediterranean region, eastwards to southern Central Asia and China (Xinjiang).

NOTE: *Eremopyrum distans* is a distinctive enough species, but an elusive record for Sinai has not been confirmed. Frederikson, Nord. J. Bot. 11: 271-285 (1991), does not include Sinai in a distribution map of the species. Its occurrence in Sinai is not unlikely and it may yet be found.

46. **Triticum** L.

Annual; raceme linear or oblong, bearing single spikelets on a fragile rhachis (tardily fragile or tough in cultivated species); spikelets several-flowered (rarely only one of the florets fertile); glumes oblong to ovate, shorter or rarely longer than the adjacent lemmas, coriaceous, 5- to 11-nerved, asymmetrically 1- to 2-keeled (but sometimes becoming rounded below as the grain expands), obtuse, truncate or toothed at the tip, the lateral nerves diverging into the teeth, mucronate or awned; lemmas rounded on the back or keeled near the tip, the tip similar to that of the glumes. 10-20 species, East Mediterranean region to Iran.

NOTE: More than half the species are cultivated and wheat is the principal cereal of temperate regions. It was domesticated in southwest Asia some time prior to 7000 BC. There are three ploidy levels, with $2n = 14$, 28 and 42, and within each level selection has proceeded from wild species (except the hexaploids) through hulled cultivated species (in which the grain is difficult to separate from the lemma and palea) and thence to free-threshing naked species. Strictly speaking, only the diploids truly belong to *Triticum*, the others being intergeneric hybrids with *Aegilops* (q.v.). The tetraploids have assimilated a genome from *A. speltoides* Tausch and the hexaploids a further genome from *A. tauschii* Coss. There are wild tetraploids but no wild hexaploids. It is impossible to do justice to the genus in this Flora; the reader is therefore advised to consult J. Percival, The wheat plant, a monograph. London (1921), and B. P. Pal, Wheat. New Delhi (1966). There is also an extremely detailed account in Täckholm & Drar, Fl. Egypt 1: 225-268 (1941), which has an extensive bibliography.

1. Raceme-rhachis fragile, disarticulating at maturity	1. **T. dicoccum**
+ Raceme-rhachis tough, not disarticulating at maturity	2
2. Glumes keeled only towards the tip, rounded on the back below	5. **T. aestivum**
+ Glumes firmly and broadly keeled from base to tip	3
3. Raceme pyramidal, tapering towards the tip	4. **T. pyramidale**
+ Raceme parallel-sided for its whole length	4
4. Leaves velutinous	2. **T. turgidum**
+ Leaves glabrous	3. **T. durum**

1. **Triticum dicoccum** (Schrank) Schübl., Diss. Char. Descr. Cereal. 29 (1818).
Syn. *Triticum spelta* L. var. *dicoccum* Schrank, Baier. Fl. 1: 389 (1789).

Culms to 1 m, glabrous or pubescent at the nodes, thick-walled or solid throughout; leaf-blades scaberulous; racemes 3-10 cm, laterally firmly compressed; rhachis fragile, disarticulating at the base of the internodes, these *c.* 3 mm, glabrous or shortly ciliate at the nodes and on the margins; spikelets 3(4)-flowered, only the 2 lowermost fertile; glumes (0.6)0.7-1 cm, broadly ovate, coriaceous, with a single prominent keel running into an apical tooth; awn scabrid, to 15 cm; grain hulled, with flinty or mealy endosperm; $2n$ =28.

NOTE: *Triticum dicoccum*, Emmer, is one of the most ancient of cultivated cereals, known from Egypt since Neolithic times (6000 years ago) but apparently no longer grown. A specimen collected on a plateau in the Eastern Desert by Simpson in 1924 does not look like a cultivated plant, so the species may still exist in remote places as a relic of former cultivation. Tolerant of waterlogged soils, but grown mostly for fodder, rarely for human consumption. Southern and eastern Europe, temperate Asia.

2. **Triticum turgidum** L., Sp. Pl., ed. 1, 86 (1753).
Syn. *Triticum compositum* L., Syst. Veg., ed. 13, 108 (1774).

Culms to 1.7 m, smooth and glabrous throughout, thick-walled and ± solid; leaf-blades velutinous (but this rubbing off with age); raceme nodding, 4.5-7 cm, ovate-cylindrical, sometimes branched below; rhachis tough, densely ciliate, the internodes (2.5)3.5-4 mm; spikelets 5- to 7-flowered, the lowermost 2-5 florets fertile; glumes broadly ovate, 0.8-1 cm, coriaceous, glabrous, puberulent or velutinous, keeled throughout with 2 keels, one of them prominent, ciliolate, terminating in a 1-2 mm tooth, the other less developed; fertile lemma 1-1.3(1.4) cm, glabrous or villous towards the margins; awn scabrid throughout, 8-18 cm; grain naked, with mealy endosperm and without a dorsal hump or ridge; $2n = 28$.

NOTE: *Triticum turgidum*, Rivet, Cone or Poulard Wheat, is rare in Egypt and not grown as an economic crop. The endosperm is low in gluten and produces a poor flour best used for biscuits rather than bread. Mediterranean region, eastwards to Central Asia and Siberia, South Africa, Australia, North and South America.

3. **Triticum durum** Desf., Fl. Atlant. 1: 114 (1798).

Culms to 1.4 m, smooth and glabrous throughout, thick-walled, sometimes solid; leaf-blades glabrous; raceme 3-8 cm, erect, dense, laterally compressed; rhachis tough,

densely ciliate, the internodes 3-4 mm long; spikelets 5(7)-flowered, only the lowermost (2)3-4 florets fertile; glumes 0.8-1(1.2) cm, broadly ovate, coriaceous, glabrous or pubescent, keeled throughout with 2 keels, one of them prominent, scaberulous, terminating in a 2-3 mm long apical tooth, the other weakly developed; fertile lemma 1-1.2 cm, glabrous; awn (5.5)10-15 cm, smooth below, scabrid above; grain naked with flinty endosperm and with a prominent dorsal hump or ridge; $2n = 28$.

NOTE: *Triticum durum*, Macaroni Wheat, is widely, but not commonly, cultivated in Egypt. The hard endosperm produces good flour ideal for making pasta. Mediterranean region, southwards to Ethiopia and eastwards to Pakistan.

4. **Triticum pyramidale** (Delile ex Schult.) Percival, The Wheat Plant 156, 262 (1921).
Syn. *Triticum sativum* var. *pyramidale* Delile ex Schult., Mant. 2: 414 (1827).

Culms to 1 m, glabrous, thick-walled, sometimes solid; leaf-blades pubescent when young; raceme 4.5-6 cm, pyramidal, broad below, tapering above, dense; rhachis tough, ciliate, the internodes 2.5-3 mm; spikelets 4- to 5-flowered, the lowermost 3-4 florets fertile; glumes 0.8-1 cm, broadly ovate, coriaceous, glabrous or pubescent, keeled throughout with 2 keels, one of them prominent, scabrid, terminating in a 0.5-1 mm apical tooth, the other weakly developed; fertile lemma 1-1.2 cm, glabrous; awn 9-17 cm, scabrid throughout; grain naked with mealy endosperm and a prominent dorsal hump or ridge; $2n = 28$.

NOTE: *Triticum pyramidale*, Egyptian Cone Wheat, a rare species, has been cultivated extensively around Faiyum and on a much smaller scale elsewhere in Egypt, but is progressively being replaced by modern varieties of *Triticum aestivum*. It is thought that it may be grown in Ethiopia and possibly Algeria, but is otherwise endemic to Egypt.

5. **Triticum aestivum** L., Sp. Pl, ed. 1, 85 (1753), nom. conserv.
Syns. *Triticum hybernum* L., Sp. Pl, ed. 1, 86 (1753).
Triticum sativum Lam., Fl Franç. 3: 625 (1778).
Triticum vulgare Vill., Hist. Pl. Dauphiné 2: 153 (1787).

Culms to 1.4 m, smooth and glabrous throughout or faintly puberulent at the nodes, thin-walled and hollow; leaf-blades scaberulous, puberulent or glabrous; raceme (1.5)5-10 cm, erect, lax to dense; rhachis tough, glabrous or ciliate, the internodes (3)4-8 mm; spikelets 3- to 9-flowered, usually only the (2)3 lowermost florets fertile; glumes 0.6-1(1.1) cm, broadly ovate, coriaceous, glabrous, pubescent or villous, keeled in the upper part only, the single keel terminating in a 2-3 mm apical tooth or a 0.4-1 cm scabrid awn; fertile lemma (1)1.2-1.5 cm; awn 4-10(12) cm, scabrid throughout, or lemma awnless; grain naked with mealy (to flinty) endosperm, smoothly dorsally curved without a hump or ridge; $2n = 42$.

NOTE: *Triticum aestivum*, Bread Wheat, a relatively recent introduction to Egypt, but highly successful and spreading rapidly. The mealy endosperm with high glutin content produces high quality flour ideal for bread-making. Grown almost throughout the world up to latitude 69.5°N.

47 **Aegilops** L.
Syn. *Amblyopyrum* (Jaub. & Spach) Eig

Annual; raceme narrowly cylindrical to ovoid, bearing solitary spikelets at the nodes of a

tough or fragile axis; tough axis falling entire (except for the persistent basal rudiments), the fragile axis disarticulating either at the base of the spikelet ('barrel-type') or at the base of the internode ('wedge-type'), often with 1-4 rudimentary spikelets at the base and the apical spikelets also somewhat reduced; spikelets several-flowered, the lower 1-3 florets fertile, the remainder sterile; glumes oblong to broadly ovate, coriaceous, with 7-13 parallel or divergent nerves, rounded on the back, truncate, dentate or 1- to 5-awned at the tip; lemmas rounded on the back but often lightly keeled at the tip, 2-dentate at the tip and usually 1- to 3-awned. 23 species, Mediterranean region, southwest Asia, eastwards to Pakistan.

NOTE: A very difficult genus that has recently been radically revised by van Slageren (Wild Wheats: a monograph of *Aegilops* L. and *Amblyopyrum* (Jaub. & Spach) Eig (Poaceae). Wageningen Agricultural University (1994)).

1. Raceme disarticulation 'barrel-type' — 1. **A. ventricosa**
\+ Raceme disarticulation 'wedge-type' or entire — 2

2. Raceme disarticulation 'wedge-type' — 2. **A. bicornis**
\+ Raceme disarticulation entire — 3

3. Raceme narrowly cylindrical, (10)30-65 times as long as wide — 3. **A. longissima**
\+ Raceme subcylindrical to narrowly ovoid, widest at the base, less than10 times as long as wide — 4

4. Glumes with nerves unequal in width, unequally spaced, sunk into the surface of the glume — 4. **A. geniculata**
\+ Glumes with nerves equal in width, equally spaced, rib-like and protruding from the surface of the glume — 5

5. Raceme slender; awns of glumes and lemmas all ± the same length; glumes of lowest fertile spikelets always with 3 awns equally wide at the base — 5. **A. kotschyi**
\+ Raceme stout; awns of glumes and lemmas unequal, giving the raceme an untidy appearance; glumes of lowest fertile spikelets with 2 or 3 apical teeth, of which 1 or 2 may be produced as an awn — 6. **A. peregrina**

1. **Aegilops ventricosa** Tausch, Flora 39: 108 (1837).
Syn. *Gastropyrum ventricosum* (Tausch) Á. Löve, Biol. Zentralbl. 101: 208 (1982).

Culms to 40(65) cm, erect or slightly geniculate below; racemes (3.5)5-12 cm, excluding the awns, moniliform, disarticulating below each spikelet, this falling with the next internode above ('barrel-type'), comprising (3)6-8(11) spikelets and 0-2 basal rudiments; lateral spikelets 0.7-1.1 cm (excluding awns), urceolate, 2- to 5-flowered, the 1-2 uppermost florets sterile; glumes 7-8 mm, ovate, glabrous, the nerves unequally wide, unequally spaced, sunk into the surface, truncate and unequally 2-toothed at the tip; lemmas 0.8-1 cm, the tip extended into an awn 0.3-3 cm; apical spikelet narrower; glumes 6-8 mm, ovate-oblong, acute at the tip, the lower with a short central tooth sometimes extended into an awn to 9 mm, the upper with a well developed awn up to 2 cm flanked by 2 short teeth; lemmas extended into an awn to 4 cm without lateral teeth.

M, S; weed of barley. Spain, Balearic Islands, France, Corsica, Italy, Sardinia, Sicily, Croatia, Morocco, Algeria, Tunisia, Libya, Egypt, adventive in Europe, western Asia, North and South America.

2. **Aegilops bicornis** (Forssk.) Jaub. & Spach, Ill. Pl. Orient. 4: 11, t. 309 (1850).
Syns. *Triticum bicorne* Forssk., Fl. Aegypt.-Arab. 26 (1775).
Aegilops bicornis var. *anathera* Eig, Bull. Soc. Bot. Genève, sér. 2, 9: 325 (1928).
Sitopsis bicornis (Forssk.) Á. Löve, Biol. Zentralbl. 101: 206 (1982).

Culms to 40 cm, slender, erect; raceme 4-7.5 cm excluding the awns, narrowly cylindrical, slightly laterally compressed, tapering above and below, disarticulating at the base of each internode, this falling attached to its spikelet ('wedge-type'), but a few lower spikelets often not disarticulating, comprising 8-15(19) spikelets without basal rudiments; spikelets 6-9 mm (excluding awns), narrowly elliptic-ovoid, laterally compressed, 3- to 4-flowered, the lower 2(3) florets fertile; glumes 4.5-7 mm, elliptic-oblong, scabrid to setulose, the nerves equal in width, equally spaced and protruding from the surface, unequally 2-dentate at the tip; lemmas 5-7 mm, narrowly elliptic, the fertile lemmas extended into an awn 3-4 mm in basal spikelets, but abruptly increasing to 6 cm in the upper spikelets and without lateral teeth.

N, M, S; sandy field margins and dunes. Cyprus, Libya, Egypt, Palestine, Syria, Arabia.

NOTE: Van Slageren recognizes two varieties of *Aegilops bicornis*: var. *bicornis*, lemmas of all spikelets awned; var. *anathera*, lemmas of lower spikelets awnless, but notes that some Egyptian material is intermediate. In fact quite a lot of Egyptian material is difficult to be sure about and the varieties would seem not to be very important. The type of *Triticum bicorne* was collected in Egypt, Alexandria, in 1762 by Forsskål (holotype not found).

3. **Aegilops longissima** Schweinf. & Muschl. in Muschl., Man. Fl. Egypt 1: 156 (1912).
Syn. *Sitopsis longissima* (Schweinf. & Muschl.) Á. Löve, Feddes Repert. 95: 492 (1984).

Culms to 70 cm, slender, erect; raceme 10-20 cm excluding the awns, narrowly cylindrical, scarcely tapering above or below, falling entire at maturity, comprising 8-17 spikelets and 0-1(2) basal rudiments; lateral spikelets 0.9-1.5 cm, narrowly ellipsoid, slightly laterally compressed, 3- to 5-flowered, the lower 2-3 florets fertile; glumes 6-8 mm, narrowly elliptic, scabrid to setose, the nerves unequal in width, unequally spaced, sunk into the surface, unequally 2-dentate at the tip; lemmas 0.9-1.2 cm, narrowly elliptic, unequally 2-dentate at the tip; lemmas of terminal spikelet extended into a stout flat awn 6-13 cm flanked by slender lateral teeth to 6 mm.

M, ?S; sandy field margins. Egypt, Palestine.

NOTE: The type of *Aegilops longissima* was collected in Egypt, near Alexandria, in 1903 by Schweinfurth (isolectotypes B).

4. **Aegilops geniculata** Roth, Bot. Abh. Beobacht. 45 (1787).
Syn. *Aegilops ovata* L., Sp. Pl., ed. 1, 1050 (1753), pro parte.



Plate 61 GRAMINEAE: *Triticum aestivum* 1, inflorescence. *Aegilops ventricosa* 2, inflorescence. *Aegilops bicornis* 3, inflorescence. *Aegilops longissima* 4, inflorescence. *Aegilops geniculata* 5, inflorescence. Drawn by Margaret Tebbs.

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Culms to 30(40) cm, geniculate below; raceme 1.5-3 cm excluding the awns, narrowly ovoid, falling entire at maturity, comprising (2)3-4 spikelets of which the uppermost is sterile, and 1(2) basal rudiments; spikelets 0.7-1 cm excluding the awns, subventricose, urceolate (except the uppermost, this narrowly obovoid and 4-5 mm), widest at or below the middle, 3- to 4-flowered, the lower 1-2 florets fertile; glumes 0.6-0.8(1) cm, (those of the terminal spikelet *c.* 3 mm), glabrous, scabrid or appressed-velutinous, the nerves unequal in width, unequally spaced, flattened in profile and sunk into the surface, (3)4 (5)-toothed at the tip, the teeth setulose and equally wide at their base, rarely unequally 2-dentate, the wider tooth extended into an awn (0.5)2-4.5 cm; lemmas 6-8 mm, narrowly ovate, 2- to 3-awned at the tip, the awns 1-2.5 cm, slender, accompanied by 1-2 teeth, the awns of the lemmas noticeably shorter than those of the glumes.

M, S; disturbed places. Widespread in southern Europe and Africa north of the Sahara, extending through much of southwest Asia, eastwards to the Caspian Sea.

5. **Aegilops kotschyi** Boiss., Diagn. Pl. Orient. 1(7): 129 (1846).
Syns. *Aegilops triuncialis* var. *kotschyi* (Boiss.) Boiss., Fl. Orient. 5: 674 (1884).
Aegilops kotschyi Boiss.var. *palaestina* Eig, Feddes Repert. 55: 128 (1929).
Aegilemma kotschyi (Boiss) Á. Löve, Biol. Zentralbl. 101: 207 (1982).

Culms to 40 cm, geniculate below; raceme 2-3(4) cm excluding the awns, narrowly ovoid, falling entire at maturity, comprising (2)3-5(6) fertile spikelets and 2-3 basal rudiments; spikelets 0.6-1 cm excluding the awns, oblong-ovoid, 4- to 5-flowered, the lower 2-3 florets fertile; glumes 5-8 mm, broadly ovate, glabrous to scabrid on the body, spinulose-scabrid on the nerves, the nerves equal in width, equally spaced, protruding from the surface, truncate at the tip and with 3 slender awns, these equally wide at the base and 2.5-3.5(4) cm (or the central often reduced); lemmas 7-9 mm, narrowly ovate, the tip with 1-3 slender awns to 4.5 cm, as long as those of the glumes, 1 (rarely 2) of them sometimes reduced; apical spikelet with glumes occasionally 4-awned.

O, M, S; sandy soils. Turkey, Cyprus, Tunisia, Libya, Egypt, Palestine, Syria, Arabia, Iraq, Iran, Azerbaijan, Afghanistan, Turkmenistan, Uzbekistan.

NOTE: The type of var. *palaestina* was collected in Egypt, at Mariut, in 1903 by Schweinfurth (syntypes B, BR).

6. **Aegilops peregrina** (Hack.) Maire & Weiller, Fl. Afr. Nord 3: 358 (1955).
Syns. *Triticum peregrinum* Hack. in J. Fraser, Ann. Scot. Nat. Hist. :102 (1907).
Aegilops triuncialis L. var. *brachyathera* Boiss., Fl. Orient. 5: 674 (1884).
Aegilops variabilis Eig, Feddes Repert. 55: 121, 123 (1929).
Aegilops peregrina var. *brachyathera* (Boiss.) Maire & Weiller, Fl. Afr. Nord 3: 360 (1955).
Aegilemma peregrina (Hack.) Á. Löve, Feddes Repert. 95: 499 (1984).

Culms to 40 cm, geniculate below; raceme 1.5-5 cm excluding the awns, narrowly ovoid, falling entire at maturity, comprising (2)3-5 fertile spikelets and (2)3 basal rudiments; spikelets 0.7-1.2 cm excluding the awns, narrowly ovoid, 3- to 5-flowered, the lower 1-3 florets fertile; glumes 5-8 mm, broadly ovate-truncate, glabrous or scabrid on the body, spinulose-scabrid on the nerves, the nerves equal in width, equally spaced and protruding from the surface, the tip with 2 or 3 slender awns 1.5-5 cm, unequally wide at the base, typically 1 glume 2-awned and the other 3-awned; lemmas 6-9 mm, narrowly ovate, the

tip with 1 or 2 very unequal slender awns 0.3-3 cm (shorter than those of the glumes), these flanked by 1 or 2 teeth or short awns to 5 mm.

M, S; sandy ground. Cyprus, Greece, Crete, Libya, Egypt, Palestine, Syria, Turkey, Arabia, Iraq, Iran, Azerbaijan.

NOTE: Van Slageren recognizes 2 varieties of *Aegilops peregrina* on the basis of relative lengths and widths of awns of the glumes and lemmas, but the differences seem rather trivial and do not separate the specimens into two very clear elements.

Tribe 12. **ARUNDINEAE**

Ligule a line of hairs (a membrane in *Arundo*); mostly tussock-forming perennials with basal leaves (except *Arundo* and *Phragmites*, leaves cauline); inflorescence a panicle, the spikelets all alike; spikelets with several fertile florets and imperfect florets above, disarticulating between the florets and above the persistent membranous glumes (spikelets falling ± entire in *Schismus*); lemmas rounded on the back, (1)3- to 11-nerved, hyaline to coriaceous, entire or 2-lobed at the tip, with or without a straight or geniculate awn from the tip or sinus; palea 2-nerved; caryopsis ellipsoid, sometimes with free or separable pericarp; hilum narrowly oblong to linear.

1. Plant reed-like with leaves all cauline, or tussock-forming with harsh leaves confined to the base; panicle large, plumose 2
+ Plant not reed-like, but tufted with basal leaves; panicle not large and plumose 4

2. Tussock-forming plant; leaves all basal 50. **Cortaderia**
+ Reed-like plant; leaves all cauline 3

3. Ligule a membrane; lemma hairy; rhachilla glabrous 51. **Arundo**
+ Ligule a line of hairs; lemma glabrous; rhachilla hairy 52. **Phragmites**

4. Annual; spikelets falling ± entire 48. **Schismus**
+ Perennial from a woody rootstock; spikelets breaking up above the persistent glumes 49. **Centropodia**

48. **Schismus** P. Beauv.

Annual or short-lived perennial; panicle contracted or spike-like; spikelets falling entire, or the upper florets falling singly and then the lower florets, glumes and pedicels falling together later; glumes as long as the spikelet or almost so, membranous with hyaline margins, prominently 5- to 7-nerved; floret callus short; lemmas membranous, 7- to 9-nerved, hairy on the back and margins, 2-lobed or merely notched, mucronate in the sinus. 5 species, southern Africa, Mediterranean region, southwest Asia.

1. Lemmas 2-3.5 mm, the lobes narrowly triangular, 0.6-1.3 mm; palea shorter than the lemma, seldom reaching beyond the middle of the lobes 1. S. **arabicus**
+ Lemmas 1.5-2 mm, the lobes broadly triangular, 0.3-0.4(0.7) mm; palea almost as long as the lemma, often longer 2. S. **barbatus**

1. **Schismus arabicus** Nees, Fl. Afr. Austral. Ill. 1: 422 (1841).
Syn. *Festuca calycina* sensu Forssk., non Loefl.

Annual to 20 cm; panicle 1-3 x 0.5-1 cm, contracted, narrow; spikelets 5-7 mm, 6- to 8-flowered; glumes 4.5-6.2 mm, lanceolate, acuminate; lowest lemma 2-3.5 mm including the 0.6-1.3 mm narrowly triangular apical lobes, 9-nerved; palea 1.6-2.9 mm, always shorter than the lemma, seldom reaching beyond the middle of the lobes.

N, M, D, GE, S; sandy and gravelly soils. Eastern Mediterranean region, southwest and Central Asia to China and northwest India, Eritrea.

2. **Schismus barbatus** (L.) Thell., Bull. Herb. Boissier, sér. 2, 7: 391 (1907).
Syns. *Festuca barbata* L., Amoen. Acad. 3: 400 (1756).
Festuca calycina Loefl., Iter Hispan. 166 (1758).
Schismus marginatus P. Beauv., Ess. Agrostogr. 177, t. 15, 4 (1812).
Schismus calycinus (Loefl.) K. Koch, Linnaea 21: 397 (1848).

Annual to 20 cm; panicle 1-5 x 0.5-1 cm, contracted, dense; spikelets 5-6 mm, 5- to 10-flowered; glumes 3-4.5(6) mm, lanceolate, acute; lowest lemma 1.5-2 mm including the 0.3-0.4(0.7) mm broadly triangular apical lobes, 9-nerved; palea 1.6-2.1 mm, usually reaching almost to the tips of the lemma lobes, sometimes exceeding them.

N, O, M, D, R, GE, S; sandy and gravelly soils. France, Spain, Morocco, Algeria, Tunisia, Libya, Egypt, Syria, Palestine, Arabia, Iraq, Iran, Afghanistan, Pakistan, South Africa, Namibia.

49. **Centropodia** Rchb.
Syn. *Asthenatherum* Nevski

Perennial from a woody rootstock, facultatively annual; leaves stiff, flat or inrolled, pungent; panicle contracted; glumes as long as the spikelet, strongly 7- to 11-nerved; floret callus pungent; lemmas coriaceous, 9-nerved, with lines of short hairs between the nerves, each line terminating above in a long tuft, 2-lobed at the tip, with a straight or geniculate awn from the sinus. 4 species, North Africa through southwest Asia to northern India and southern Africa.

1. Robust plant to 1.2 m (seldom less than 50 cm); panicle 17-35 cm; lowest lemma usually 4.8-6 mm, with an awn projecting 0.1-0.6(1.6) mm beyond the tips of the lobes; anthers 1.6-2.7 mm 1. C. **fragilis**
+ Small plant seldom over 20 cm; panicle 2-14 cm; lowest lemma usually 3.7-5.2 mm, with an awn projecting (0.9)-1.2 mm beyond the tips of the lobes; anthers 0.7-1.2 mm 2. **C. forskaolii**

1. **Centropodia fragilis** (P. Guinet & Sauvage) Cope, Kew Bull. 37: 658 (1983).
Syns. *Danthonia fragilis* P. Guinet & Sauvage, Compt.-Rend. Séances Soc. Sci. Nat. Maroc 6: 73 (1951).
Asthenatherum fragile (P. Guinet & Sauvage) Monod, Bull. Inst. Franç. Afr. Noire 14: 421 (1952).

Robust perennial to 1.2 m, rarely less than 0.5 m; panicle (17)20-35 cm; glumes 0.8-1.05 cm, subequal; lemmas 4.8-6 mm including the callus and the narrowly triangular apical

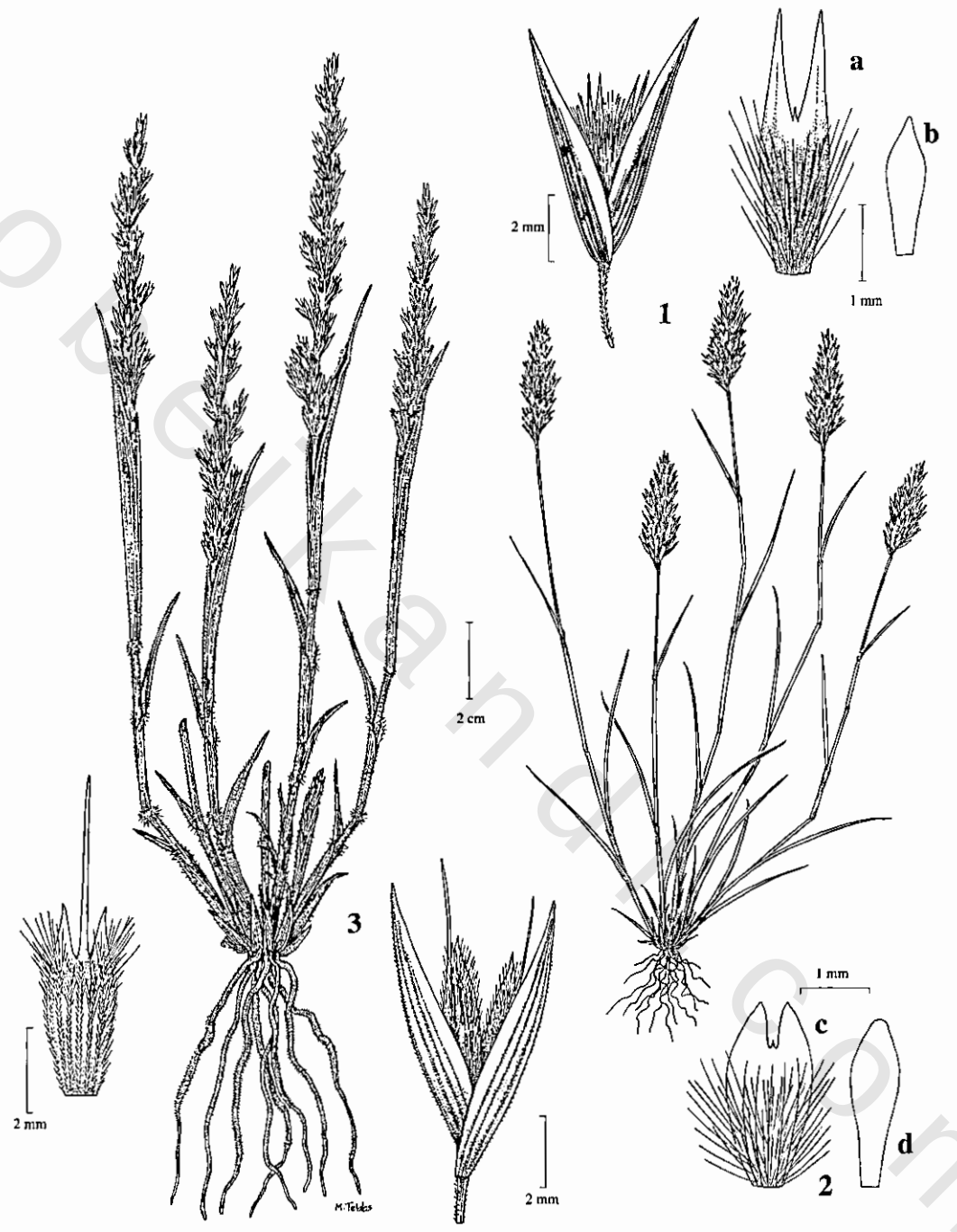


Plate 62. GRAMINEAE: *Schismus arabicus* 1, habit; spikelet (up left); lemma (a); palea (b). *Schismus barbatus* 2; lemma (c); palea (d). *Centropodia forskaolii* 3, habit; spikelet (down right); lemma (down left). Drawn by Margaret Tebbs.

lobes, with a straight awn projecting 0.1-0.6(1.6) mm beyond the tips of the lobes; anthers 1.6-2.7 mm.

S; sandy and gravelly soils. Mauritania, Chad, Libya, Sinai, Arabia.

2. **Centropodia forskaolii** (Vahl) Cope, Kew Bull. 37: 658 (1983).
Syns. *Avena pensylvanica* Forssk.. Fl. Aegypt.-Arab. 23 (1775), non L. (1753).
Avena forskaolii Vahl, Symb. Bot. Upsal. 2 :25 (1791), based on the preceding.
Danthonia forskaolii (Vahl) R. Br. in Denham & Clapperton, Narr. Travels Africa, App. 244 (1826).
Asthenatherum forskaolii (Vahl) Nevski, Trudy Sredne-Aziatsk. Gosud. Univ., Ser. 8b, Bot. 17: 8 (1934).

Perennial, facultatively annual, to 45 cm, but rarely over 20 cm; panicle 2-7(14) cm; glumes 5.5-8.5 mm, subequal; lemma 3.7-5.2 mm including the callus and the narrowly triangular apical lobes, with a straight awn projecting (0.9)1.2-2.2 mm beyond the tips of the lobes; anthers 0.7-1.2 mm.

N, O, M, D, R, GE, S; stable sand dunes and gravel. Tropical and northern Africa, Sinai, Arabia, Palestine, eastwards to Central Asia and Pakistan.

NOTE: The epithet of this species (and several others, as well as a genus) has been the subject of more variation in spelling than almost any other. It is named for Pehr Forsskål who was himself somewhat inconsistent about how he spelled his own name (sometimes using Forsskaal). Most authorities recommend the spelling used here with 'Forssk.' as the preferred abbreviation. With this particular species, the epithet was rendered 'forskålei' by Vahl which after correcting the genitive to -ii becomes 'forskålii.' The Code allows the use of single 's' as chosen by the author, but the 'å' must be rendered as 'ao.' The type of *A. pensylvanica* was collected in Egypt, near Cairo, in 1761 or 1762, by Forsskål (holotype C).

50. **Cortaderia** Stapf, nom. conserv.

Perennial, often tall, rarely with inrolled pungent leaves; gynodioecious, the two forms similar or not; panicle commonly large and plumose, sometimes small; spikelets laterally compressed, 2- to 4-flowered, disarticulating above the glumes and between the florets; glumes longer than the lowest lemma, 2/3 as long to as long as the spikelet, narrow, hyaline, 1(3)-nerved; floret callus linear, hairy; lemmas hyaline, 3- to 5(7)-nerved, plumose on the back, entire or with 2 filiform teeth at the tip, with or without a straight awn; palea glabrous or hairy; female plant with minute or well developed sterile anthers. 24 species, mainly South America, 4 species in New Zealand and 1 in New Guinea.

1. **Cortaderia selloana** (Schult. & Schult.f.) Asch. & Graebn., Syn. Mitteleur. Fl. 2: 325 (1900).
Syns. *Arundo selloana* Schult. & Schult.f., Mant. 3: 605 (1827).
Gynerium argenteum Nees, Agrost. Bras. 462 (1829).

Gynodioecious; culms 2-3(4) m, stout, arising from large tufts; leaf-blades 1-3 m, glaucous, hard with sharply serrate margins; panicle (0.3)0.5-1 m, oblong; branches

erecto-patent in bisexual plants, patent in female plants; spikelets silvery or pinkish, female 1.5-1.8 cm,4- to 6-flowered with silky-hairy lemmas, bisexual 1.8-2.3 mm, 2- to 6-flowered, with glabrous or sparsely pilose lemmas; glumes of both types lanceolate, the upper with a long terminal awn; lemmas with long terminal awn, that of bisexual spikelets longer than that of female spikelets.

Cultivated ornamental (Pampas grass). Native to Brazil, Argentina, Paraguay, Uruguay.

NOTE: The bisexual plants of *Cortaderia selloana* have such reduced viability that they function more or less as pollen parents and the species is virtually dioecious. It is normally the female that is grown because of its more decorative silky-hairy panicle. Without a male plant in the vicinity no viable seed is set.

51. **Arundo** L.

Tall rhizomatous perennial reeds; leaves all cauline; ligule membranous with minutely ciliolate margin; panicle large, plumose; spikelets (1)few-flowered, the florets all fertile or the uppermost ± reduced; glumes as long as the spikelet, 3- to 5-nerved; floret-callus short, glabrous; rhachilla glabrous; lemmas membranous, 3- to 7-nerved, 3 of the nerves percurrent or excurrent, the rest short, plumose below the middle, entire or 2-toothed at the tip, with a short straight awn from between the teeth. 3 species, Mediterranean region, Sinai, eastwards to China, widely introduced elsewhere.

1. **Arundo donax** L., Sp. Pl., ed. 1, 81 (1753).

Culms to 5 m, arising from creeping woody rhizomes; leaves 30-60 x 2.5-5 cm, conspicuously distichous, the blades linear-lanceolate, rounded or cordate at the base; panicle 30-60 cm; spikelets 1-1.5 cm; glumes subequal, the lower a little shorter than the upper, lanceolate to narrowly lanceolate; lemmas (0.6)0.85-1.3 cm, the hairs to 7 mm, 3 of the nerves produced as short awns, the longest *c.* 1.5 mm.

N, O, M, D, S; planted along water-courses, rarely occurring as a native. Mediterranean region, Sinai, eastwards to Myanmar, introduced elsewhere.

52. **Phragmites** Adans.

Tall rhizomatous aquatic or semi-aquatic perennial reeds; leaves all cauline, the blades deciduous; ligule a very short membrane with long-ciliate margin; panicle large, plumose; spikelets 3- to 11-flowered, the lowest floret male or empty, the following bisexual, the uppermost ± reduced, disarticulating above the sterile floret and between the fertile florets; glumes shorter than the lowest lemma, 3- to 5-nerved; floret-callus linear, plumose; rhachilla plumose; lowest lemma ± persistent; fertile lemmas hyaline, 1- to 3-nerved, glabrous, long-caudate, entire (the tail very fragile and often breaking off). 3 or 4 species, cosmopolitan.

NOTE: The species of *Phragmites* are very hard to distinguish; they are, for the most part, allopatric but the possibility of there being just a single widespread species may repay further consideration.

1. Leaf-blades scabrid beneath (at least in the upper part), the tips attenuate, stiff; rhachilla-hairs 4-7 mm; upper glume 3-5 mm ..... 1. **P. mauritianus**

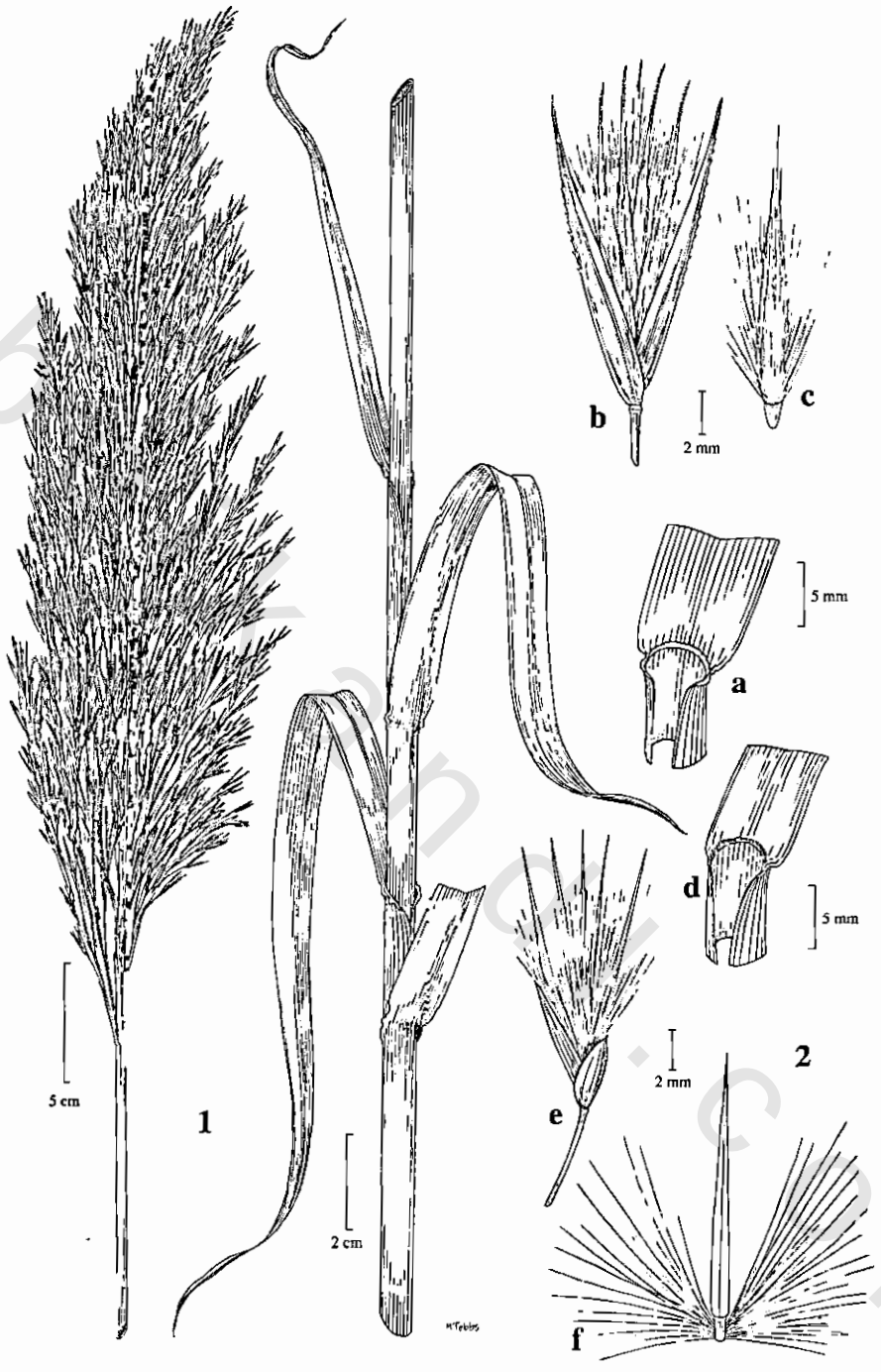


Plate 63. GRAMINEAE: *Arundo donax* 1, inflorescence and part of the culm with leaves; ligule (a); spikelet (b); floret (c). *Phragmites australis*; ligule (d); spikelet (e); floret (f). Drawn by Margaret Tebbs.

+ Leaf-blades smooth beneath, the tips filiform and flexuous; rhachilla-hairs 0.8-1.25 cm; upper glume 5.5-9 mm 2. **P. australis**

1. **Phragmites mauritianus** Kunth, Révis. Gramin. 1: 277 (1830).
Syns. *Phragmites laxiflorus* Steud., Syn. Pl. Glumac. 1: 196 (1854).
Phragmites communis Trin. var. *mauritianus* (Kunth) Baker, Fl. Mauritius 454 (1877).

Culms 2-8 m, to 4 cm diam., often woody and bamboo-like, arising from long stout creeping rhizomes; leaf-blades to 75 x 0.6-4 cm, glabrous, scabrid beneath (at least in the upper half), the tips attenuate and stiff or even pungent; panicle 30-50 cm; spikelets 0.7-1.6 cm, the rhachilla-hairs 4-7 mm and rather sparse; glumes 3-5 mm, subequal, shortly acuminate at the tip; lowest lemma 7-8 mm, narrowly elliptic; fertile lemmas 8-9 mm, narrowly lanceolate.

N; along water-courses. Tropical Africa and Madagascar, the northern limit more or less passing through Ethiopia, Sudan and Zaire.

2. **Phragmites australis** (Cav.) Trin. ex Steud., Nomencl. Bot., ed. 2, 2: 324 (1841).

Culms to 6 m, arising from creeping rhizomes; leaf-blades 20-60 x 0.8-3.2 cm, glabrous, smooth beneath, the tips filiform and flexuous (sometimes obscurely scaberulous or with attenuate tips in subsp. *altissimus*); panicle 15-45 cm; spikelets 1.2-1.8 cm, the rhachilla-hairs 0.8-1.25 cm, copious and silky; glumes unequal, the lower 3-4.5 mm, ovate, the upper 5.5-9 mm, lanceolate or narrowly elliptic-oblong, sharply acute, obtuse or tridenticulate at the tip; lowest lemma 0.8-1.5 cm, linear-lanceolate to linear-oblong; fertile lemmas 0.9-1.3 cm, very narrowly lanceolate.

Two subspecies occur in Egypt:

subsp. **australis**
Syns. *Arundo phragmites* L., Sp. Pl., ed. 1, 81 (1753).
Arundo donax sensu Forssk., Fl. Aegypt.-Arab. 23 (1775), non L. (1753).
Arundo australis Cav., Anales Hist. Nat. 1: 100 (1799).
Phragmites communis Trin., Fund. Agrost. 134 (1820), based on *Arundo phragmites* L.
Arundo isiaca Delile in Schult., Mant. 2: 288 (1824), non Delile (1814).
Phragmites communis var. *stenophylla* Boiss., Fl. Orient. 5: 563 (1884).

Culms to 4 m; panicle 15-20(30) cm; spikelets with upper glume lanceolate, sharply acute, usually apiculate.

N, O, M, D, R, S; along water-courses, in areas of cultivation and on sandy plains with seasonally high water-table. Temperate regions of both hemispheres of the World.

NOTE: The type of *Arundo isiaca* (1824) was collected in Rosetta, Egypt, by Sieber (isotypes K), but this is probably not the same plant that Delile described in 1814, based on the dubious *Arundo maxima* of Forsskål. The identity of the latter is not known, but it is suspected to be subsp. *altissimus*. Plants with short pungent distichous leaves often found in desert areas were hitherto separated as var. *stenophylla*, but rhizomes bearing shoots with this sort of leaf have been traced back to normal plants growing nearer to a water supply.

subsp. **altissimus** (Benth.) Clayton, Taxon 17: 169 (1968).

Syns. *Arundo altissima* Benth., Cat. Pl. Pyrénées 62 (1826).
?*Arundo maxima* Forssk., Fl. Aegypt.-Arab. 24 (1775), nom. dub.
Arundo isiaca Delile, Descr. Egypte Hist. Nat. 2: 52 (1814), nom. superfl., based on *Arundo maxima* Forssk., non *A. isiaca* Delile (1824).
Phragmites maxima (Forssk.) Blatt. & McCann, Bombay Grasses 202 (1935).

Culms to 6 m; panicle 30-45 cm; spikelets with upper glume narrowly elliptic-oblong, obtuse to tridenticulate.

N, M, D; along water-courses. Coasts of the Mediterranean Sea, extending eastwards to Iran and southwards to Kenya, Ethiopia and the southern edge of the Sahara.

NOTE: The type of *Arundo maxima* is treated as a nomen dubium. No authentic material has been found and it is impossible to decide whether or not it is indeed *P. australis* subsp. *altissimus*. Forsskål gave it as '*Arundo donax maxima*' and the possibility that it is *A. donax* cannot be ruled out. Delile (1814) based *A. isiaca* on this taxon, so the name is likewise to be treated as dubious. However, in 1824 Delile cited an extant Sieber specimen as the basis of *A. isiaca* and this can be positively identified as subsp. *australis*.

Tribe 13. **ARISTIDEAE**

Ligule a line of hairs; inflorescence an open to contracted panicle, the spikelets all alike; spikelets 1-flowered without rhachilla-extension, laterally compressed or terete, disarticulating above the persistent glumes; glumes longer than the body of the lemma (rarely shorter in *Aristida*), membranous to scarious, mostly acute to acuminate; lemmas terete (rarely laterally compressed), 1- to 3-nerved, coriaceous, wrapped around and concealing the palea, 3-awned, the awns ± connate at the base and often raised upon a twisted column, the laterals sometimes reduced; palea less than half as long as the lemma, sometimes scarcely longer than the lodicules; stamens 3, rarely 1; caryopsis usually fusiform, the hilum linear.

1. Central awn, and sometimes also lateral awns, plumose — 53. **Stipagrostis**
\+ All three awns glabrous — 54. **Aristida**

53. **Stipagrostis** Nees

Syn. *Schistachne* Fig. & De Not.

Perennial, rarely annual, sometimes with knotty rhizomatous base or suffruticose; leaf-blades mostly inrolled, sometimes pungent; glumes 1- to 11-nerved; callus of floret long and pungent; lemma convolute; awns with or without a column, the central always, the laterals sometimes, plumose. About 50 species, Africa, southwest Asia to Pakistan, Central Asia.

1. Body of lemma articulated at or just above the middle, the awns and column breaking off with the conical upper part of the lemma (Sect. *Schistachne*) — 1. **S. ciliata**
\+ Body of lemma articulated at the summit, the awns and column breaking off cleanly without a part of the lemma (Sect. *Stipagrostis*) — 2

2. All three awns plumose, at least in the upper part — 3
\+ Only the central awn plumose, the lateral awns quite glabrous — 5

3. Internodes of the culm, or at least the lower, densely woolly; awns plumose only in the upper part, or the central hairy almost to the base — 2. **S. lanata**
\+ Internodes of the culm glabrous, or at most minutely pubescent; all 3 awns plumose throughout — 4

4. Lower glume longer than the upper — 3. **S. scoparia**
\+ Lower glume shorter than the upper — 4. **S. vulnerans**

5. Internodes of the culm, or at least the lower, densely woolly — 6
\+ Internodes of the culm glabrous, scaberulous or minutely pubescent — 11

6. Central awn plumose to the base — 7
\+ Central awn glabrous in the lower part — 8

7. Panicle lax, the spikelets spreading on long slender pedicels; central awn *c.* 2 mm; column 2-3 mm — 5. **S. drarii**
\+ Panicle narrow and dense, the spikelets on short stiff pedicels; central awn 3.5-5 cm; column 0.8-1.1 cm — 6. **S. raddiana**

8. Glumes 1- to 3-nerved — 9
\+ Lower glume 5- to 9-nerved; upper glume 3- to 5-nerved — 10

9. Glumes 8-9 mm; lemma (including the callus) *c.* 5 mm; central awn *c.* 1.5 cm; column less than 1 mm — 7. **S. acutiflora**
\+ Glumes 1.5-1.8 cm; lemma (including the callus) 6-7 mm; central awn 2.5-6.5 cm; column to 1 cm — 8. **S. plumosa**

10. Loosely tufted annual — 9. **S. shawii**
\+ Densely tufted perennial — 10. **S. multinerva**

11. Column hairy — 12
\+ Column glabrous — 13

12. Callus of floret with 2 collars of hair, a lower of very short hairs just behind the tip, and an upper of much longer hairs adjacent to the base of the lemma-body, the callus conspicuously glabrous between the collars — 11. **S. hirtigluma**
\+ Callus of floret with one continous band of hair, the hairs increasing in length upwards and the callus glabrous only at the tip — 12. **S. uniplumis**

13. Central awn plumose to the base, 6-7 cm — 13. **S. paradisea**
\+ Central awn glabrous in the lower half, 2-3 cm — 14. **S. obtusa**

1. **Stipagrostis ciliata** (Desf.) De Winter, Kirkia 3: 133 (1963).
Syns. *Aristida plumosa* Desf., Fl. Atlant. 1: 109 (1798), non L. (1763).
Aristida ciliata Desf., Neues J. Bot. 3: 255 (1809), based on the above.
Aristida schimperi Hochst. & Steud. ex Steud., Syn. Pl. Glumac. 1: 143 (1854), in syn.

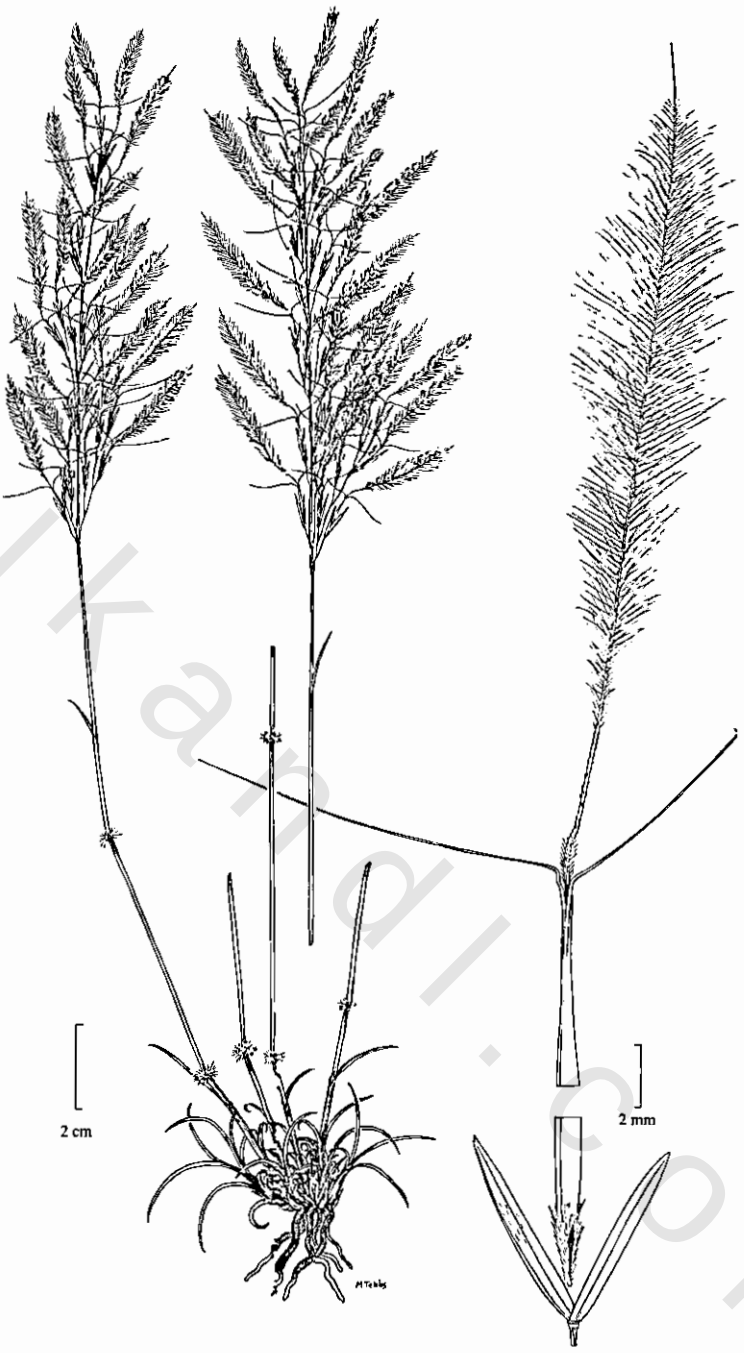


Plate 64. GRAMINEAE: *Stipagrostis ciliata*, habit; a single spikelet showing the disarticulation of the awns (right); 2 glumes (down right). Drawn by Margaret Tebbs.

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Densely tufted perennial to 80 cm, with conspicuously bearded nodes; panicle contracted or rather loose, the spikelets pallid and often with a purple spot at the base; glumes 1.2-1.4 cm, subequal, 3-nerved, narrowly ovate, glabrous; lemma 1-1.1 cm including both the column and the bearded callus, smooth, passing gradually into the awns without a column, or the column well developed and to 3.5 mm; column glabrous, it and the awns becoming detached at maturity with the conical upper portion of the lemma; central awn 4-5 cm, plumose in the upper two-thirds but with a naked excurrent tip; lateral awns up to 2.5 cm long, glabrous.

N, M, D, R, GE, S; sandy and gravelly soils. Canary Islands, Madeira, Morocco, Algeria, Tunisia, Libya, Egypt, Palestine, Iraq, Iran, Afghanistan, Sudan.

NOTE: The type of *Aristida schimperi* was collected on Mt. Sinai in 1835 by Schimper (no. 161, isotypes K).

2. **Stipagrostis lanata** (Forssk.) De Winter, Kirkia 3: 135 (1963).
Syns. *Aristida lanata* Forssk., Fl. Aegypt.-Arab. 25 (1775).
Aristida forskohlii Tausch, Flora 19: 506 (1836).

Tufted perennial to 40 cm; lower internodes densely woolly; panicle contracted, not fully exserted from the uppermost leaf-sheath; glumes unequal, narrowly lanceolate, glabrous or faintly puberulent, subacute, the lower 1.1-1.2 cm, 1- to 3-nerved, the upper 1.4-1.5 cm, 3-nerved; lemma 4.5-5.5 mm including the bearded callus; column 2.5-5 mm, glabrous; central awn 2.5-3.5 cm, plumose at least in the upper half, sometimes throughout; lateral awns 2-2.5 cm, plumose in the middle third.

N, M, O, D, S: sand dunes and palm groves. Egypt, Palestine, Syria.

NOTE: The type of *Aristida lanata* has not yet been found, though it was supposed to have been collected in Egypt. The type of *A. forskohlii* was collected in Egypt by Sieber.

3. **Stipagrostis scoparia** (Trin. & Rupr.) De Winter, Kirkia 3: 136 (1963).
Syn. *Aristida scoparia* Trin. & Rupr., Sp. Gram. Stipac. 176 (1842).

Suffrutescent perennial to 60 cm; internodes glabrous; leaf-blades tightly inrolled, stiff and pungent, curved outwards; panicle oblong, open and rather sparse; glumes linear-lanceolate, glabrous or faintly pubescent towards the tip, subacute to acuminate or shortly awned; lower glumes 1.8-2 cm, 5-nerved, the upper 1.5-1.6 cm, 3-nerved; lemma 7-8 mm including the subglabrous callus; column *c.* 1 mm, glabrous; awns to 1 cm, subequal, densely plumose throughout.

N, O, M, D, S; sandy soils. Niger, Libya, Egypt, Palestine, Syria.

NOTE: Type material of *Aristida scoparia* was collected in Egypt, near the Pyramids, Giza by Aucher-Eloy (no. 2988, isosyntype K) and in 1835 at Abu Zabel by Schimper (no. 36, isosyntypes K).

4. **Stipagrostis vulnerans** (Trin. & Rupr.) De Winter, Kirkia 3: 136 (1963).
Syns. *Aristida vulnerans* Trin. & Rupr., Sp. Gram. Stipac. 175 (1842).
Aristida pungens, auct. plur. non Desf.



Plate 65. GRAMINEAE: *Stipagrostis lanata* 1, a single spikelet showing the disarticulation of the awns (a); upper glume with 3 nerves (b); 2 glumes (c). *Stipagrostis scoparia* 2, inflorescence; spikelet (d); a single spikelet showing the disarticulation of the awns (e). *Stipagrostis vulnerans* 3, inflorescence; spikelet (f); a single floret showing the disarticulation of the awns (g). Drawn by Margaret Tebbs.

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Suffrutescent perennial to 60 cm; internodes glabrous; leaf-blades tightly inrolled, stiff and pungent, usually straight; panicle oblong, dense, not fully exserted from the uppermost leaf-sheath; glumes unequal, 1(3)-nerved, scabrid on the keel above; lower glumes *c.* 9 mm, broadly lanceolate, with an apical awnlet *c.* 1.5 mm, the upper 1-1.1 cm, erose at the tip and with an awnlet *c.* 1 mm; lemma *c.* 5 mm including the subglabrous callus; column to 1 mm, glabrous; awns *c.* 1 cm, subequal, plumose throughout except for the naked excurrent tip.

N, O, D; sandy soils. Chad, Libya, Egypt.

NOTE: The type of *Stipagrostis vulnerans* was collected in Egypt at Aswan ('Syene') by Sieber (isotype K).

5. **Stipagrostis drarii** (Täckh.) De Winter, Kirkia 3: 133 (1963)
Syns. *Aristida drarii* Täckh., Svensk Bot. Tidskr. 36: 244 (1942).
Stipagrostis arabiifelicis Bor, Österr. Bot. Z. 114: 100 (1967).

Tufted perennial to 1 m; lower internodes densely woolly; panicle open, the branches and pedicels filiform; glumes unequal, 3-nerved, lanceolate-acuminate (the upper sometimes with an awnlet), scaberulous; lower glumes 7.5-9.5 mm, the upper 0.95-1.05 cm; lemma 4.5-5.5 mm including the bearded callus, smooth; column 1.5-2 mm, glabrous; central awn 1.3-2.5 cm, plumose throughout except for the naked excurrent tip; lateral awns 0.7-1.7 cm, glabrous.

S; desert sands. Sinai, Palestine, Arabia, Iraq.

NOTE: The type of *Aristida drarii* was collected in Sinai, Mitla Pass, in 1939 by Mohammed Drar no. 589, (holotype, S).

6. **Stipagrostis raddiana** (Savi) De Winter, Kirkia 3: 135 (1963).
Syn. *Aristida raddiana* Savi, Mem. Mat. Fis. Soc. Ital. Sci. 21: 198 (1837).

Tufted perennial to 40 cm; lower internodes woolly; panicle contracted, not fully exserted from the uppermost leaf-sheath; glumes unequal, lanceolate-acuminate, glabrous; the lower 1.7-1.8 cm, 3-nerved, the upper 1.4-1.5 cm, 1(3)-nerved; lemma 5-5.5 mm including the bearded callus, scaberulous; column 1.1-1.4 cm, glabrous; central awn 5.5-7 cm, plumose throughout except for the naked excurrent tip; lateral awns 1.5-1.8 cm, glabrous.

N, O, D, GE, S; sandy and rocky deserts. Egypt, Palestine, Arabia, Iraq, Iran, Afghanistan.

NOTE: The type of *Aristida raddiana* was collected in Egypt by Raddi, but no further details are available.

7. **Stipagrostis acutiflora** (Trin. & Rupr.) De Winter, Kirkia 3: 133 (1963).
Syns. *Aristida acutiflora* Trin. & Rupr., Sp. Gram. Stipac. 167 (1842).
Aristida zittelii Asch., Verh. Bot. Vereins Prov. Brandenbourg 21: 70 (1880).

Tufted perennial to 65 cm; lower internodes densely woolly; panicle contracted; glumes slightly unequal, lanceolate-acuminate (or the upper frequently mucronate), scaberulous;



Plate 66. GRAMINEAE: *Stipagrostis raddiana* 1, habit; a single spikelet showing the disarticulation of the lemma (left); 2 glumes (down left). *Stipagrostis drarii* 2, a single spikelet showing the disarticulation of the awns; 2 glumes (down). Drawn by Margaret Tebbs.

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lower glume 8-8.5 mm, 1- to 3-nerved, the upper 8.5-9 mm, 3-nerved; lemma 4.5-5 mm including the bearded callus, smooth; column 1-1.5 mm, glabrous; central awn 1.3-1.8 cm, plumose in the upper half but with a naked excurrent tip, the feather nevertheless very obtuse in outline; lateral awns 0.6-0.8 cm, glabrous.

N, D, R, S; desert sands. Chad, Niger, Mauritania, Algeria, Tunisia, Libya, Egypt, Arabia.

NOTE: The type of *Aristida zittelii* was collected in Egypt, between Asiyut and Farafra Oasis in 1873 by Ascherson (no. 2498).

8. **Stipagrostis plumosa** (L.) Munro ex T. Anderson, J. Linn. Soc., Bot., Suppl. 1: 40 (1860).
   Syns. *Aristida plumosa* L., Sp. Pl., ed. 2, 1666 (1763).
   Aristida brachypoda Tausch, Flora 19: 506 (1836).
   Aristida plumosa L. var. *seminuda* Trin. & Rupr., Sp. Gram. Stipac. 166 (1842).
   Aristida plumosa L. var. *alexandrina* Trin. & Rupr., Sp. Gram. Stipac. 166 (1842).
   Stipagrostis brachypoda (Tausch) De Winter, Kirkia 3: 133 (1963).
   Stipagrostis plumosa (L.) Munro ex T. Anderson var. *brachypoda* (Tausch) Bor, Taxon 16: 467 (1967).
   Stipagrostis plumosa (L.) Munro ex T. Anderson var. *alexandrina* (Trin. & Rupr.) Täckh., Publ. Cairo Univ. Herb. 5: 58 (1974).
   Stipagrostis rigidifolia H. Scholz, Willdenowia 6: 295 (1971).
   Stipagrostis plumosa (L.) Munro ex T. Anderson subsp. *seminuda* (Trin. & Rupr.) H. Scholz, Willdenowia 6: 295 (1971).

Slender tufted perennial to 40 cm, sometimes robust and to 1 m; lower internodes densely woolly, the lower leaf-sheaths also woolly or sometimes glabrous; panicle usually contracted, but looser in the more robust plants; glumes unequal, 1- to 3-nerved, lanceolate-acuminate, glabrous, the lower 0.85-1.15 cm, the upper 1.15 -1.3 cm; lemma, including the bearded callus, 4-5.5 mm; column 2.5-9 mm, glabrous; central awn 2.5-6 cm, plumose in the upper half to two-thirds but with a naked excurrent tip, the feather ± acute in outline; lateral awns 1-2 cm, glabrous.

N, O, M, D, R, GE, S; sandy and stony soils. Africa north of the Sahara, eastwards through Arabia, Turkey and Palestine to Pakistan and northwest India.

NOTE: *Stipagrostis plumosa* comprises several more or less intergrading elements sometimes recognised at specific or varietal rank: '*plumosa*' has wool on the lower leaf-sheaths as well as on the internodes; '*seminuda*' is similar but has a longer glabrous portion to the central awn; '*alexandrina*' is also similar but has less densely woolly internodes; '*brachypoda*' has glabrous leaf-sheaths but rather more flexuous blades; '*rigidifolia*' also has glabrous sheaths but has stiffer blades. Supposed differences in column, awn and callus lengths do not seem to be very helpful and the complex is best treated as a single variable species. The type of var. *seminuda* was collected in Sinai, near El Tor, in 1835 by Schimper (no. 174, isosyntypes K); the type of var. *alexandrina* was collected in Egypt, Alexandria, by Ehrenberg; and the type of *A. brachypoda* was collected in Egypt by Sieber (?isotype K).

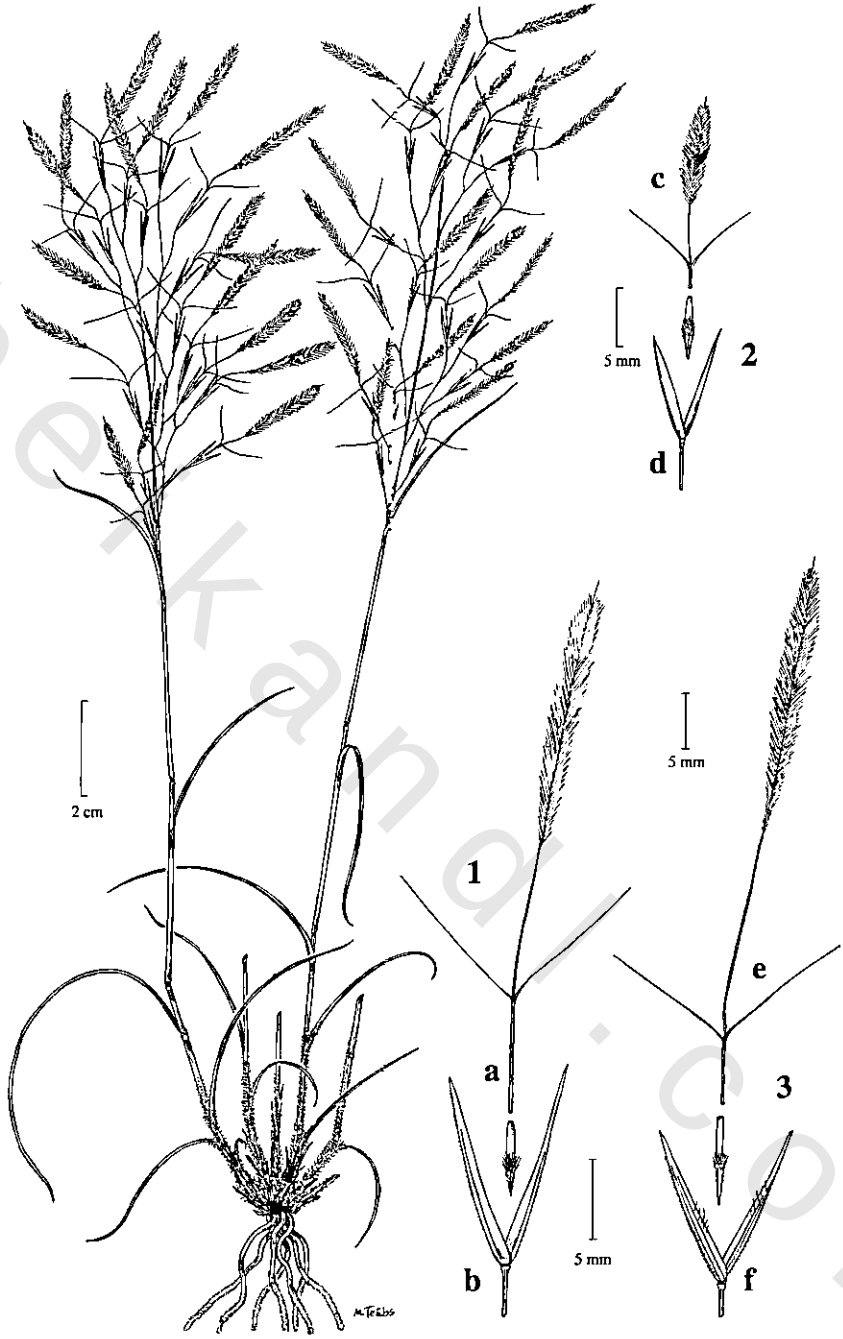


Plate 67. GRAMINEAE: *Stipagrostis plumosa* 1, habit; a single spikelet showing the disarticulation of the lemma (a); 2 glumes (b). *Stipagrostis acutiflora* 2, a single spikelet showing the disarticulation of the lemma (c); 2 glumes (d). *Stipagrostis multinerva* 3, a single spikelet showing the disarticulation of the awns (e); 2 glumes (f). Drawn by Margaret Tebbs.

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9. **Stipagrostis shawii** (H. Scholz) H. Scholz, Österr. Bot. Z. 117: 290 (1969).
Syn. *Aristida shawii* H. Scholz, Willdenowia 5: 475 (1969).

Annual to 15 cm; lower internodes woolly, the lower leaf-sheaths also woolly; panicle lax, sparse, exserted or not fully exserted from the uppermost leaf-sheath; glumes unequal; the lower 1.1-1.3 cm, 7(9)-nerved, puberulent to pilose in the middle, otherwise scaberulous; upper glume 1.5-1.6 cm, 5-nerved, scabrid above, pilose in the middle, glabrous below; lemma 5-6 mm including the bearded callus, smooth; column 3-5 mm, glabrous; central awn to 4.5 cm, plumose in the upper half to two-thirds except for the naked excurrent tip; lateral awns 1.2-1.5 cm, glabrous.

O (? Uweinat); sandy soil. Libya, Egypt, Sudan.

NOTE: *Stipagrostis shawii* is known only from the type which was said to have been collected on the Libyan side of Jebel Uweinat in 1932 by W.B.K. Shaw (no. 29, holotype K). It has never been refound either on Jebel Uweinat or in the surrounding countryside. Léonard (Flore et Végétation du Jebel Uweinat (Désert de Libye, Egypte, Sudan), part 1, 1997) discussed the likely provenance of the type specimen in some detail and concluded that it was most likely to have been collected neither in Egypt nor in Libya but in Sudan, not far from the Chad frontier, on the eastern side of the Ennedi Massif.

10. **Stipagrostis multinerva** H. Scholz, Österr. Bot. Z. 117: 289 (1969).

Tufted perennial to 30 cm; lower internodes woolly, the lower leaf-sheaths also woolly; panicle contracted, not fully exserted from the uppermost leaf-sheath; glumes unequal, lanceolate-acuminate, pilose on the back, the lower *c.* 1.4 cm, 5- to 7-nerved, the upper 1.4-1.6 cm, 3- to 5-nerved; lemma, 6-7 mm including the bearded callus, smooth; column *c.* 5 mm, glabrous; central awn 3.5-4.5 cm, plumose in the upper half but with a naked excurrent tip; lateral awns *c.* 1.4 cm, glabrous.

S; low dunes. Sinai, Arabia, Iran.

NOTE: Material recently identified with this species from Oman and Iran seems to be annual. Should this indeed be the case, then distinguishing it from *Stipagrostis shawii* would be very problematic, suggesting that there may be just a single species. *S. multinerva* is only provisionally accepted for this Flora; one of the two specimens from Sinai quoted by Scholz (and the only one seen so far) has proved to be *S. plumosa*.

11. **Stipagrostis hirtigluma** (Steud. ex Trin. & Rupr.) De Winter, Kirkia 3: 136 (1963).
Syn. *Aristida hirtigluma* Steud. ex Trin. & Rupr., Sp. Gram. Stipac. 171 (1842).

Annual or short-lived perennial to 45 cm; internodes and leaf-sheaths glabrous or scaberulous; panicle contracted, although the spikelets on rather long filiform pedicels; glumes unequal, narrowly lanceolate, 3-nerved, pilose on the back, obtuse, the midnerve shortly excurrent, the lower glume 7.5-9.5 mm, the upper 1-1.15 cm; lemma, including the bearded callus, 3-4.5 mm, papilliose-scabrid; callus with 2 collars of hairs, a lower, just behind the naked tip, of very short hairs all about the same length, and an upper, at the summit of the callus, of hairs about half as long as the body of the lemma, the callus glabrous between the collars; column 0.7-1.3 cm, pilose, especially towards the junction of the awns; central awn 4-7 cm, plumose throughout except for the naked excurrent tip, sometimes only sparsely hairy below; lateral awns 1-1.6 cm.

O, De, R, GE, S; desert sand and rocky mountains. Tropical and southern Africa, through

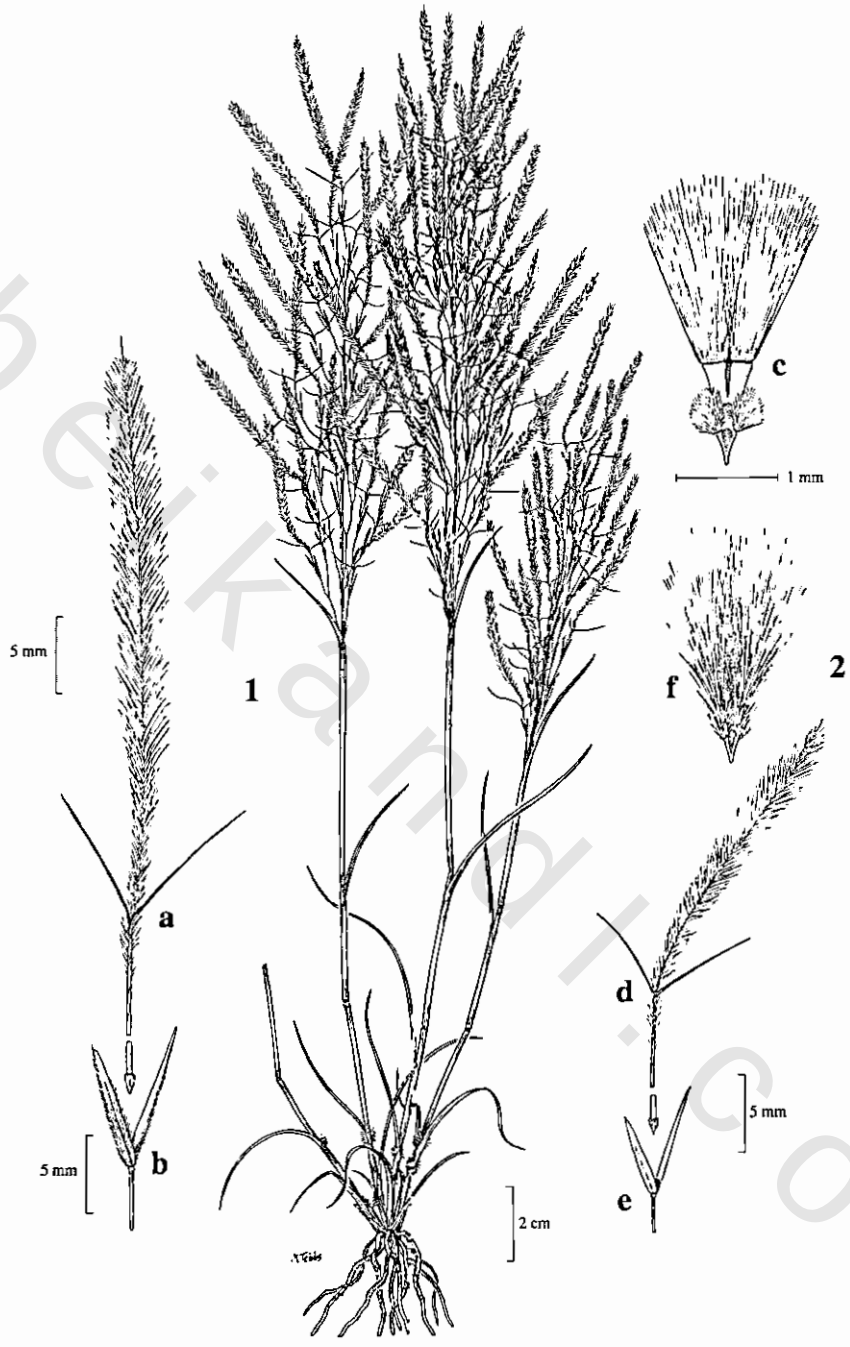


Plate 68. GRAMINEAE: *Stipagrostis hirtigluma* 1, habit; a single spikelet showing the disarticulation of the lemma (a); 2 glumes (b); callus (c). *Stipagrostis uniplumis* 2; a single spikelet showing the disarticulation of the awns (d); 2 glumes (e); callus (f). Drawn by Margaret Tebbs.

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Egypt and Arabia to Pakistan and India.

NOTE: The type of *Aristida hirtigluma* was collected in Sinai, 'Wadi Hebran,' in 1835 by Schimper (no. 165, isotype K).

12. **Stipagrostis uniplumis** (Licht.) De Winter, Kirkia 3: 136 (1963).
Syns. *Aristida uniplumis* Licht., Roem. & Schult., Syst. Veg. 2: 401 (1817).
Aristida papposa Trin. & Rupr., Sp. Gram. Stipac. 173 (1842).
Arthratherum pogonoptilum Jaub. & Spach, Ill. Pl. Orient. 4: 56, t. 337 (1851).
Aristida pogonoptila (Jaub. & Spach) Boiss., Fl. Orient. 5: 496 (1884).
Stipagrostis papposa (Trin. & Rupr.) De Winter, Kirkia 3: 136 (1963).
Stipagrostis pogonoptila (Jaub. & Spach) De Winter, Kirkia 3: 136 (1963).

Tufted, short-lived perennial to 75 cm; internodes and leaf-sheaths glabrous; panicle contracted, although the spikelets on long filiform branches and pedicels; glumes unequal, narrowly lanceolate, 3-nerved, glabrous or thinly pilose on the back; lower glumes 7-8 mm, shortly bifid at the tip with the central nerve excurrent, the upper 0.9-1.05 cm, narrowed above into a short awn; lemma 2.5-3 mm including the bearded callus, papillose-scabrid; callus with a single collar of hairs behind the naked tip, these increasing in length upwards; column 0.65-1 cm, pilose, especially (and sometimes only) at the junction of the awns; central awn 3-4 cm, plumose throughout, sometimes thinly so below, with or without a naked excurrent tip; lateral awns 0.8-1.2 cm, glabrous.

De, GE; wadi beds. Tropical and southern Africa through Arabia to Pakistan.

13. **Stipagrostis paradisea** (Edgew.) De Winter, Kirkia 3: 135 (1963).
Syns. *Aristida paradisea* Edgew., Asiat. Soc. Bengal 16: 1219 (1847).
Arthratherum caloptilum Jaub. & Spach, Ill. Pl. Orient. 4: 54, t. 336 (1851).
Aristida caloptila (Jaub. & Spach) Boiss., Fl. Orient. 5: 497 (1884).

Tufted perennial to 40 cm, much-branched at the base; internodes and leaf-sheaths glabrous; panicle contracted; glumes unequal, lanceolate-subulate, 3-nerved, glabrous, the lower 1.4-1.9 cm, the upper 1.2-1.4 cm; lemma, including the bearded callus, 4-4.5 mm, smooth; column 1.1-1.4 cm, glabrous; central awn 6-7 cm, plumose throughout except for the naked excurrent tip; lateral awns 1.6-2.5 cm, glabrous.

N, De; rocky ground. Somalia, Egypt, Arabia, Iran, Afghanistan.

14. **Stipagrostis obtusa** (Delile) Nees, Linnaea 7: 293 (1832).
Syn. *Aristida obtusa* Delile, Descr. Égypte, Hist. Nat. 175, t. 13, f. 2 (1814).

Densely tufted perennial to 30 cm, the leaves mostly confined to a basal cushion; lower leaf-sheaths disintegrating into a persistent tuft of whitish fibres; internodes glabrous; panicle contracted; glumes 0.83-1 cm, subequal, 3-nerved, narrowly lanceolate-acuminate, glabrous; lemma 2.5-4 mm including the bearded callus, smooth; column 3.5-8 mm, glabrous; central awn 2-3 cm, plumose in the upper half, without a naked excurrent tip and the feather very obtuse in outline; lateral awns 1-1.5 cm, glabrous.

N, M, De, S; sandy and gravelly soils. South and southern tropical Africa northwards to Ethiopia, thence westwards through much of Africa north of the Sahara and eastwards

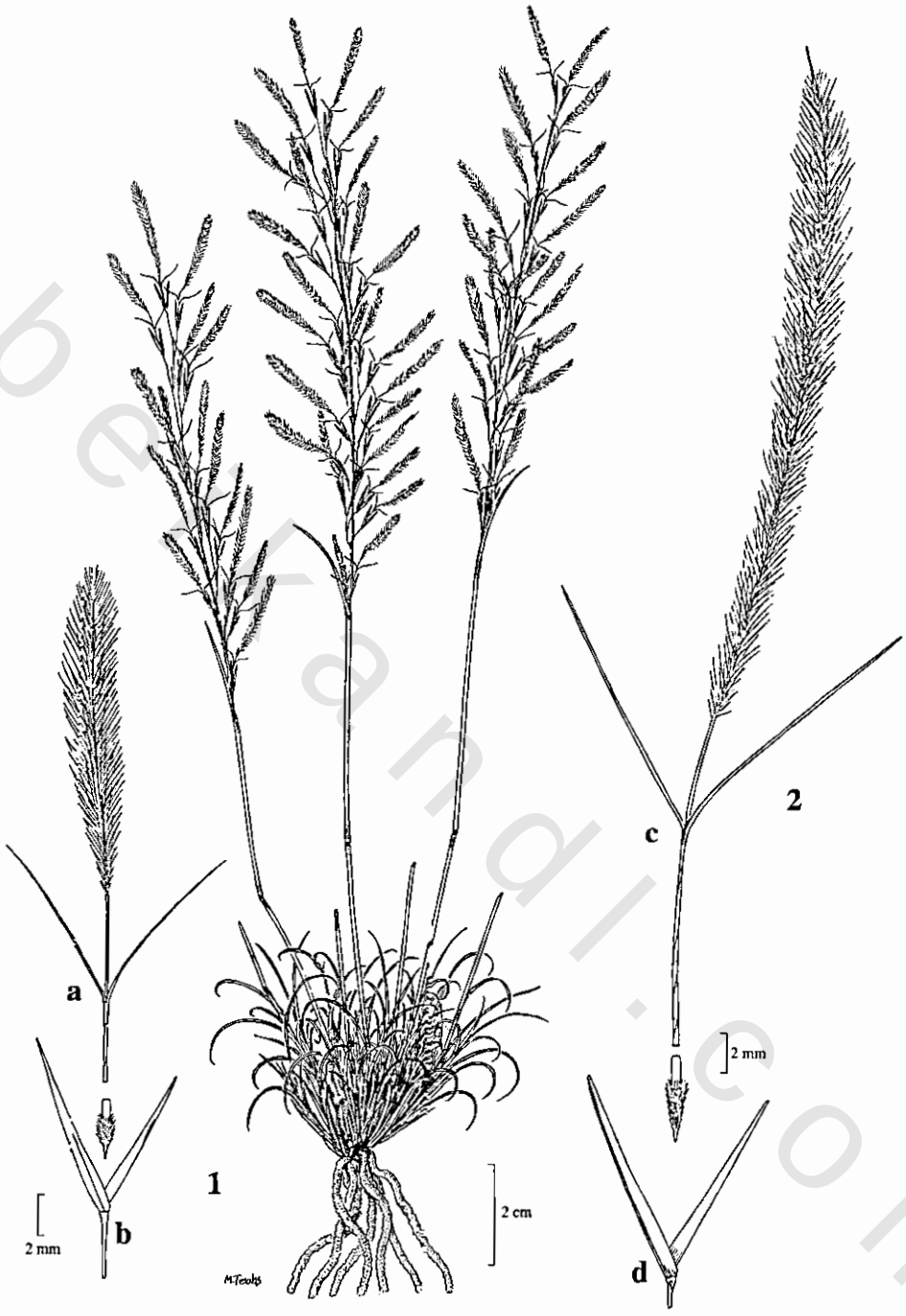


Plate 69. GRAMINEAE: *Stipagrostis obtusa* 1, habit; a single spikelet showing the disarticulation of the lemma (a); 2 glumes (b). *Stipagrostis paradisea* 2; a single spikelet showing the disarticulation of the awns (c); 2 glumes (d). Drawn by Margaret Tebbs.

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through Arabia and Palestine to Pakistan.

NOTE: The type of *Aristida obtusa* was collected in Egypt, from the desert between Cairo and Suez, in 1800 by Delile (holotype MPU, isotype K).

54. **Aristida** L.

Annual or perennial; leaf-blades flat or rolled; glumes 1-nerved (rarely more); callus of floret obtuse to pungent; lemma convolute or involute; awns with or without a column, persistent or deciduous, glabrous, flat or terete, sometimes the laterals reduced or suppressed; caryopsis terete, or grooved when lemma involute. About 250 species, tropics and subtropics.

1. Awns without a column; lemma not articulated at the summit (Sect. *Aristida*) 1. **A. adscensionis**
\+ Awns with a column; lemma or column articulated at the summit 2

2. Articulation at the summit of the lemma where it meets the column (Sect. *Arthratherum*) 2. **A. funiculata**
\+ Articulation at the summit of the column, just below the meeting point of the awns (Sect. *Pseudarthratherum*) 3. **A. mutabilis**

1. **Aristida adscensionis** L., Sp. Pl., ed. 1, 82 (1753).
Syns. *Aristida paniculata* Forssk., Fl. Aegypt.-Arab. 25 (1775).
Aristida depressa Retz., Observ. Bot. 4: 22 (1786/7).
Aristida caerulescens Desf., Fl. Atlant. 1: 109, t. 21, f. 2 (1798).
Aristida festucoides Poir., Encycl. Lam. Suppl. 1: 433 (1810).
Aristida pumila Decne., Ann. Sci. Nat. (Paris), sér. 2, 4: 85 (1835).
Aristida vulgaris Trin. & Rupr. var. *abyssinica* Trin. & Rupr., Sp. Gram. Stipac. 134 (1842).
Aristida vulgaris Trin. & Rupr. var. *aethiopica* Trin. & Rupr., Sp. Gram. Stipac. 134 (1842).
Aristida ehrenbergii Trin. & Rupr., Sp. Gram. Stipac. 136 (1842).
Aristida adscensionis L. var. *pumila* (Decne.) Coss. & Durieu, Fl. Alger. Glum. 84 (1855).
Aristida caerulescens Desf. var. *breviaristata* Schweinf., Bull. Herb. Boissier 2, app. 2: 27 (1894).
Aristida adscensionis L. var. *aethiopica* (Trin. & Rupr.) T. Durand & Schinz, Consp. Fl. Afr. 5: 799 (1895).
Aristida adscensionis L. var. *ehrenbergii* (Trin. & Rupr.) Henrard, Meded. Rijks-Herb. 54: 158 (1926).
Aristida adscensionis L. var. *festucoides* (Poir.) Henrard, Meded. Rijks-Herb. 54: 177 (1926).
Aristida caerulescens Desf. var. *arabica* Henrard, Meded. Rijks-Herb. 58A: 310 (1932).
Aristida adscensionis L. var. *typica* subvar. *abyssinica* (Trin. & Rupr.) Henrard, Meded. Rijks-Herb. 58A: 325 (1932).
Aristida caerulescens Desf. var. *exilis* Schweinf. ex Blatt., Fl. Arab. 497 (1936).

Annual or short-lived perennial to 75 cm, but usually much less; panicle usually

contracted about the primary branches, these either spreading or appressed to the main axis; glumes unequal, linear-lanceolate to lanceolate, the lower 4-8.5 mm, the upper 0.7-1.15 cm; lemma (0.5)1.15-1.7 cm including the bearded callus, laterally compressed, scabrid on the keel and sometimes also on the flanks, passing into the awns without either column or articulation; awns terete, the central (0.7)1.5-2.5 cm, the laterals similar or a little shorter.

N, O, D, R, GE, S; ubiquitous weed. Throughout the tropics and subtropics.

NOTE: *Aristida adscensionis* is a variable species but perhaps not as variable as the extensive list of synonyms might suggest. The more important variants are the annuals (*adscensionis* sensu str.) and the short-lived perennials (*caerulescens*); the species is capable of switching from one to the other depending on ambient conditions. Perennials predominate in the tropics and annuals in more seasonal climates.

2. **Aristida funiculata** Trin. & Rupr., Sp. Gram. Stipac. 159 (1842).
Syns. *Aristida royleana* Trin. & Rupr., Sp. Gram. Stipac. 160 (1842).
Aristida kotschyi Hochst. ex Steud., Syn. Pl. Glumac. 1: 142 (1854), in syn.

Annual to 30 cm; panicle sparse, contracted, scarcely exserted from the uppermost leaf-sheath; glumes unequal, linear-lanceolate, long-acuminate at the tip, the lower 1.5-2.5 cm, the upper 1.3-2 cm; lemma-body, including the bearded callus, 4-7.5 m, terete, smooth, articulated at the summit and bearing a column 2-4.5 cm; awns 4.5-8.5 cm, subequal, filiform.

O (Uweinat), M, De, R, GE, S; sandy soils. Tropical Africa from Senegal to Somalia and Kenya, to Egypt, Arabia, Afghanistan, Pakistan, India and Myanmar.

NOTE: The type of *Aristida kotschyi* was collected in Upper Egypt by Kotschy (no. 98, isotype K).

3. **Aristida mutabilis** Trin. & Rupr., Sp Gram. Stipac. 150 (1842).
Syns. *Aristida meccana* Hochst. ex Trin. & Rupr., Gram. Stipac. 152 (1842).
Aristida mutabilis Trin. & Rupr. var. *aequilonga* Trin. & Rupr., Gram. Stipac. 151 (1842).
Aristida mutabilis Trin. & Rupr. var. *meccana* (Hochst. ex Trin. & Rupr.) Fenzl in sched., Kotschy, Pl. Aethiop. no. 103.
Aristida schweinfurthii Boiss., Fl. Orient. 5: 493 (1884).
Aristida schweinfurthii Boiss. var. *boissieri* Schweinf., Bull. Herb. Boissier 2, app. 2: 28 (1894).
Aristida cassanellii A. Terracc., Annuario Reale Ist. Bot. Roma 5: 94 (1894).

Annual to 35 cm; panicle open or contracted, the spikelets clustered at the tips of the branches; glumes unequal, lanceolate, acute, acuminate or shortly 2-toothed at the tip, with a mucro or awnlet to 1 mm, the lower 3.5-5.5 mm, the upper 5.5-7 mm; lemma, including the bearded callus, 5-8 mm, terete, smooth, narrowed above into a column a little less than half the total length of the lemma, the column articulated at the summit; awns slender, terete, 1.5-2.5 cm.

O (Uweinat), De, R, GE, S; sand. Tropical Africa from Mauritania, eastwards to Egypt, Arabia, Pakistan, India.

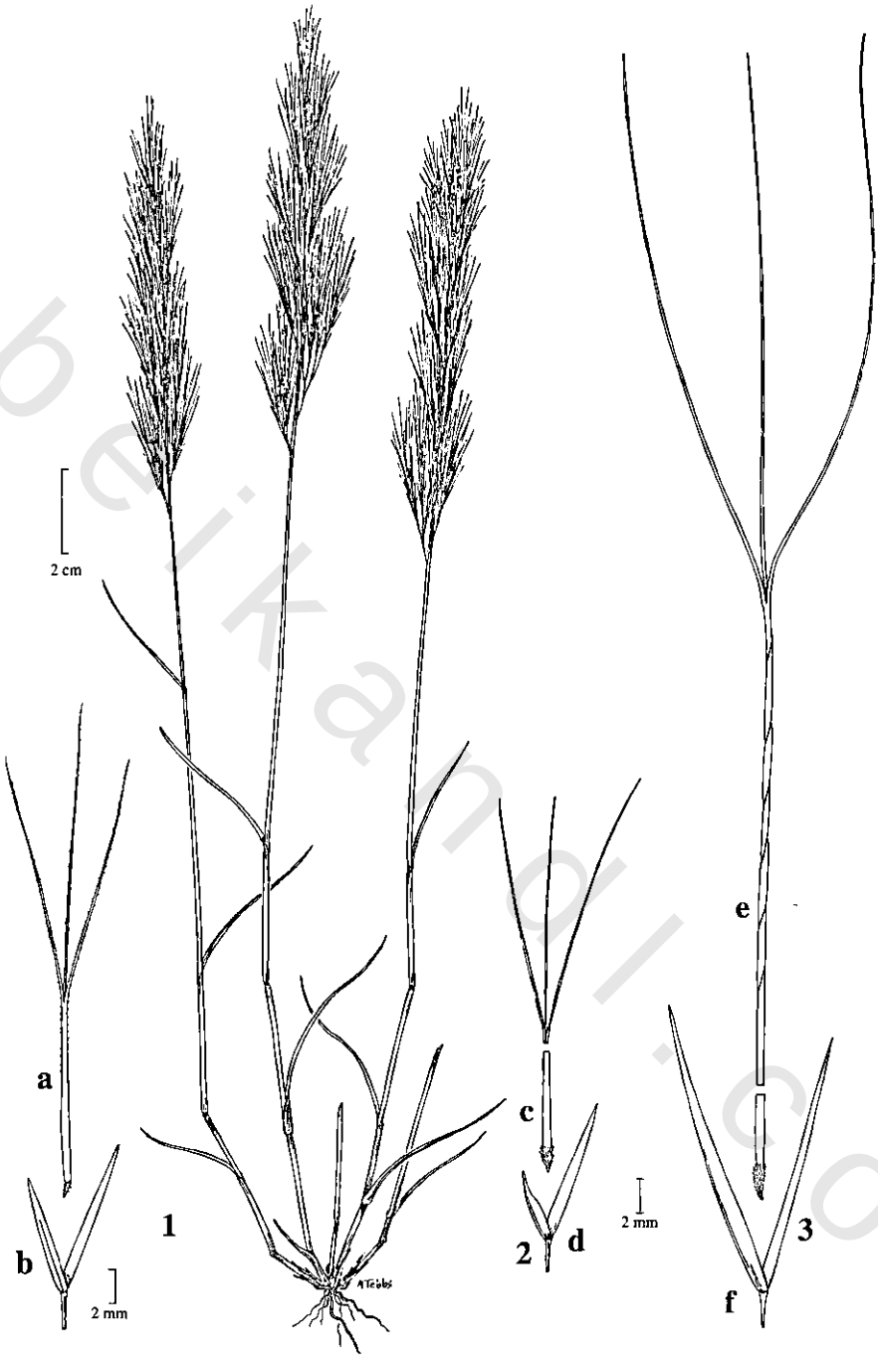


Plate 70. GRAMINEAE: *Aristida adscensionis* 1, habit; spikelet showing absence of disarticulation (a); two glumes (b). *Aristida mutabilis* 2, a single spikelet showing the disarticulation of the awns (c); two glumes (d). *Aristida funiculata* 3; a single spikelet showing the disarticulation of the awns (e); two glumes (f). Drawn by Margaret Tebbs.

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NOTE: The type of *Aristida schweinfurthii* was collected in Egypt, between 'Kosseir' and 'Ras-Benass,' (Red Sea coast) in 1867 by Schweinfurth (no. 2517, holotype G, isotype K).

Tribe 14. **PAPPOPHOREAE**

Ligule a line of hairs; inflorescence a dense, often narrow panicle, the spikelets all alike; spikelets several-flowered, slightly laterally compressed, the lowermost 1 or 2 florets bisexual, the upper progressively reduced, disarticulating above the glumes but not between the florets; glumes persistent, thinly membranous, distinctly 3- to 9-nerved, at least as long as the body of the lowermost lemma, entire; lemmas 9- to 11-nerved, broad, rounded on the back, the nerves produced into 5-9 awns or hyaline lobes; palea-keels ciliate; stamens 3; hilum punctiform.

1. Lemma 9-awned — 55. **Enneapogon**
+ Lemma 5-awned, the awns alternating with 6 hyaline lobes — 56. **Schmidtia**

55. **Enneapogon** P. Beauv.

Perennial, sometimes annual; leaf-blades usually narrow, often inrolled; spikelets with only 1 fertile floret; lemmas chartaceous to coriaceous, hairy below the middle, with 9 ciliate (rarely scaberulous) awns; uppermost florets reduced to a brush-like appendage. 28 species, tropics and subtropics, especially Africa and Australia.

1. Awns of fertile lemma scaberulous throughout — 1. **E. scaber**
+ Awns of fertile lemma ciliate for most of their length, scaberulous only towards the tip — 2

2. Fertile lemma with 3 dense patches of hair on the back, one along the mid-nerve and one along each margin — 2. **E. lophotrichus**
+ Fertile lemma with hairs on the back evenly distributed — 3

3. Basal leaf-sheaths persistent, forming a bulbous swelling to the base of the culm, eventually disintegrating into a cushion of fibres; spikelets 3.5-6 mm long; third lemma vestigial, 0.3-0.8 mm long — 3. **E. desvauxii**
+ Basal leaf-sheaths neither forming a bulbous swelling to the base of the culm nor disintegrating into a cushion of fibres; spikelets 6-13 mm long; third lemma well developed, 2.5-9(10.5) mm long, often accompanied by a vestigial fourth — 4. **E. persicus**

1. **Enneapogon scaber** Lehm., Nov. Stirp. Pug. 3: 41 (1831).
Syn. *Pappophorum scabrum* (Lehm.) Kunth, Enum. Pl. 1: 255 (1833).

Tufted perennial to 35 cm; basal leaf-sheaths remaining intact; panicle loosely contracted; spikelets 4.8-6 mm; lower glume 3.7-5.2 mm, 7-nerved, the upper 4.5-6.5 mm, 5-nerved; fertile lemma 5-6.5 mm including the awns, hairy on the back all over; awns scaberulous; anthers 1.3-2.7 mm; third lemma 0.3-0.6 mm, vestigial.

GE; stony ground. Mauritania, Morocco, Algeria, Egypt, Arabia, Eritrea, Somalia, Angola, Namibia.

2. **Enneapogon lophotrichus** Chiov. ex H. Scholz & P. König, Willdenowia 13: 369 (1983).

Annual to 20 cm; basal leaf-sheaths remaining intact; panicle loosely contracted, oblong; spikelets 6.5-7 mm; glumes often flushed with pink, the lower 3.5-5 mm, 7- to 9-nerved, the upper 5-7 mm, 5- to 7-nerved; fertile lemma 6-7.5 mm including the awns, hairy on the back in 3 patches, one along the mid-nerve and one along each margin; awns ciliate; anthers 0.3-0.5 mm; third lemma 3.2-5.3 mm, well developed (but barren), usually accompanied by a vestigial fourth lemma.

GE; wadi beds. Egypt, Arabia, Ethiopia, Somalia.

3. **Enneapogon desvauxii** P. Beauv., Ess. Agrostogr. 82, t. 16,11 (1812).
Syns. *Pappophorum phleoides* Trin., Spreng., Neue Entd. 2: 73 (1821).
Pappophorum brachystachyum Jaub. & Spach, Ill. Pl. Orient. 4: 34, t. 324 (1851).
Pappophorum bulbosum Fig. & De Not., Mem. Reale Accad. Sci. Torino, ser. 2, 12: 254 (1852).
Pappophorum arabicum Hochst. & Steud., Steud., Syn. Pl. Glumac. 1: 199 (1854).
Enneapogon brachystachyus (Jaub. & Spach) Stapf, Dyer, Fl. Cap. 7: 654 (1900).

Tufted perennial, or sometimes annual, to 18 cm; basal leaf-sheaths persistent, forming a pseudobulbous base to the culm and usually ultimately disintegrating into a tuft of fibres; panicle densely contracted, spike-like; spikelets 3.5-6 mm; lower glume 1.8-3.5 mm, 7-nerved, the upper 2-4.5 mm, 5-nerved; fertile lemma 3.4-6 mm including the awns, hairy on the back all over; awns ciliate; anthers 0.4-0.8(1.2) mm; third lemma 0.3-0.8 mm, vestigial.

De, R, GE, S; sandy soils and rock fissures. Cape Verde Islands, North Africa, through Arabia to India and China, tropical Africa from Chad and Somalia southwards to the Cape.

NOTE: The type of *Pappophorum bulbosum* was collected in Sinai by Figari (holotype FT, isotype K).

4. **Enneapogon persicus** Boiss., Diagn. Pl. Orient. 1(5): 71 (1844).
Syns. *Pappophorum schimperianum* Hochst. ex A. Rich., Tent. Fl. Abyss. 2: 403 (1850).
Pappophorum aucheri Jaub. & Spach, Ill. Pl. Orient. 4: 32, t. 323 (1851).
Pappophorum elegans Nees ex Steud., Syn. Pl. Glumac. 1: 199 (1854).
Pappophorum persicum (Boiss.) Steud., Syn. Pl. Glumac. 1: 200 (1854).
Enneapogon elegans (Nees ex Steud.) Stapf, Bull. Misc. Inform., Kew 1907: 224 (1907).
Enneapogon schimperianus (Hochst. ex A. Rich.) Renvoize, Kew Bull. 22: 400 (1968).

Tufted perennial to 50 cm; basal leaf-sheaths remaining intact; panicle loosely or densely contracted, spike-like or lobed; spikelets 0.6-1.3 cm; glumes often deeply suffused with purple, the lower 0.35-0.75(1) cm, 7-nerved, the upper 0.45-1.03 cm, 7-nerved; fertile

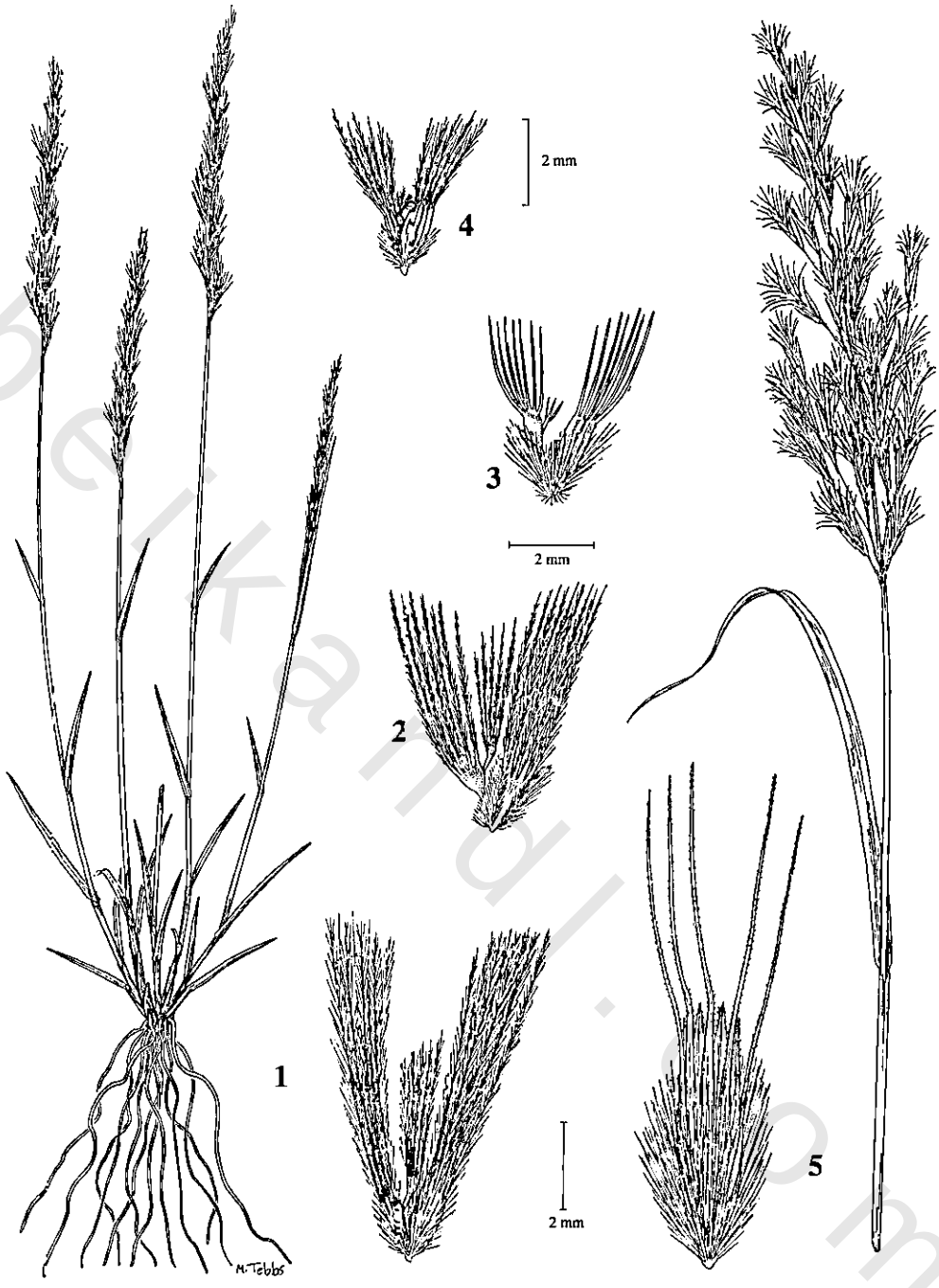


Plate 71. GRAMINEAE: *Enneapogon persicus* 1, habit; spike (down right). *Enneapogon lophotrichus* 2, spikelet. *Enneapogon scaber* 3, spikelet. *Enneapogon desvauxii* 4, spikelet. *Schmidtia pappophoroides* 5, inflorescence; lemma (down left). Drawn by Margaret Tebbs.

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lemma 0.6-1.3 cm including the awns, hairy on the back all over; awns ciliate; anthers 0.6-1 mm; third lemma 0.25-0.9(1.05) cm, often well developed (but barren), sometimes accompanied by a vestigial fourth lemma.

N, GE; rocky ground. Tropical Africa through South and southwest Asia to India.

56. **Schmidtia** Steud., nom. conserv.

Annual or perennial; leaf-sheaths and blades bearing gland-tipped hairs and often sticky; spikelets 4- to 6(9)-flowered; lemmas subcoriaceous, hairy below the middle, 6-lobed, the hyaline lobes (which are themselves sometimes awned) alternating with 5 scaberulous awns; uppermost 1 or 2 florets sterile and reduced. 2 species, Africa and Pakistan.

1. **Schmidtia pappophoroides** Steud. in J. A. Schmidt, Beitr. Fl. Cap. Verd. Ins. 145 (1852).

Shortly rhizomatous perennial, often also with long surface stolons, to 90 cm, swollen at the base and often more or less suffrutescent; panicle loose or slightly contracted; spikelets to 1.5 cm; lower glume 4.6-7.5 mm, the upper 6-9 mm; lowest lemma 0.85-1.4 cm including the lobes; awns 4.5-8 mm.

O; sandy ground. Ethiopia to southern and West tropical Africa; Cape Verde Islands, Socotra, Pakistan.

Tribe 15. **ERAGROSTIDEAE**

Ligule membranous or a line of hairs; inflorescence a panicle or of tough unilateral racemes, these digitate or scattered along an axis, rarely solitary, the spikelets all alike; spikelets sometimes 1-flowered, typically several- to many-flowered with the lower florets fertile and the uppermost ± reduced, usually laterally compressed, commonly disarticulating below each floret but with a wide variety of other abscission modes; glumes mostly persistent (except *Eragrostis* and *Sporobolus* in particular), usually membranous, 0- to 1-nerved and shorter than the lowermost lemma (but some exceptions), entire; lemmas membranous to coriaceous, 1- to 3-nerved (except *Aeluropus*), entire or 2- to 3-lobed and then occasionally with small subsidiary teeth between the lobes, with or without 1(3) straight or flexuous terminal awns; grain sometimes with a free pericarp.

1. Spikelets 2- to several-flowered — 2
\+ Spikelets 1-flowered — 15

2. Lemmas 9- to 11-nerved — 57. **Aeluropus**
\+ Lemmas 3-nerved (if clavate-hairy on the back below see *Desmazeria*), sometimes 1 or more subsidiary nerves present on either side of the keel in *Eleusine* — 3

3. Tip of lemma emarginate to 2- to 3-lobed, or the flanks hairy between the lateral nerves and the margin, or florets conspicuously bearded from the callus — 4
\+ Tip of lemma entire, the nerves and flanks glabrous; florets not bearded from the callus — 11

4. Grain strongly flattened, concavo-convex with a free pericarp — 65. **Coelachyrum**
\+ Grain seldom flattened and then not with a free pericarp — 5

5. Inflorescence a panicle — 58. **Triraphis**
\+ Inflorescence comprising 2 or more racemes — 6

6. Racemes persistent — 7
\+ Racemes deciduous — 10

7. Lower glume much longer than the lowest lemma — 61. **Trichoneura**
\+ Lower glume not longer than the lowest lemma — 8

8. Spikelets disarticulating above the glumes but not between the florets — Tribe 16. *Cynodonteae*
\+ Spikelets disarticulating between the florets or the rhachilla persistent — 9

9. Florets bearded from the callus — 60. **Halopyrum**
\+ Florets not bearded from the callus — 59. **Leptochloa**

10. Glumes as long as the spikelet, enclosing the florets; racemes arranged along a central axis — 62. **Dinebra**
\+ Glumes not or scarcely exceeding the adjacent lemmas; racemes digitate — 63. **Ochthochloa**

11. Inflorescence a panicle — 64. **Eragrostis**
\+ Inflorescence comprising 2 or more racemes — 12

12. Racemes terminating in a rigid naked point — 68. **Dactyloctenium**
\+ Racemes terminating in a fertile or abortive spikelet — 13

13. Racemes arranged on a long central axis — 69. **Desmostachya**
\+ Racemes digitate or ± whorled — 14

14. Rhachilla fragile, the spikelets disarticulating between the florets; lemma-tip awnless and the lateral nerves not excurrent — 66. **Eleusine**
\+ Rhachilla tough, the lemmas disarticulating but leaving the persistent paleas; lemma-tip awn-pointed and the lateral nerves slightly excurrent — 67. **Acrachne**

15. Inflorescence a short and very dense spike-like panicle subtended by an inflated leaf-sheath bearing a rudimentary blade; if elongate and not enclosed by the uppermost sheath then plant annual — 71. **Crypsis**
\+ Inflorescence a spreading or spike-like panicle, but not subtended by an inflated leaf-sheath; plant perennial — 70. **Sporobolus**

57. **Aeluropus** Trin.

Stoloniferous perennials; ligule a very short membrane fringed with hairs; inflorescence capitate to spike-like, comprising short dense racemes appressed to a central axis (sometimes a single ovoid raceme in *A. lagopoides*); spikelets several-flowered, disarticulating below each floret; glumes shorter than the lemmas, the lower 1- to 3-nerved, the upper 5- to 7-nerved; lemmas rounded on the back, chartaceous, strongly 9-

to 11-nerved, glabrous or hairy on the margins, entire or emarginate, apiculate; caryopsis ellipsoid. 3 or 4 species, Mediterranean region, eastwards to China and Sri Lanka, Ethiopia.

1. Inflorescence a globose, ellipsoid or oblong head, sometimes reduced to a raceme of closely crowded spikelets; lemmas hairy 1. **A. lagopoides**
+ Inflorescence elongate, comprising several widely spaced racemes; lemmas glabrous 2. **A. littoralis**

1. **Aeluropus lagopoides** (L.) Trin. ex Thwaites, Enum. Pl. Zeyl. 374 (1864).
Syns. *Dactylis lagopoides* L., Mant. 33 (1767).
Dactylis brevifolia K.D. Koenig ex Willd., Sp. Pl., ed. 4, 1: 410 (1797), nom. superfl., based on *Dactylis lagopoides*.
Dactylis repens Desf., Fl. Atlant. 1: 79, t.15 (1798).
Calotheca niliaca Spreng., Syst. Veg. 1: 348 (1825).
Dactylis repens Sieber ex Spreng., Syst. Veg. 1: 348 (1825), in syn., non *Dactylis repens* Desf.
Aeluropus villosus Trin. ex C.A. Mey., Verz. Pfl. Casp. Meer :18 (1831), nom. superfl., based on *Dactylis repens*.
Poa massauensis Fresen., Mus. Senckenberg. 2: 143 (1837).
Aeluropus brevifolius (K.D. Koenig ex Willd.) Nees ex Steud., Nomencl. Bot., ed. 2, 1: 30 (1840).
Aeluropus niliacus (Spreng.) Steud., Nomencl. Bot., ed. 2, 1: 30 (1840).
Aeluropus repens (Desf.) Parl., Fl. Ital. 1: 462 (1848).
Dactylis massauensis (Fresen.) Steud., Syn. Pl. Glumac. 1: 298 (1854).
Aeluropus littoralis (Gouan) Parl. var. *repens* (Desf.) Coss. & Durieu, Expl. Sci. Algérie 2: 155 (1855).
Aeluropus massauensis (Fresen.) Mattei, Boll. Reale Orto Bot. Giardino Colon. Palermo 9: 64 (1910).

Sub-shrubby or sward-forming, with long creeping stolons, to 15(30) cm; leaf-blades narrow, spreading, sometimes subdistichous, soft and tapering, but typically distichous, rigid and pungent, hairy or glabrous; inflorescence (0.5)1-2(2.5) x (0.5)1-1.5 cm, a globose, ellipsoid or oblong head, sometimes reduced to a solitary raceme of closely crowded spikelets; spikelets 2.5-4.5 mm, elliptic-oblong, 4- to 8-flowered; glumes elliptic, unequal, villous, the lower 1.4-1.7 mm, the upper 1.8-2.2 mm; lemmas 2.4-2.8 mm, broadly elliptic, villous on the margins, apiculate.

N, O, M, D, R, GE, S; damp and arid places, both fresh and saline. Mediterranean region, Red Sea coasts through southwest Asia to Central Asia, India, Sri Lanka.

NOTE: The type of *Calotheca niliaca* was collected in Egypt, at the mouth of the Nile, by Sieber.

2. **Aeluropus littoralis** (Gouan) Parl., Fl. Ital. 1: 461 (1848).
Syn. *Poa littoralis* Gouan, Fl. Monsp. 470 (1765).

Stoloniferous to 30 cm high; leaf-blades narrow, distichous, rigid and pungent, glabrous or with tubercle-based hairs; inflorescence to 10 cm, spike-like, the spikelets densely crowded in numerous short racemes which are about their own length apart; spikelets 3-3.5 mm, elliptic, 6- to 9-flowered; glumes 1.25-1.5 mm, subequal, glabrous, the lower narrower than the upper; lemmas 1.7-2.5 mm, broadly elliptic, glabrous, apiculate.

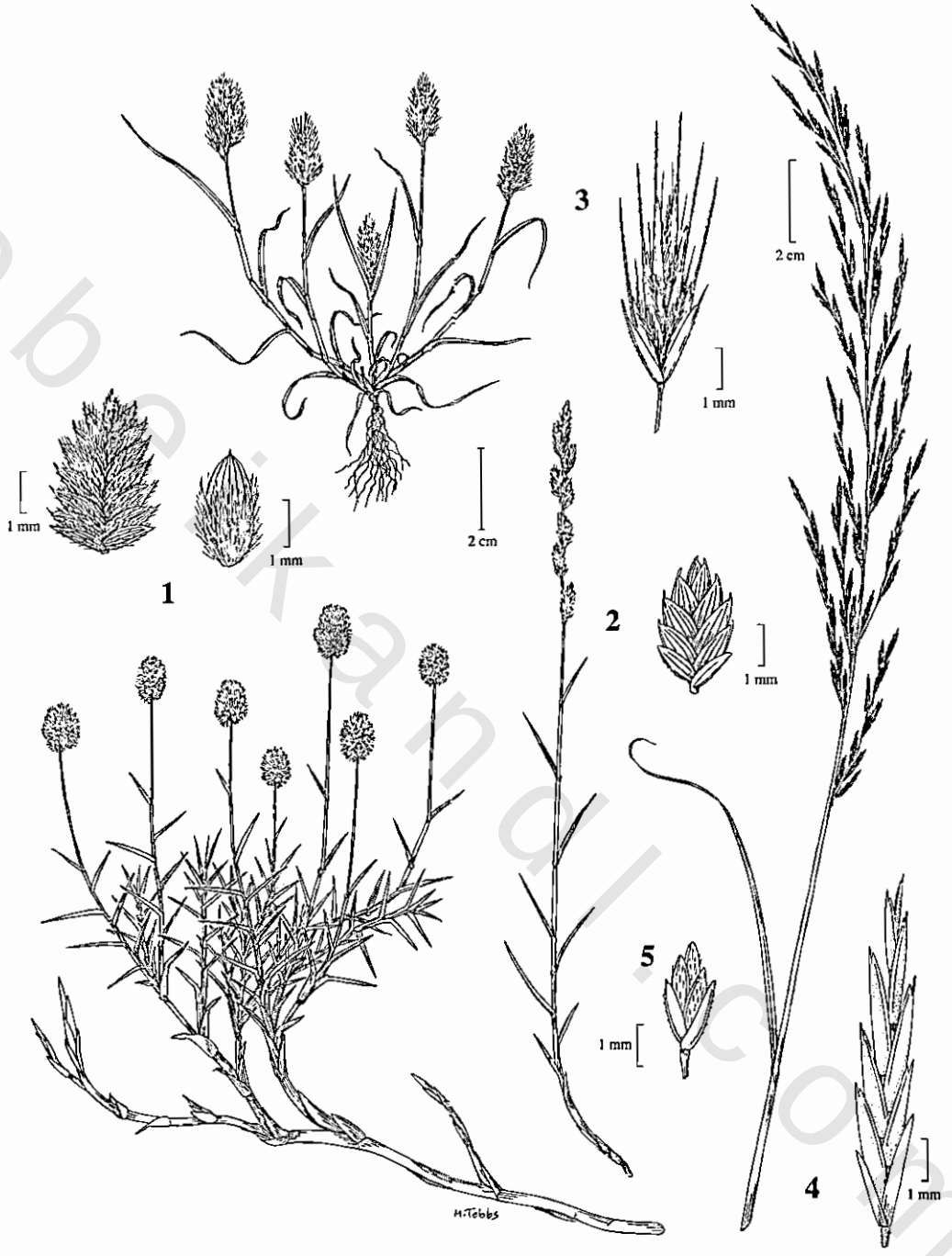


Plate 72. GRAMINEAE: *Aeluropus lagopoides* 1, habit; spikelet (up left); lemma (up middle). *Aeluropus littoralis* 2, inflorescence; spikelet (up right). *Triraphis pumilio* 3, habit; spikelet (right). *Leptochloa fusca* 4, inflorescence; spikelet (down right). *Leptochloa panicea* 5, spikelet. Drawn by Margaret Tebbs.

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R, S; sandy and saline soils. Mediterranean region, eastwards to eastern Asia.

58. **Triraphis** R. Br.

Annual or perennial; ligule membranous or a line of hairs; inflorescence an open or contracted, rarely spike-like, panicle; spikelets several-flowered, disarticulating below each floret; lemmas keeled, villous on the lateral nerves, 3-lobed, 3-awned, the central lobe 2-dentate; caryopsis linear, trigonous in section. 7 species, Africa and Arabia, 1 in Australia.

1. **Triraphis pumilio** R. Br. in Denham & Clapperton, Narr. Travels Africa, app. 91, 92 (1826).
   Syns. *Diplachne nana* Nees, Fl. Afr. Austral. Ill. 259 (1841).
   Triraphis nana (Nees) Hack., Bot. Jahrb. Syst. 11: 403 (1890).
   Triraphis glomerata A. Camus, Bull. Mus. Hist. Nat. (Paris), sér. 2, 3: 759 (1931).

Annual to 18 cm, but usually much smaller; panicle 2-3.5 x 0.9-1.6 cm, a dense ovoid head; glumes 2.2-3.2 mm, lanceolate, shortly awned; lemma-body 2.3-2.6 mm, the central awn 2.2-2.7 mm, the laterals *c.* 1 mm.

De, R, GE; sandy and stony ground. Egypt, Arabia, Mauritania, Sudan, Angola, South Africa.

59. **Leptochloa** P. Beauv.
Syn. *Diplachne* P. Beauv.

Annual or perennial; ligule membranous, sometimes with a ciliate fringe; inflorescence open, comprising several slender racemes arranged along a central axis; spikelets laterally compressed or subterete, 2- to several-flowered, or 1-flowered without rhachilla-extension; lemmas keeled or rounded on the back, glabrous or appressed-hairy on the nerves, obtuse or 2-dentate at the tip, rarely acute, sometimes mucronate, rarely with a short awn; anthers 2 or 3; caryopsis laterally or dorsally compressed. 40 species, throughout the tropics and in warm temperate parts of America and Australia.

1. Spikelets 0.6-1.5 cm, subterete with lemmas rounded on the back, loosely arranged in the indistinctly secund racemes — 1. **L. fusca**
\+ Spikelets 2-3 mm, laterally compressed with keeled lemmas, overlapping in the clearly secund racemes — 2. **L. panicea**

1. **Leptochloa fusca** (L.) Kunth, Révis. Gramin. 1: 91 (1829).
   Syns. *Festuca fusca* L., Syst. Nat., ed. 10, 2: 876 (1759).
   Bromus polystachios Forssk., Fl. Aegypt.-Arab. 23 (1775).
   Diplachne fusca (L.) P. Beauv. ex Roem. & Schult., Syst. Veg. 2: 615 (1817).
   Megastachya uninervia J. Presl in C. Presl, Reliq. Haenk 1: 283 (1830).
   Leptochloa fusca subsp. *uninervia* (J. Presl) N. Snow, Novon 8(1): 79 (1998).

Densely tufted aquatic or semi-aquatic perennial to 1.5 m, rooting and branched from the lower nodes; leaf-blades linear, finely tapered at the tip; inflorescence 20-35 cm, composed of 10-30 racemes, each 7-15 cm and bearing loosely arranged, indistinctly

secund spikelets; spikelets 0.6-1.5 cm, 7- to 11-flowered, subterete; lower glume 1.4-2.2 mm, the upper 2-3.4 mm; lemmas 2.2-4 mm, rounded on the back, pilose on the nerves below, tipped with a short mucro 0.1-0.3 mm; caryopsis dorsally compressed.

N, O, M, D, R, GE; watersides, marshes and as a weed of rice. Tropical and subtropical regions of the Old World.

NOTE: The type of *Bromus polystachios* was collected in Egypt, near Alexandria, in 1762 by Forsskål (no. 1016, holotype C).

2. **Leptochloa panicea** (Retz.) Ohwi, Bct. Mag. (Tokyo) 55: 311 (1941).
Syn. *Poa panicea* Retz., Observ. Bot. 3: 11 (1783).

Annual to 1.1 m, slender, geniculately ascending; leaf-blades linear, papillate-pilose on both surfaces, long-attenuate; inflorescence 20-30 cm, composed of numerous racemes each 4-11 cm and bearing overlapping, clearly secund spikelets; spikelets 2-3 mm, (2)3 (5)-flowered, laterally compressed; lower glume 0.7-1.5 mm, the upper 0.9-1.6 mm; lemmas 0.8-1.2 mm, keeled, minutely hairy on the back, bluntly 2-dentate at the tip; caryopsis obtusely trigonous in cross-section.

N; alluvial soils. Tropical and South Africa, tropical Asia.

60. **Halopyrum** Stapf

Perennial with robust stolons; ligule a line of hairs; leaf-blades stiff, inrolled, filiform at the tip; inflorescence comprising short racemes appressed to an elongated axis; spikelets several-flowered, laterally compressed, disarticulating between the florets; callus of each floret conspicuously bearded; glumes persistent, 3- to 7-nerved; lemmas rounded on the back, coriaceous, asperulous, entire or minutely 2-dentate at the tip, mucronate; caryopsis elliptic in outline, concavo-convex. 1 species, shores of the Indian Ocean and Red Sea from Mozambique to Sri Lanka.

1. **Halopyrum mucronatum** (L.) Stapf in Hook., Icon. Pl. 25: t. 2448 (1896).
Syns. *Uniola mucronata* L., Sp. Pl., ed. 2, 104 (1762).
Eragrostis mucronata (L.) Deflers, Bull. Soc. Bot. France 34: 69 (1887), non Roem. & Schult. (1817).
Desmazeria unioloides Deflers, Voy. Yemen 220 (1889), nom. superfl., based on Uniola mucronata L.

Tough stoloniferous perennial forming dense tussocks; culms to 1.5(2) m, rigid, woody, branching to produce clusters of shoots at the nodes; leaf-blades narrowly linear to setaceous, stiff, glaucous; inflorescence to 26 cm, narrow; spikelets 1.5-2 cm, 8- to 16-flowered; glumes 6.5-9.5 mm, coriaceous, acute; lemmas 7.5-8.5 mm, the callus and rhachilla-tip bearded with hairs 3-5 mm.

R, GE; coastal dunes, growing up through successive accretions of sand. Distribution as for the genus.

61. **Trichoneura** Andersson

Annual or perennial; ligule membranous; inflorescence composed of stiff spreading or short appressed racemes on a central axis; spikelets cuneate, several-flowered,

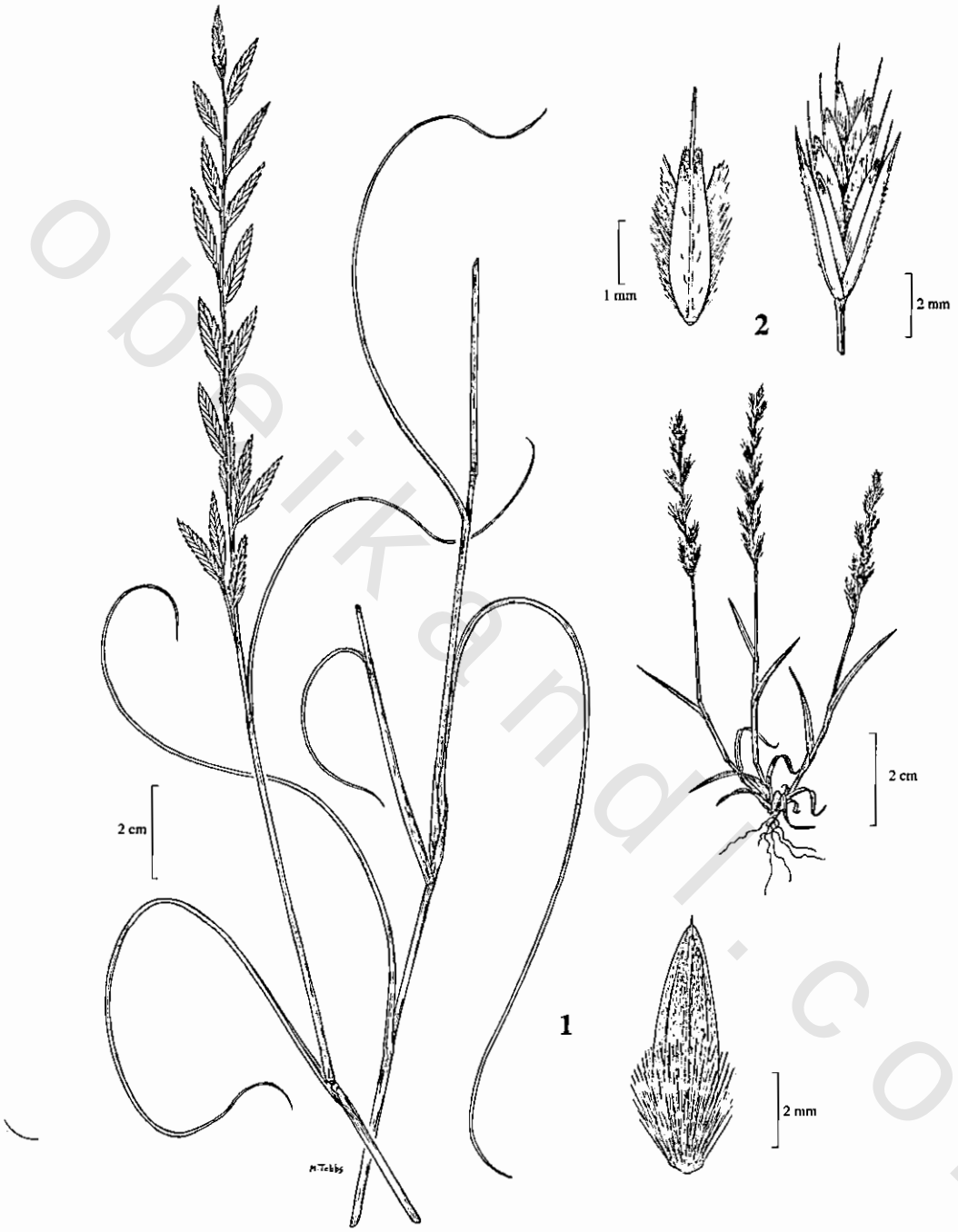


Plate 73. GRAMINEAE: *Halopyrum mucronatum* 1, inflorescence and part of the culm with leaves; lemma (down right). *Trichoneura mollis* 2, habit; spikelet (up right); lemma (up left). Drawn by Margaret Tebbs.

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disarticulating between the florets; glumes narrow, subequal, 1-nerved, longer than the adjacent lemmas and often as long as the spikelet, usually tapering to a mucro or awn; lemmas rounded on the back or lightly keeled, membranous, ciliate on the lateral nerves, 2-dentate at the tip and mucronate or shortly awned; palea often capitate-pilose between the keels; caryopsis narrow, dorsally flattened, concavo-convex. 7 species, tropical Africa, Arabia, North America (Texas), Galapagos Islands.

1. **Trichoneura mollis** (Kunth) Ekman, Ark. Bot. 11(9): 10 (1912).
   Syns. *Leptochloa mollis* Kunth, Révis. Gramin. 2: 443, t. 135 (1831).
   Uralepis arenaria Steud., Syn. Pl. Glumac. 1: 248 (1854).
   Trichoneura arenaria (Steud.) Ekman, Ark. Bot. 11(9): 11 (1912).

Slender annual to 50 cm; inflorescence 5-25 cm, fairly compact with stiff ascending racemes 1.5-5 cm; spikelets 6.2-8 mm, 5- to 9-flowered, green or tinged with red; glumes as long as or exceeding the florets, caudate at the tip; lemmas 2.5-3.5 mm, oblong, sparsely hairy on the back; awn 0.6-2 cm; palea glabrous or capitate-pilose.

De, R, GE; sand. Senegal and Mauritania, eastwards to Somalia and the Red Sea coasts of Africa and Arabia.

62. **Dinebra** Jacq.

Annual; ligule membranous; inflorescence composed of elongated or cuneate racemes on a central axis, these deciduous or with deciduous secondary branchlets; spikelets 1- to several-flowered, laterally compressed, cuneate, eventually disarticulating between the florets; glumes subequal, exceeding and enclosing the florets, often coriaceous, sometimes 3-nerved, acute to aristate at the tip; lemmas keeled, thinly membranous, pubescent on the nerves or sometimes glabrous, acute to emarginate, with or without a mucro; caryopsis elliptic in outline, trigonous in cross-section. 3 species, Africa and Madagascar to India.

1. **Dinebra retroflexa** (Vahl) Panz., Denkschr. Königl. Akad. Wiss. München 1813: 270, t. 12 (1814).
   Syns. *Cynosurus retroflexus* Vahl, Symb. Bot. 2: 20 (1791).
   Dinebra arabica Jacq., Fragm. Bot. 77, t. 121,1 (1809).
   Dinebra (as '*Dinaeba*') *aegyptiaca* Delile, Descr. Égypte, Hist. Nat. 170, t. 11, f. 3 (1814), nom. superfl., based on *Cynosurus retroflexus* Vahl

Loosely tufted, to 50 cm, slender, usually straggling and ascending from a decumbent base, much-branched and rooting from the lower nodes; inflorescence 8.5-17(22) cm, linear with short oblong to cuneate densely crowded racemes, more or less elliptic-oblong or pyramidal, with longer racemes to 3 cm apart; racemes 1-2.5(5) cm, stiff, at first ascending, eventually reflexed and finally deciduous; spikelets 5-6.5(9) mm, 1- to 3-flowered, narrowly cuneate; glumes coriaceous, asymmetric, overlapping abaxially and obscuring the florets; lemmas 1.8-2.4 mm, narrowly ovate, appressed-pubescent along the lateral nerves and on the back below.

N, O, M, GE, S; damp soils and as a weed of maize, cotton, onions and sugar-cane. Tropical Africa through southwest Asia to India.

NOTE: The type of *Dinebra aegyptiaca* was collected in Egypt, Damyut (Damietta), by Delile (holotype MPU, ?isotype LIV).

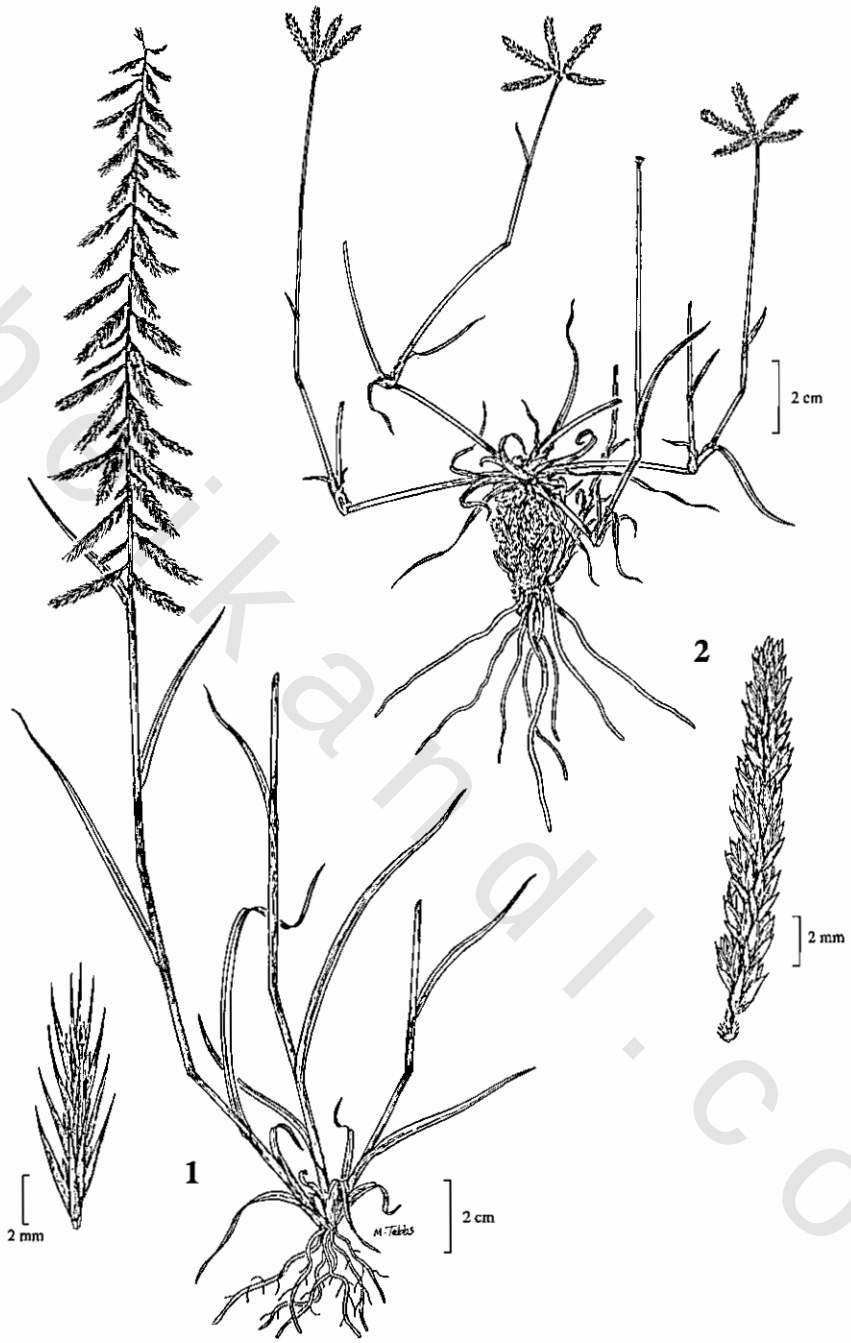


Plate 74. GRAMINEAE: *Dinebra retroflexa* 1, habit; spikelet (down left). *Ochthochloa compressa* 2, habit; spikelet (down right). Drawn by Margaret Tebbs.

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63. **Ochthochloa** Edgew.

Stoloniferous perennial; ligule a short membrane with a long ciliate fringe; inflorescence composed of (2)3-5 short secund digitate racemes, these deciduous at maturity; spikelets several-flowered, strongly laterally compressed, disarticulating above the glumes but not between the florets; glumes unequal, shorter than the adjacent lemmas, the upper with a thickened 3-nerved keel; lemmas keeled, villous on the margins and keel below, acute or with a short awn-point; grain ellipsoid, smooth, with free pericarp. 1 species, Egypt, Arabia, Iran, Afghanistan, Pakistan, northwest India, Sudan, Ethiopia, Somalia, Djibouti.

1. **Ochthochloa compressa** (Forssk.) Hilu, Kew Bull. 36: 560 (1981).
Syns. *Panicum compressum* Forssk., Fl. Aegypt.-Arab. 18 (1775).
Eleusine flagellifera Nees, Linnaea 16: 220 (1842).
Eleusine arabica Hochst. ex Steud., Syn. Pl. Glumac. 1: 211 (1854).
Eleusine compressa (Forssk.) Asch. & Schweinf. ex C. Chr., Dansk. Bot. Ark. 4(3): 12 (1922).

Sprawling plant with stolons to 1 m and prostrate or ascending culms to 40 cm; leaf-blades glaucous, short, stiff and pungent; racemes 2-4 cm; spikelets 6-8 mm, 3- to 8-flowered; lower glume 2.5-3 mm; upper glume 3.6-5.6 mm; lemmas 4-5.6 mm.

R, ?GE. Sandy and rocky soils. Distribution as for the genus.

64. **Eragrostis** Wolf
Syn. *Diandrochloa* De Winter

Annual or perennial; ligule a line of hairs, rarely a membrane; inflorescence an open or contracted panicle, the spikelets all alike; spikelets 2- to many-flowered, orbicular to vermiform, variously disarticulating; glumes often deciduous, 1(3)-nerved; lemmas 3-nerved, keeled or rounded on the back, membranous to coriaceous, glabrous to asperulous or rarely hairy, entire at the tip, obtuse to acuminate, sometimes mucronate; palea-keels sometimes winged or ciliate; anthers 2-3; fruit mostly ellipsoid to subspherical, usually a caryopsis but sometimes the pericarp free. About 370 species, tropics and subtropics throughout the world.

1. Palea-keels tuberculate-ciliate, the cilia protruding from the margins of the lemma 2
\+ Palea-keels glabrous or scabrid 4

2. Panicle contracted, spike-like or lobed and interrupted, the spikelets densely crowded 1. **E. ciliaris**
\+ Panicle loose and open 3

3. Anthers 2; glumes lanceolate, unequal; lemmas oblong, truncate and mucronate at the tip 2. **E. lepida**
\+ Anthers 3; glumes ovate, subequal; lemmas ovate, rounded at the tip 3. **E. amabilis**

4. Tufted perennial; lemmas semi-ovate in profile, with straight keel and gibbous margins 4. **E. tenuifolia**
\+ Annual or mat-forming perennial; lemmas oblong with ± parallel keel and margins or elliptic with ± equally curved keel and margins 5

5. Spikelets shedding their florets from the apex downwards, the rhachilla-internodes falling with the florets 6
\+ Spikelets shedding their florets from below upwards, the rhachilla remaining on the pedicel (or eventually breaking up), rarely the spikelets not breaking up at all 7

6. Ligule a membrane 5. **E. japonica**
\+ Ligule a line of hairs 6. **E. aspera**

7. Palea falling at about the same time as the lemma, leaving the naked zig-zag rhachilla, or florets persistent and the grain retained on the mature panicle 8
\+ Palea persistent on the rhachilla long after the lemma has fallen (however, the upper part of the rhachilla can be rather fragile and may start to break up once the lower lemmas have fallen) 9

8. Florets deciduous at maturity 7. **E. pilosa**
\+ Florets persistent and the grain retained on the mature panicle 8. **E. tef**

9. Creeping mat-forming perennial; panicle narrow, contracted 9. **E. sarmentosa**
\+ Annual; panicle variable 10

10. Spikelets trembling on long fine pedicels in a very loose open panicle 10. **E. tremula**
\+ Spikelets on short stiff pedicels in a ± contracted, sometimes open, panicle 11

11. Grain subrotund in outline, 0.4-0.6 mm diam. 11. **E. cilianensis**
\+ Grain broadly oblong to elliptic-oblong in outline, 0.5-1 mm long 12

12. Leaf-blades with crateriform glands along the margins 12. **E. minor**
\+ Leaf-blades without crateriform glands along the margins 13

13. Panicle-branches solitary or paired; spikelets usually purple-tinged, in a ± open panicle; lemmas 1.7-2.3 mm, obtuse 13. **E. barrelieri**
\+ At least the lower panicle-branches clustered or whorled; spikelets usually pallid, in a rather dense, but sometimes spreading, panicle; lemmas 1.4-1.6 mm, subacute 14. **E. aegyptiaca**

1. **Eragrostis ciliaris** (L.) R. Br., Tuckey, Narr. Exped. Zaire, app. 5: 478 (1818).
Syns. *Poa ciliaris* L., Syst. Nat., ed. 10, 2: 875 (1959).
Cynodon ciliaris (L.) Rasp., Ann. Sci. Nat. (Paris) 5: 302 (1825).
Eragrostis pulchella Parl., Atti Riunione Sci. Ital. 8: 586 (1847).
Eragrostis arabica Jaub. & Spach, Ill. Pl. Orient. 4: 31, t. 322 (1851).
Eragrostis ciliaris (L.) R. Br. var. *brachystachya* Boiss., Fl. Orient. 5: 582 (1884).

Annual to 50 cm; leaf-blades flat; panicle 1-12.5 cm, contracted, spike-like or lobed and interrupted; spikelets 2-3.5 mm, oblong-elliptic to ovate, 6- to 12-flowered, the florets covered by the spreading palea-hairs, disarticulating between the florets, the rhachilla fragile; glumes 0.9-1.4 mm, equal, lanceolate; lemmas 0.9 -1.5 mm, oblong in profile, thinly membranous, with a few pectinate hairs on the lower part of the keel (at least in the upper florets), broadly obtuse and mucronate; palea-keels pectinate-ciliate with tubercle-based hairs 0.4-0.8 mm; anthers 2, 0.1-0.2 mm; caryopsis 0.3-0.5 mm, ellipsoid.

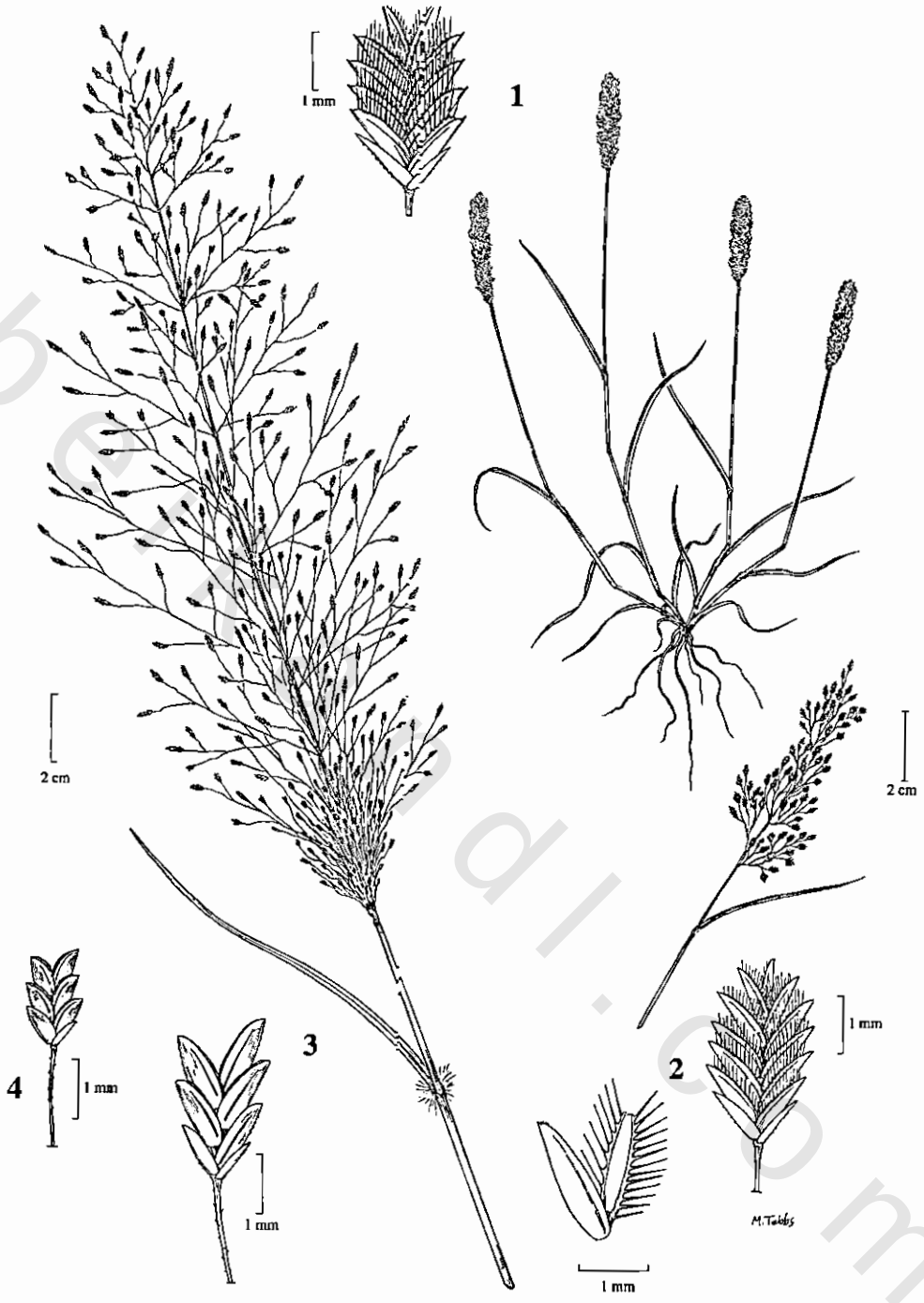


Plate 75. GRAMINEAE: 1. *Eragrostis ciliaris* 1, habit, spikelet (up left). *Eragrostis lepida* 2, inflorescence; spikelet (down); palea (left to spikelet). *Eragrostis aspera* 3, inflorescence; spikelet (down left). *Eragrostis japonica* 4, spikelet. Drawn by Margaret Tebbs.

De, R, GE; sandy soils. Throughout the tropics.

2. **Eragrostis lepida** (A. Rich.) Hochst. ex Steud., Syn. Pl. Glumac. 1: 269 (1854).
Syns. *Poa lepida* A. Rich., Tent. Fl. Abyss. 2: 424 (1850).
Eragrostis tenella auct. plur. non (L.) P. Beauv. ex Roem. & Schult.

Annual to 40 cm; leaf-blades flat; panicle 3 -10(15) cm, lanceolate to narrowly elliptic in outline, open, delicate, eglandular; spikelets 2.2-3 mm, elliptic to oblong, 4- to 10-flowered, the florets covered by the spreading palea-hairs, disarticulating between the florets, the rhachilla fragile; glumes unequal, lanceolate, the lower 0.6-0.9 mm, acute, the upper 0.9-1.1 mm, often mucronate; lemmas (0.8)1.1 -1.2 mm, oblong in profile, thinly membranous, scaberulous, truncate and mucronate; palea-keels pectinate-ciliate with tubercle-based hairs 0.3-0.4 mm; anthers 2, 0.1-0.15 mm; caryopsis 0.4-0.5 mm, ellipsoid.

GE; rocky ground. Egypt, Sudan, Eritrea, Somalia, Djibouti, Kenya, Arabia.

3. **Eragrostis amabilis** (L.) Hook. & Arn., Bot. Beechey Voy. 251 (1840).
Syns. *Poa amabilis* L., Sp. Pl., ed. 1, 68 (1753).
Poa tenella L., Sp. Pl., ed. 1, 69 (1753).
Poa plumosa Retz., Observ. Bot. 4: 20 (1786/7).
Eragrostis tenella (L.) P. Beauv. ex Roem. & Schult., Syst. Veg. 2: 576 (1817).
Eragrostis plumosa (Retz.) Link, Hort. Berol. 1: 192 (1827).

Annual to 40 cm; leaf-blades flat; panicle 4-9 cm, elliptic to pyramidal in outline, loose and open; spikelets 1.5-2.3 mm, oblong-ovate, 4- to 6(8)-flowered, disarticulating between the florets, the rhachilla fragile; glumes 0.6-0.9 mm, subequal, ovate, obtuse or subacute; lemmas 0.7-1.1 mm, ovate in profile, thinly membranous, rounded; palea-keels pectinate-ciliate with slender tubercle-based hairs 0.1-0.3 mm; anthers 3, 0.2-0.4 mm; caryopsis 0.4-0.5 mm, ellipsoid.

Likely to occur in GE, but all material seen thus far is referable to *Eragrostis lepida*. Throughout the tropics.

4. **Eragrostis tenuifolia** (A. Rich.) Hochst. ex Steud., Syn. Pl. Glumac. 1: 268 (1854).
Syn. *Poa tenuifolia* A. Rich., Tent. Fl. Abyss. 2: 425 (1850).

Tufted perennial to 90 cm; basal leaf-sheaths strongly compressed and keeled; leaf-blades flat or folded; panicle 7-25 cm, open, pyramidal in outline with divaricate branches, often simple above; spikelets 0.5-1.6 cm, 5- to 16-flowered, linear, dark olive-green, the florets spreading and imparting a conspicuously serrate outline to the spikelets, shedding their lemmas from below upwards, the paleas persistent on the tough rhachilla; glumes very small, lanceolate, the lower 0.4-0.75 mm, the upper 0.7-0.9 mm; lemmas 1.8-2.2 mm, narrowly semi-ovate in profile with straight keel and gibbous margins, membranous, subacute; palea-keels scaberulous; anthers 3, 0.4-0.5 mm; caryopsis 0.9-1.1 mm, oblong in outline, strongly laterally compressed.

N; cultivated in Giza in 1976, presumably on trial as a fodder grass, but may no longer be extant. Throughout tropical Africa, Madagascar, India, New Guinea, Australia, Colombia, Ecuador, Peru.

5. **Eragrostis japonica** (Thunb.) Trin., Gram. Gen. 405 (1830).
Syns. *Poa japonica* Thunb., Fl. Jap. 51 (1784).
Poa diarrhena Schult., Mant. 2: 616 (1824).
Eragrostis diarrhena (Schult.) Steud., Syn. Pl. Glumac. 1: 266 (1854).
Eragrostis diplachnoides Steud., Syn. Pl. Glumac. 1: 268 (1854).
Diandrochloa japonica (Thunb.) Henry, Bull. Bot. Surv. India 9: 290 (1967).

Annual or short-lived perennial to 1.5 m; ligule membranous; leaf-blades flat; panicle 5-55 cm, very variable in shape ranging from linear and contracted to loose and open with ascending branches, the branches solitary or whorled; spikelets 1.3-3 mm, elliptic to narrowly oblong, 4- to 14-flowered, disarticulating between the florets, the rhachilla fragile; glumes 0.5-0.8 mm, subequal, narrowly ovate, subacute to obtuse; lemmas 0.7-1 mm, broadly oblong-elliptic in profile, thinly membranous, broadly obtuse; palea-keels smooth or scabrid; anthers 2, 0.1-0.4 mm; caryopsis 0.3-0.5 mm, obovoid.

N, S; sandy and heavy soils. Tropical Africa to southeast Asia.

6. **Eragrostis aspera** (Jacq.) Nees, Fl. Afr. Austral. Ill. 1: 408 (1841).
Syn. *Poa aspera* Jacq., Hort. Bot. Vindob. 3: 22, t. 56 (1776).

Coarse annual to 1.1 m; leaf-blades flat; panicle 10-50 cm, elliptic to ovate in outline, open to very diffuse, the spikelets distant on very long capillary pedicels, the branches solitary or whorled; spikelets 3-8 mm, 5- to 20-flowered, oblong to linear, disarticulating between the florets, the rhachilla fragile, but sometimes a few lemmas falling before their palea; glumes 0.8-1.4 mm, subequal, oblong-lanceolate, obtuse; lemmas 1.1-1.5 mm, broadly elliptic in profile, membranous, broadly obtuse to truncate; palea-keels scabrid; anthers 0.2-0.6 mm; caryopsis *c.* 0.5 mm diam., subspherical.

N, GE; damp sandy soils. Tropical Africa southwards to South Africa, Arabia to southern India and the Mascarene Islands.

7. **Eragrostis pilosa** (L.) P. Beauv., Ess Agrostogr. 162, 175 (1812).
Syns. *Poa pilosa* L., Sp. Pl., ed. 1, 68 (1753).
Eragrostis tenuiflora Steud., Syn. Pl. Glumac. 1: 268 (1854).

Annual to 75 cm; leaf-blades flat; panicle 8-30 cm, lanceolate to narrowly elliptic in outline, the lowermost branches whorled and usually bearded in the axils with a few loose hairs; spikelets 3-6 mm, narrowly oblong, 4- to 12-flowered, shedding their florets from below upwards, the palea falling with or soon after the lemma leaving the tough naked zig-zag rhachilla; glumes very unequal, the lower 0.3-0.7 mm, a minute nerveless scale, the upper 0.9-1.4 mm, ovate; lemmas 1.2-1.7 mm, lanceolate in profile, membranous, pallid or leaden grey, subacute; palea-keels scaberulous; anthers 3, 0.2-0.3 mm; caryopsis 0.7-0.9 mm, ellipsoid but with one straight face, slightly laterally compressed.

N, O, M, D, GE, S; weed of cultivation. Tropical and warm temperate regions throughout the world.

8. **Eragrostis tef** (Zucc.) Trott., Boll. Soc. Bot. Ital. 1918: 62 (1918).
Syns. *Poa tef* Zucc., Diss. Concern. Ist. Pianta Paniz. Abiss. (1775).



Plate 76. GRAMINEAE: *Eragrostis pilosa* 1, spikelet. *Eragrostis tef* 2, spikelet. *Eragrostis sarmentosa* 3, habit; spikelet (left). *Eragrostis tremula* 4, inflorescence; spikelet (down left).

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Poa abyssinica Jacq., Misc. Austriac. 2: 364 (1781).
Eragrostis abyssinica (Jacq.) Link, Hort. Berol. 1: 192 (1827).

Annual to 1 m; leaf-blades flat; panicle 10-60 cm, contracted and narrowly elliptic in outline to diffuse and ovate, the branches ascending, flexuous, the lowermost often whorled; spikelets 4-9 mm, narrowly oblong, 4- to 12-flowered, the florets mostly remaining intact on the tough rhachilla and retaining the plump grain, occasionally some lemmas and paleas eventually falling; glumes unequal, lanceolate, acuminate, the lower 1-2.8 mm, the upper 1.5-3 mm; lemmas 2-3 mm, oblong-lanceolate in profile, membranous, scaberulous on the keel and on the flanks above, acute; palea-keels scaberulous; anthers 3, (0.2)0.3-0.5 mm. caryopsis 1-2 mm, turgid, ellipsoid.

N, O; tested as a forage grass in Egypt and occasionally found as a casual. Cultivated cereal (Tef) only in Ethiopia, introduced elsewhere for forage and often escaping, under trial in some parts of the world as a possible gluten-free alternative to wheat.

9. **Eragrostis sarmentosa** (Thunb.) Trin., Mém. Acad. Imp. Sci. St.-Pétersbourg, sér. 6, Sci. Math. 1: 398 (1830).
Syns. *Poa sarmentosa* Thunb., Frodr. Pl. Cap. 1: 21 (1794).
Eragrostis hackeliana Bornm. & Kneuck., Repert. Spec. Nov. Regni Veg. 10: 381 (1912), non Hassl. (1910).
Eragrostis kneuckeri Hack. & Bornm., Repert. Spec. Nov. Regni Veg. 10: 472 (1912).

Mat-forming rhizomatous perennial, often also with long stolons; culms to 50 cm; leaf-blades flat; panicle 6-15 cm, linear, the spikelets condensed about the short distant appressed primary branches; spikelets 3-7 mm, narrowly oblong, 10- to 14-flowered, shedding their lemmas from below upwards, the paleas persistent on the rhachilla, this tough below but fragile above; glumes unequal, lanceolate, acute or subacute, the lower 0.6-0.8 mm, the upper 1.1-1.4 mm; lemmas 1.3-1.5 mm, narrowly ovate in profile, membranous, subacute; palea-keels scaberulous; anthers 3, 0.2-0.3 mm; caryopsis 0.5-0.6 mm, ellipsoid to ovoid.

M; probably introduced. Native to southern tropical Africa, tropical Asia, introduced in Palestine and elsewhere.

10. **Eragrostis tremula** Hochst. ex Steud., Syn. Pl. Glumac. 1: 269 (1854), non *Poa tremula* Lam.
Syns. *Poa tremula* Lam., Tab. Encycl. 1: 185 (1792).
Poa multiflora Roxb., Fl. Ind. 1: 340 (1820), non Forssk. (1775).
Eragrostis multiflora (Roxb.) Trin., Mém. Acad. Imp. Sci. St.-Pétersbourg, sér. 6, Sci. Math 1: 401 (1830).
Eragrostis lamarckii Steud., Syn. Pl. Glumac. 1: 269 (1854), based on *Poa tremula* Lam.
Eragrostis serpula Chiov , Ann. Bot. (Rome) 8: 66 (1908).

Annual to 1 m; leaf-blades flat or inrolled; panicle 14-35(50) cm, ovate in outline, open and very lax, the spikelets trembling on long fine pedicels to 2 cm; spikelets 0.4-3.3 cm, linear to narrowly ovate-elliptic, (7)15- to 60-flowered, shedding their lemmas from below upwards, the paleas persistent on the tough rhachilla or this eventually breaking up; glumes unequal, acute, the lower 1.5-1.8 mm, narrowly ovate, the upper 1.7-1.9 mm,

lanceolate; lemmas 1.6-2 mm, ovate in profile, chartaceous, subacute; palea-keels scaberulous; anthers 2, 0.3-0.5 mm; caryopsis 0.5-0.75 mm, subrotund to broadly ovoid.

N; an occasional introduction. Native to tropical Africa and India.

11. **Eragrostis cilianensis** (All.) Vignolo ex Janch., Mitt. Naturwiss. Vereins Univ. Wien 5(9): 110 (1907).
Syns. *Briza eragrostis* L., Sp. Pl., ed. 1, 70 (1753).
Poa cilianensis All., Fl. Pedem. 2: 246, t. 91, 2 (1785).
Poa megastachya Koeler, Descr. Gram. 181 (1802).
Eragrostis major Host, Icon. Descr. Gram. Austriac. 4: 14, t. 24 (1809), based on *Briza eragrostis* L.
Eragrostis megastachya (Koeler) Link, Hort. Berol. 1: 187 (1827).

Annual to 75 cm; leaf-blades flat or inrolled, sometimes with crateriform glands along the margins; panicle 5-15(20) cm, lanceolate to narrowly elliptic in outline, usually ± contracted with short pedicels, occasionally very contracted to a dense ovoid or cylindrical head, the branches and pedicels often bearing crateriform glands; spikelets oblong-ovate (linear when many-flowered), green to leaden grey, 0.45-1.5(2) cm, 8- to 30(45)-flowered, shedding their lemmas from below upwards, the paleas persistent on the tough rhachilla (often the rhachilla fragile in the upper part, rarely breaking away entire soon after the lemmas have begun to fall, very rarely fragile throughout with the florets falling from the top downwards); glumes 1.5-2.7 mm, subequal, lanceolate, often with crateriform glands along the nerve, acute; lemmas 2-2.8 mm, elliptic-ovate in profile, papery, scaberulous, subacute to obtuse; palea-keels scabrid; anthers 3, 0.3-0.5 mm; caryopsis 0.4-0.6 mm, usually subrotund, rarely broadly oblong.

N, O, M, D, R, GE, S; damp sand and areas of cultivation. Tropical and warm temperate regions of the Old World.

12. **Eragrostis minor** Host, Icon. Descr. Gram. Austriac. 4: 15 (1809).
Syns. *Poa eragrostis* L., Sp. Pl., ed. 1, 68 (1753).
Eragrostis pooides P. Beauv., Ess. Agrostogr. 162 (1812), as '*poaeoides*,' based on Poa eragrostis L.

Annual to 60 cm; leaf-blades flat or inrolled, with crateriform glands along the margins; panicle 3-20 cm, elliptic to ovate in outline, rather open but with short pedicels, the branchlets and pedicels bearing crateriform glands; spikelets 4.8-9 mm, linear to narrowly oblong, green or olive to leaden grey or reddish, 8- to 16-flowered, shedding their lemmas from below upwards, the paleas persistent on the tough rhachilla; glumes 1.3-1.8 mm, subequal, lanceolate, sometimes with crateriform glands along the nerve, acute; lemmas 1.4-1.8 mm, ovate in profile, chartaceous, scaberulous, obtuse; palea-keels scabrid; anthers 3, *c.* 0.3 mm; caryopsis (0.5)0.6-0.8 mm, usually broadly oblong, sometimes subrotund.

N, O, S; damp soils. Subtropical and warm temperate Old World.

13. **Eragrostis barrelieri** Daveau, J. Bot. (Morot) 8: 289 (Sept. 1894); Bull. Herb. Boissier 2: 651-660, t. 32A (Nov. 1894).

Annual to 60 cm; leaf-blades flat or inrolled, always without crateriform glands along the margins; panicle 3-15 cm, lanceolate to elliptic in outline, the spikelets evenly spaced or

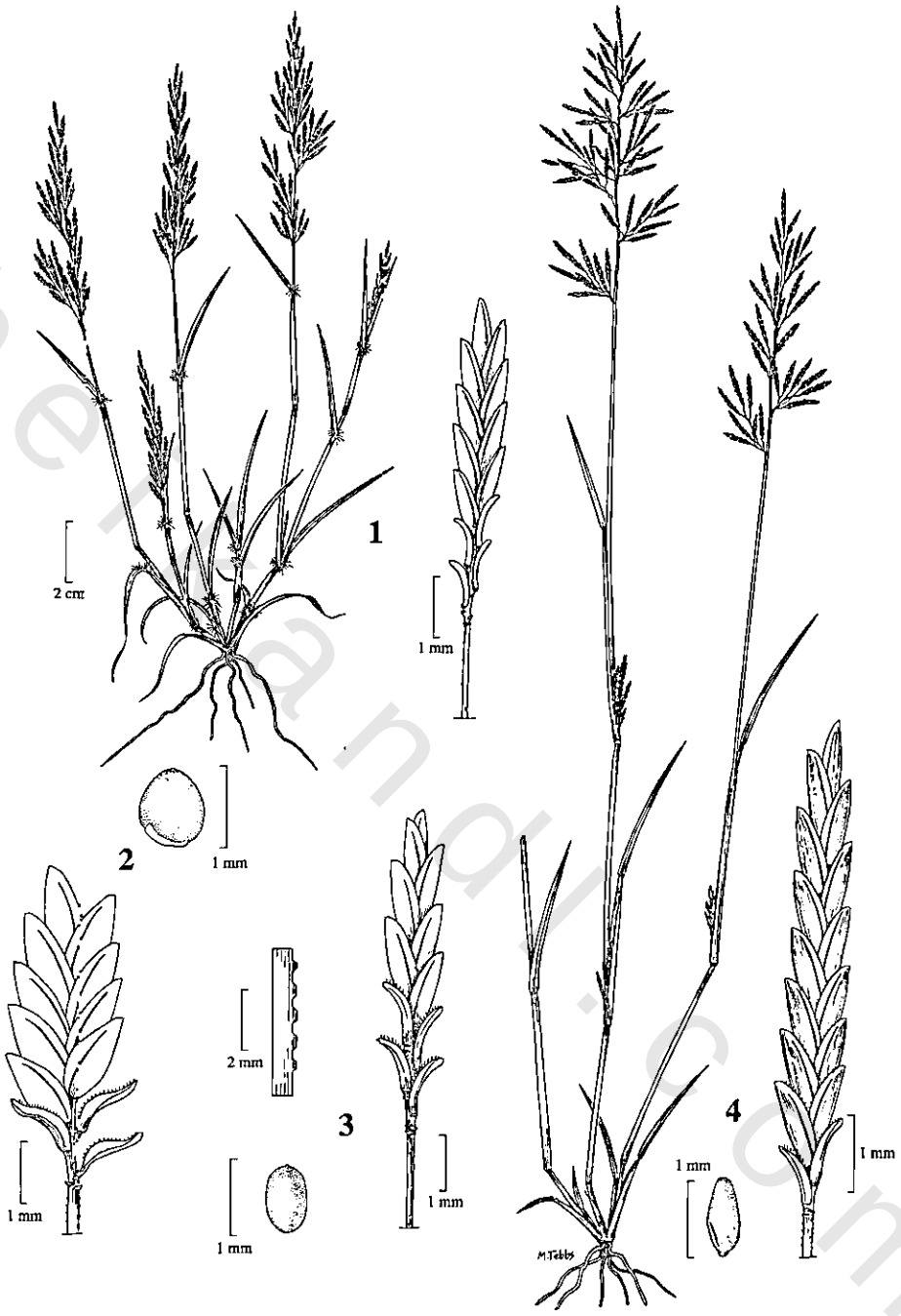


Plate 77. GRAMINEAE: *Eragrostis aegyptiaca* 1, habit; spikelet (right). *Eragrostis cilianensis* 2, spikelet; caryopsis (up right). *Eragrostis minor* 3, spikelet; piece of leaf margin (left); caryopsis (down left). *Eragrostis barrelieri* 4, habit, caryopsis and spikelet (down right). Drawn by Margaret Tebbs.

gathered into fascicles, very rarely a dense ovoid head, the branchlets and pedicels often bearing crateriform glands; spikelets 0.6-1.5 cm, 8- to 25-flowered, linear, pallid, greyish or reddish, shedding their lemmas from below upwards, the paleas persistent on the tough rhachilla; glumes unequal, lanceolate, without crateriform glands on the nerve, acute, the lower 1-1.5 mm, the upper 1.3-2.1 mm; lemmas 1.7-2.3 mm, oblong-lanceolate in profile, chartaceous, scaberulous above, obtuse; palea-keels scabrid; anthers 3, *c.* 0.2 mm long; caryopsis 0.6-1 mm, elliptic-oblong in outline.

N, O, M, D, GE, S; watersides and cultivated fields. Sudan, Ethiopia, Somalia, Mediterranean region, eastwards through Arabia to Pakistan; distribution imperfectly known because of past confusion with *Eragrostis minor*.

NOTE: A type specimen of *Eragrostis barrelieri* was collected in Egypt, near Cairo, in 1879 by Ascherson (no. 336, isosyntype, K).

14. **Eragrostis aegyptiaca** (Willd.) Delile, Descr. Egypte, Hist. Nat. 157, t. 4, f. 2 (1814).
Syn. *Poa aegyptiaca* Willd., Enum. Pl. 107 (1809).

Annual to 45(60) cm; leaf-blades flat or inrolled, without crateriform glands along the margins; panicle (1.5)3.5-15 cm, narrowly ovate to linear-lanceolate in outline, the spikelets loosely to densely contracted about the primary branches, these spreading or appressed to the main axis, clustered or whorled, often bare of spikelets below, sometimes the panicle contracted and subcylindrical in the smaller plants, the branchlets and pedicels sometimes with a few crateriform glands; spikelets 0.5-0.65(1) cm, linear, pallid, 9- to 16(20)-flowered, shedding their lemmas from below upwards, the paleas persistent on the tough rhachilla; glumes unequal, the lower 0.5-0.9 mm, oblong-lanceolate to narrowly lanceolate, acute, the upper 1.1-1.3 mm, oblong-elliptic, obtuse to subacute; lemmas 1.5-1.8 mm, oblong-elliptic in profile, chartaceous, scabrid on the keel, subacute; palea-keels scabrid above, smooth below; anthers 3, 0.15-0.25 mm; caryopsis 0.6-0.8 mm, ellipsoid.

Two subspecies occur in Egypt:

subsp. **aegyptiaca**

Culms to 45(60) cm, erect or ascending, usually not less than 10 cm.

N, M, De, GE; along water-courses. Senegal, northern Nigeria, Mali, Chad, Sudan, Egypt.

NOTE: Records of the species in Europe have been discounted by Scholz who accommodated them in a separate taxon, *Eragrostis rivalis* H. Scholz, Willdenowia 26: 229 (1996). This was described as having the panicle-branches naked below, whereas in *E. aegyptiaca* they are described as spiculate to the base; this is, however, not so in Egyptian material which includes both forms. The European plants may well have been introduced as weeds. Earlier references to *E. aegyptiaca* as endemic to Egypt were erroneous.

subsp. **humifusa** H. Scholz, Willdenowia 26: 231 (1996).

Dwarf plant, culms 1-5 cm, prostrate.

Described from Gebel Uweinat in northwest Sudan.

NOTE: This subspecies has not yet been found for certain in Egypt although Täckholm & Drar, Fl. Egypt 1: 192 (1941) referred to a prostrate dwarf form that resembled a species of *Schismus*. There are dwarf, semi-prostrate forms with cylindrical panicles in Egypt, but material that has been seen is not as extreme as those specimens from Sudan determined as subsp. *humifusa* by Scholz, and is best accommodated in subsp. *aegyptiaca*.

65. **Coelachyrum** Hochst. & Nees
Syn. *Cypholepis* Chiov.

Annual or perennial, usually stoloniferous; ligule membranous, sometimes with a ciliate fringe; inflorescence rarely a panicle, more often of open or dense racemes, these digitate or disposed along an axis; spikelets several-flowered, disarticulating between the florets; glumes 1- to 3-nerved; lemma lightly keeled at first, but becoming broadly rounded on the back as the grain expands, thinly chartaceous to thinly coriaceous, puberulent to villous on the flanks, lateral nerves and sometimes also on the keel, rarely clavate-hairy or glabrous, obtuse at the tip and sometimes mucronate; palea sometimes villous on the keels; grain broadly elliptic to subrotund in outline, strongly flattened, concavo-convex, the pericarp free. 8 species, tropical Africa to Arabia and Pakistan, South Africa.

1. **Coelachyrum brevifolium** Hochst. & Nees, Linnaea 16: 221 (1842).
Syns. *Eleusine brevifolia* (Hochst. & Nees) Hochst. & Steud. in Steud., Syn. Pl. Glumac. 1: 211 (1854).
Eragrostis coelachyrum Benth., Hook., Icon. Pl. 14, t. 1368 (1881), nom. superfl., based on *Coelachyrum brevifolium*.

Annual without stolons, to 35 cm; inflorescence 2-4 cm, comprising 3-6 subdigitate racemes on an axis scarcely longer than the longest raceme, the spikelets 3-3.4 mm, subsessile, broadly ovate, 5- to 8-flowered; glumes unequal, broadly ovate to broadly elliptic, mucronate, the lower 1.2 -1.7 mm, the upper 1.6-2.5 mm; lemmas 1.8-2 mm, broadly elliptic to subrotund, shortly and inconspicuously hairy, broadly rounded to truncate, mucronate.

De, R, GE; sandy and rocky soils. Red Sea coasts of Sudan, Eritrea, Egypt and Arabia, coastal Somalia, extending westwards to the subdesert zone of West Africa in Mauritania, Mali and northern Nigeria.

66. **Eleusine** Gaertn.

Annual or perennial; ligule membranous, usually with a ciliate fringe; leaf-blades folded, the sheaths strongly keeled; inflorescence comprising digitate or subdigitate racemes, the axis shorter than the longest raceme, the racemes with imbricate spikelets and terminating in a fertile spikelet; spikelets several-flowered, disarticulating between the florets (except in *E. coracana*); lemmas strongly keeled, sometimes the keel thickened and containing closely spaced additional nerves, membranous, glabrous, obtuse or acute; grain elliptic to subrotund in outline, trigonous in cross section, flat or concave on the hilar side, the pericarp free. 9 species, mostly East and northeast tropical Africa, 1 cosmopolitan weed and 1 species confined to South America.

1. Perennial; leaf-blades with tufts of hair scattered along the margins; mid-nerve of lemma simple 1. **E. floccifolia**
+ Annual; leaf-blades without marginal hair-tufts; mid-nerve of lemma with 2-3 subsidiary nerves close to each side of it, forming a thickened keel 2

2. Racemes 0.9-1.5 cm wide; spikelets ovate, non-shattering, very closely overlapping; grain plump, almost globose, usually brown, often exposed between the gaping lemma and palea when ripe (cultivated cereal) 2. **E. coracana**
+ Racemes 3-7 mm wide; spikelets elliptic, disarticulating between the florets; grain oblong to broadly oblong in outline, blackish, never exposed when ripe (wild grass) 3

3. Slender plant; lower glume 1-nerved, 1.1-2.3 mm; upper glume 1.8-2.9 mm; lemmas 2.4-3.6(4) mm; grain obliquely striate with very fine close perpendicular lines running between the striae 3. **E. indica**
+ Robust plant; lower glume often 2- to 3-nerved, 2-3.2 (3.9) mm; upper glume 3-4.7 mm; lemmas 3.7-4.9 mm; grain obliquely ridged, uniformly granular 4. **E. africana**

1. **Eleusine floccifolia** (Forssk.) Spreng., Syst. Veg. 1: 350 (1824).
Syns. *Cynosurus floccifolius* Forssk., Fl. Aegypt.-Arab. 21 (1775).
Chloris floccifolia (Forssk.) Poir., Encycl. Lam. Suppl. 2: 238 (1811).

Densely tufted rhizomatous perennial to 70 cm; leaf-blades with scattered tufts of short white hairs along the margins; inflorescence comprising 2-5(10) slender subdigitate racemes 2.5-8.5 (12.5) cm (usually 1 or 2 of them set below the rest); spikelets 3.3-6.8 mm, elliptic, 4- to 7-flowered; glumes unequal, dark olive-grey, acute, the lower 1-1.2 mm, the upper 2.6-4.2 mm; lemmas 2.8-4.6 mm, narrowly elliptic in profile, pale with a tinge of grey, the mid-nerve simple, acute; grain minutely rugulose.

N; introduced and grown for basket-making, occasionally found as an escape. Ethiopia, Somalia, Yemen, introduced in Kenya.

2. **Eleusine coracana** (L.) Gaertn., Fruct. Sem. Pl. 1: 8, t. 1,11 (1788).
Syns. *Cynosurus coracanus* L., Syst. Nat., ed. 10, 2: 875 (1759).
Eleusine tocussa Fresen., Mus. Senckenberg. 2: 141 (1837).

Robust annual to 1.7 m; leaf-blades without marginal hair-tufts; inflorescence comprising 4-20 linear-oblong subdigitate racemes 4-14 x 0. 9-1.5 cm; spikelets 5-9 mm, ovate, 6- to 9-flowered, non-shattering at maturity; glumes 1.5-3 mm, unequal, acute, the lower 3-nerved, the upper 1.8-5 mm, with additional nerves on either side of the keel; lemmas 2.2-4.7 mm, narrowly ovate in profile, subacute, with additional nerves on either side of the keel; grain subglobose, finely striate-punctate, usually brown but varying from black to reddish-brown or whitish, exposed between the gaping lemma and palea when ripe.

N, M; cultivated for forage (African or Finger Millet) and occasionally escaping. Cultivated in the Old World tropics and subtropics; probably arose in the uplands of East Africa as a derivative of *Eleusine africana* (q.v.).

NOTE: Plants that have escaped from cultivation into the wild are often slender rather than robust, but they retain the broad racemes of non-shattering spikelets.

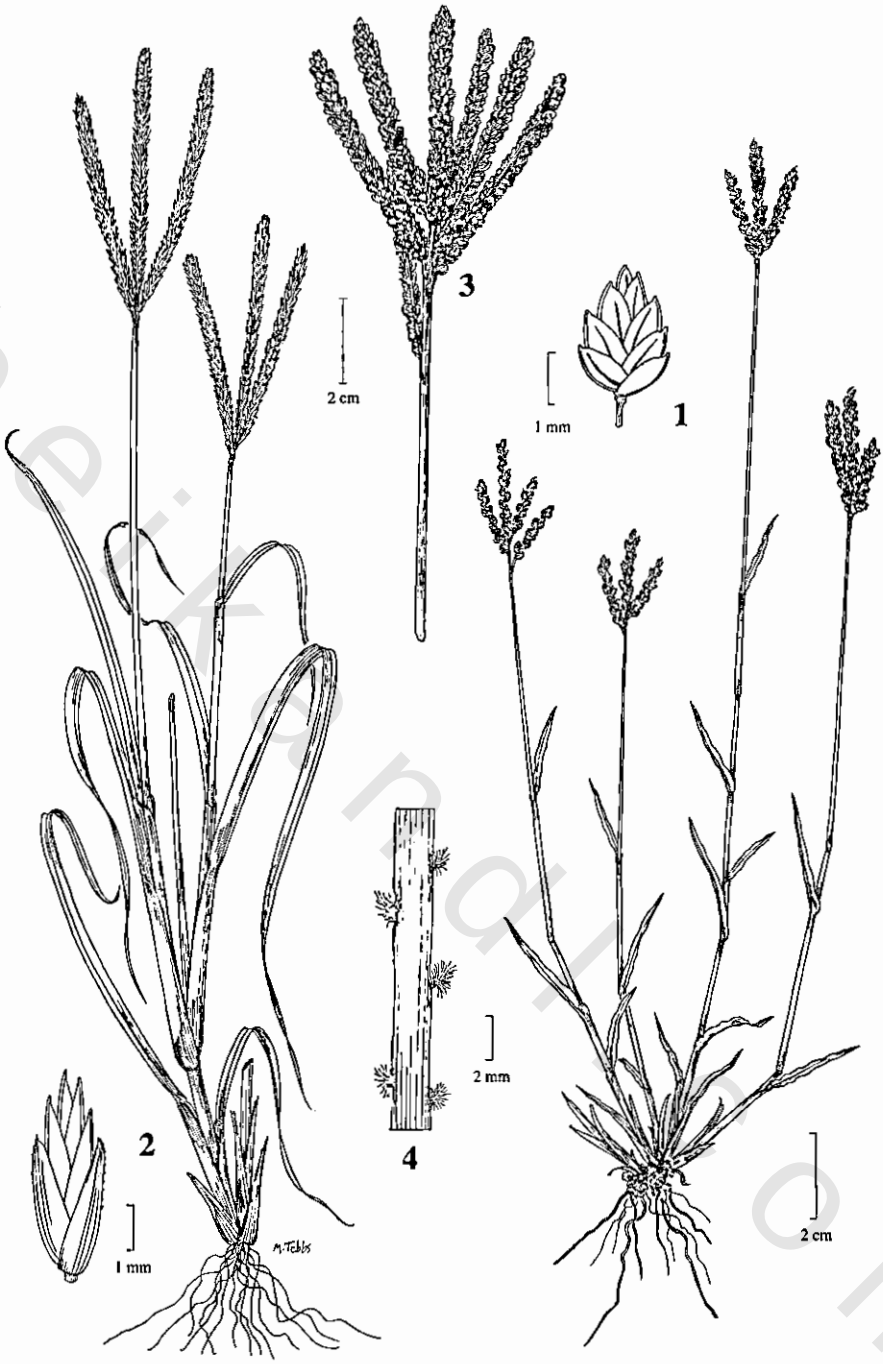


Plate 78. GRAMINEAE: *Coelachyrum brevifolium* 1, habit; spikelet (up within). *Eleusine africana* 2, habit; spikelet (down left). *Eleusine coracana* 3, inflorescence. *Eleusine floccifolia* 4, part of the leaf-blade. Drawn by Margaret Tebbs.

3. **Eleusine indica** (L.) Gaertn., Fruct. Sem. Pl. 1: 8 (1788).
Syn. *Cynosurus indicus* L., Sp. Pl., ed. 1, 72 (1753).

Slender annual to 85 cm; ligule sparsely and minutely ciliolate; leaf-blades without marginal hair-tufts; inflorescence comprising 1-10(17) slender digitate racemes 3.5-15.5 cm (a few often set below the rest), 3-5.5 mm wide; spikelets 4.6-7.8 mm, elliptic, 3- to 9-flowered, breaking up at maturity; glumes 1.1-2.3 mm, unequal, acute, the lower 1-nerved, broadly to very narrowly winged on the keel, the upper 1.8-2.9 mm; lemmas 2.4-3.6(4) mm, lanceolate in profile, with additional nerves on either side of the keel, acute to subacute; grain obliquely striate with very fine close perpendicular lines running between the striae; diploid ($2n = 18$).

N, M, S; weed of cultivation. Pantropical weed.

4. **Eleusine africana** Kenn.-O'Byrne, Kew Bull. 12: 65 (1957).
Syn. *Eleusine indica* subsp. *africana* (Kenn.-O'Byrne) S. M. Phillips, Kew Bull. 27: 259 (1972).

Moderately robust annual to 90 cm; ligule with a pronounced ciliate fringe; leaf-blades without marginal hair-tufts; inflorescence comprising 3-15 subdigitate racemes 4-17 cm (a few below often remote), 4-7 mm wide; spikelets 4-8 mm, elliptic, 3- to 9-flowered, breaking up at maturity; glumes unequal, acute, the lower 2-3.2(3.9) mm, often 2- to 3-nerved, the upper 3-4.7 mm, with additional nerves on either side of the keel; lemmas 3.7-4.9 mm, lanceolate in profile, with additional nerves on either side of the keel, acute; grain obliquely ridged, uniformly granular; tetraploid ($2n = 36$).

N, O, M, R, S; weed of cultivation. Throughout tropical Africa but mainly in the eastern and southern uplands, rare in West Africa, Arabia.

67. **Acrachne** Wight & Arn. ex Chiov.

Annual; ligule membranous with a ciliate fringe; inflorescence comprising digitate or whorled racemes, these with imbricate spikelets and terminating in an abortive spikelet; spikelets several-flowered, shedding their lemmas but retaining the persistent paleas on the tough rhachilla; lemmas strongly keeled, firmly membranous, glabrous, entire or 2-dentate at the tip and with a stout awn-point; grain ellipsoid with free pericarp. 3 species, Old World tropics, 1 widespread, 1 confined to southern India, 1 confined to Madagascar.

1. **Acrachne racemosa** (B. Heyne ex Roem. & Schult.) Ohwi, Bull. Tokyo Sci. Mus. 18: 1 (1947).
Syns. *Eleusine racemosa* B. Heyne ex Roem. & Schult., Syst. Veg. 2: 583 (1817).
Eleusine verticillata Roxb., Fl. Ind. 1: 346 (1820).
Leptochloa schimperana Hochst., Flora 38: 203 (1855).
Acrachne verticillata (Roxb.) Lindl. ex Chiov., Fl. Eritrea 361 (1908).

Culms to 75 cm; racemes 1.5-10 cm; digitate, often with additional whorls below, spikelets 0.55-1.3 cm , 6- to 25-flowered; glumes unequal; the lower 1.2-3 mm, acute and mucronate; the upper 1.5-3 mm, acuminate and awned, the awn $1/3$-$2/3$ the length of the



Plate 79. GRAMINEAE: *Acrachne racemosa* 1, habit; spikelet (a). *Dactyloctenium scindicum* 2, habit; spikelet (b). *Dactyloctenium aegyptium* 3, spikelet (c); caryopsis (d). *Dactyloctenium aristatum* 4, spikelet (e); caryopsis (f). Drawn by Margaret Tebbs.

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body; lemmas 2-2.8 mm, narrowly ovate in profile, with excurrent lateral nerves, the awn 0.3-0.9 mm.

N; introduced weed of maize, naturalized. Throughout the Old World tropics.

68. **Dactyloctenium** Willd.

Annual or perennial; ligule membranous; inflorescence composed of paired or digitate racemes, these bearing imbricate spikelets and terminating in a naked pointed rhachis-extension, eventually falling from the culms (sometimes very tardily); spikelets several-flowered, disarticulating above the glumes but usually not between the florets; upper glume with an oblique subapical awn; lemma strongly keeled, membranous, glabrous, acute to shortly awn-pointed and often recurved at the tip; grain with free pericarp. 13 species, mainly in the hinterland of the Indian Ocean from South Africa to northern India, 1 cosmopolitan weed, 1 species confined to Australia.

1. Stoloniferous perennial; racemes 0.8-2 cm, slightly falcate — 3. **D. scindicum**
\+ Annual, sometimes stoloniferous — 2

2. Inflorescence open, the racemes 1.2-6.5(7.5) cm, linear to narrowly oblong, ascending or radiating; lemmas acute, cuspidate or mucronate; grain transversely rugose — 1. **D. aegyptium**
\+ Inflorescence compact, the racemes 0.8-1.8(2.6) cm, oblong to broadly oblong, clustered in a dense head; lemmas conspicuously acuminate-mucronate; grain granular or granular-striate — 2. **D. aristatum**

1. **Dactyloctenium aegyptium** (L.) Willd., Enum. Pl. 1029 (1809).
Syns. *Cynosurus aegyptius* L., Sp. Pl., ed. 1, 72 (1753).
Eleusine aegyptia (L.) Desf., Fl. Atlant. 1: 85 (1798).
Dactyloctenium figarei De Not., Ann. Sci. Nat. (Paris), sér. 3, 9: 325 (1848).

Annual, often stoloniferous and mat-forming, to 0.7(1) m; leaf-blades papillose-hispid, especially on the margins; inflorescence comprising (1)3-9 linear to narrowly oblong racemes 1.2-6.5(7.5) cm, these ascending or radiating; spikelets 3.5-4.5 mm, broadly ovate; glumes 1.5-2.2 mm, subequal, the upper with an awn from half as long to as long as the body; lemmas 2.6-4 mm, narrowly ovate in profile, acute and with a stout cusp or mucro up to 1 mm long; anthers 0.25-0.8 mm; grain transversely rugose.

N, O, M, D, S; weed of cultivation. Tropical and warm temperate Old World.

NOTE: *Cynosurus aegyptius* was described from Egypt, description in Bauhin, Pinax 7: (1623) and India, illustration in Pluk., Alm. 175, t. 300, 8 (1696). The type of *Dactyloctenium figarei* was collected in Egypt by Figari (holotype GE, destroyed; isotype FT)

2. **Dactyloctenium aristatum** Link, Hort. Berol. 1: 59 (1827).
Syn. *Cynosurus aegyptiacus,* sensu Forssk., Fl. Aegypt.-Arab. CIV, no. 75 (1775), non *Cynosurus aegyptius* L. (1753).

Sprawling, geniculately ascending annual, to 40 cm, often rooting from the lower nodes; leaf-blades conspicuously papillose-hispid; inflorescence comprising (2)4-7(11) oblong

or broadly oblong racemes 0.8-1.8(2.6) cm, these clustered in a dense, often ovoid head; spikelets 4.1-5.2 mm, broadly ovate; glumes 1.7-2.3 mm, subequal, the upper with an awn as long as to longer than the body; lemmas (3)3.3-4.3 mm, lanceolate to narrowly ovate in profile, acuminate and often with a stout mucro to 1 mm; anthers 0.3-0.5 mm; grain granular or granular-striate.

GE; coastal saline sandy soils. Coastal areas of Kenya, Somalia, Eritrea, Sudan and Egypt, eastwards around the Arabian peninsula to Pakistan and northwest India.

NOTE: Despite the epithet, the type of *Cynosurus aegyptiacus* seems to have been collected in Saudi Arabia.

3. **Dactyloctenium scindicum** Boiss., Diagn. Pl. Orient. 3(2): 131 (1856).
Syns. *Dactyloctenium glaucophyllum* Courbai, Ann. Sci. Nat. (Paris), sér. 4, 18: 133 (1862).
Eleusine glaucophylla (Courbai) Munro ex Benth., J. Linn. Soc., Bot. 19: 107 (1881).
Eleusine aristata Ehrenb. ex Boiss., Fl. Orient. 5: 557 (1884), in syn.

Stoloniferous mat-forming perennial to 45 cm; leaf-blades tough and rather glaucous, flat or folded, scattered papillose-hispid; inflorescence comprising 3-4 (5) slightly falcate oblong racemes 0.8-2 cm, forming a compact head; spikelets 4-8 mm, broadly lanceolate to ovate; glumes 1.5-2.5 mm, subequal, the upper with an awn half as long to as long as the body; lemmas 3-3.8 mm, lanceolate in profile, acute and with a mucro to 0.8 mm; anthers 1.1-2 mm; grain transversely rugose.

N, De, R, GE; sandy soils. Kenya, Somalia, Ethiopia and the Red Sea coast of Sudan to Egypt, Arabia to Afghanistan, Pakistan, northwest India.

69. **Desmostachya** (Hook.f.) Stapf

Perennial; ligule a line of hairs; inflorescence comprising numerous racemes on a long central axis, the spikelets densely imbricate, sessile or subsessile; spikelets several-flowered, laterally compressed, falling entire; glumes acute; lemmas keeled, membranous or chartaceous to coriaceous, glabrous, acute; caryopsis obliquely ovoid, trigonous in cross section, with adnate pericarp. 1 species, Old World tropics.

1. **Desmostachya bipinnata** (L.) Stapf in Dyer, Fl. Cap. 7: 632 (1900).
Syns. *Cynosurus durus* Forssk., Fl. Aegypt.-Arab. 21 (1775), non L. (1753).
Briza bipinnata L., Syst. Nat., ed. 10, 2: 875 (1759).
Uniola bipinnata (L.) L., Sp. Pl., ed. 2, 104 (1762).
Poa cynosuroides Retz., Observ. Bot. 4: 20 (1786/7).
Eragrostis cynosuroides (Retz.) P. Beauv., Ess. Agrostogr. 162 (1812).
Eragrostis bipinnata (L.) K. Schum., Engl., Pflanzenw. Ost-Afrikas C: 113 (1895).
Stapfiola bipinnata (L.) Kuntze in T. Post & Kuntze, Lex. Gen. Phan., Prosp. 532 (1903)

Harsh, tussock-forming rhizomatous perennial to 1.5 m; lower leaf-sheaths coriaceous, often densely flabellate; inflorescence up to 60 cm, the racemes 1-4 cm, erect or curving outwards from the main axis; spikelets narrowly ovate to linear-oblong, 0.3-1 cm;

glumes unequal, the lower 0.7-1.5 mm, the upper 1.1-2 mm; lemmas 1.8-2.7 mm, straw-coloured or suffused with purple.

N, O, D, S; by springs, along water-courses, in wet alluvium and in areas of cultivation. Distribution as for the genus.

NOTE: The type of *Cynosurus durus* was collected near Cairo, Egypt, in 1761/2 by Forsskål (nos. 1180, 1181 & 1182, syntypes, C). The type of *Briza bipinnata* was also described from Egypt.

70. **Sporobolus** R. Br.

Annual or perennial; ligule a line of hairs; panicle open or contracted, rarely spike-like, usually exserted from the uppermost leaf-sheath; spikelets 1-flowered, usually without a rhachilla-extension, fusiform, disarticulating below the floret; glumes deciduous, awnless, the upper usually the longer; lemma thinly membranous and often shiny, 1-nerved, entire, awnless; anthers 2-3; grain subglobose to ellipsoid, rounded or truncate; pericarp free, commonly swelling when wet and expelling the seed to the tip of the spikelet. About 160 species, tropics and subtropics.

1. At least the lowermost panicle-branches in whorls — 1. **S. ioclados**
\+ Panicle-branches not whorled — 2

2. Leaf-blades pungent, usually tightly inrolled — 3
\+ Leaf-blades not at all pungent — 4

3. Panicle smoothly cylindrical; leaf-blades stiff and pungent but not conspicuously distichous — 2. **S. spicatus**
\+ Panicle untidily ovate, embraced below by the uppermost leaf-sheath; leaf-blades stiff and pungent, conspicuously distichous — 3. **S. pungens**

4. Upper glume 1/2 as long as the spikelet — 4. **S. natalensis**
\+ Upper glume 2/3-3/4 as long as the spikelet — 5. **S. wrightii**

1. **Sporobolus ioclados** (Nees ex Trin.) Nees, Fl. Afr. Austral. Ill. 1: 161 (1841).
Syns. *Vilfa ioclados* Nees ex Trin., Gen. Gram. Exp. V. Agrost. 43 (1840).
Vilfa pallida Nees ex Trin., Gen. Gram. Exp. V. Agrost. 40 (1840).
Sporobolus marginatus Hochst. ex A. Rich., Tent. Fl. Abyss. 2: 397 (1850).
Sporobolus arabicus Boiss., Diagn. Pl. Orient. 2(13): 47 (1854).
Sporobolus pallidus (Nees ex Trin.) Boiss., Fl. Orient. 5: 512 (1884), non Lindl. (1848).
Agrostis kentrophylla K. Schum., Engl., Pflanzenw. Ost-Afrikas C: 108 (1895).
Sporobolus jemenicus Pilg. ex O. Schwartz, Fl. Trop. Arab. 324 (1939).
Sporobolus kentrophyllus (K. Schum.) Clayton, Kew Bull. 25: 248 (1971).

Tussocky perennial to 80 cm, often with creeping stolons; leaf-blades flat or inrolled, harsh or soft, often pungent; panicle 4-15 cm, narrowly ovate to pyramidal, the primary branches in whorls (at least the lowermost), bare of spikelets in the lower 1/4-1/3;



Plate 80. GRAMINEAE: *Desmostachya bipinnata* 1, lower part and inflorescence; spikelet (up within). *Sporobolus spicatus* 2, habit; spikelet (down right). Drawn by Margaret Tebbs.

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spikelets 1.5-3(3.3) mm; lower glume 0.5-1 mm, narrowly ovate to narrowly oblong, obtuse; upper glume narrowly ovate to lanceolate, (1/2)2/3 as long to as long as the spikelet; lemma lanceolate-elliptic, as long as or almost as long as the spikelet; anthers 3, 0.9-1.4 mm; grain 0.8-1.2 mm, ellipsoid.

?GE; unconfirmed in Egypt, but likely to occur. Tropical Africa, Arabia, eastwards to India and Sri Lanka.

2. **Sporobolus spicatus** (Vahl) Kunth, Révis. Gramin. 1: 67 (1829).
Syns. *Agrostis virginica* Forssk., Fl. Aegypt.-Arab. 20 (1775), non L. (1753).
Agrostis spicata Vahl, Symb. Bot. 1: 9 (1790).

Tufted, sometimes mat-forming perennial; culms to 70 cm, wiry, often with fascicles of shoots at the nodes, arching over and rooting to form long looping stolons; leaf-blades stiff and pungent, usually inrolled but sometimes flat, often painfully pungent; panicle 15-20 cm, spike-like, smoothly and compactly cylindrical, the branches closely appressed to the main axis; spikelets (1.7)2.2-2.8 mm; lower glume 0.5-0.9 mm, broadly ovate to lanceolate, the upper 2/3 as long to as long as the spikelet, narrowly ovate to narrowly lanceolate; lemma oblong-elliptic, as long as the spikelet; anthers 3, 1-1.5 mm; grain 0.7-1.1 mm, ellipsoid.

N, O, M, D, R, GE, S; seasonally inundated saline desert sand. Drier parts of Africa from the Mediterranean coast to South Africa, southwest Asia to India.

3. **Sporobolus pungens** (Schreb.) Kunth, Révis. Gramin. 1: 68 (1829).
Syns. *Agrostis pungens* Schreb., Beschr. Gräs. 2: 46, t. 27, f. 3 (1772).
Agrostis arenaria Gouan, Ill. Observ. Bot. 3 (1773).
Sporobolus arenarius (Gouan) Duval-Jouve, Bull. Soc. Bot. France 16: 294 (1869).
Sporobolus virginicus var. *arenarius* (Gouan) Maire in Jahand. & Maire, Cat. Pl. Maroc 928 (1941).

Rhizomatous perennial to 40 cm; leaf-blades conspicuously distichous (especially on sterile shoots), flat or more usually loosely to tightly inrolled, stiff and pungent; panicle 3-6(10) cm, untidily contracted, not fully exserted from the uppermost leaf-sheath, narrowly ovate to pyramidal in outline, the branches ascending but not tightly appressed to the main axis; spikelets 2.5-2.8 mm; glumes unequal, ovate, acute, the lower 1.8-2.2 mm, the upper as long as the spikelet; lemma similar to the upper glume and equal to it; anthers 3, 1.4-1.6 mm; grain *c.* 0.7 mm diam., subglobose.

M, S; sandy seashores and saltmarshes. Coastal areas of Spain, Balearic Islands, France, Corsica, Italy, Sardinia, Sicily, Albania, Greece, Crete, Croatia, Morocco, Tunisia, Libya, Egypt, Palestine, Cyprus, Turkey.

NOTE: *Sporobolus pungens* is doubtfully distinct from the tropical *S. virginicus* (L.) Kunth which has a tighter, more oblong panicle fully exserted from the uppermost leaf-sheath and, commonly, narrower, more tightly rolled leaf-blades. Kit Tan in Fl. Turkey 9: 581-582 (1985) distinguished between *S. arenarius* and *S. pungens*, amalgamating the former with *S. virginicus* and giving a distribution from Europe to tropical Africa. She noted, however, that some specimens from Turkey may be referable

to *S. pungens* (whose distribution was not specified) on the basis of their flat leaf-blades up to 10 mm wide. Egyptian material was considered to be *S. virginicus*. It seems better for the present to distinguish tropical *S. virginicus* from Mediterranean *S. pungens* (including *S. arenarius*) until the taxonomy has been properly resolved.

4. **Sporobolus natalensis** (Steud.) T. Durand & Schinz, Consp. Fl. Afric. 5: 822 (1895).
Syn. *Vilfa natalensis* Steud., Syn. Pl. Glumac. 1: 154 (1854).

Tufted perennial to 1.2 m; panicle 20-30 cm, narrowly pyramidal, the primary branches 3-7 cm, spreading or ascending, subsecund, densely spiculate from the base; spikelets 1.6-2.3 mm; lower glume 0.4-0.7 mm, oblong, the upper about 1/2 the length of the spikelet, ovate, acute; lemma narrowly ovate, acute, as long as the spikelet; anthers 3, 0.8-1 mm; grain 0.7-0.8 mm, obovate-ellipsoid, truncate.

?M; introduced to Fuka in the 1950s, presumably on trial as a fodder grass, but probably now extinct. Native to tropical and southern Africa and tropical Arabia.

5. **Sporobolus wrightii** Munro ex Scribn., Bull. Torrey Bot. Club 9: 103 (1882).

Tufted perennial to 1(2) m; panicle 30-60 cm, narrowly ovate in outline, the primary branches 6-12 cm, spreading or ascending, subsecund, often bare of spikelets below; spikelets 2-2.5 mm; glumes ovate, obtuse to acute, the lower *c.* 1/3 the length of the spikelet, the upper 2/3-3/4 the length of the spikelet; lemma narrowly ovate, acute, as long as the spikelet; anthers 3, 0.9-1.7 mm; grain 1.3-1.4 mm, ellipsoid.

?M; introduced to Ras el Hekma in the 1950s, presumably on trial as a fodder grass, but probably now extinct. Native to southern USA and Mexico.

71. **Crypsis** Aiton
Syn. *Heleochloa* Host ex Roem.

Annual; ligule a line of hairs; panicle spike-like and ± exserted or ovoid and capitate and partially embraced by 1 or 2 inflated bract-like leaf-sheaths; spikelets 1-flowered without a rhachilla-extension, strongly laterally compressed and keeled, sometimes falling entire; glumes narrow, shorter than the floret (rarely almost as long), acute or with a short awn-point; lemma membranous, 1-nerved, acute or with a short awn-point; anthers 2 or 3; grain ellipsoid, the pericarp free and sometimes swelling when wet. 8 species, Mediterranean region and southwest Asia, extending to China and Central Asia, naturalized in southern Africa and America.

1. Panicle at least 5 times as long as wide, scarcely embraced by the uppermost and scarcely inflated leaf-sheath 1. **C. alopecuroides**
\+ Panicle not more than twice as long as wide, tightly embraced below by a pair of conspicuously inflated leaf-sheaths, each bearing a reduced or rudimentary blade 2

2. Blade of uppermost leaf continuous with its sheath; panicle capitate, wider than or as wide as long; palea 1-nerved 2. **C. aculeata**
\+ Blade of uppermost leaf clearly demarcated from its sheath; panicle ovoid, longer than wide; palea 2-nerved 3



Plate 81. GRAMINEAE: *Sporobolus pungens* 1, habit; spikelet (down within). *Crypsis alopecuroides* 2, habit. *Crypsis aculeata* 3, flowering branch. *Crypsis schoenoides* 4, habit. Drawn by Margaret Tebbs.

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3. Collar and sheath-margins glabrous; glumes unequal, shorter than the lemma; anthers 0.7-1.1 mm 3. **C. schoenoides**

\+ Collar and sheath-margins hairy; glumes subequal, as long as the lemma; anthers 0.5-0.9 mm 4. **C. vaginiflora**

1. **Crypsis alopecuroides** (Piller & Mitterp.) Schrad., Fl. Germ. 1: 167 (1806).
Syns. *Phleum alopecuroides* Piller & Mitterp., Iter Poseg. Sclavon. 147, t. 16 (1783).
Heleochloa alopecuroides (Piller & Mitterp.) Host ex Roem., Collecteana 233 (1809).
Crypsis aegyptiaca Tausch, Flora 20: 120 (1837).

Green or glaucous geniculately ascending annual to 35 cm; leaf-sheaths glabrous, the uppermost scarcely inflated, bearing a well-developed, clearly demarcated blade; panicle cylindrical (but tapering below), 0.5-7.5 cm, scarcely embraced by the uppermost leaf-sheath; spikelets narrowly ovate, 2-2.5(3) mm; glumes subequal, lanceolate, acute or subobtuse, ciliate on the keel, a little shorter than the lemma; lemma as long as the spikelet, awnless; palea 2-nerved; anthers 3, 0.6-1.2 mm; grain 1-1.2 mm.

N, M, De; roadsides and cultivated ground. Widespread in temperate Eurasia from Central and southern Europe eastwards to western Siberia, and North Africa (Algeria) eastwards through southwest and Central Asia, introduced in North America.

NOTE: The type of *Crypsis aegyptiaca* was collected in Egypt by Sieber (?isotype, K).

2. **Crypsis aculeata** (L.) Aiton, Hort. Kew. 1: 48 (1789).
Syn. *Schoenus aculeatus* L., Sp. Pl., ed. 1, 42 (1753).

Glaucous procumbent or ascending annual to 30 cm; leaf-sheaths glabrous, the uppermost conspicuously inflated, the reduced blade continuous with the sheath; panicle *c.* 0.5 cm, as wide as or wider than long, capitate, embraced below by the 2 uppermost leaf-sheaths; spikelets 3-4.5 mm, elliptic; glumes unequal, lanceolate, ciliolate on the keel, acute, the lower 2.5-3 mm, the upper (2.6)3-3.5(4) mm; lemma as long as the spikelet, acute and sometimes shortly awned; palea 1(3)-nerved; anthers 2, 0.8-1 mm; grain *c.* 2 mm.

N, M; weed of cultivation. Widespread in temperate Eurasia from Central Europe, Mediterranean region, eastwards through southwest and Central Asia to China, introduced in South Africa.

3. **Crypsis schoenoides** (L.) Lam., Tab. Encycl. 1: 166, t. 42, 1 (1791).
Syns. *Phleum schoenoides* L., Sp. Pl., ed. 1, 60 (1753).
Heleochloa schoenoides (L.) Host, Icon. Descr. Gram. Austriac. 1: 23 (1801).

Glaucous prostrate annual, the culms eventually ascending to 30 cm; leaf-sheaths glabrous, the uppermost conspicuously inflated and bearing a reduced blade clearly demarcated from the sheath; panicle 0.5-3(7.5) cm, ellipsoid or ovoid, rarely cylindrical, embraced below by the 2 uppermost leaf-sheaths; spikelets 2.7-3.2(4) mm, lanceolate, tardily deciduous; glumes unequal, lanceolate, acute, glabrous on the margins, stiffly ciliolate on the keel, both shorter than the lemma, the lower a little shorter than the

upper; lemma lanceolate, as long as the spikelet, acute, awnless; palea 2-nerved; anthers 3, 0.7-1.1 mm; grain 1-1.5 mm.

N, O, M, De, R; sandy and moist ground, often in saline soils. Mediterranean region, eastwards to India and southwards sporadically in tropical Africa, introduced in North America.

4. **Crypsis vaginiflora** (Forssk.) Opiz, Naturalientausch 8: 83 (1823).
Syns. *Phalaris vaginiflora* Forssk., Fl. Aegypt.-Arab. 18 (1775).
Crypsis niliaca Fig. & De Not., Mem. Reale Accad. Sci. Torino, ser. 2, 14: 322 (1854).
Crypsis compacta Steud., Syn. Pl. Glumac. 1: 151 (1854).
Heleochloa compacta (Steud.) T. Durand & Schinz., Consp. Fl. Afr. 5: 814 (1894).
Crypsis schoenoides auct. plur., non (L.) Lam.

Prostrate annual with culms 1-30 cm, eventually ascending; leaf-sheaths hairy on the margins and on the collar, the uppermost conspicuously inflated and bearing a reduced blade clearly demarcated from the sheath; panicle 0.3-1.5 cm, ovoid, almost wholly embraced by the 2 uppermost leaf-sheaths; spikelets 2.5-3.2 mm, lanceolate, readily deciduous; glumes subequal, lanceolate, acute, as long as the lemmas or almost so, ciliolate on the keel, at least the lower also hairy on the margins; lemma lanceolate, as long as the spikelet, acute, awnless; palea 2-nerved; anthers 3, 0.5-0.9 mm; grain 1.3-1.7 mm.

N, D; moist ground. Egypt, Sudan, Ethiopia, Tanzania, Senegal, eastwards to India (distribution in Asia uncertain due to confusion with *C. schoenoides*).

NOTE: In the past *Crypsis vaginiflora* has been either confused with or included in *Crypsis schoenoides*, but the differences were resolved by Hammel & Reeder, Syst. Bot. 4: 267-280 (1979). The type of *C. vaginiflora* was collected in Alexandria, Egypt, in 1761/2 by Forsskål (no. 52, holotype C). The type of *C. niliaca* was collected from Nile islands in Upper Egypt.

Tribe 16. **CYNODONTEAE**

Ligule a short membrane with ciliate margin; inflorescence of tough unilateral racemes, these solitary, digitate or scattered along an axis, often deciduous, the spikelets ± all alike; spikelets with 1 fertile floret (except *Tetrapogon*) with or without additional male or barren florets, laterally or dorsally compressed, disarticulating above the glumes but not between the florets, or falling entire; glumes herbaceous to membranous, 1- to 3 (5)-nerved, shorter than the floret or enclosing it, sometimes the lower absent; lemma membranous to coriaceous, 3-nerved, often ciliate on the nerves, entire or 2-lobed, with or without 1-3 terminal or subterminal awns, these usually straight; grain sometimes with a free pericarp.

1. Spikelets containing 2-5 fertile florets — 72. **Tetrapogon**
\+ Spikelets containing 1 fertile floret — 2

2. Racemes persistent, the spikelets breaking up at maturity — 3
\+ Racemes short, scattered along a central axis, deciduous — 6

3. Spikelets 1-flowered, awnless — 75. **Cynodon**
+ Spikelets 2- to several-flowered, or the lemma sinuously awned — 4

4. Grain and lemma dorsally compressed — 74. **Enteropogon**
+ Grain trigonous to subterete in section; lemma laterally compressed — 5

5. Lemma bearing a long sinuous awn — 76. **Schoenefeldia**
+ Lemma with a short straight awn — 73. **Chloris**

6. Spikelets 2-flowered in a cuneate raceme — 77. **Melanocenchris**
+ Spikelets 1-flowered — 7

7. Lower glume very small or suppressed; upper glume and lemma about equal, with raised nerves bearing hooked prickles — 78. **Tragus**
+ Lower glume well developed, often modified into a long flat recurved tail; upper glume usually smaller, enfolding the lemma — 79. **Leptothrium**

72. **Tetrapogon** Desf.

Annual or perennial; racemes 1-4, digitate, often hairy; spikelets laterally compressed, cuneate, with 2-5 fertile florets, the rhachilla terminating in a clavate cluster of sterile lemmas; fertile lemmas rounded on the back or keeled, coriaceous, ciliate on the nerves and keel, sometimes subglabrous, entire or 2-dentate at the tip, with a subapical awn; grain with free pericarp. 5 species, Africa through southwest Asia to India.

1. Glumes inconspicuous, 2-4 mm — 1. **T. villosus**
+ Glumes conspicuous, 0.5-1.2 cm — 2. **T. cenchriformis**

1. **Tetrapogon villosus** Desf., Fl. Atlant. 2: 389, t. 255 (1799).
Syns. *Chloris villosa* (Desf.) Pers., Syn. Pl. 1: 87 (1805).
Chloris villosa var. *sinaica* Decne., Ann. Sci. Nat. (Paris), sér. 2, 2: 12 (1834).
Tetrapogon villosus var. *monostachys* Batt. & Trab., Bull. Soc. Hist. Nat. Afr. Nord 9: 17 (1918).
Tetrapogon villosus var. *sinaicus* (Decne.) Täckh., Stud. Fl. Egypt 555 (1956), nom. inval., sine bibl. ref.

Densely tufted perennial to 60 cm; basal leaf-sheaths keeled and conspicuously flabellate; racemes 3-8.5 cm, usually paired (rarely solitary or up to 4) but often interlocked back to back and appearing solitary, exserted or partially enclosed by the slightly inflated uppermost leaf-sheath; glumes 2-4 mm, inconspicuous; lowermost lemma 2.5-3.7 mm, ciliate on the nerves and keel with hairs 3-8 mm; awn 0.85-1.3 cm.

De, GE, S; rocky hillsides. Canary Islands, Algeria, Egypt, Palestine, Syria, Arabia, Iran, Afghanistan, Pakistan, India, Sudan, Ethiopia, Eritrea, Somalia, Uganda.

NOTE: The type of *Chloris villosa* var. *sinaica* was collected in Sinai by Bové (no. 2, holotype P, isotype K).

2. **Tetrapogon cenchriformis** (A. Rich.) Clayton, Kew Bull. 16: 250 (1962).
Syns. *Lepidopironia cenchriformis* A. Rich., Tent. Fl. Abyss. 2: 442, t. 101 (1850)
Chloris spathacea Hochst. ex Steud., Syn. Pl. Glumac. 1: 204 (1854).
Cryptochloris spathacea Benth. in Hook.f., Icon. Pl. 14: 57, t. 1376 (1882), non Chloris spathacea Hochst. ex Steud.
Tetrapogon spathaceus (Hochst. ex Steud.) Hack. in T. Durand & Schinz, Consp. Fl. Afr. 5: 864 (1895).
Tetrapogon spathaceus (Benth.) Macloskie in Scott, Rep. Princeton Univ. Exp. Patagonia, Botany 8: 211 (1904), non (Hochst. ex Steud.) Hack.

Loosely to densely tufted annual or short-lived perennial to 60 cm; basal leaf-sheaths keeled, loosely flabellate; racemes 3-6 cm, solitary, rarely paired, partially enclosed by the very inflated uppermost leaf-sheath; glumes 0.5-1.2 cm, conspicuous; lowermost lemma 4-6 mm, ciliate on the nerves and keel with hairs *c.* 4 mm; awn 0.7-1.1 cm.

GE; rocky ground. Cape Verde Islands, Mauritania, southeast Egypt, Eritrea, Ethiopia, Somalia, Kenya, Uganda, Tanzania, Arabia.

NOTE: Although *Cryptochloris spathacea* was presumed to have been described from Patagonia, Bentham was unsure of the origin of the specimen concerned; it has never subsequently been found in South America so there was clearly a mix-up of material involved.

73. **Chloris** Sw.

Annual or perennial; racemes digitate or rarely crowded on an elongated axis, the spikelets pectinate or appressed; spikelets laterally compressed, with 1 fertile floret, sometimes with a smaller male floret, the rhachilla terminating in 1 or more reduced lemmas; glumes acute; fertile lemma keeled, cartilaginous to coriaceous, mostly pallid, often decoratively ciliate on the margins, entire or 2-lobed, conspicuously awned from the tip or just below it; grain elliptic in outline and trigonous in cross section to lanceolate and subterete, the pericarp free (though sometimes reluctantly). About 55 species, tropical and warm temperate regions of both hemispheres.

1. Leaf-blades obtuse — 1. **C. pycnothrix**
\+ Leaf-blades tapering — 2

2. Fertile lemma obliquely obovate in profile, the keel slightly gibbous, with a crown of long spreading hairs just below the tip — 2. **C. virgata**
\+ Fertile lemma lanceolate in profile, not gibbous, without a crown of long spreading hairs near the tip, but ciliate along the margins — 3. **C. gayana**

1. **Chloris pycnothrix** Trin., Gram. Unifl. Sesquifl. 234 (1824).
Syns. *Chloris leptostachya* Hochst. ex A. Rich., Tent. Fl. Abyss. 2: 407 (1850).
Chloris intermedia A. Rich., Tent. Fl. Abyss. 2: 407 (1850).
Chloris leptostachya Hochst. ex A. Rich. var. *intermedia* (A. Rich.) T. Durand & Schinz, Consp. Fl. Afr. 5: 861 (1895).

Annual to 25 cm, erect or geniculately ascending, often rooting at the nodes; leaf-blades



Plate 82. GRAMINEAE: *Tetrapogon cenchriformis* 1, habit; inflorescence after spikelets have dropped (right); spikelet (left). *Chloris virgata* 2, habit; spikelet (up left). *Chloris gayana* 3, spikelet. *Entropogon prieurii* 4, spikelet. Drawn by Margaret Tebbs.

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oblong, very obtuse; inflorescence a head of 4-6 digitate racemes 3-6 cm; spikelets 2-flowered, 1- to 2-awned; fertile lemma 2.3-2.6 mm, narrowly elliptic in profile, scabrid on the margins, keel and flanks, with an awn 0.8-1.8 cm; second lemma similar to the fertile but much smaller, awned or awnless.

N; introduced garden weed. Native throughout tropical Africa, Arabia and South America (Brazil, Paraguay, Argentina).

2. **Chloris virgata** Sw., Fl. Ind. Occid. 1: 203 (1797).
Syn. *Chloris meccana* Hochst. & Steud. ex Schltdl., Linnaea 18: 158 (1844).

Annual to 70 cm, erect or ascending, occasionally rooting at the lower nodes; leaf-blades linear, tapering; inflorescence a head of 4-8 digitate racemes 2.5-5 cm; spikelets 3-flowered, 2-awned; fertile lemma obliquely obovate in profile, the keel slightly gibbous, 2-3.6 mm, shortly ciliate on the margins and keel, shortly hairy on the flanks, with a crown of spreading hairs 1.5-4 mm just below the tip, and with an awn 2.5-8.5 mm; second lemma an oblong glabrous awned scale; third lemma a clavate glabrous awnless scale.

N, O, GE; sandy ground beside water and in areas of cultivation. Throughout the tropics.

3. **Chloris gayana** Kunth, Révis. Gramin. 1: 293, t. 58 (1830).

Stoloniferous perennial to 1 m; leaf-blades linear, tapering; inflorescence a head of 9-12 digitate racemes 3-12 cm; spikelets 3- to 4-flowered, 2-awned; fertile lemma 2.9-3.2 mm, lanceolate in profile, sparsely to densely ciliate on the margins and keel, with an awn 4-5 mm; second floret with a palea and often a male flower, the lemma lanceolate, ciliate on the margins, awned; third lemma a scabrid oblong or clavate awnless scale; fourth lemma, if present, a glabrous clavate awnless scale.

N, O, M; garden escape, now naturalized as a field weed. Native to tropical and southern Africa and tropical Arabia, widely cultivated as a fodder grass (Rhodes Grass).

74. **Enteropogon** Nees

Annual or perennial; racemes solitary or digitate; spikelets dorsally compressed, with 1 fertile floret, sometimes also a smaller male floret, the rhachilla terminating in an awned rudiment or a cluster of rudiments; fertile lemma broadly rounded to almost flat on the back, with prominently raised mid-nerve, subcoriaceous, often scabrid, 2-toothed, awned; grain narrowly elliptic in outline, dorsally compressed, concavo-convex, the pericarp free. 17 species, throughout the tropics.

1. **Enteropogon prieurii** (Kunth) Clayton, Kew Bull. 37: 419 (1982).
Syn. *Chloris prieurii* Kunth, Révis. Gramin. 2: 441 (1831).

Annual to 85 cm; racemes 4-9, 4-12 cm, erect; spikelets 4- to 6-flowered; fertile lemma 3-5 mm, ciliate on the margins, with an awn 0.7-2.5 cm; second to sixth lemmas glabrous, progressively reduced to awned rudiments.

De, R, GE; sandy soils. Macaronesia, Egypt, tropical Africa, Arabia.

75. **Cynodon** Rich., nom. conserv.

Perennial, mostly rhizomatous or stoloniferous, or both, and sward-forming; racemes digitate, sometimes in 2 or more closely spaced whorls; spikelets strongly laterally compressed, 1-flowered, with or without a rhachilla-extension (this very rarely bearing a vestigial floret); glumes very short to as long as the floret; lemma keeled, firmly cartilaginous, entire, awnless; caryopsis elliptic in outline, laterally compressed, the pericarp adnate. About 8 species, Old World tropics, 1 species pantropical and extending into warm-temperate regions.

1. Leaf-blades flat or inrolled, to 12 x 0.4 cm; racemes usually 4-6, 1.5-6(8) cm — 1. **C. dactylon**
\+ Leaf-blades filiform, 1-4 x 0.1 cm; racemes usually 2, 0.7-1.5 cm — 2. **C. transvaalensis**

1. **Cynodon dactylon** (L.) Pers., Syn. Pl. 1: 85 (1805).
Syns. *Panicum dactylon* L., Sp. PL, ed. 1, 58 (1753).
Cynodon glabratus Steud., Syn. Pl. Glumac. 1: 212 (1854).
Cynodon dactylon (L.) Pers. var. *villosus* Regel, Bull. Soc. Nat. Moscou 41: 305 (1868).

Stoloniferous sward-forming perennial with slender underground rhizomes; culms to 40 cm; leaf-blades flat or loosely inrolled, to 12 x 0.4 cm; racemes 1.5-6(8) cm, (2)4-6 in a single whorl; spikelets 2-2.6 mm; glumes lanceolate in profile, the upper 1/2-3/4 the length of the floret; lemma silky-pubescent on the keel, sometimes only thinly so.

N, O, M, D, R, GE, S; sandy and rocky soils, along water-courses, by lakes and as a weed of cultivation. Tropical and warm temperate regions throughout the world, widely used as a lawn grass (Dhub, Bermuda Grass, Star Grass) in the tropics.

NOTE: Robust specimens with flat leaf-blades have been collected in the Nile region and the oases. They resemble the tropical African *Cynodon nlemfuensis* Vanderyst, a species that has extensive creeping stolons but lacks rhizomes. The specimens in question are incomplete and it is not clear whether or not they have rhizomes. The species is a useful fodder grass and may well have been introduced to Egypt either deliberately or by accident for this purpose. A decision on its inclusion in the Egyptian flora must await better material. One of the types of *Cynodon glabratus* was collected on Mt. Sinai in 1835 by Schimper (no. 311, isosyntype K).

2. **Cynodon transvaalensis** Burtt Davy, Bull. Misc. Inform., Kew 1921: 281 (1921).

Stoloniferous sward-forming perennial with slender underground rhizomes; culms to 15 cm; leaf-blades filiform, inrolled, 1-4 cm and to 1 mm wide; racemes 0.7-1.5 cm, 1-3(4), usually 2, in a single whorl; spikelets *c.* 2.5 mm; glumes lanceolate in profile, the upper 1/4-1/3 the length of the floret; lemma sparsely ciliate on the keel.

Cultivated lawn grass. Native to South Africa.

76. **Schoenefeldia** Kunth

Annual or perennial; racemes solitary or digitate; spikelets laterally compressed, strictly 1-flowered or with a rhachilla-extension terminating in a long-awned rudiment; glumes

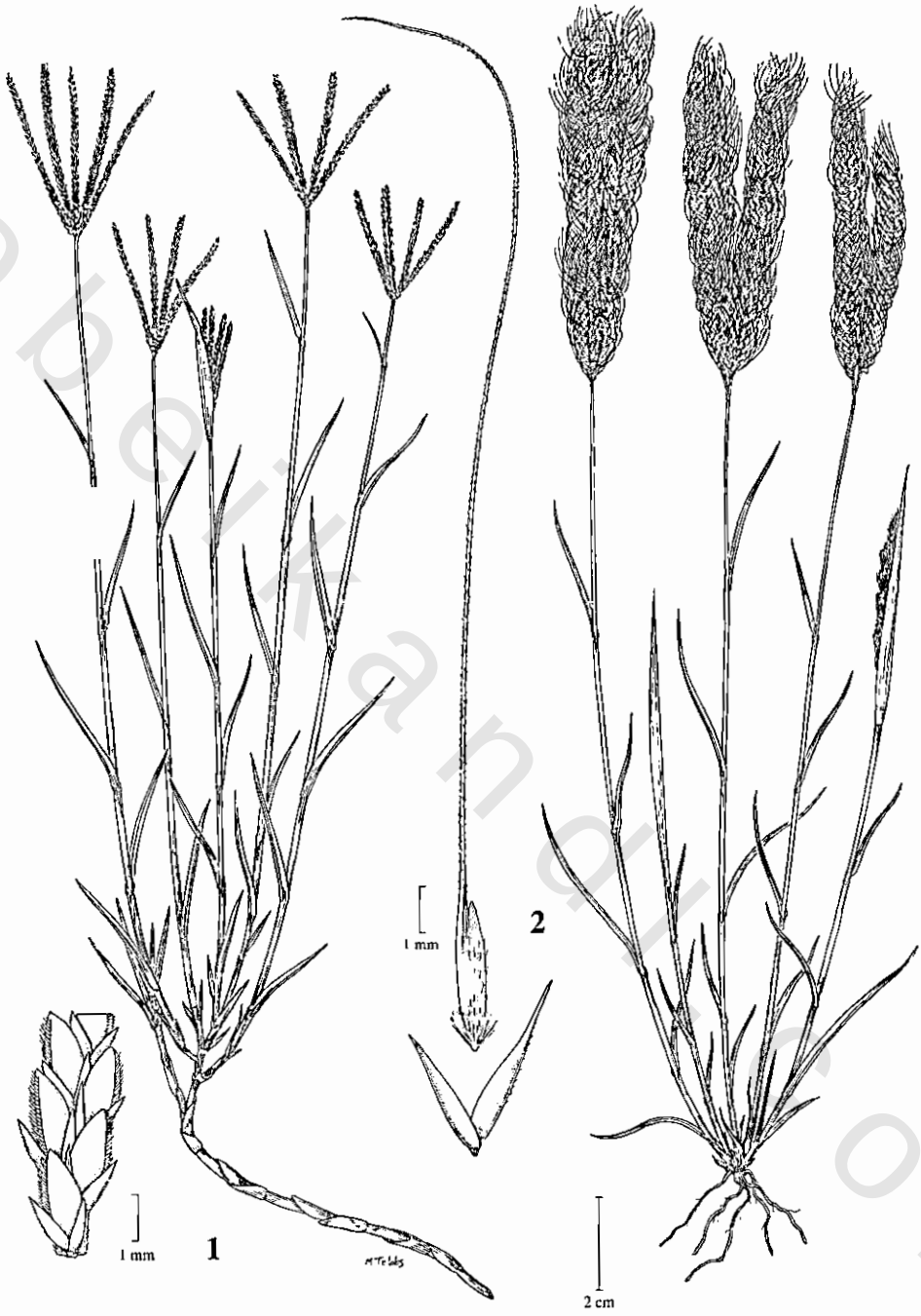


Plate 83. GRAMINEAE: *Cynodon dactylon* 1, habit; part of raceme with 5 spikelets (down left). *Schoenfeldia gracilis* 2, habit; spikelet (left). Drawn by Margaret Tebbs.

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longer than the floret; lemma keeled, cartilaginous, 2-dentate at the tip, with a long sinuous awn; grain elliptic in outline, laterally compressed, the pericarp free. 2 species, Africa, Madagascar, eastwards to India.

1. **Schoenefeldia gracilis** Kunth, Révis. Gramin. 1: 283, t. 53 (1830).
   Syns. *Schoenefeldia pallida* Edgew., J. Asiat. Soc. Bengal 21: 183 (1852).
   Chloris pallida (Edgew.) Hook.f., Fl. Brit. India 7: 289 (1896).
   Chloris myosuroides Hook.f., Fl. Brit. India 7: 290 (1896).

Annual to 90 cm; racemes 1-4, 3-20 cm; spikelets strictly 1-flowered; glumes 2.5-5 mm; lemma 2-2.5 mm, loosely hairy, with an awn 2-4 cm; awns characteristically delicately braided.

N; sandy soils. Egypt, Ethiopia westwards to Senegal, eastwards to Arabia, Pakistan and India.

77. **Melanocenchris** Nees

Annual or perennial; racemes disposed singly along an elongated axis, cuneate, deciduous, ending in a forked bristle, generally with 1-2 fertile spikelets and 2-3 progressively smaller sterile spikelets; fertile spikelets dorsally compressed, 2-flowered, the upper floret male or sterile, with rhachilla-extension; glumes placed side by side, hairy, the lower awn-like, the upper similar but with a narrowly expanded base; lemma chartaceous, 3-awned; palea 2-awned; caryopsis ellipsoid. 3 species, Chad to India and Sri Lanka.

1. **Melanocenchris abyssinica** (R. Br. ex Fresen.) Hochst., Flora 38: 274 (1855).
   Syns. *Eutriana abyssinica* R. Br. ex Fresen., Mus. Senckenberg. 2: 142 (1837).
   Ptiloneilema plumosa Hochst. & Steud. in Steud., Syn. Pl. Glumac. 1: 201 (1854).
   Melanocenchris plumosa (Hochst. & Steud.) Hochst., Flora 38: 273 (1855).

Annual to 20 cm; racemes 3-5(6), 0.6-1.4 cm apart, 1-1.5 cm including the awns; glumes of lowermost spikelet as long as the raceme, densely ciliate below; fertile lemma (4)6-7 mm including the short awns.

De, GE; sandy soils. Egypt, Arabia, Iran, Pakistan, northwest India, Sudan, Ethiopia, Eritrea.

78. **Tragus** Haller f., nom. conserv.

Annual or perennial; inflorescence a cylindrical false raceme; racemelets deciduous, shortly pedunculate, of 2-5 spikelets, these contiguous or on a short rhachis, sometimes the upper reduced; spikelets 1-flowered; lower glume a minute scale or suppressed; upper glume scarcely exceeding the floret, dorsally rounded, its 5 -7 nerves forming prominent ribs, some bearing stout hooked prickles, acute to acuminate; lemma similar to the upper glume, acute. 7 species, throughout the tropics.

1. Spikelets in pairs separated by a distinct internode, the upper shorter than the lower, the rhachis not prolonged; upper glume 5-nerved 1. **T. berteronianus**
+ Spikelets in a racemelet of 2-4 fertile and 1-2 sterile, separated by distinct internodes, the rhachis prolonged; upper glume 7-nerved 2. **T. racemosus**

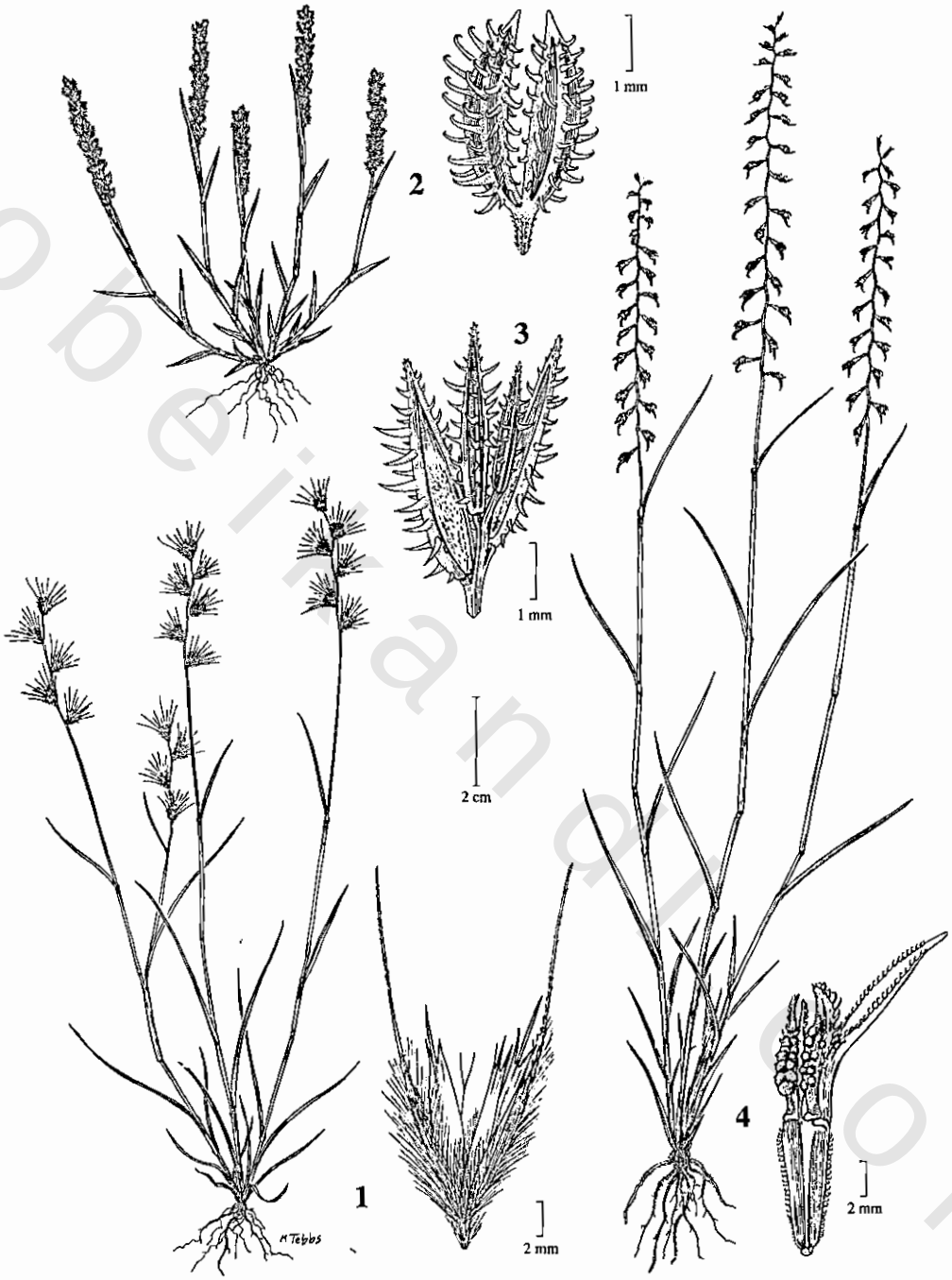


Plate 84. GRAMINEAE: *Melanocenchris abyssinica* 1, habit; raceme (down right). *Tragus berteronianus* 2, habit; racemelet (right). *Tragus racemosus* 3, racemelet. *Leptothrium senegalense* 4, habit; racemelet (down right). Drawn by Margaret Tebbs.

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1. **Tragus berteronianus** Schult., Mant. 2: 205 (1824).
Syns. *Tragus occidentalis* Nees, Agrost. Bras. 286 (1829).
Tragus alienus (Spreng.) Schult. var. *brevispinus* Henrard, Meded. Rijks-Herb. 40: 46 (1921).

Annual to 20 cm; inflorescence 2-7.5 cm; racemelets comprising 2 spikelets separated by a short but distinct internode, the upper shorter than the lower, the rhachis not prolonged; spikelets 2-3 mm, acute; upper glume 5-nerved, the prickles hooked and with turgid or swollen base.

De, R, GE; wadi-beds. Widespread in Africa and warmer parts of America, Arabia, Iran, Afghanistan, Pakistan and China.

2. **Tragus racemosus** (L.) All., Fl. Pedem. 2: 241 (1785).
Syns. *Cenchrus racemosus* L., Sp Pl., ed. 1, 1049 (1753).
Phalaris muricata Forssk., Fl. Aegypt.-Arab. 202 (1775).
Tragus brevicaulis Boiss., Diagn. Pl. Orient. 2(13): 44 (1854).

Annual to 25 cm; inflorescence (2)5-7.5 cm; racemelets comprising 2-4 fertile and 1-2 sterile spikelets separated by distinct internodes, the rhachis prolonged; spikelets 4-5.5 mm, acuminate; upper glume 7-nerved, the prickles hooked and with turgid or swollen base.

De, R, GE; dry sandy or stony ground. Central and southern Europe, northern tropical Africa, temperate Asia.

79. **Leptothrium** Kunth
Syn. *Latipes* Kunth

Perennial; inflorescence an open false raceme; racemelets deciduous, comprising (1)2 spikelets side by side on the truncate tip of a cuneate peduncle; spikelets 1-flowered; glumes longer than the floret, indurate, smooth or tuberculate-spinulose, the lower usually modified into a long flat recurved acuminate tail (less so in the second spikelet of a pair; rarely no longer than the upper), the upper laterally compressed and enfolding the floret (very rarely resembling the lower); lemma acute. 2 species, 1 Senegal to Pakistan, 1 in the Caribbean.

1. **Leptothrium senegalense** (Kunth) Clayton, Kew Bull. 27: 151 (1972).
Syn. *Latipes senegalensis* Kunth, Révis. Gramin. 1: 261 (1830).

Short-lived perennial to 75 cm, forming tough bunches; inflorescence 6-11 cm, the racemelets ± distant on the wavy main axis, brightly coloured purple and light green; peduncle 1-4 mm, cuneate, flattened, ciliate on the margins with hooked hairs; first spikelet: lower (outer) glume 3-6.5 mm, the margins ciliate with hooked hairs above; upper glume 3-4 mm, densely tuberculate and often spinulose, pectinate with hooked spines near one margin, rostrate at the tip; second spikelet: lower (outer) glume 2.5-4 mm, tuberculate-spinulose; upper glume 3-4.5 mm, tuberculate-spinulose, rostrate above and with a crest of hooked prickles.

De, R, GE; sandy soils. Tropical Africa from Senegal to the Red Sea, southwards to Tanzania, Arabia, Iran, Pakistan.

Tribe 17. **PANICEAE**

Ligule a short membrane with ciliate fringe, rarely absent; inflorescence an open to spike-like panicle or of unilateral racemes (these rarely compound), usually terminal, the spikelets all alike, sometimes paired but those of a pair similar, when racemose the lower glume usually turned away from the rhachis (abaxial); spikelets 2-flowered without rhachilla-extension, usually dorsally compressed, falling entire, rarely awned; glumes membranous or herbaceous, rarely coriaceous, the upper often as long as the spikelet, the lower usually shorter and sometimes rudimentary; lower floret male or barren; upper floret fertile, the lemma and palea ± indurate; stamens 3, rarely fewer; caryopsis usually with round or oval hilum.

1. Spikelets not subtended by a deciduous involucre of bristles or spines, if subtended by bristles then these persistent on the panicle branches and not forming an involucre — 2
\+ Spikelets, singly or in clusters, subtended by a deciduous involucre of bristles or spines — 12

2. Upper lemma coriaceous to bony at maturity with narrow inrolled margins clasping only the edges of the palea — 3
\+ Upper lemma cartilaginous to chartaceous or rarely hyaline, the margins flat, usually hyaline and covering the back of the palea — 9

3. Spikelets subtended by persistent bristles or the raceme-rhachis prolonged into a subulate point — 4
\+ Spikelets not subtended by bristles nor the raceme-rhachis prolonged into a subulate point — 5

4. Inflorescence a panicle, all or most of the spikelets subtended by 1 or more bristles — 85. **Setaria**
\+ Inflorescence of racemes, only the terminal spikelet subtended by a bristle formed by prolongation of the raceme-rhachis (if racemes in pockets on a broad main axis see *Stenotaphrum*; if lower glume absent see *Paspalum*) — 86. **Paspalidium**

5. Inflorescence an open panicle — 80. **Panicum**
\+ Inflorescence of unilateral racemes, the spikelets usually single or paired but sometimes in irregular clusters or in short secondary racemelets, rarely the spikelets long-pedicelled and distant (*Brachiaria deflexa*) — 6

6. Lower glume absent — 84. **Paspalum**
\+ Lower glume present — 7

7. Tip of upper palea reflexed or slightly protuberant; glumes or lemmas sometimes awned — 81. **Echinochloa**
\+ Tip of upper palea not reflexed; glumes and lemmas awnless — 8

8. Upper lemma usually muticous, if shortly mucronate then spikelets plump (if spikelets borne singly then lower glume adaxial) — 82. **Brachiaria**
\+ Upper lemma prominently mucronate; spikelets plano-convex, cuspidate (if spikelets borne singly then lower glume abaxial) — 83. **Urochloa**

9. Spikelets laterally compressed; inflorescence a panicle 10
+ Spikelets dorsally compressed; inflorescence of racemes 11

10. Upper lemma dorsally compressed, the stigmas emerging terminally 88. **Tricholaena**
+ Upper lemma laterally compressed, the stigmas emerging laterally 89. **Melinis**

11. Inflorescence of very short racemes embedded in an enlarged central axis 87. **Stenotaphrum**
+ Inflorescence not of embedded racemes 90. **Digitaria**

12. Involucral bristles free throughout, ± filiform 91. **Pennisetum**
+ Involucral bristles often flattened into spines and connate below into a disc or cup 92. **Cenchrus**

80. **Panicum** L.

Annual or perennial; leaf-blades flat or inrolled; inflorescence a panicle, usually much-branched but occasionally contracted about the primary branches; spikelets dorsally or weakly laterally compressed, ovate or oblong; glumes hyaline to membranous, usually the lower shorter than, and the upper as long as, the spikelet; lower floret male or barren, its lemma usually resembling the upper glume, with or without a palea; upper lemma about as long as the spikelet, crustaceous, the margins inrolled and clasping only the edges of the palea; caryopsis elliptic in outline, dorsally compressed. About 470 species, pantropical, extending to temperate regions of North America.

1. Upper lemma faintly to strongly rugose 1. **P. maximum**
+ Upper lemma quite smooth 2

2. Spikelets 4-4.5 mm 3
+ Spikelets up to 3.5 mm 4

3. Hispid annual; spikelets persistent 2. **P. miliaceum**
+ Glabrous shrubby perennial; spikelets deciduous 3. **P. turgidum**

4. Lower glume 1/2-2/3 the length of the spikelet 4. **P. antidotale**
+ Lower glume up to 1/3 the length of the spikelet 5

5. Plant tufted from a knotty rootstock; lower glume membranous, 1-3(7)-nerved 7. **P. coloratum**
+ Plant with long slender rhizomes and often surface stolons; lower glume hyaline, 0(3)-nerved 6

6. Culms erect from long spreading rhizomes; leaf-sheaths tough, woolly on the margin (at least when young); ligule 0.3-0.5 mm; leaf-blades tough, pungent 5. **P. repens**
+ Culms stoloniferous from a basal tuft; leaf-sheaths loose, papery, glabrous on the margins; ligule 0.8-2 mm; leaf-blades soft 6. **P. hygrocharis**

1. **Panicum maximum** Jacq., Icon. Pl. Rar. 1: 2, t. 13 (1781).
Syns. *Panicum polygamum* Sw., Prodr. 24 (1788), non Forssk. (1775).
Panicum jumentorum Pers.. Syn. Pl. 1: 83 (1805), based on *Panicum polygamum* Sw.

Panicum sparsum Schumach., Beskr. Guin. Pl. 84 (1827).
Panicum praelongum Steud., Syn. Pl. Glumac. 1: 73 (1854).
Panicum tephrosanthum Schinz, Bull. Herb. Boissier, sér. 2, 1: 766 (1901).

Loosely to densely tufted perennial to 1.5(2) m, erect from a shortly rhizomatous base or ascending and rooting at the lower nodes; leaf-blades 12-40 x 0.4-3.5 cm, linear to narrowly lanceolate; panicle 12-45 cm, oblong or pyramidal in outline, usually much-branched, the branches ascending to spreading, the lowermost in a whorl; spikelets 3-4.5 mm, oblong, glabrous or pubescent, blunt or acute; lower glume 1/3-1/2 the length of the spikelet, broadly ovate, 3-nerved, obtuse to acute; upper lemma and palea faintly to strongly transversely rugose.

N; cultivated for fodder (Guinea Grass). Native to tropical and southern Africa, widely introduced in the tropics.

2. **Panicum miliaceum** L., Sp. Pl., ed. 1, 58 (1753).

Robust, sparsely to densely hispid annual to 1.5 m; leaf-blades 15-40 x 0.8-2.4 cm, linear to narrowly lanceolate, cordate to amplexicaul at the base; panicle 15-35 cm, narrowly oblong to pyramidal in outline, often appearing 1-sided; spikelets (4)4.5-5.5 mm, ovate to ovate-oblong, glabrous, acute to shortly acuminate; lower glume 1/2-3/4 the length of the spikelet, ovate, 5-nerved, acuminate, separated from the upper by a short internode; upper lemma pale and glossy, often tinged with orange, usually persistent.

N, M; rarely cultivated as a cereal (Proso Millet), but readily escaping and often persisting. Native to India, widely cultivated in warm temperate regions, it is doubtful if it now exists anywhere as a truly wild plant.

3. **Panicum turgidum** Forssk., Fl. Aegypt.-Arab. 18 (1775).

Glaucous perennial forming rounded bushes to 1(2) m and often as much across; culms erect or ascending, woody, branched at the nodes, sometimes forming fastigiate tufts; leaf-blades (0.5)2-15 x 0.1-0.6 cm, linear-lanceolate, flat, folded or inrolled, glabrous and glaucous, stiff and pungent, often much shorter than the sheath, rarely filiform and to 30 cm; panicle 2.5-15(30) cm, subpyramidal in outline, lax, the branches distant and eventually spreading; spikelets 3.5-4.5(5) mm, ovoid, glabrous, acute or acuminate, turgid and often gaping at anthesis; lower glume 3/4 as long to almost as long as the spikelet, broadly ovate, 5- to 9-nerved; upper lemma pallid, smooth and shining.

N, O, M, D, R, GE, S; sandy soils. Mauritania, Morocco, Tunisia, Libya, Egypt, Cyprus, Palestine, Arabia, Iraq, Iran, Pakistan, Sudan, Ethiopia, Eritrea, Somalia.

NOTE: The type of *Panicum turgidum* was collected in Egypt, from deserts around Cairo, in 1761/2 by Forsskål (no.1554, holotype C).

4. **Panicum antidotale** Retz., Observ. Bot. 4: 17 (1786/7).
Syn. *Panicum miliare* Lam., Tab. Encycl. 1: 173 (1791).

Perennial with creeping woody rootstock; culms woody, pubescent at the base, to 1.8 m high, erect or ascending, often pruinose below; leaf-blades 6-30 x 0.4-1.4 cm, linear,



Plate 85. GRAMINEAE: *Panicum turgidum* 1, habit; spikelet (up left). *Panicum repens* 2, habit; spikelet (up left). *Panicum maximum* 3, spikelet. Drawn by Margaret Tebbs.

flat, glabrous, acute; panicle 13-32 cm, narrowly pyramidal to broadly oblong or ovate in outline, varying from copiously branched with subverticillate branches to sparsely branched with the spikelets condensed about the distant branches; spikelets 2.4-3.2(3.6) mm, elliptic, glabrous, acute; lower glume broadly ovate, 1/2-2/3 the length of the spikelet (rarely less), membranous with broad hyaline margins, 3- to 5-nerved, acute; upper lemma pallid, smooth and shining.

N, M, R, S; introduced fodder grass, possibly native to Sinai. Egypt, Arabia, Iran, Afghanistan, Pakistan, India, introduced in tropical Africa.

5. **Panicum repens** L., Sp. Pl., ed. 2, 87 (1762).
Syn. *Panicum grossarium* Forssk., Fl. Aegypt.-Arab. 19 (1775), non L. (1753).

Subglabrous perennial with long creeping rhizomes; culms to 1 m, tough, erect or decumbent, often arising from a knotty base; leaf-sheaths tough, woolly on the margins (at least when young); ligule 0.3-0.5 mm; leaf-blades 7-25 x 0.2-0.8 cm, linear, flat (or inrolled when dry), stiff and pungent, distichous; panicle 5-20 cm, narrowly oblong in outline, sparsely to moderately branched, the branches ascending; spikelets 2.5-3 mm, ovate, pallid but often tinged with purple, acute; lower glume 1/3 the length of the spikelet, broadly ovate, hyaline, 1(3)-nerved, clasping the base of the spikelet, obtuse or acute; upper lemma pallid, smooth and shining.

N, O, M, De; canal-banks, irrigation-ditches and rice-fields, and on coastal sands. Throughout the tropics and subtropics.

NOTE: The type of *Panicum grossarium* Forssk. was collected at Rashid (Rosetta), Egypt, in 1761 by Forrskål (no. 1551, holotype C).

6. **Panicum hygrocharis** Steud., Syn. Pl. Glumac. 1: 72 (1854)
Syn. *Panicum repentellum* Napper, Kirkia 3: 127 (1963).

Tufted aquatic perennial; culms to 1 m, stoloniferous and rooting at the nodes, spongy; leaf-sheaths loose, papery, glabrous on the margins; ligule 0.8-2 mm; leaf-blades 6-12 x 0.3-0.5 cm, linear, flat, soft, distichous; panicle 6-14 cm, ovate in outline, moderately branched with loosely spreading branches or narrower with ascending branches; spikelets 2.2-3 mm, elliptic, pallid with prominent green nerves above, acuminate; lower glume up to 1/3 the length of the spikelet, broadly ovate, hyaline, 0(3)-nerved, clasping the base of the spikelet, rounded to truncate; upper lemma pallid, smooth and shining

M; irrigation and drainage canals. Eastern and southern tropical Africa, distribution not precisely known because of previous confusion with *Panicum repens*.

7. **Panicum coloratum** L., Mant. 30 (1767).

Tufted, pubescent or subglabrous perennial, the base usually knotty or slightly swollen, often with persistent scales; culms to 1 m, sometimes more, erect, rarely decumbent; leaf-blades (3)12-30 x (0.2)0.5-1 cm, linear, straight or subamplexicaul at the base, flat, glabrous or hairy, acute or acuminate, neither distichous nor pungent; panicle 4-30 cm, ovate in outline, usually much-branched, contracted or spreading, the branches ascending; spikelets 2-3 mm, ovate-elliptic, green but often tinged with purple, obtuse,

acute or occasionally acuminate; lower glume 1/4-1/3 the length of the spikelet, ovate, membranous, 1(3)-nerved, cuff-like and clasping, acute; upper lemma pallid, smooth and shining.

N, O, M, De; canal banks and gardens. Tropical and subtropical Africa, introduced elsewhere.

81. **Echinochloa** P. Beauv., nom. conserv.

Annual or perennial; ligule often absent; inflorescence of racemes arranged along a central axis; spikelets paired or in short secondary racemelets, typically densely packed in 4 rows, narrowly elliptic to subrotund, flat on one side, gibbous on the other, often hispidulous, cuspidate or awned at the tip; glumes acute to acuminate, the lower about 1/3 the length of the spikelet, typically acute or acuminate; lower floret male or barren, its lemma often stiffly awned, with or without a palea; upper lemma crustaceous, smooth and shining, its margins inrolled and clasping only the edges of the palea, terminating in a short membranous laterally compressed incurved beak; upper palea acute, the tip shortly reflexed and slightly protuberant from the lemma; caryopsis broadly elliptic in outline, dorsally flattened. About 20 species, tropical and warm temperate regions of the world.

1. Annual; ligule absent 2
\+ Perennial; ligule a line of hairs, at least in the lower leaves 3

2. Racemes untidily 2- to several-rowed, the longest 2-10 cm and usually with secondary branchlets at the base; spikelets 3-4 mm, acuminate to awned, hispid 1. **E. crusgalli**
\+ Racemes neatly 4-rowed, openly spaced, rarely more than 3 cm, simple; spikelets 1.5-3 mm, acute, pubescent 2. **E. colona**

3. Reed-like plant; culms robust; spikelets 2.5-4 mm, plump, awnless or rarely with a subulate point 3. **E. pyramidalis**
\+ Rhizomatous plant; culms spongy, decumbent and rooting at the nodes; spikelets 3.5-6 mm, awned, the awn to 2(5) cm 4. **E. stagnina**

1. **Echinochloa crusgalli** (L.) P. Beauv., Ess. Agrostogr. 53, 161 (1812).
Syns. *Panicum crusgalli* L., Sp. Pl., ed. 1, 56 (1753).
Panicum crusgalli L. var. *mite* Pursh, Fl. Amer. Sept. 1: 66 (1814).
Panicum crusgalli L. var. *brevisetum* Doell, Fl. Baden. 1: 232 (1857).
Panicum crusgalli L. var. *longisetum* Doell, Fl. Baden. 1: 232 (1857).
Echinochloa crusgalli (L.) P. Beauv. var. *mitis* (Pursh) Peterm., Fl. Lips. Excurs. 82 (1838).
Echinochloa crusgalli (L.) P. Beauv. var. *breviseta* (Doell) Podp., Kvetena Moravy 6: 475 (1926).
Echinochloa crusgalli (L.) P. Beauv. var. *longiseta* (Doell) Podp., Kvetena Moravy 6: 475 (1926).

Coarse annual; culms to 1 m, erect or spreading; ligule absent; inflorescence 6-22 cm, linear to ovate in outline, the racemes untidily 2- to several-rowed; racemes 2-10 cm, usually with short secondary branchlets at the base; spikelets mostly 3-4(5) mm, ovate-elliptic, hispid; lower floret barren, the lemma acuminate or with an awn to 5 cm; upper lemma 2-3(3.5) mm including the short herbaceous tip.

N, O, M, Dw; weed of irrigation ditches and rice-fields. Warm temperate and subtropical regions of the world, sometimes extending into the tropics.

2. **Echinochloa colona** (L.) Link, Hort. Berol. 2: 209 (1833).
Syns. *Panicum colonum* L., Syst. Nat., ed. 10, 2: 870 (1759).
Panicum arabicum Nees ex Steud., Syn. Pl. Glumac. 1: 63 (1854), in part, Schimper 807, but not 963 (= *Paspalidium desertorum*)
?*Panicum colonum* L. var. *leianthum* Boiss., Fl. Orient. 5: 436 (1884), based on *Panicum arabicum* Nees ex Steud.
Panicum colonum L. var. *glaucum* Sickenb., Mém. Inst. Égypt. 4: 300 (1901).
Panicum colonum L. var. *repens* Sickenb., Mém. Inst. Égypt. 4: 300 (1901).
Echinochloa colona (L.) Link var. *glauca* (Sickenb.) N.D. Simpson, Minist. Agric. Egypt Bull. 93: 10 (1930).
Echinochloa colona (L.) Link var. *repens* (Sickenb.) N.D. Simpson, Minist. Agric. Egypt Bull. 93: 10 (1930).

Annual; culms to 1 m, erect or ascending; ligule absent; inflorescence 1-15 cm, typically linear, the racemes neatly 4-rowed; racemes seldom over 3 cm, simple, commonly half their length apart and appressed to the axis, but sometimes subverticillate and spreading (rarely forming a lanceolate head, but then the spikelets purplish with the lower floret male); spikelets 1.5-3 (3.5) mm, ovate-elliptic to subglobose, pubescent (rarely shortly hispid); lower floret male or barren, the lemma acute to cuspidate (rarely with a subulate point to 1 mm); upper lemma 2-3 mm.

N, O, M, D, R, GE, S; canal banks, gardens and cultivated fields. Throughout tropics and subtropics of the world.

NOTE: The type material of *Panicum arabicum* represents two distinct species, this one (Schimper 807) and *Paspalidium desertorum* (Schimper 963). The latter agrees with the circumscription so the name properly belongs in the synonymy of that species. The types of both var. *glaucum* and var. *repens* were collected in Egypt.

3. **Echinochloa pyramidalis** (Lam.) Hitchc. & Chase, Contr. U.S. Natl. Herb. 18: 345 (1917).
Syns. *Panicum pyramidale* Lam., Tab. Encycl. 1: 171 (1791).
Panicum atroviolaceum A. Rich., Tent. Fl. Abyss. 2: 368 (1850).

Reed-like rhizomatous perennial; culms to 4 m, robust, firm, erect; ligule a line of hairs, at least in the lower leaves; inflorescence 8-40 cm, ovate to narrowly lanceolate in outline with overlapping racemes, or linear with ± distant racemes; racemes 3-20 cm, simple or compound, straight, ascending; spikelets 2.5-3.5 (4) mm, narrowly ovate to broadly elliptic, plump, glabrous to hispid; lower lemma acute to acuminate, rarely with a subulate point to 3 mm; upper lemma 2-3 mm.

Unconfirmed in Egypt, but very likely to occur. Tropical and southern Africa, Madagascar, Arabia.

4. **Echinochloa stagnina** (Retz.) P. Beauv., Ess. Agrostogr. 53, 161, 171 (1812).
Syns. *Panicum stagninum* Retz., Observ. Bot. 5: 17 (1789).

Panicum scabrum Lam., Tab. Encycl. 1: 171 (1791).
Echinochloa scabra (Lam.) Roem. & Schult., Syst. Veg. 2: 479 (1817).
Panicum crusgalli L. var. *sieberanum* Asch. & Schweinf., Ill. Fl. Égypte, Mém. Inst. Egypt. 2, Suppl. 777 (1889).
Panicum crusgalli L. var. *stoloniferum* Schweinf. & Muschl. in Muschl., Man. Fl. Egypt 1: 52 (1912).

Rhizomatous perennial, but sometimes behaving as an annual; culms to 2 m, spongy, decumbent and rooting at the nodes, these sometimes bearded; ligule a line of hairs, at least in the lower leaves; inflorescence 6-25 cm, ovate to narrowly lanceolate in outline, typically open with the racemes secund, flexuous and ± nodding, but displaying much variation; racemes 2-8 cm, simple; spikelets 3.5-6 mm, narrowly ovate, hispid, the hairs often tubercle-based, rarely glabrescent; lower lemma tapering to an awn (0.1)0.3-2(5) cm; upper lemma 3-5 mm.

N, O, M, De; irrigation canals, ditches, moist ground. Tropical Africa, Madagascar, tropical Asia from northeast India to Indo-China.

NOTE: The type of var. *sieberanum* was collected at Rashid (Rosetta), Egypt, by Sieber (*s.n.*, isotype K), and the type of var. *stoloniferum* was collected at Zagazig in 1887 by Schweinfurth (no. 49, isotype K).

82. **Brachiaria** (Trin.) Griseb.

Annual or perennial; leaf-blades linear to lanceolate; inflorescence composed of racemes along a central axis, the rhachis filiform to ribbon-like; spikelets single or paired, rarely in fascicles or secondary racemelets, sessile or pedicellate, adaxial, plump, sometimes the lowest rhachilla-internode elongated, accrescent to the sheathing base of the lower glume and forming a short stipe; lower glume shorter than the spikelet; lower floret male or barren; upper lemma coriaceous to crustaceous, obtuse to acute, occasionally mucronate, its margins inrolled and covering only the edges of the palea; upper palea obtuse to subacute, its tip enclosed within the lemma; caryopsis elliptic in outline, dorsally compressed. About 100 species, mainly Old World tropics.

NOTE: The genus *Brachiaria* presents a distinctive facies when compared with *Urochloa* but the differences are sometimes considered to be slight. *Brachiaria* has adaxial, plump spikelets and usually muticous upper lemma, whereas in *Urochloa* the spikelets are abaxial, plano-convex and have a cuspidate tip to accommodate the distinctly mucronate upper lemma. There are, however, some intermediates that are difficult to place and there is a growing tendency to regard all species of *Brachiaria*, except *B. eruciformis*, as congeneric with *Urochloa*. The one exception is excluded on account of its readily deciduous upper lemma. Again, there are intermediates that obscure even this distinction as well as problems over typification of *Brachiaria* itself. For now, generic concepts are left alone until the arguments have settled down and there is a consensus.

1. Upper lemma smooth, shining, obtuse, readily deciduous from the rest of the spikelet at maturity; spikelets neatly imbricate; lower glume up to 1/5 the length of the spikelet 1. **B. eruciformis**
+ Upper lemma granulose to rugose, subacute to mucronulate, falling with the rest of the spikelet at maturity; spikelets in pairs, fascicles or on short secondary racemelets; lower glume usually more than 1/5 the length of the spikelet 2



Plate 86. GRAMINEAE: *Echinochloa colona* 1, habit; spikelets showing both surfaces. (up right). *Echinochloa crusgalli* 2, inflorescence; spikelets showing both surfaces (middle right and left). *Echinochloa stagnina* 3, inflorescence; spikelets showing both surfaces (down right and left). *Brachiaria eruciformis* 4, inflorescence; spikelets showing both surfaces (down right). Drawn by Margaret Tebbs.

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2. Perennial; rhachis of racemes flat, ± ribbon-like, narrowly winged 2. **B. mutica**
+ Annual; rhachis of racemes triquetrous or crescentic in section 3

3. Glumes separated by a distinct internode; upper lemma coarsely rugose; racemes slender, distant, secund 3. **B. leersioides**
+ Glumes adjacent, or if slightly separated then the upper lemma not coarsely rugose 4

4. Racemes compound, bearing the spikelets in dense fascicles or in short secondary racemelets 4. **B. deflexa**
+ Racemes simple, the spikelets borne in pairs 5

5. Spikelets 1.5-2.2 mm; lower glume up to 1/4 the length of the spikelet, usually truncate 5. **B. reptans**
+ Spikelets 2.5-3.5 mm; lower glume up to 1/2 the length of the spikelet, obtuse 6. **B. ramosa**

1. **Brachiaria eruciformis** (Sm.) Griseb. in Ledeb., Fl. Ross. 4: 469 (1853).
Syns. *Panicum eruciforme* Sm. in Sibth. & Sm., Fl. Graec. 1: 44, t. 59 (1806).
Panicum isachne Roth ex Roem. & Schult., Syst. Veg. 2: 458 (1817)
Brachiaria isachne (Roth ex Roem. & Schult.) Stapf in Prain, Fl. Trop. Afr. 9: 552 (1919).

Annual to 60 cm, slender, geniculately ascending; leaf-blades linear to narrowly lanceolate, glabrous or pubescent; inflorescence 1-8 cm, of 3-14 racemes on an axis; racemes 0.5-2.5 cm, secund, bearing single spikelets imbricate on a triquetrous rhachis; spikelets 1.7-2.7 mm, elliptic, pubescent, subacute, without a stipe; lower glume to 1/5 the length of the spikelet, obtuse; upper glume adjacent to the lower; upper lemma readily deciduous, smooth and shining, obtuse.

N, O, S; weed of cultivation. Mediterranean region, southwards to South Africa and eastwards to India.

2. **Brachiaria mutica** (Forssk.) Stapf in Prain, Fl. Trop. Afr. 9: 526 (1919).
Syns. *Panicum muticum* Forssk., Fl. Aegypt.-Arab. 20 (1775).
Panicum appressum Forssk., Fl. Aegypt.-Arab. 20 (1775).
Panicum numidianum Lam., Tab. Encycl. 1: 172 (1791).
Brachiaria numidianum (Lam.) Henrard, Blumea 3: 434 (1940).
Urochloa mutica (Forssk.) T. Q. Nguyen, Novosti Sist. Vyssh. Rast. 1966: 13 (1966).

Sprawling perennial to 1.25 m, prostrate below and rooting at the nodes; leaf-blades broadly linear; inflorescence of 5-20 racemes on an axis 7-20 cm; racemes 2-10 cm, bearing paired spikelets in several untidy rows on a flat, narrow (0.5-1 mm) ± ribbon-like winged rhachis (sometimes the spikelets in short secondary racemelets below or borne singly above); spikelets 2.5-3.5 mm, elliptic, glabrous, acute; lower glume 1/4-1/3 the length of the spikelet, subacute; upper glume adjacent to the lower; upper lemma rugulose, obtuse, with an obscure mucro.

N, M, S; canal banks and irrigation ditches. Throughout tropical regions of the world.

NOTE: The type of *Panicum muticum* was collected at Rashid (Rosetta), Egypt, in 1761 by Forsskål (no. 86, holotype C); the type of *P. numidianum* was collected in Egypt by Poiret (holotype P).

3. **Brachiaria leersioides** (Hochst.) Stapf in Prain, Fl. Trop. Afr. 9: 551 (1919).
Syn. *Panicum leersioides* Hochst., Flora 38: 196 (1855).

Annual to 1 m, ascending; leaf-blades linear, setaceously acuminate; inflorescence of 3-14 widely spaced racemes, these spreading horizontally or deflexed at maturity, borne on an axis 3-20 cm; racemes 1-7 cm, slender, secund, bearing paired spikelets on a triquetrous rhachis; spikelets 2-3.5 mm, narrowly elliptic, glabrous, subacute, without a stipe; lower glume $1/3$-$1/2$ the length of the spikelet, obtuse to subacute, clasping; upper glume separated from the lower by a distinct internode 0.2-0.5 mm; upper lemma coarsely rugose, subacute.

De, GE; sandy wadis. Tropical Africa and tropical Arabia.

4. **Brachiaria deflexa** (Schumach.) C.E. Hubb. ex Robyns, Bull. Jard. Bot. État 9: 181 (1932).
Syns. *Panicum deflexum* Schumach., Beskr. Guin. Pl. 63 (1827).
Panicum regulare Nees, Fl. Afr. Austral. Ill. 41 (1841).
Panicum nudiglume Hochst., Flora 27: 253 (1844).
Brachiaria regularis (Nees) Stapf in Prain, Fl. Trop. Afr. 9: 544 (1919).
Urochloa deflexa (Schumach.) H. Scholz, Bull. Mus. Natl. Hist. Nat., B, Adansonia, sér. 4, 11: 443 (1989).

Annual to 70 cm, often weak and ascending; leaf-blades broadly linear; inflorescence of 7-15 racemes on an axis 6-15 cm; racemes 2-10 cm, usually compound, bearing spikelets in dense fascicles or in pairs in short secondary racemelets, spreading from the triquetrous rhachis, the inflorescence imitating a panicle; pedicels, or some of them, longer than the spikelets and to 1.5 cm; spikelets 2.5-3.5 mm, broadly elliptic, glabrous to pubescent, acute, with a short stipe to 0.5 mm; lower glume $1/3$-$1/2$ the length of the spikelet, obtuse; upper glume ± adjacent to the lower; upper lemma rugose, subacute to acute.

De, R, GE; sandy wadis and seashores. Tropical and southern Africa, tropical Arabia, India.

5. **Brachiaria reptans** (L.) C.A. Gardner & C.E. Hubb. in Hook., Icon. Pl. 34: t. 3363 (1938).
Syns. *Panicum reptans* L., Syst. Nat., ed. 10, 2: 870 (1759).
Panicum prostratum Lam., Tab. Encycl. 1: 171 (1791).
Panicum sieberi Link, Hort. Berol. 1: 207 (1827), nom. superfl., based on *Panicum prostratum* Lam.
Urochloa reptans (L.) Stapf in Prain, Fl. Trop. Afr. 9: 601 (1919).

Annual to 60 cm, usually decumbent and rooting at the nodes; leaf-blades narrowly lanceolate to lanceolate; inflorescence of 5-15 racemes on an axis 1-8 cm; racemes 1-4 cm, bearing paired spikelets crowded on a triquetrous rhachis; spikelets 1.5-2.2 mm, narrowly ovate to broadly elliptic, glabrous, acute, without a stipe; lower glume to $1/4$

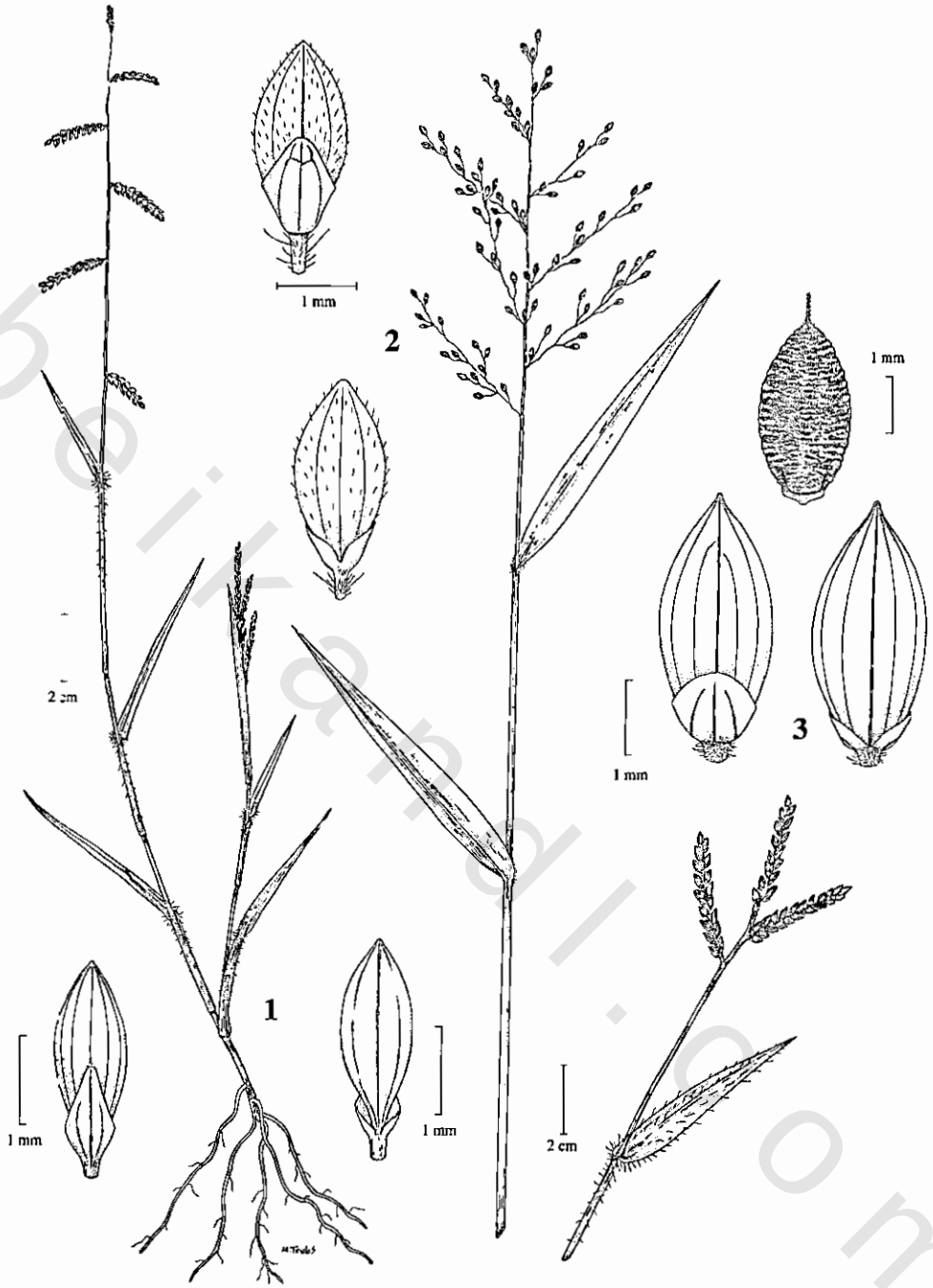


Plate 87. GRAMINEAE: *Brachiaria leersioides* 1, habit; spikelets showing both surfaces (down right and left). *Brachiaria deflexa* 2, inflorescence; spikelets showing both surfaces (up and middle left). *Urochloa panicoides* 3, inflorescence; spikelets showing both surfaces (up); upper lemma (further up). Drawn by Margaret Tebbs.

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the length of the spikelet, hyaline, clasping, truncate (rarely a little longer and broadly ovate); upper glume adjacent to the lower; upper lemma rugose, subacute, mucronulate.

N, M, De; weed of cultivation. Tropical Africa, tropical Asia, introduced weed throughout the tropics.

6. **Brachiaria ramosa** (L.) Stapf in Prain, Fl. Trop. Afr. 9: 542 (1919).
Syns. *Panicum ramosum* L., Mant. 29 (1767).
Panicum petiveri Trin., Gram. Panic. 144 (1826).
Urochloa ramosa (L.) T.Q. Nguyen, Novosti Sist. Vyssh. Rast. 1966: 13 (1966).

Annual to 70 cm; leaf-blades broadly linear; inflorescence of 3-15 racemes on an axis 0.3-1 cm; racemes 1-8 cm, simple or the longest with branchlets at the base, bearing mostly paired, loosely contiguous spikelets appressed to the triquetrous rhachis; pedicels 1-2 mm, shorter than the spikelets; spikelets 2.5-3.5 mm, elliptic to broadly elliptic, glabrous or pubescent, acute to cuspidate, with or without a stipe to 0.5 mm; lower glume 1/3-1/2 the length of the spikelet, obtuse; upper lemma rugose, subacute to acute.

De, R, GE; moist sandy soils. Tropical and southern Africa, tropical Asia.

83. **Urochloa** P. Beauv.

Annual or perennial; leaf-blades linear to lanceolate; ligule a line of hairs; inflorescence of racemes along an axis; spikelets single or paired, abaxial, plano-convex, cuspidate to acuminate; lower glume shorter than the spikelet; upper glume membranous to firmly chartaceous; lower floret male or sterile, its lemma similar to the upper glume; upper lemma coriaceous, obtuse with a long mucro housed within the spikelet, its margins inrolled and covering only the edges of the palea; upper palea obtuse; caryopsis broadly elliptic to subrotund in outline, strongly flattened. 12 species, Old World tropics, mainly Africa.

NOTE: See comments under *Brachiaria*.

1. **Urochloa panicoides** P. Beauv., Ess. Agrostogr. 53, t. 11, 1 (1812).
Syns. *Panicum helopus* Trin. in Spreng., Neue Entd. 2: 84 (1821).
Panicum hochstetteranum A. Rich., Tent. Fl. Abyss. 2: 369 (1850).
Panicum controversum Steud., Syn. Pl. Glumac. 1: 60 (1854), nom. superfl., based on *Panicum hochstetteranum* A. Rich.
Urochloa helopus (Trin.) Stapf in Prain, Fl. Trop. Afr. 9: 595 (1920).

Annual to 1 m, often ascending from a prostrate rooting base; leaf-blades linear to narrowly lanceolate, subamplexicaul, coarse, glabrous or pubescent, the margins tuberculate-ciliate at least near the base; inflorescence of 2-7 racemes on an axis 1-9 cm; racemes 1-7 cm, bearing single or paired spikelets on a narrowly winged rhachis; spikelets (2.5)3.5-4.5(5.5) mm, elliptic, acute; lower glume 1/4-1/2 the length of the spikelet, ovate, 3- to 5-nerved, obtuse to subacute; lower lemma sometimes with a setose fringe; upper lemma rugulose, with a mucro 0.3-1 mm.

N; weed of cultivation. East tropical Africa southwards to South Africa, Arabia, India, introduced in Australia.

84. **Paspalum** L.

Annual or perennial; ligule a short membrane; leaf-blades linear to narrowly lanceolate; inflorescence of racemes, these conjugate, digitate or on an elongated central axis, rarely solitary; rhachis flat, narrowly to broadly winged, bearing single or paired spikelets in 2-4 rows; spikelets orbicular to oblong or ovate, mostly plano-convex, abaxial; lower glume usually absent, rarely represented by a minute scale; upper glume membranous; lower floret barren, without a palea, the lemma resembling the upper glume; upper lemma coriaceous to crustaceous, usually obtuse, its margins inrolled and clasping only the edges of the palea; upper palea obtuse, sometimes acute but not reflexed; caryopsis plano-convex. About 330 species, tropics, predominantly New World.

1. Spikelets with a ciliate fringe from the margins of the upper glume — 1. **P. dilatatum**
\+ Spikelets glabrous or minutely pubescent, without a ciliate fringe — 2

2. Perennial; leaf-blades linear; racemes paired, rarely a third raceme present below — 2. **P. distichum**
\+ Annual; leaf-blades broadly lanceolate, subcordate at the base; racemes numerous, crowded in a narrowly oblong head — 3. **P. racemosum**

1. **Paspalum dilatatum** Poir. in Lam., Encycl. 5: 35 (1804).
Syn. *Paspalum ovatum* Nees ex Trin., Gram. Panic. 113 (1826).

Tufted perennial; culms to 1.8 m, robust; leaf-blades 6-45 x 0.3-1.2 cm, linear; inflorescence of (2)3-5(11) racemes on an axis 2-20 cm; racemes 4-11 cm, the spikelets paired in 2-4 rows on a rhachis *c.* 1.2 mm wide; spikelets 2.8-3.8 mm, ovate, shallowly plano-convex, yellowish-green; lower glume absent; upper glume sparsely hairy on the back, ciliate on the margins; lower lemma similar but not ciliate; upper lemma papillose-striate, pallid at maturity.

N, S; introduced garden weed. Native to South America, now an established weed in most tropical regions.

2. **Paspalum distichum** L., Syst. Nat., ed. 10, 2: 855 (1759).
Syns. *Digitaria paspalodes* Michx., Fl. Bor.-Amer. 1: 46 (1803).
Paspalum paspalodes (Michx.) Scribn., Mem. Torrey Bot. Club 5: 29 (1894).

Creeping stoloniferous perennial to 50 cm; leaf-blades 5-20 x 0.25-0.65 cm, linear; inflorescence of 2(4) conjugate racemes; racemes 1.5-7 cm, the spikelets borne singly in 2 rows on a winged rhachis 1-2 mm wide; spikelets 2.5-3.5 mm, ovate, plumply plano-convex, acute or subacute, pallid or pale green; lower glume often present as a minute scale; upper glume herbaceous, appressed-puberulent, with a distinct mid-nerve; lower lemma similar but glabrous; upper lemma smooth, pallid at maturity.

N, O, M, S; canal banks and irrigation ditches, rarely in cultivated fields. Throughout the tropics, extending into the subtropics.

3. **Paspalum racemosum** Lam., Tab. Encycl. 1: 176 (1791).

Annual; culms to 90 cm, often decumbent at the base; leaf-blades 4-13 x 1-2.2 cm, broadly lanceolate, subcordate at the base; inflorescence of numerous racemes on an axis

5-15 cm; racemes 1-2.5 cm, the spikelets borne singly in 2 rows on a broadly winged, foliaceous rhachis 1.5-2 mm wide; spikelets 2.6-3.2 mm, oblong-elliptic, pallid or tinged with purple; lower glume absent; upper glume herbaceous, glabrous on the back but with a tuft of short hair at the apiculate tip, with a distinct mid-nerve, rugose below, denticulate-spinulose on the margins; lower lemma similar; upper lemma smooth, pallid at maturity.

N; Native to Colombia, Ecuador and Peru, introduced and at one time grown as a forage crop, but apparently no longer in cultivation.

85. **Setaria** P. Beauv., nom. conserv.

Annual or perennial; ligule usually a line of hairs; leaf-blades flat or folded, sometimes pleated, rarely sagittate; inflorescence an open or spike-like panicle, the spikelets subtended by 1 or more bristles, derived from barren panicle-branches, that persist on the axis after the spikelets have fallen; spikelets oblong to ovate, ± plano-convex, awnless; lower glume ovate from a clasping base, shorter than the spikelet; upper glume as long as or shorter than the spikelet; lower floret male or barren, the lemma herbaceous; upper lemma crustaceous, strongly convex on the back, the margins inrolled and clasping only the edges of the palea; caryopsis oblong-ellipsoid. About 100 species, tropics and subtropics.

1. Leaf-blades pleated fan-wise, especially at the base of the young ones; panicle clearly branched — 5. **S. megaphylla**
\+ Leaf-blades not at all pleated; panicle spike-like, sometimes ± lobed — 2

2. Spikelets not deciduous, the upper lemma disarticulating at maturity above the persistent lower lemma — 3. **S. italica**
\+ Spikelets deciduous as a whole — 3

3. Bristles retrorsely barbed, tenaciously clinging to clothing or fur, if mostly antrorsely barbed then panicle untidily lobed — 1. **S. verticillata**
\+ Bristles all antrorsely barbed, not clinging; panicle smoothly cylindrical — 4

4. Upper glume as long as the upper lemma, the latter finely rugose — 2. **S. viridis**
\+ Upper glume shorter than the upper lemma, the latter strongly rugose to corrugate, rarely almost smooth — 4. **S. pumila**

1. **Setaria verticillata** (L.) P. Beauv., Ess. Agrostogr. 51, 178 (1812).
Syns. *Panicum verticillatum* L., Sp. Pl., ed. 2, 82 (1762).
Panicum adhaerens Forssk., Fl. Aegypt.-Arab. 20 (1775).
Panicum verticillatum L. var. *ambiguum* Guss., Fl. Sicul. Prodr. 80 (1827).
Setaria verticilliformis Dumort., Fl. Belg. 150 (1827).
Setaria ambigua (Guss.) Guss., Fl. Sicul. Syn. 1: 114 (1843), non Mérat (1836), nec Schrad. (1838).
Setaria verticillata (L.) P. Beauv. var. *ambigua* (Guss.) Parl., Fl. Palerm. 1: 36 (1845).
Setaria viridis (L.) P. Beauv. var. *ambigua* (Guss.) Coss. & Durieu, Expl. Sci. Algérie 2: 36 (1854).
Setaria adhaerens (Forssk.) Chiov., Nuovo Giorn. Bot. Ital., n.s. 26: 77 (1919).



Plate 88. GRAMINEAE: *Paspalum distichum* 1, habit; spikelets showing both surfaces (up right). *Paspalum dilatatum* 2, spikelets showing both surfaces. *Setaria pumila* 3, habit; spikelet (middle left). *Setaria viridis* 4, spikelet. *Setaria verticillata* 5, spikelet. Drawn by Margaret Tebbs.

Annual to 1 m, geniculately ascending; leaf-blades broadly linear; panicle 2-15 cm, contracted, spike-like, usually untidily lobed, often entangled with others on the same plant, the rhachis hispidulous; bristles 3-8 mm, retrorsely barbed, tenaciously clinging to clothing or fur (rarely antrorsely barbed, but these usually mixed with a few retrorsely barbed); spikelets 1.5-2.5 mm, elliptic; lower glume 1/3-1/2 the length of the spikelet; upper glume as long as the spikelet; lower floret barren, the palea minute; upper lemma finely rugose.

N, O, M, D, R, GE, S; weed of cultivation. Tropical and warm temperate regions throughout the world.

2. **Setaria viridis** (L.) P. Beauv., Ess. Agrostogr. 51, 171, 178 (1812).
Syn. *Panicum viride* L., Syst. Nat., ed. 10, 2: 870 (1759).

Annual to 50 cm, erect or geniculately ascending; leaf-blades broadly linear to narrowly lanceolate, rounded at the base; panicle 2-12 cm, contracted, spike-like, smoothly cylindrical or rarely ± lobed below, the rhachis puberulent to hispidulous; bristles 0.3-1.2 cm, antrorsely barbed; spikelets 2-2.5(3) mm; lower glume 1/4-1/3 the length of the spikelet; upper glume as long as the spikelet; lower floret barren, the palea *c.* 1/2 as long as the lemma; upper lemma finely rugose.

N, O, De, S; weed of cultivation. Temperate Old World, introduced in the New World.

3. **Setaria italica** (L.) P. Beauv., Ess. Agrostogr. 51, 170, 178 (1812).
Syns. *Panicum italicum* L., Sp. Pl., ed. 1, 56 (1753).
Panicum germanicum Mill., Gard. Dict., ed. 8, no. 1 (1768).

Annual; culms to 1 m, slender or stout, erect or geniculately ascending; leaf-blades linear from a contracted base; panicle to 30 cm, contracted, spike-like, sometimes cylindrical but typically lobed, the rhachis scabrid; bristles to 1 cm, antrorsely barbed; spikelets 2.5-3.5 mm, elliptic, persistent; lower glume *c.* 1/3 the length of the spikelet; upper glume *c.* 1/2 the length of the spikelet; lower floret barren, the palea minute; upper lemma smooth or nearly so, the floret deciduous at maturity.

N; occasionally cultivated as a cereal (Italian Foxtail Millet) but mostly grown for fodder or bird-seed, cultivated throughout the warm temperate Old World.

NOTE: *Setaria italica* is probably a cultivated derivative of *Setaria viridis*.

4. **Setaria pumila** (Poir.) Roem. & Schult., Syst. Veg. 2: 891 (1817).
Syns. *Panicum pumilum* Poir., Encycl. Lam. Suppl. 4: 273 (1816).
Setaria glauca, auct. plur, non (L.) P. Beauv.

Annual to 1.3 m, ascending; leaf-blades linear; panicle contracted, spike-like, smoothly cylindrical, 1-10(20) cm, the rhachis tomentellous; bristles 0.3-1.2 cm, antrorsely barbed, commonly fulvous; spikelets ovate, 1.5-2.5 mm; lower glume 1/3-1/2 the length of the spikelet; upper glume similar to the lower; lower floret male or barren, the palea almost as long as the lemma; upper lemma rugose to corrugate, rarely almost smooth.

N, O, GE, S; canal banks and areas of cultivation. Tropical and warm temperate Old World.

5. **Setaria megaphylla** (Steud.) T. Durand & Schinz, Consp. Fl. Afr. 5: 773 (1894).
Syns. *Panicum megaphyllum* Steud., Syn. Pl. Glumac. 1: 53 (1854).
Panicum plicatile Hochst., Flora 38: 198 (1855).
Setaria plicatilis (Hochst.) Hack. ex Engl., Hochgebirgsfl. Afrika 121 (1892).

Tufted perennial; culms to 1.5 m, slender, radiating outwards or geniculately ascending to form a leafy clump with emergent flowering shoots; leaf-blades broadly linear to narrowly lanceolate, conspicuously pleated, sometimes falsely petiolate; panicle 10-30 cm, linear to narrowly lanceolate in outline, with short branches ascending or appressed to the puberulent rhachis; bristles 0.3-1.5 mm, often inconspicuous, obscurely scaberulous; spikelets 2.5-3.3 mm, narrowly ovate to elliptic; lower glume 1/3-1/2 the length of the spikelet; upper glume 1/2-3/4 the length of the spikelet; lower floret usually barren, sometimes male, the palea well developed or sometimes reduced; upper lemma smooth or obscurely rugose, often shiny, becoming light brown.

N; cultivated ornamental. Native to Arabia, ?Egypt, Sudan, Eritrea, Ethiopia, Uganda, Kenya, Tanzania, Zaire, South Africa, tropical America, a few records from India.

86. **Paspalidium** Stapf

Annual or perennial, often aquatic; ligule a line of hairs; leaf-blades linear; inflorescence composed of several to many short racemes on a common axis and ± appressed to shallow hollows in the axis; rhachis triquetrous or winged, usually terminating in a naked point, bearing single spikelets in 2 neat rows; spikelets ovate, dorsally compressed, glabrous, abaxial; lower glume much shorter than the spikelet; upper glume shorter than or almost as long as the spikelet; lower floret male or barren; upper lemma crustaceous, acute, its margins inrolled and clasping only the edges of the palea; upper palea acute, its tip slightly reflexed; caryopsis elliptic in outline, dorsally compressed. About 40 species, throughout the tropics.

1. Leaf-blades setaceously acuminate; spikelets 1.6-2.6 mm — 1. **P. geminatum**
+ Leaf-blades obtuse to bluntly pointed; spikelets 3-4 mm — 2. **P. obtusifolium**

1. **Paspalidium geminatum** (Forssk.) Stapf in Prain, Fl. Trop. Afr. 9: 583 (1920).
Syns. *Panicum geminatum* Forssk., Fl. Aegypt.-Arab. 18 (1775).
Panicum brizoides Lam., Tab. Encycl. 1: 170 (1791), non L. (1771).
Panicum fluitans Retz., Observ. Bot. 3: 8 (1783).
Panicum paspalodes Pers., Syn. Pl. 1: 81 (1805), based on *Panicum brizoides* Lam.

Perennial to 60 cm, with creeping or floating spongy stolons, the culms ascending from a prostrate base, rooting at the lower nodes; leaf-blades setaceously acuminate; inflorescence 5-30 cm; racemes 0.5-4 cm, contiguous and less than their own length apart (but the lowermost usually remote), the rhachis 0.5-1 mm wide, narrowly winged, usually shortly ciliate; spikelets 1.6-2.6 mm, ovate; lower glume truncate, 1/4-1/3 the length of the spikelet; upper glume 2/3-4/5 the length of the spikelet; upper lemma granulose.

N, O, M, De; irrigation ditches, along canals and in swamps. Old World tropics.

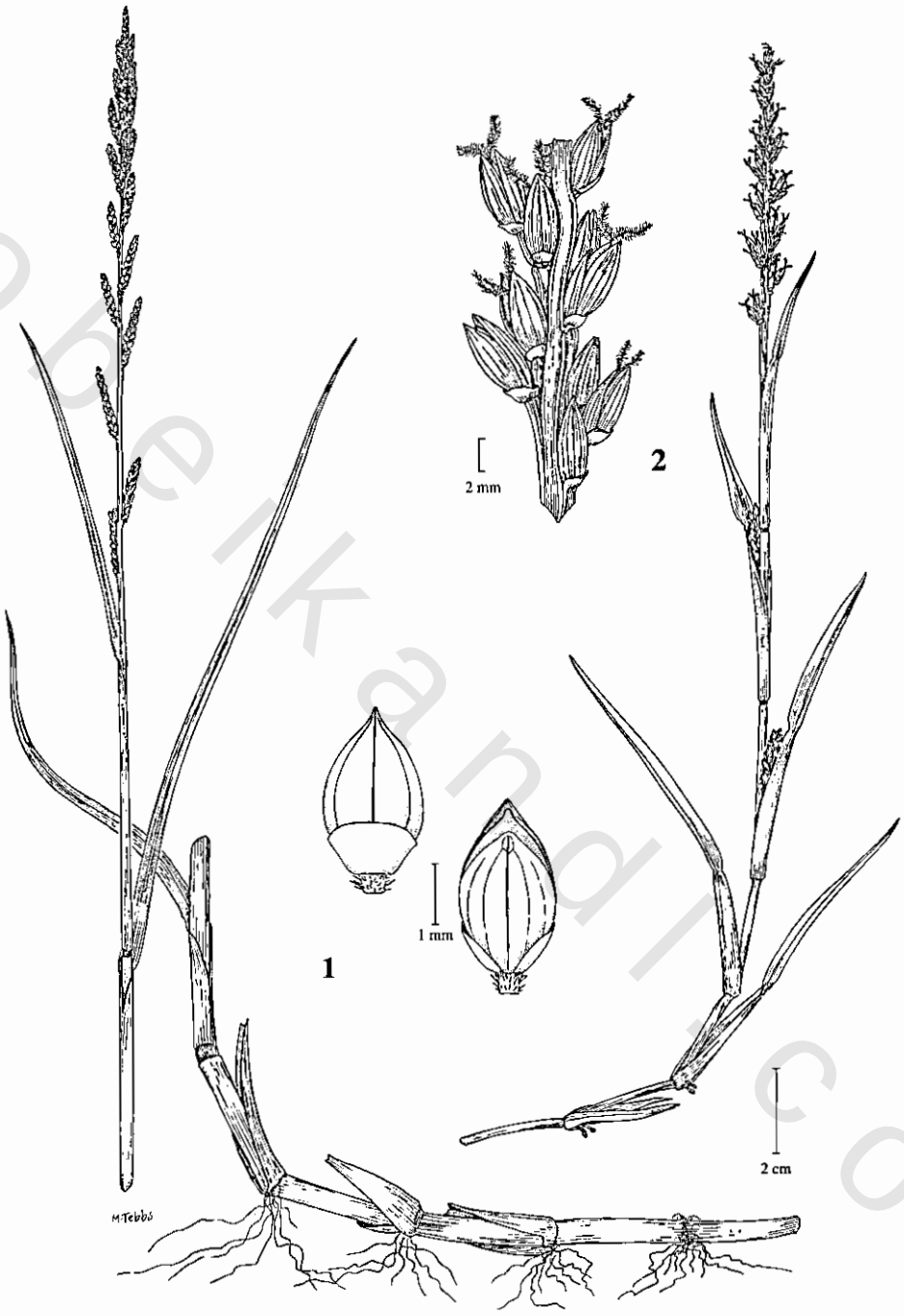


Plate 89. *Paspalidium geminatum* 1, lower part and inflorescence ; spikelets showing both surfaces (middle right). *Stenotaphrum secundatum* 2, habit; segment of inflorescence (up left). Drawn by Margaret Tebbs.

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NOTE: The type of *Panicum geminatum* was collected at Rashid (Rosetta), Egypt, in 1761 by Forsskål (no. 113, holotype C).

2. **Paspalidium obtusifolium** (Delile) N. D. Simpson, Minist. Agric. Egypt Bull. 93: 10 (1930).
Syns. *Panicum obtusifolium* Delile, Descr. Égypte, Hist. Nat. 150, t. 5, f.1 (1814).
Digitaria obtusifolia (Delile) Roem. & Schult., Syst. Veg. 2: 889 (1817).
Panicum obtusifolium Delile var. *acutifolium* Coss. & Durieu, Expl. Sci. Algérie 29 (1854).
Paspalidium platyrhachis C. E. Hubb., Bull. Misc. Inform., Kew 1934: 262 (1934).

Perennial with creeping or floating spongy rhizomes; culms to 60 cm, ascending from a prostrate base, rooting at the lower nodes; leaf-blades broadly obtuse to bluntly pointed; inflorescence 10-30 cm; racemes 1-3 cm, their rhachis winged and 1-3 mm wide; spikelets 3-4 mm, narrowly ovate; lower glume truncate, 1/8-1/4 the length of the spikelet; upper glume 1/3-1/2 the length of the spikelet; upper lemma granulose.

N, M; irrigation ditches. Algeria, Egypt, East tropical Africa southwards to South Africa.

NOTE: The type of *Panicum obtusifolium* was collected in Egypt by Delile (holotype MPU).

87. **Stenotaphrum** Trin.

Creeping annual or perennial; ligule a line of hairs; leaf-blades linear to narrowly lanceolate; inflorescence spike-like, composed of several to many very short racemes ± embedded in a thickened central axis, sometimes shedding single spikelets, more often shedding a segment of the axis with the embedded raceme or even the whole inflorescence; raceme-rhachis mostly triquetrous and prolonged into a naked subulate tip, bearing spikelets singly; spikelets lanceolate to ovate, plump, abaxial; lower glume membranous, much shorter than the spikelet; upper glume resembling the lower or almost as long as the spikelet; lower floret male or barren, the lemma chartaceous to coriaceous; upper lemma similar to the lower but slightly smaller, its margins inrolled and clasping the edges of the palea, but leaving the acute palea-tip free; caryopsis lanceolate to oblong in outline, plano-convex. 7 species, tropical and subtropical coasts of the Old World and of eastern America.

1. **Stenotaphrum secundatum** (Walter) Kuntze, Revis. Gen. Pl. 2: 794 (1891).
Syns. *Ischaemum secundatum* Walter, Fl. Carol. 249 (1788).
Stenotaphrum americanum Schrank, Pl. Rar. Hort. Monac. 2(10), t. 98 (1821).

Stoloniferous perennial; culms to 30 cm, ascending from a procumbent base; leaf-sheaths laterally compressed and keeled; leaf-blades broadly linear, folded when young, obtuse; inflorescence 3-10 cm, the racemes wholly or partially sunk in one face of a corky central axis; racemes 0.5-1 cm, bearing 1-3 spikelets on a triquetrous rhachis, this prolonged into a naked subulate point; spikelets 4-5 mm, narrowly ovate, pale green.

N; cultivated as a lawn grass (St Augustine Grass) and possibly naturalized on the Mediterranean coast. Native to the shores of both sides of the Atlantic Ocean, now naturalized quite extensively in Australia and the Pacific.

88. **Tricholaena** Schult.

Perennial, rarely annual; ligule a line of hairs; leaf-blades rigid, glaucous, often inrolled; inflorescence a panicle; spikelets symmetrically oblong in profile, slightly laterally compressed, awnless; lower glume small and slightly separated from the upper or suppressed; upper glume as long as the spikelet, thinly membranous, not gibbous, slightly emarginate to acute; lower floret male, the lemma resembling the upper glume; upper lemma dorsally compressed (and the stigmas emerging terminally), firmly cartilaginous, smooth and shining, white, readily deciduous, the margins flat and covering 1/4-2/3 of the palea, acute; caryopsis ovoid to oblong-ellipsoid. 4 species, Macaronesia, Africa, Mediterranean region to India.

1. **Tricholaena teneriffae** (L.f.) Link, Handbuch 1: 91 (1829).
   Syns. *Saccharum teneriffae* L.f., Suppl. Pl. 106 (1781).
   Panicum teneriffae (L.f.) R. Br., Prodr. 189 (1810).
   Panicum leucanthum A. Rich., Tent. Fl. Abyss. 2: 372 (1850).
   Melinis teneriffae (L.f.) Hack., Österr. Bot. Z. 51: 464 (1901).
   Tricholaena mascatensis Gand., Bull. Soc. Bot. France 66: 303 (1920).
   Tricholaena leucantha (A. Rich.) Stapf & C.E. Hubb. in Prain, Fl. Trop. Afr. 9: 915 (1930).
   Tricholaena setacea C.E. Hubb., Bull. Misc. Inform., Kew 1941: 191 (1941).

Perennial, forming tussocks from a woody rootstock; culms to 60 cm, ascending, wiry with narrow leaves or herbaceous with broader leaves; leaf-blades flat or inrolled, glabrous or thinly pubescent; panicle 3-15 cm, usually narrowly oblong in outline, fairly dense; spikelets 2.5-3.5 mm; lower glume a minute truncate scale (rarely to 0.5 mm); upper glume ovate, tuberculate-hairy with white hairs extending 0.5-4 mm beyond the tip, but often glabrous in the upper 1/4, acute and usually mucronate.

De, R, GE, S; sandy and stony soils. Macaronesia, Mediterranean region, eastwards to India, East tropical Africa.

89. **Melinis** P. Beauv.
Syn. *Rhynchelytrum* Nees

Annual or perennial; ligule a line of hairs; leaf-blades flat or filiform; inflorescence a panicle with capillary branches; spikelets laterally compressed, glabrous to silky-hairy; lower glume small, sometimes distant from the upper; upper glume as long as the spikelet, firmly membranous to chartaceous or subcoriaceous, sometimes becoming thinner towards the tip, straight or ± gibbous on the back below the middle and sometimes tapering to a beak above, emarginate to 2-lobed (rarely entire), often awned in the sinus; lower floret male or barren, the lemma resembling the upper glume or narrower and less gibbous, the palea present or absent; upper lemma laterally compressed (and the stigmas emerging laterally), often deciduous before the rest of the spikelet, cartilaginous, smooth, its margins flat and ± enfolding the palea; caryopsis oblong-ellipsoid. 26 species, tropical and South Africa, Arabia, India.

1. Spikelets 5-12 mm; upper glume gibbous — 1. **M. repens**
+ Spikelets 1.5-2(2.4) mm; upper glume straight on the back — 2. **M. minutiflora**



Plate 90. GRAMINEAE: *Tricholaena teneriffae* 1, habit; spikelet (up within). *Melinis repens* 2, lower part and inflorescence; spikelet (down left). Drawn by Margaret Tebbs.

1. **Melinis repens** (Willd.) Zizka, Biblioth. Bot. 138: 57 (1988).
Syn. *Saccharum repens* Willd., Sp. Pl., ed. 4, 1: 322 (1798).

Annual or short-lived perennial to 90 cm; panicle ovate to oblong in outline, (6)8-15 cm long, fluffy, silvery pink or purple; spikelets ovate, (0.2)0.5-1.2 cm long, usually villous with hairs extending 1-4 mm beyond the tip; lower glume narrowly oblong, (0.6)1.5-3 (4.3) mm, separated from the upper by an internode (0.1)0.7-1.7 mm; upper glume conspicuously gibbous, chartaceous, tapering to a glabrous membranous beak 1/4-1/2 its length, emarginate, mucronate or with inconspicuous awn to 0.7(1) cm; lower lemma narrower and less gibbous than the upper glume.

Represented in Egypt by:

subsp. **grandiflora** (Hochst.) Zizka, Biblioth. Bot. 138: 60 (1988).
Syns. *Rhynchelytrum grandiflorum* Hochst., Flora 27: 249 (1844).
Monachyron villosum Parl. in Hook., Niger. Fl. 191 (1849).
Tricholaena grandiflora Hochst. ex A. Rich., Tent. Fl. Abyss. 2: 445 (1850), non *Rhynchelytrum grandiflorum* Hochst.
Tricholaena wrightii Nees & Arn. ex Steud., Syn. Pl. Glumac. 1: 93 (1854).
Rhynchelytrum roseum, auct. non (Nees) Stapf

Differs from subsp. *repens* by its larger spikelets (5-12 mm rather than 2-5 mm) and longer internode between the glumes (mostly 0.7-1.7 mm rather than 0.1-0.7mm).

N; escape from cultivation (Natal Grass). Tropical and South Africa, India.

2. **Melinis minutiflora** P. Beauv., Ess. Agrostogr. 54, t. 11, 4 (1812).

Perennial; culms to 1 m, often matted, ascending, the sheaths and blades tomentose with sticky hairs often smelling of linseed oil; panicle 10-30 cm, lanceolate to narrowly ovate in outline, dense, often purplish; spikelets 1.5-2 (2.4)mm, narrowly oblong, glabrous or hairy; lower glume sometimes almost suppressed, but usually a minute oblong scale 0.2-0.5 mm, adjacent to the upper glume; upper glume straight on the back, prominently 7-nerved, the nerves forming raised ribs, obtusely 2-lobed, with or without a mucro to 0.5 mm; lower lemma similar to the upper glume, but 5-nerved, acutely lobed and sometimes with an awn to 1.5 cm.

N; once cultivated in the garden of the Agricultural Museum at Dokki, but its subsequent fate is unknown. Native to tropical Africa, introduced in the tropics as a fodder plant (Molasses Grass).

90. **Digitaria** Haller f., nom. conserv.

Annual or perennial; ligule a short membranous or scarious rim; leaf-blades mostly linear and flat; inflorescence of racemes, these digitate or borne upon an elongated axis; rhachis flat or triquetrous, bearing the spikelets in appressed groups of (1)2-3(6); spikelets lanceolate to oblong-elliptic, flattened on the front, convex on the back; lower glume small or suppressed; upper glume membranous, as long as the spikelet or shorter and exposing the upper lemma; lower floret barren, the prominently nerved lemma as long as the spikelet (rarely shorter), often hairy, usually with the hairs forming stripes between the first and second lateral nerves and along the margins, the palea absent; upper lemma

chartaceous to coriaceous, finely longitudinally striate, with its flat hyaline margins enfolding and concealing most of the palea, subacute to acuminate; caryopsis oblong in outline, plano-convex, acute to subacute. About 230 species, tropical and warm temperate regions throughout the world.

1. Spikelets ternate, at least in the middle of the raceme — 1. **D. violascens**
+ Spikelets paired — 2

2. Tufted perennial with hairy cataphylls at the base — 2. **D. nodosa**
+ Straggling annual without hairy cataphylls — 3

3. Nerves of lower lemma scabrid, otherwise glabrous; upper glume 1/3-1/2 the length of the spikelet — 3. **D. sanguinalis**
+ Nerves of lower lemma quite smooth, though sometimes hairy or clothed with long glassy bristles; upper glume (1/2)2/3-4/5 the length of the spikelet — 4

4. Racemes diverging from a central axis, this seldom exceeding the longest raceme, delicate, the spikelets loosely imbricate; spikelets 1.5-2.1 mm — 4. **D. velutina**
+ Racemes digitate, or with a short central axis in robust specimens, the spikelets closely imbricate; spikelets 2.5-3.3 mm — 5. **D. ciliaris**

1. **Digitaria violascens** Link, Hort. Berol. 1: 229 (1827).

Annual to 60 cm, erect or geniculately ascending, rarely stoloniferous; inflorescence of (2)3-6(9) subdigitate racemes; racemes 3-14 cm, the spikelets ternate on a ribbon-like winged rhachis with low rounded midrib; spikelets 1.2-2 mm, elliptic; lower glume an obscure hyaline rim; upper glume 4/5 as long to as long as the spikelet, 3(5)-nerved, with short appressed verrucose hairs between the nerves; lower lemma as long as the spikelet, 5- to 7-nerved, pubescent (often obscurely so) between the nerve with verrucose hairs; fruit elliptic, dark brown to almost black.

N; introduced weed. Native to tropical Asia and tropical America, occasionally introduced elsewhere as a weed.

2. **Digitaria nodosa** Parl., Pl. Nov. 39 (1842).
Syn. *Panicum commutatum* var. *nodosum* (Parl.) Hack. ex T. Durand & Schinz, Consp. Pl. Afr. 5: 744 (1895).

Tufted perennial without rhizomes; culms to 1 m, swollen at the base and clothed in silky-pubescent to tomentose cataphylls; inflorescence of 4-12 racemes, these digitate or borne along an axis to 7.5 cm; racemes 3-15 cm, the spikelets paired on a triquetrous rhachis; spikelets 2-3 mm, narrowly elliptic; lower glume an ovate scale 0.1-0.4 mm; upper glume 2/3 as long to almost as long as the spikelet, 3-nerved, glabrous or pubescent to villous; lower lemma as long as the spikelet, 7-nerved, glabrous to pilose or woolly-villous between the nerves; fruit elliptic, greyish to light brown.

GE; rocky ground. Canary Islands, North Africa, northeast tropical Africa, southwest Asia, eastwards to Pakistan.

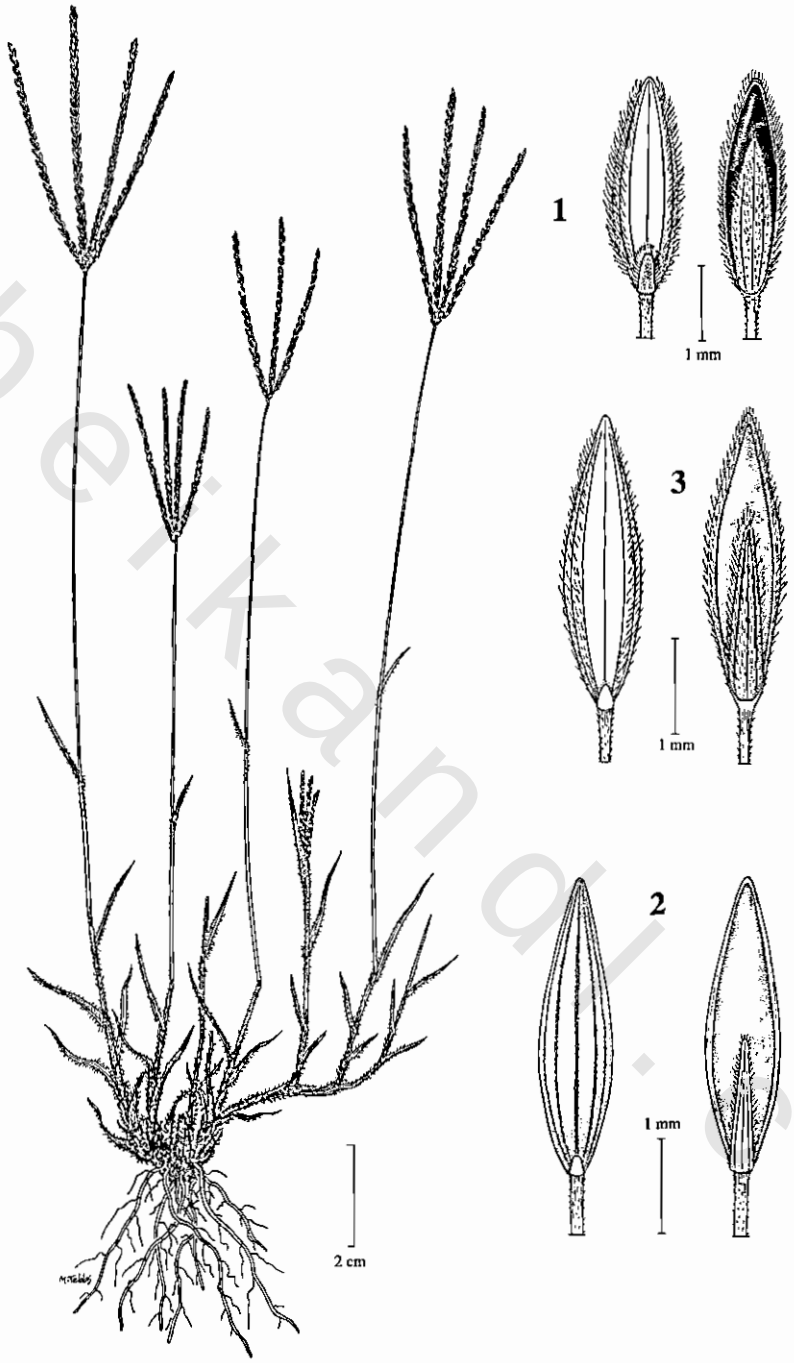


Plate 91. GRAMINEAE: *Digitaria nodosa* 1, habit; spikelets showing both surfaces (up right). *Digitaria sanguinalis* 2, spikelets showing both surfaces. *Digitaria ciliaris* 3, spikelets showing both surfaces. Drawn by Margaret Tebbs.

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3. **Digitaria sanguinalis** (L.) Scop., Fl. Carniol., ed. 2, 1: 52 (1772).
Syns. *Panicum sanguinale* L., Sp. Pl., ed. 1, 57 (1753).
Panicum aegyptiacum Retz., Observ. Bot. 3: 8 (1783).
Digitaria sanguinalis (L.) Scop. var. *aegyptiaca* (Retz.) Maire & Weiller, Fl. Afr. Nord. 1: 299 (1952).

Straggling annual to 60 cm, decumbent at the base and geniculately ascending; leaf-blades broadly linear to narrowly lanceolate; inflorescence of 2-16 digitate or subdigitate racemes; racemes 3-20 cm, stiff, the spikelets paired and overlapping by about 2/3 their length on a winged rhachis with triquetrous midrib; spikelets 2.3-3.5 mm, narrowly elliptic to ovate-elliptic, acute; lower glume an ovate scale *c.* 0.2 mm; upper glume 1/3-1/2 the length of the spikelet, 3-nerved; lower lemma as long as the spikelet, 7-nerved, the nerves evenly spaced (rarely with a wide interspace flanking the midnerve) and scabrid (rarely almost smooth), obscurely appressed-pubescent between the nerves, rarely with a ciliate fringe or the spikelet clothed with glassy bristles; fruit lanceolate, grey or light brown.

N, O, M, De, S; weed of cultivation. Warm temperate regions throughout the world.

NOTE: *Panicum aegyptiacum* was described from material collected in Egypt, further details unknown at present.

4. **Digitaria velutina** (Forssk.) P. Beauv., Ess. Agrostogr. 51 (1812).
Syns. *Phalaris velutina* Forssk., Fl. Aegypt.-Arab. 17 (1775).
Panicum fenestratum Hochst. ex A. Rich., Tent. Fl. Abyss. 2: 361 (1850).
Panicum sanguinale L. var. *fenestratum* (Hochst. ex A. Rich.) Schweinf., Bull. Herb. Boissier 2, app. 2: 18 (1894).
Panicum zeyheri Nees, Fl. Afr. Austral. Ill. 25 (1841).

Rambling annual to 80 cm, often decumbent at the base and geniculately ascending; leaf-blades broadly linear to lanceolate, thin; inflorescence of (3)7-20 racemes diverging from a common axis 1-7 cm, this seldom exceeding the longest raceme; racemes 3-13 cm, delicate, the spikelets paired and overlapping by less than half their length on a narrowly winged triquetrous rhachis; spikelets 1.5-2.6 mm, narrowly ovate-elliptic, bluntly pointed; lower glume obscure or an ovate scale to 0.2 mm; upper glume 2/3-4/5 the length of the spikelet, 3-nerved; lower lemma as long as the spikelet, 7-nerved, the nerves evenly spaced and smooth, obscurely appressed-pubescent between the nerves, occasionally with a ciliate frill; fruit elliptic, mostly grey but varying from yellowish to purplish-brown.

GE; sandy soils. Southeast Egypt, tropical Arabia, Tanzania, Kenya, Uganda, Ethiopia, South Africa, Mozambique, Zimbabwe, Zambia, Malawi, Botswana.

5. **Digitaria ciliaris** (Retz.) Koeler, Descr. Gram. 27 (1802).
Syns. *Panicum ciliare* Retz., Observ. Bot. 4: 16 (1786/7).
Digitaria biformis Willd., Enum. Pl. 92 (1809).
Digitaria marginata Link, Hort. Berol. 1: 102 (1827).
Digitaria sanguinalis (L.) Scop. var. *ciliaris* (Retz.) Parl., Fl. Ital. 1: 126 (1848).
Digitaria chrysoblephara Fig. & De Not., Mem. Reale Accad. Sci. Torino, ser. 2, 14: 364, t. 27 (1854).

Straggling annual to 60 cm, decumbent at the base and geniculately ascending; leaf-blades broadly linear; inflorescence of 2-12 digitate or subdigitate racemes, the axis to 5 cm in robust specimens; racemes 6-22 cm, stiff, the spikelets paired and overlapping by two-thirds their length on a winged rhachis with triquetrous midrib; spikelets 2.5-3.3 (3.7) mm, narrowly elliptic, acute; lower glume a distinct triangular scale usually 0.2-0.4 mm; upper glume (1/2)2/3-3/4 the length of the spikelet, 3-nerved; lower lemma as long as the spikelet, 7-nerved, the nerves smooth and evenly spaced or with a wide interspace flanking the mid-nerve (sometimes the spikelets of a pair different), appressed-puberulent to silky pubescent or rarely shortly villous between the nerves, often with a ciliate frill, sometimes one or both spikelets of a pair clothed with glassy bristles; fruit elliptic, grey to light brown.

N, O, R, GE, S; damp and cultivated soils. Throughout the tropics.

91. **Pennisetum** Rich.
Syn. *Beckeropsis* Fig. & De Not.

Annual or perennial; ligule a line of hairs, rarely a membrane; leaf-blades linear to lanceolate; inflorescence spike-like, cylindrical to globose, terminal, rarely axillary but then often gathered into a leafy false panicle, each spikelet or cluster of spikelets subtended by a deciduous (rarely persistent) involucre of 1 to many slender bristles, these free throughout; rhachis rounded or angular, with or without short peduncle stumps, occasionally the involucre shortly stipitate below the insertion of the bristles; spikelets narrowly lanceolate to oblong, dorsally compressed, glabrous or almost so; lower glume up to 1/2 the length of the spikelet, sometimes suppressed; upper glume very small to as long as the spikelet; lower floret male or barren, its lemma variable in length, membranous; upper lemma as long as the spikelet or nearly so, membranous to coriaceous, its thin flat margins covering about half the palea; anther-tips usually glabrous, sometimes shortly penicillate; caryopsis oblong and dorsally compressed to subglobose. About 80 species, throughout the tropics.

1. Inflorescence reduced to a cluster of 2-4 spikelets enclosed in the uppermost leaf-sheath, with long protruding filaments and stigmas — 1. **P. clandestinum**
\+ Inflorescence a spike-like panicle, conspicuously exserted — 2

2. Annual; anther-tips penicillate — 3
\+ Perennial; anther-tips glabrous — 5

3. Involucres persistent, usually stipitate, the bristles plumose or glabrous; lemmas usually pubescent on the margins (cultivated cereal) — 2. **P. glaucum**
\+ Involucres readily deciduous, the bristles ciliate or plumose; lemmas glabrous to ciliate (wild grass) — 4

4. Involucres stipitate — 3. **P. sieberianum**
\+ Involucres sessile — 4. **P. violaceum**

5. Bushy plant with woody culms branched throughout — 5. **P. divisum**
\+ Tufted herbaceous plant, if branched and woody then only at the base — 6

6. Plant mat-forming, rhizomatous; panicle densely ovoid to subspherical — 6. **P. villosum**
\+ Plant erect, densely tufted, with or without rhizomes; panicle linear — 7

7. Densely tufted plant without rhizomes; the culms mostly unbranched; leaf-blades with conspicuously thickened midrib on the upper surface 7. **P. setaceum**
+ Loosely tufted plant, sub-shrubby below, often with woody rhizomes; the culms woody and branched below; leaf-blades without thickened midrib 8. **P. orientale**

1. **Pennisetum clandestinum** Hochst. ex Chiov., Pirotta, Fl. Eritrea 41 (1903).

Sward-forming perennial with slender rhizomes and stout rampant stolons clothed with pale subinflated leaf-sheaths; culms to 15(45) cm; ligule a line of hairs; leaf-blades flat or folded; panicle reduced to a cluster of (1)2-4(6) subsessile spikelets concealed within the uppermost leaf-sheath; involucre sparse; bristles 1/3-3/4 the length of the spikelets, delicate, scaberulous to ciliolate; spikelets 1-2 cm, narrowly lanceolate; lower glume absent; upper glume 1-3 mm, ovate, sometimes suppressed; lower floret narrowly lanceolate, as long as the spikelet, tapering, barren and without a palea; upper lemma resembling the lower; stigmas to 3 cm; anthers exserted on fine filaments to 5 cm.

M; cultivated for fodder (Kikuyu Grass). Native to tropical Africa, widely introduced for fodder to tropical highlands and to subtropics throughout the world.

2. **Pennisetum glaucum** (L.) R. Br., Prodr. 195 (1810).
Syns. *Panicum glaucum* L., Sp. Pl., ed. 1, 56 (1753).
Panicum americanum L., Sp. Pl., ed. 1, 56 (1753).
Alopecurus typhoides Burm.f., Fl. Indica 27 (1768).
Panicum lutescens Weigel, Observ. Bot. 20 (1772), nom. superfl., based on *Panicum glaucum* L.
Setaria glauca (L.) P. Beauv., Ess. Agrostogr. 51, 178 (1812).
Pennisetum spicatum (L.) Körn. in Körn. & Werner, Handb. Getreidebaus 1: 284 (1885).
Pennisetum americanum (L.) Leeke, Z. Naturwiss. 79: 52 (1907).
Setaria lutescens (Weigel) F.T. Hubb., Rhodora 18: 232 (1916).
Pennisetum typhoides (Burm.f.) Stapf & C.E. Hubb., Bull. Misc. Inform., Kew 1933: 271 (1933).

Robust annual to 3 m (or even more); ligule a line of hairs; leaf-blades to (or exceeding) 1 x 0.07 m, flat; panicle 10-50 cm, dense; rhachis tomentose; involucres persistent, with a basal stipe 0.1-2.5 cm, enclosing 1-9 spikelets; bristles glabrous or plumose, often shorter than the spikelets; spikelets 3-6 mm, obovate; lower glume *c.* 0.6 mm, obtuse or truncate; upper glume similar but up to 1/3 the length of the spikelet; lower floret male, the lemma as long as or almost as long as the spikelet, firmly membranous, truncate or shallowly emarginate, ciliolate at the tip and often pubescent on the margins below; upper lemma ovate, very obtuse, coriaceous, smooth and shining on the back, densely pubescent on the margins; anther-tips penicillate; caryopsis swollen, protruding from the spikelet.

N, O, De, GE; cultivated cereal (Pearl Millet, Bulrush Millet). Widely cultivated in the tropics for fodder and grain, particularly important in the Sahel zone of West Africa.

NOTE: *Pennisetum glaucum* is probably derived from *P. violaceum* which occurs as a weed in Egypt.

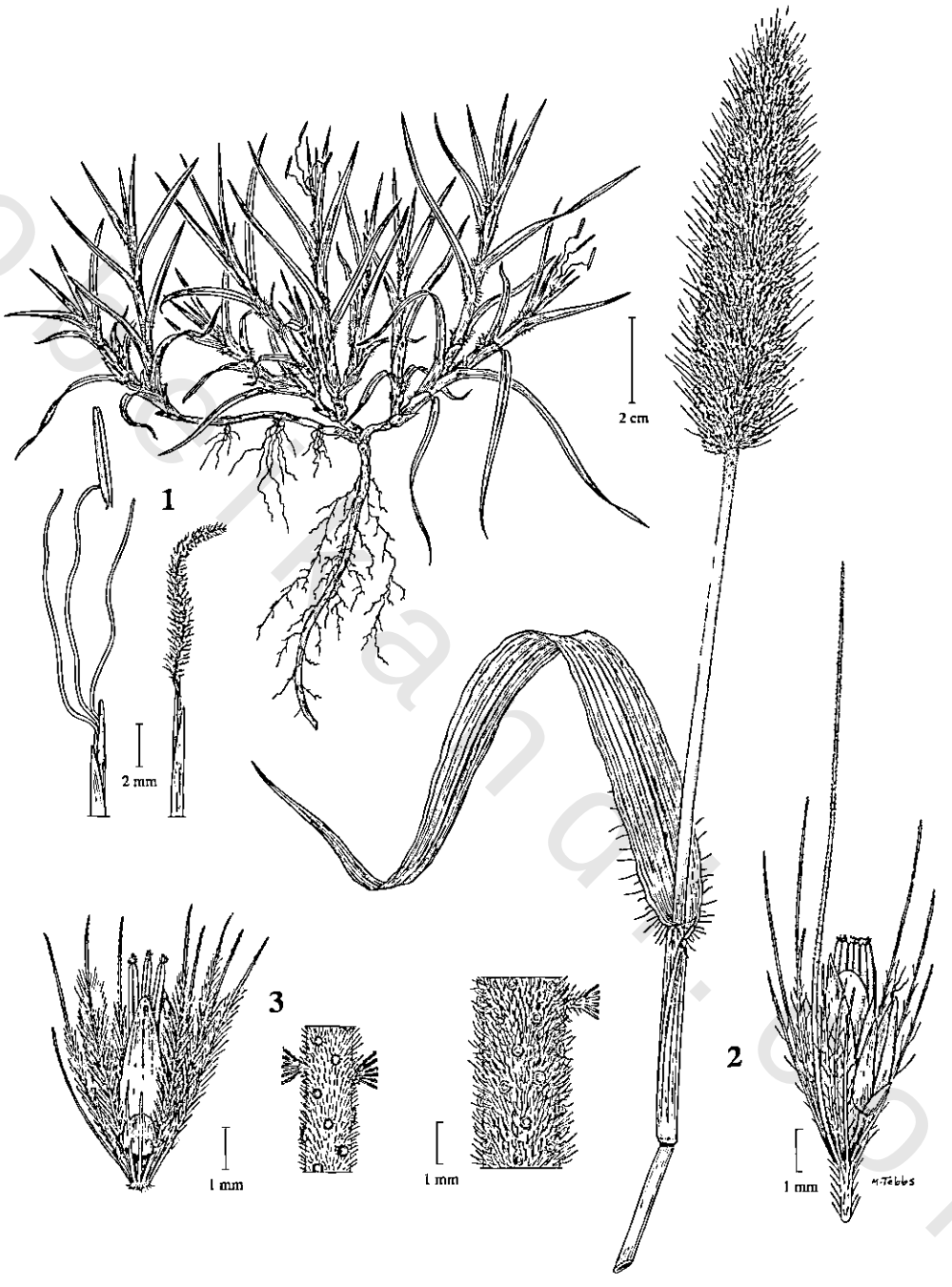


Plate 92. GRAMINEAE: *Pennisetum clandestinum* 1, habit; stigma and stamens (down left). *Pennisetum sieberianum* 2, inflorescence; involucre enclosing two spikelets (down right); segment of inflorescence (down left). *Pennisetum violaceum* 3, segment of inflorescence and involucre enclosing one spikelet. Drawn by Margaret Tebbs.

3. **Pennisetum sieberianum** (Schltdl.) Stapf & C. E. Hubb., Bull. Misc. Inform., Kew 1933: 270 (1933).
Syn. *Penicillaria sieberiana* Schltdl., Linnaea 25: 565 (1852).

Robust annual to 1.2 m; leaf-blades broadly linear, flat; ligule a line of hairs; panicle 5-15 cm, dense; rhachis tomentose; involucres deciduous, with a basal stipe 0.25-1.5 mm, enclosing 2 spikelets; bristles subglabrous to densely plumose, slightly exceeding the spikelets; spikelets 4-6 mm, lanceolate to ovate; lower glume absent or ovate to elliptic and to 1 mm; upper glume oblate, to 1/2 the length of the spikelet; lower floret male or barren; the lemma slightly shorter than the spikelet, membranous, truncate, ciliolate towards the tip; upper lemma lanceolate to ovate, obtuse, subcoriaceous and glossy in the lower half, scaberulous to pilose near the margins above; anther tips penicillate; caryopsis somewhat swollen, enclosed within the spikelet or protruding.

N; weed of cultivation. Egypt, Arabia, Ethiopia to Senegal, southwards to Angola and Namibia.

NOTE: *Pennisetum sieberianum* is a weed which freely hybridizes with *Pennisetum glaucum*.. Vegetatively, it mimics the crop but readily sheds its involucres at maturity. It is thought to have arisen by hybridization between *Pennisetum glaucum* and *Pennisetum violaceum* and freely hybridizes also with the latter. The type was collected at Aswan ('Syene') by Sieber, but no further details are currently available.

4. **Pennisetum violaceum** (Lam.) Rich. in Pers., Syn. Pl. 1: 72 (1805).
Syns. *Panicum violaceum* Lam., Tab. Encycl. 1: 169 (1791).
Penicillaria fallax Fig. & De Not., Mem. Reale Accad. Sci. Torino, ser. 2, 14 :371 (1854).
Pennisetum chudeaui Maire & Trab. subsp. *monodii* Maire, Bull. Mus. Hist. Nat. (Paris), sér. 2, 3: 523 (1931).
Pennisetum fallax (Fig. & De Not.) Stapf & C.E. Hubb., Bull. Misc. Inform., Kew 1933: 270 (1933).
Pennisetum americanum (L.) Leeke subsp. *monodii* (Maire) Brunken, Amer. J. Bot. 64: 170 (1977).

Robust or slender annual to 2(3) m; ligule a line of hairs; leaf-blades 15(25) x 0.3-1(2.5) cm, linear, flat; panicle 3-20 cm, dense; rhachis tomentose; involucres deciduous, sessile, enclosing 1 or 2 shortly pedicellate spikelets; bristles thinly ciliate to densely plumose, the longest to 1.8 cm; spikelets 4-7 mm, lanceolate, slightly gibbous; glumes reduced to small rounded scales to 1 mm, or the lower suppressed; lower floret male and as long as the spikelet, or barren and much shorter, the lemma membranous, acuminate, glabrous; upper lemma ovate, acute or obtuse and mucronate, becoming indurate, smooth and shiny below; anther-tips penicillate; caryopsis oblong-elliptic.

N; weed of cultivation. Tropical Africa, foothills of the Saharan mountains.

5. **Pennisetum divisum** (Forssk. ex J.F. Gmel.) Henrard, Blumea 3: 162 (1938).
Syns. *Panicum dichotomum* Forssk., Fl. Aegypt.-Arab. 20 (1775), non L. (1753).
Panicum divisum Forssk. ex J. F. Gmel., Syst. Nat., ed. 1791, 2(1): 156 (1791).
Pennisetum dichotomum Delile, Descr. Egypte, Hist. Nat. 15, t. 8, f. 1 (1814), based on Panicum dichotomum Forssk.

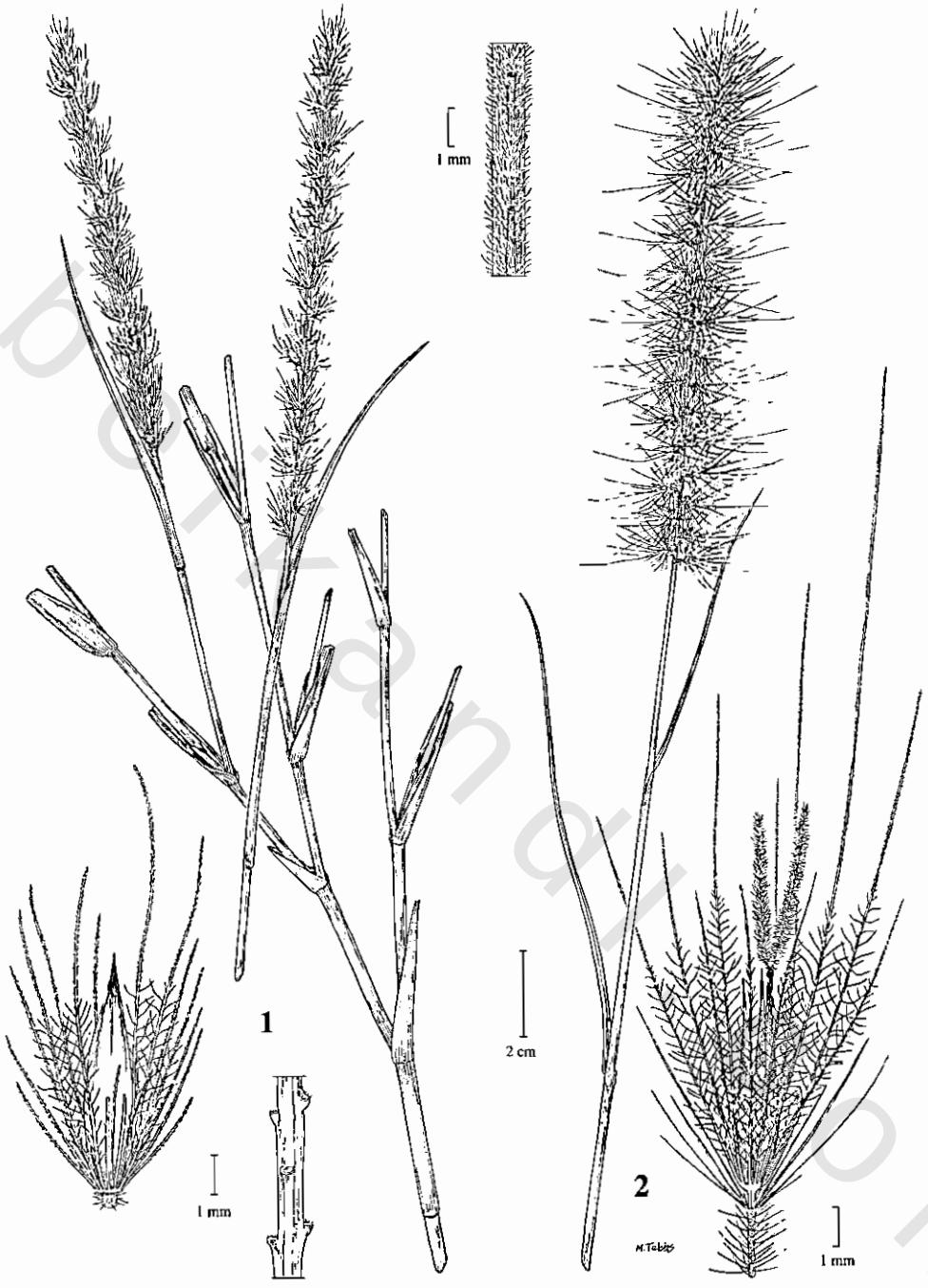


Plate 93. GRAMINEAE: *Pennisetum divisum* 1, habit; segment of inflorescence axis and involucre enclosing one spikelet (down left). *Pennisetum setaceum* 2, inflorescence; segment of inflorescence axis (up left); involucre enclosing spikelets (down right). Drawn by Margaret Tebbs.

Pennisetum elatum Hochst. & Steud. in Steud., Nomencl. Bot., ed. 2, 2: 297 (1841).
Pennisetum asperifolium Hochst. & Steud. in Steud. (1841), non (Desf.) Kunth (1829), in syn. *Pennisetum elatum*

Perennial with short woody rhizomes; culms to 1(2) m, woody, suffruticosely branched throughout; leaf-sheaths inflated, the lower readily shedding their short blade; ligule a line of hairs; leaf-blades tightly inrolled, pungent, glaucous; panicle 5-12 cm, oblong; rhachis with shallowly angular ribs below the cupular peduncle-scars, scaberulous; involucre deciduous, enclosing 1 sessile spikelet, borne upon a short oblong stipe 0.5-1 mm; bristles glabrous, rarely thinly hairy, the longest 0.7-2 cm; spikelets 6.5-8.5 mm, narrowly lanceolate; lower glume 1/2-3/4 the length of the spikelet; upper glume almost as long as the spikelet, acute or acuminate; lemmas similar to the upper glume, lanceolate, acuminate, the lower floret male; anther-tips glabrous.

N, O, D, R, S; sandy deserts. Algeria, Libya, Egypt and the Sahara to Eritrea and Somalia, Arabia, Palestine, Iraq, Iran, Afghanistan, Pakistan, northwest India.

NOTE: The type of *Pennisetum elatum* was collected from 'Arabia Petraea, Nakkeb', Sinai) in 1836 by Schimper (no. 308, isotype K).

6. **Pennisetum villosum** R. Br. ex Fresen. in Salt, Voy. Abyss., app. lxiii (1814), nom. nud.; Mus. Senckenberg. 2: 134 (1837).

Low, mat-forming rhizomatous perennial; culms to 45 cm, loosely ascending; ligule a line of hairs; leaf-blades linear, flat; panicle 5-10 cm, densely ovoid to subspherical; rhachis with rounded ribs and short peduncle-stumps, thinly pilose; involucre deciduous, enclosing 1(2) subsessile spikelets, with a short villous stipe to 0.7(1) mm; bristles softly plumose below, the longest 3.5-6.5 cm; spikelets 0.85-1(1.2) cm, lanceolate; lower glume vestigial or to 1 mm; upper glume 1/3-1/2 the length of the spikelet, acuminate; lower floret male or barren, the lemma narrowly lanceolate, almost as long as the spikelet, sharply acuminate; upper lemma coriaceous below; anther-tips glabrous.

N, M; cultivated ornamental, sometimes escaping. Native to Eritrea, Ethiopia, Somalia and tropical Arabia, cultivated as an ornamental in warm regions of the world.

7. **Pennisetum setaceum** (Forssk.) Chiov., Boll. Soc. Bot. Ital. 1923: 113 (1923).
Syns. *Phalaris setacea* Forssk., Fl. Aegypt.-Arab. 17 (1775).
Pennisetum macrostachyum Fresen., Mus. Senckenberg. 2: 135 (1837), non (Brongn.) Trin. (1834).
Pennisetum ruppellii Steud., Nomencl. Bot., ed. 2, 2: 298 (1841), based on *Pennisetum macrostachyum* Fresen.
Pennisetum spectabile Fig. & De Not., Mem. Reale Accad. Sci. Torino, ser. 2, 12: 248 (1852).
Pennisetum tiberiadis Boiss., Diagn. Pl. Orient. 2(13): 43 (1854).
Pennisetum asperifolium, auct. non (Desf.) Kunth

Densely tufted perennial to 1.3 m, the culms usually unbranched; ligule a line of hairs; leaf-blades inrolled with noticeably thickened midrib on the upper surface, rigid, harsh, glaucous; panicle 6-30 cm, linear; rhachis with shallowly angular ribs below the stumpless peduncle-scars, glabrous to pilose; involucre enclosing 1 sessile and 0-1(2)-

pedicellate spikelets, borne upon a slender pubescent stipe 1-3 mm; bristles loosely plumose, the longest 1.6-4 cm; spikelets (4.5)5-7 mm, lanceolate; lower glume to 2 mm, or vestigial; upper glume 1/5-2/3 the length of the spikelet; lower floret male or barren, the lemma as long as the spikelet; upper lemma similar to the lower; anther-tips glabrous.

N, M, De, GE, S; native in deserts, but often cultivated in gardens. Algeria, Tunisia, Libya, Egypt, Sudan, Ethiopia, Somalia, Kenya, Tanzania, Syria, Lebanon, Palestine, Arabia, with scattered records from Iran and Afghanistan.

NOTE: The type of *Phalaris setacea* was collected near Cairo, Egypt, in 1761/2 by Forsskål (but no specimen has been located). The type of *Pennisetum spectabile* was collected in Sinai, St. Katherine, by Figari (whereabouts uncertain).

8. **Pennisetum orientale** Rich. in Pers., Syn. Pl. 1: 72 (1805).
Syns. *Pennisetum sinaicum* Decne., Ann. Sci. Nat. (Paris), sér. 2, 2: 11 (1834).
Pennisetum fasciculatum Trin., Mém. Acad. Imp. Sci. St.-Pétersbourg, sér. 6, Sci. Math. 3:181(1835).
Pennisetum variabile Fig. & De Not., Mem. Reale Accad. Sci. Torino, ser. 2, 12: 248 (1852).
Pennisetum triflorum Nees ex Steud., Syn. Pl. Glumac. 1: 107 (1854).

Shortly rhizomatous perennial often forming large clumps; culms to 2 m or more, woody and often densely fastigiately branched below; ligule a line of hairs; leaf-blades flat or inrolled, with slender midrib; panicle 8-30 cm, linear, often interrupted; rhachis with shallowly angular ribs below the stumpless peduncle-scars, scaberulous to pubescent; involucre enclosing 1 sessile and 2(4)-pedicellate spikelets, borne upon a slender pubescent stipe 0.5-1.5 mm; bristles loosely plumose, the longest 1.5-3 cm; spikelets 4.5-6.5 mm, lanceolate; lower glume 1/4-2/5 the length of the spikelet; upper glume 1/2-3/4 the length of the spikelet; lower floret male, as long as the spikelet, the lemma setaceously acuminate; upper lemma similar to the lower; anther-tips glabrous.

De, S; rocky deserts. North Africa, Sinai, eastwards to northern India and Central Asia.

NOTE: The type of *Pennisetum sinaicum* was collected in Sinai in 1832 by Bové (no. 19, isotype K), the type of *P. variabile* was collected in Sinai by Figari (s.n., syntypes FT).

92. **Cenchrus** L.

Annual or perennial; ligule a line of hairs; leaf-blades flat or inrolled; inflorescence a cylindrical spike-like panicle with angular rhachis, each spikelet or cluster of spikelets enclosed by a deciduous involucre; involucre composed of 1 or more whorls of bristles, those of the innermost whorl ± flattened and often spiny, connate at the base for some distance along their length; spikelets lanceolate to ovate, dorsally compressed, acute to acuminate; lower glume up to 1/2 the length of the spikelet, sometimes suppressed; upper glume a little shorter than the spikelet; lower floret male or barren, its lemma as long as the spikelet, membranous; upper lemma as long as the spikelet, firmly membranous to coriaceous, its thin flat margins covering much of the palea; caryopsis elliptic to ovate in outline, dorsally compressed. 22 species, throughout the tropics.

NOTE: The genus is distinguished from *Pennisetum* by the transformation of the involucral bristles into a spiny cup. This tendency is scarcely developed in *Cenchrus*

ciliaris whose inclusion in the genus is justified only by its intergradation with *Cenchrus pennisetiformis*.

1. Bristles of the involucre antrorsely scaberulous, not clinging 2
+ Bristles of the involucre retrorsely barbellate, tenaciously clinging to clothing or fur 4

2. Inner bristles (spines) rigid, flattened, connate for 1/4-2/3 their length to form a cup 3. **C. setiger**
+ Inner bristles flexuous, filiform above 3

3. Perennial; inner bristles united only at the base to form a shallow disc 0.5-1.5 mm diam., occasionally connate for up to 0.5 mm above its rim 1. **C. ciliaris**
+ Annual or short-lived perennial; inner bristles connate for 1-2.5 mm above the rim of the basal disc to form a cup 2. **C. pennisetiformis**

4. Inner bristles connate only at the base to form a shallow disc 4. **C. biflorus**
+ Inner bristles (spines) connate for *c.* 1/2 their length to form a globose cup 5. **C. echinatus**

1. **Cenchrus ciliaris** L., Mant. Alt. 302 (1771).
Syns. *Pennisetum cenchroides* Rich. in Pers., Syn. Pl. 1: 72 (1805), nom. superfl., based on Cenchrus ciliaris L.
Pennisetum ciliare (L.) Link, Hort. Berol. 1: 213 (1827).
Pennisetum petraeum Steud., Syn. Pl. Glumac. 1: 106 (1854).
Cenchrus ciliaris L. var. *villifer* Fig. & De Not., Mem. Reale Accad. Sci. Torino, ser. 2,14: 386, t. 36 (1854).
Pennisetum polycladum Chiov., Annuario Reale Ist. Bot. Roma 6: 167, t. 10 (1896).
Pennisetum ciliare (L.) Link var. *pallens* Leeke, Z. Naturwiss. 79: 22 (1907).
Cenchrus ciliaris L. var. *pallens* (Leeke) Maire & Weiller, Fl. Afr. Nord 1: 342 (1952).

Perennial, often forming mats or tussocks; culms to 1.5 m, ascending, wiry or somewhat woody; panicle 2-14 cm; involucre 0.6-1.6 cm, elongate; inner bristles much exceeding the spikelets, one longer and stouter than the rest, united only at the base to form a shallow disc 0.5-1.5 mm diam., sometimes connate for up to 0.5 mm above the rim of the disc, sparsely to densely ciliate below, filiform above, flexuous, antrorsely scaberulous; outer bristles filiform; spikelets 1-4 per involucre, 2-5.5 mm.

N, M, D, R, GE, S; desert wadis and areas of cultivation. Tropical and southern Africa eastwards to India.

NOTE: A type of *Pennisetum petraeum* was collected in Wadi Hibran, Sinai, in 1835 by Schimper (no. 153, isosyntype, K).

2. **Cenchrus pennisetiformis** Hochst. & Steud. in Steud., Syn. Pl. Glumac. 1: 109 (1854).
Syns. *Cenchrus rigidifolius* Fig. & De Not., Mem. Reale Accad. Sci. Torino, ser. 2, 14: 384 (1854).

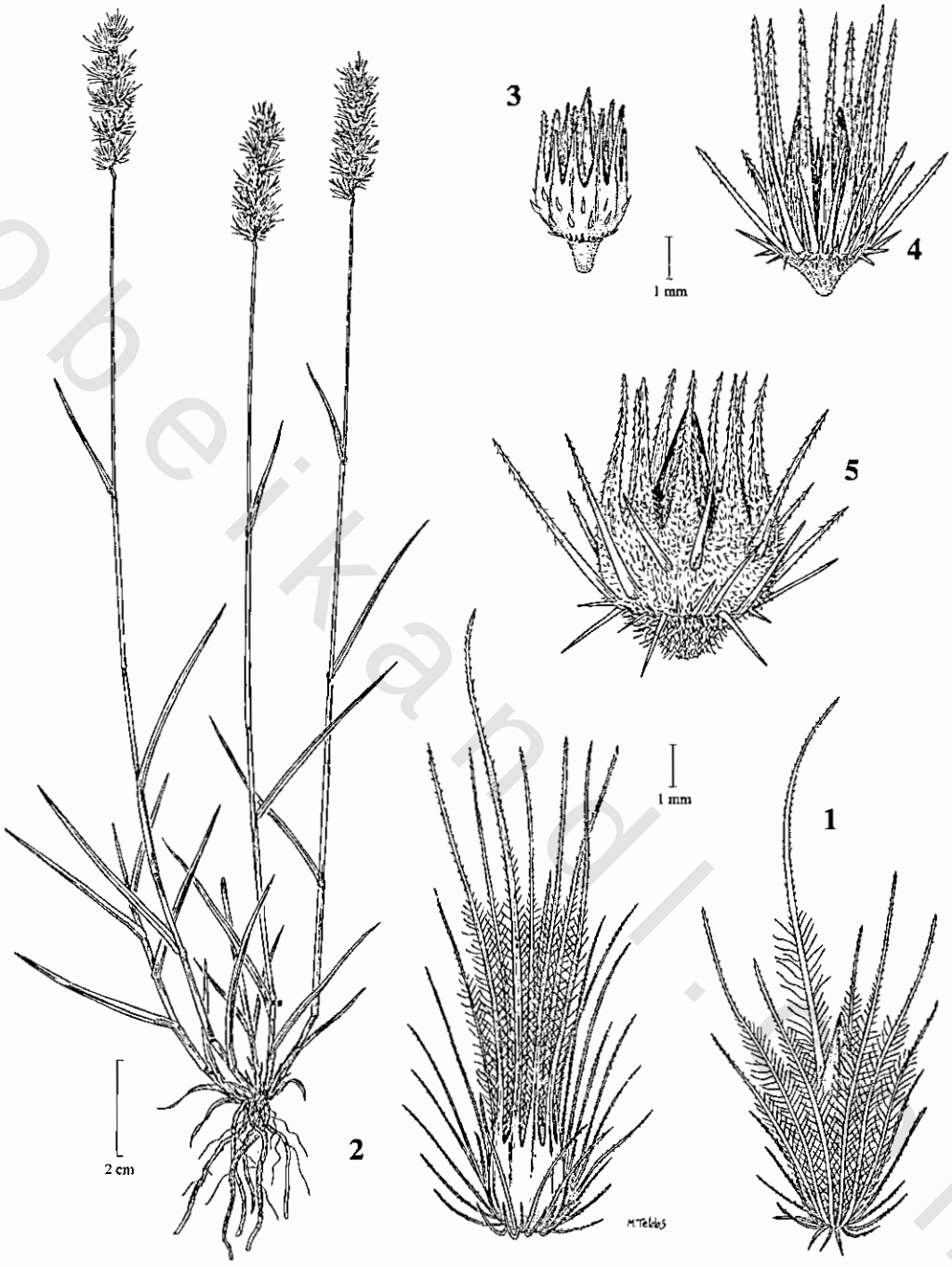


Plate 94. GRAMINEAE: *Cenchrus ciliaris* 1, involucre enclosing the spikelets. *Cenchrus pennisetiformis* 2, habit; involucre enclosing the spikelets (down right). *Cenchrus setiger* 3, involucre enclosing the spikelets. *Cenchrus biflorus* 4, involucre enclosing the spikelets. *Cenchrus echinatus* 5, involucre enclosing the spikelets. Drawn by Margaret Tebbs.

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Cenchrus aequiglumis Chiov., Agric. Colon. 20: 108 (1926).

Annual or short-lived perennial; culms to 40 cm, ascending; panicle 2-6 cm; involucre 0.6-1.6 cm, elongate; inner bristles much exceeding the spikelets, one longer and stouter than the rest, flattened at the base, connate for 1-2.5 mm above the rim of the basal disc to form a cup, almost glabrous to sparsely ciliate below, filiform above, flexuous, antrorsely scaberulous; outer bristles filiform; spikelets 1-3 per involucre, 3-5 mm.

N, O, De, R, GE, S; sandy soils. East and northeast tropical Africa, eastwards to India, introduced in Australia.

3. **Cenchrus setiger** Vahl, Enum. Pl. 2: 395 (1806).
Syns. *Cenchrus schimperi* Hochst. & Steud. in Steud., Nomencl. Bot., ed. 2, 1: 317 (1840), in syn. *Cenchrus montanus* Nees, nom. nud.
Cenchrus montanus Nees ex Steud., Syn. Pl. Glumac. 1: 111 (1854).

Perennial, forming clumps from a ± bulbous base; culms to 80 cm, geniculately ascending; panicle 2 -12 cm; involucre 3-7 mm, cup-shaped; inner spines short, flattened, connate for 1/4-1/2 their length, glabrous or obscurely puberulent; outer spines few, short, often suppressed, rarely almost as long as the inner; spikelets 1-3 per involucre, 3-5 mm.

O, De, R, GE; sandy soils. East and northeast tropical Africa, eastwards to India, introduced elsewhere in the tropics.

NOTE: Vahl rendered the epithet as '*setigerus*' but modern opinion is that the correct spelling should be '*setiger.*'

4. **Cenchrus biflorus** Roxb., Fl. Ind. 1: 238 (1820).
Syns. *Elymus caput-medusae* Forssk., Fl. Aegypt.-Arab. 25 (1775), non L. (1753).
Cenchrus barbatus Schumach., Beskr. Guin. Pl. 43 (1827).
Cenchrus catharticus Delile, Cat. Hort. Monsp. 1838: 4(1839); Linnaea 13, Litt. 103 (1839).
Cenchrus niloticus Fig. & De Not., Mem. Reale Accad. Sci. Torino, ser. 2, 14: 380, t. 33 (1854).

Annual; culms to 90 cm, ascending; panicle 2-15 cm; involucre 0.4-1.1 cm, ovoid; inner spines flattened, united at the base to form a shallow disc 2-4 mm diam., ciliate below, retrorsely barbellate above and pungent at the tip; outer spines numerous, acicular, shorter than the inner, usually divergent; spikelets 1-3 per involucre, 3.5-6 mm.

N, D, S; introduced weed, naturalized in newly reclaimed lands east and west of the Nile Delta. Native to tropical Africa, Arabia, eastwards to India.

NOTE: A syntype of *Cenchrus niloticus* was collected along the Nile in Egypt, by Figari (whereabouts uncertain).

5. **Cenchrus echinatus** L., Sp. Pl., ed. 1, 1050 (1753).

Coarse annual; culms to 90 cm, ascending; panicle 2-10 cm; involucre 0.5-1 cm, globose; inner spines flattened, connate for *c.* 1/2 their length to form a deep cup, pubescent,

retrorsely barbellate; outer spines rigid, mostly shorter than the inner, ± divergent; spikelets 2-3 per involucre, 5-7 mm.

N; introduced weed. Native to warmer parts of the New World, now widely naturalized as a weed throughout the tropics and subtropics.

Tribe 18. **ARUNDINELLEAE**

Ligule usually a line of hairs, sometimes a membrane; inflorescence a panicle, the spikelets all alike, usually immature at emergence and completing their growth on the panicle, often in triads, these sometimes with connate pedicels; spikelets 2-flowered without rhachilla-extension, lanceolate, slightly laterally compressed, shedding one or both florets; glumes persistent, the upper about as long as the spikelet, the lower usually shorter, membranous to coriaceous; lower floret male or barren, the lemma resembling the upper glume, often persistent, 3- to 9-nerved; upper floret fertile, subterete, the lemma thinly coriaceous, often decorated with hair-tufts, 2-dentate or 2-lobed at the tip, awned from the sinus; awn geniculate, with flat or terete twisted column, often deciduous; hilum often linear.

93. **Danthoniopsis** Stapf

Perennial, rarely annual; panicle open or contracted, bearing spikelets in groups of 2 or 3, the pedicels not connate; spikelets with glabrous glumes; lower lemma 5- to 9-nerved; upper lemma with 2-8 transversely arranged tufts or lines of hair, sometimes glabrous, 2-lobed at the tip; callus square to narrowly oblong, obtuse or 2-dentate. About 20 species, mainly Central and southern Africa, West Africa, Sudan to Pakistan.

1. **Danthoniopsis barbata** (Nees) C.E. Hubb., Bull. Misc. Inform., Kew 1934: 435 (1934).
   Syn. *Tristachya barbata* Nees, Fl. Afr. Austral. Ill. 1: 269 (1841).

Tufted perennial to 1 m, with knotty base; nodes densely bearded; leaves distichous, the blades flat, stiff and pungent, pilose and with conspicuous white cartilaginous margins; panicle contracted, rarely open, the spikelets mostly in triads, usually flushed with purple; lower glume 5.5-7 mm; upper glume 0.85-1.05 cm; lower lemma 0.85-1.1 cm; upper lemma, including the 0.6-1.2 mm 2-toothed callus and 3-5 mm awned lobes, 0.8-1.05 cm, with tufts of hair across the back; awn 1.5-2 cm, rigidly falcate.

De, GE, S; rocky hillsides and sandy wadis. Eritrea, Ethiopia, Somalia, Sudan, Egypt, tropical Arabia.

Tribe 19. **ANDROPOGONEAE**

Ligule scarious or membranous, a line of hairs, or absent; inflorescence of fragile (very rarely tough) racemes, these sometimes in a large leafy false panicle, but usually solitary, paired or digitate, terminal or axillary and numerous, in the latter case each true inflorescence subtended by a modified leaf-sheath (spatheole) and often aggregated into a leafy false panicle; racemes bearing spikelets in pairs (rarely singly or in 3s, but usually terminating in a triad), nearly always with one sessile and the other pedicellate, these

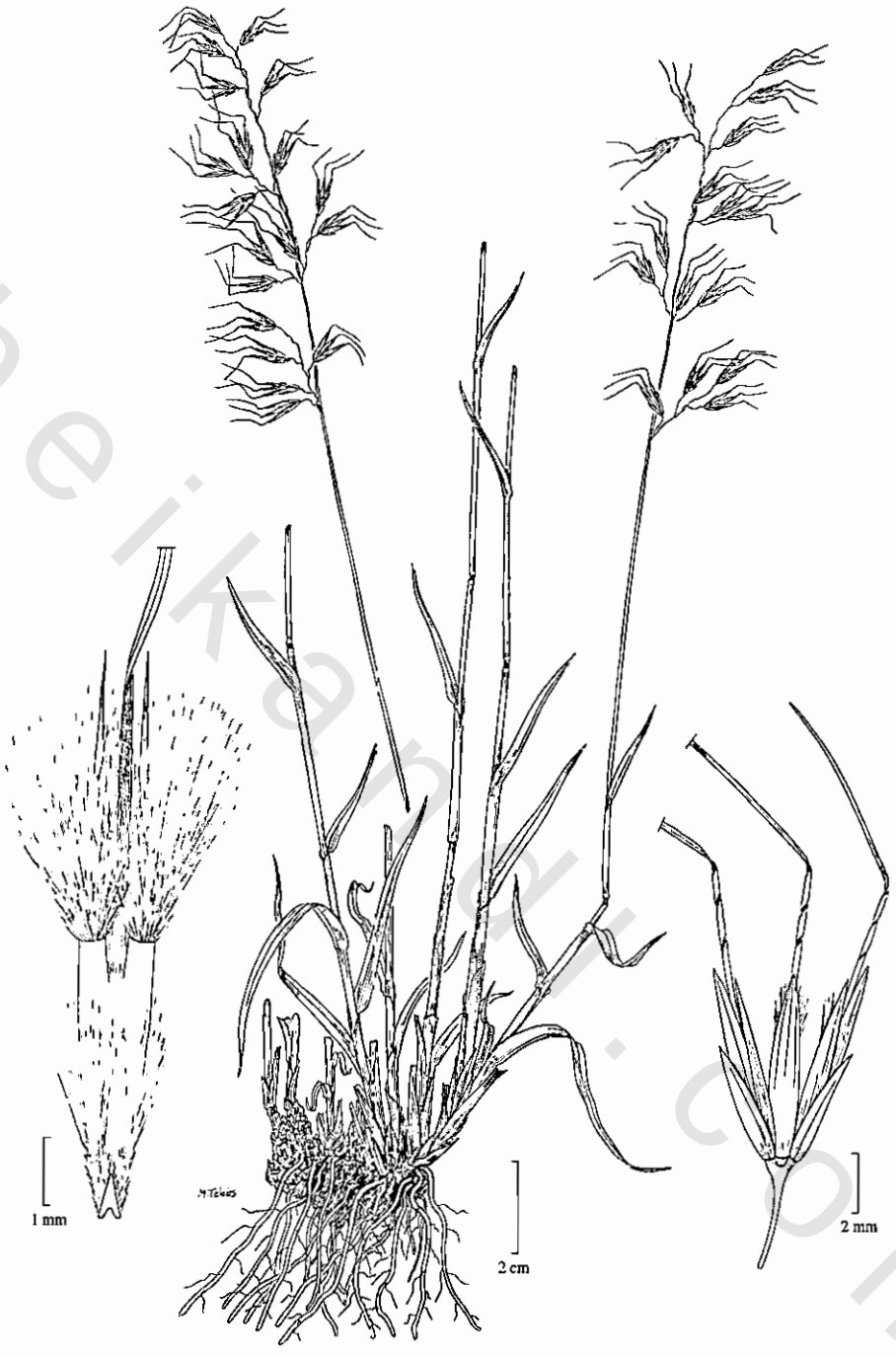


Plate 95. GRAMINEAE: *Danthoniopsis barbata*, habit; triad of spikelets (down right); upper lemma from back side (down left). Drawn by Margaret Tebbs.

sometimes alike but usually dissimilar, the sessile being fertile and the pedicellate male or barren; occasionally with 1 or more of the lowermost pairs (homogamous pairs) alike, infertile and subpersistent (and often resembling the pedicellate spikelets); sessile spikelet 2-flowered, falling entire at maturity with the adjacent internode and pedicel (the pedicellate spikelet usually falling separately); glumes as long as the spikelet and ± hardened; lower floret male or barren, the lemma hyaline or membranous, awnless, the palea suppressed if the floret is barren; upper floret fertile, the lemma membranous or hyaline, awned or awnless; pedicellate spikelet sometimes resembling the sessile but usually male or barren, often smaller and sometimes suppressed; rarely the pedicel absent or fused to the internode; hilum punctiform.

1. Spikelets unisexual, with male and female in separate inflorescences or in different parts of the same inflorescence — 2
\+ Spikelets, or at least some of them, bisexual — 3

2. Racemes unisexual, the female spikelets either in a simple raceme or in rows on a thick woody cob male spikelets in an ample terminal panicle — 110. **Zea**
\+ Racemes bisexual, the female spikelets below, completely enclosed in a metamorphosed leaf-sheath (utricle) which takes the form of a spherical or ovoid bony bead-like structure; male spikelets above, protruding from the tip of the utricle — 111. **Coix**

3. Rhachis-internodes and pedicels slender, sometimes thickened upwards but then the upper lemma awned — 4
\+ Rhachis-internodes and pedicels stout, thickening upwards; upper lemma awnless — 14

4. Spikelets of a pair similar, both fertile — 5
\+ Spikelets of a pair differing in shape and sex — 8

5. Inflorescence comprising single axillary racemes — 97. **Pogonatherum**
\+ Inflorescence a panicle of numerous racemes — 6

6. Raceme-rhachis fragile; one spikelet of a pair sessile — 94. **Saccharum**
\+ Raceme-rhachis tough; both spikelets of a pair pedicellate — 7

7. Panicle loose; glumes tough — 95. **Miscanthus**
\+ Panicle contracted, spike-like; glumes membranous — 96. **Imperata**

8. Inflorescence a panicle with elongated central axis — 9
\+ Inflorescence of single or subdigitate racemes — 10

9. Lower glume of sessile spikelet dorsally compressed — 98. **Sorghum**
\+ Lower glume of sessile spikelet laterally compressed — 99. **Chrysopogon**

10. Lower glume of sessile spikelet 2-keeled; callus ± inserted in the hollowed summit of the internode — 11
\+ Lower glume of sessile spikelet usually rounded without keels; callus applied obliquely to the summit of the internode with its tip free — 12

11. Leaves not aromatic; racemes not deflexed, borne upon unequal terete raceme-bases — 101. **Andropogon**

+ Leaves nearly always aromatic; racemes usually deflexed at maturity and borne upon subequal flattened raceme-bases 102. **Cymbopogon**

12. Upper lemma 2-toothed, awned 103. **Hyparrhenia**
+ Upper lemma entire 13

13. Racemes with 2 large homogamous pairs at the base forming an involucre 104. **Themeda**
+ Racemes without homogamous pairs at the base 100. **Dichanthium**

14. Pedicels fused to the adjacent rhachis-internode 107. **Hemarthria**
+ Pedicels free from the rhachis-internodes 15

15. Callus of sessile spikelet obtuse to acute, with oblique articulation; lower glume of sessile spikelet with pectinate margins 105. **Elionurus**
+ Callus of sessile spikelet truncate, with transverse articulation often reinforced by a central peg; lower glume of sessile spikelet without pectinate margins 16

16. Raceme glabrous; central peg obscure 106. **Vossia**
+ Raceme silky-villous; central peg pronounced 108. **Lasiurus**

94. **Saccharum** L.
Syn. *Erianthus* Michx.

Tufted or rhizomatous perennials; ligule a scarious membrane or a line of hairs; leaf-blades linear; inflorescence a panicle, often large and plumose, bearing numerous racemes crowded on its branches; racemes with fragile rhachis, bearing paired similar spikelets, one sessile, the other pedicellate; internodes linear, slender; spikelets lanceolate, enveloped in long silky hairs from the callus, dorsally compressed; callus very short, truncate; glumes equal, membranous to coriaceous, the lower flat or rounded on the back, ± 2-keeled; lower floret barren, reduced to a hyaline lemma; upper lemma lanceolate, hyaline, entire or rarely 2-dentate, awnless or with a straight awn, sometimes almost suppressed; stamens 2-3; caryopsis subrotund to narrowly oblong in outline. 35-40 species, throughout the tropics and subtropics.

1. Leaf-blades 0.5-1.5 cm wide; axis of the panicle and summit of the peduncle hirsute; panicle 25-60 cm; spikelets 2.5-7 mm; callus-hairs dense, silky, white (wild grass) 1. **S. spontaneum**
+ Leaf-blades to 4 cm wide; axis of the panicle and summit of the peduncle glabrous to pubescent; panicle to 1 m or more; spikelets 3.5-4 mm; callus-hairs off-white (cultivated grass) 2. **S. officinarum**

1. **Saccharum spontaneum** L., Mant. Alt. 183 (1771).

Rhizomatous perennial to 5 m; leaf-blades 0.5-1.5(4) cm wide, glaucous; panicle 25-40 (60) cm, the axis and especially the summit of the peduncle hirsute; racemes 3-15 cm, usually much longer than the supporting branches; spikelets 3.5-7 mm, the callus bearded with silky white hairs 2-3 times as long as the spikelet; glumes subcoriaceous in the lower third, membranous above, glabrous on the back; upper lemma very shortly awned, the awn not visible beyond the tips of the glumes.

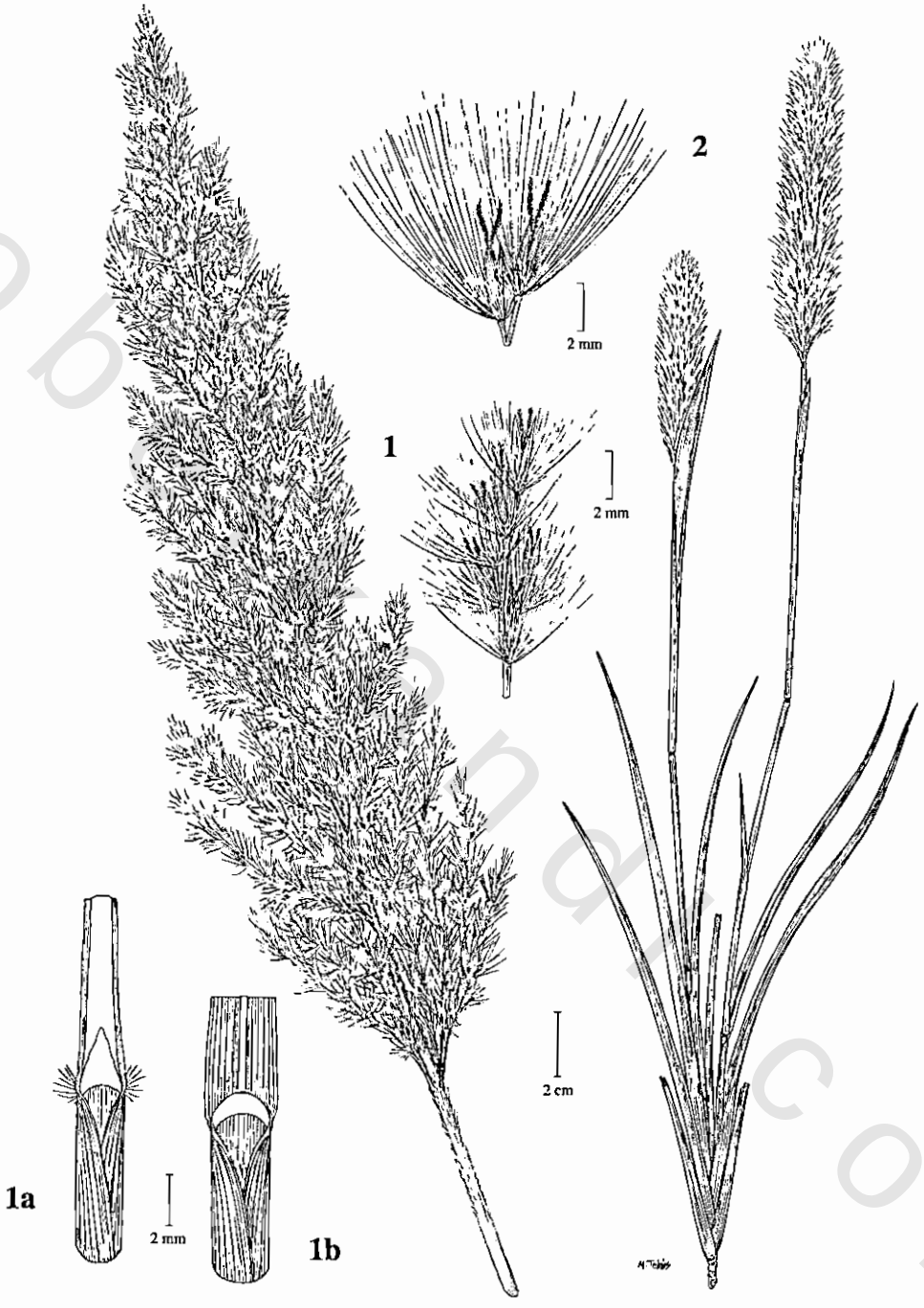


Plate 96. GRAMINEAE: *Saccharum spontaneum* 1, inflorescence; part of raceme (middle right); subsp. *spontaneum* 1a, lamina (narrow) with ligule; subsp. *aegyptiacum* 1b, lamina (wide) with ligule. *Imperata cylindrica* 2, habit; pair of spikelets (up left). Drawn by Margaret Tebbs.

Two subspecies occur in Egypt:

subsp. **spontaneum**

Leaf-blades becoming petiolate towards the base; the lamina gradually reduced to a narrow wing on either side of the midrib, up to 7.5 mm wide; ligule triangular.

N, M, S; along water-courses, margins of cultivated land. Throughout much of tropical and warm temperate Asia.

subsp. **aegyptiacum** (Willd.) Hack. in DC., Monogr. Phan. 6: 115 (1889).
Syns. *Saccharum biflorum* Forssk., Fl. Aegypt.-Arab. 16 (1775).
Saccharum aegyptiacum Willd., Enum. Pl. 1: 82 (1809).
Saccharum punctatum Schumach., Beskr. Guin. Pl. 46 (1827).
Saccharum palisotii Tausch, Flora 19: 527 (1836).
Saccharum spontaneum L. var. *aegyptiacum* (Willd.) Hack. in DC., Monogr. Phan. 6: 115 (1889).
Saccharum spontaneum L. subsp. *biflorum* (Forssk.) Pilg. in Fries, Wiss. Ergebn. Schwed. Rhod.-Kongo-Exped. 1: 191 (1916).

Leaf-blades with lamina extending to the base, 0.5-1.5(4) cm wide; ligule crescent-shaped.

N, O, M, D, R, S; along water-courses, margins of cultivated land. Egypt, Syria, tropical and northern Africa.

NOTE: The type of *Saccharum biflorum* was collected near Rashid (Rosetta), Egypt, in 1761/2 by Forsskål (no. 64, holotype C); and the type of subsp. *aegyptiacum* was collected at Memphis by Schwartz (holotype B).

2. **Saccharum officinarum** L., Sp. Pl., ed. 1, 54 (1753).

Rhizomatous perennial to 6 m; leaf-blades linear or narrowly lanceolate, to 4 cm wide, flat, with broad white midrib; panicle to 1 m (or even more), the axis and the summit of the peduncle glabrous or pubescent; racemes to 15 cm, usually much longer than the supporting branches; spikelets 3.5-4 mm, the callus bearded with off-white hairs 2-3 times as long as the spikelets; glumes subcoriaceous in the lower third, membranous above, glabrous on the back, the upper sometimes faintly ciliate on the margins; upper lemma awnless.

N; cultivated (Sugar-cane). Thought to have arisen in New Guinea, now cultivated for sugar throughout the tropics and subtropics.

95. **Miscanthus** Andersson
Syn. *Miscanthidium* Stapf

Tufted or rhizomatous perennials, often tall; leaf-blades linear; inflorescence often large and plumose, comprising numerous racemes, these subdigitate or paniculate; racemes with tough rhachis, bearing paired similar unequally pedicellate spikelets; spikelets lanceolate to narrowly oblong, with a spreading, often involucral, beard from the callus; callus very short, truncate; glumes equal, as long as the spikelet, cartilaginous to thinly coriaceous, the lower broadly convex on the back, sometimes weakly 2-keeled; lower

floret barren, without a palea; upper lemma hyaline, entire or 2-dentate at the tip, with or without a straight or geniculate awn; stamens 2-3; caryopsis oblong or lanceolate in outline. About 20 species, mainly southeast Asia, but some in tropical Africa.

1. **Miscanthus sinensis** Andersson, Öfvers. Förh. Kongl. Svenska Vetenck.-Akad. 12: 166 (1855).

Rhizomatous; culms to 3 m; leaf-blades 0.5-1 m, 1-2 cm wide, with scabrid margins; inflorescence 15-40 cm with racemes to 20 cm; spikelets 4-6 mm; callus-hairs silvery, 5-7 mm, spreading; upper lemma with a geniculate awn 0.5-1.5 cm.

N; cultivated ornamental (Japanese Silver-grass), represented in Egypt by var. *zebrinus* Beal which has alternating horizontal bands of green and yellowish white on the leaves. The wild variant is a native to China, Japan and Korea but the species, under numerous varietal names, is widely cultivated as an ornamental.

96. **Imperata** Cirillo

Rhizomatous perennials; leaves mostly basal; ligule scarious; inflorescence a narrow, often spike-like panicle, its numerous primary branches bearing very short secondary racemes; racemes with tough rhachis, bearing paired similar spikelets each with a slender pedicel; spikelets lanceolate to oblong, ± terete, enveloped in long silky hairs from the callus and glumes; callus very short, truncate; glumes equal, membranous; lower floret barren, reduced to a hyaline lemma; upper lemma hyaline, awnless; stamens 1-2; caryopsis ellipsoid. 8 species, throughout the tropics, extending to warm temperate regions.

1. **Imperata cylindrica** (L.) Raeusch., Nomencl. Bot., ed. 3, 10 (1797).
Syns. *Lagurus cylindricus* L., Syst. Nat., ed. 10, 2: 878 (1759).
Saccharum koenigii Retz., Observ. Bot. 5: 16 (1789).
Imperata arundinacea Cirillo, Pl. Rar. Neapol. 2: 27, t. 11 (1792).

Aggressively rhizomatous plant to 1.2 m, forming tufts of leaves from the scaly rhizome; leaves basal, the blades flat or loosely inrolled, stiffly erect; panicle 3-22 cm, spike-like, cylindrical, obscured by the copious silky white hairs from the callus and glumes; spikelets 3-6 mm.

N, O, M, D, R, S; watersides and irrigated land where it can become a serious weed. Throughout the tropics, extending to the Mediterranean region, also in South America.

NOTE: *Imperata cylindrica* is a polymorphic species in which a number of varieties have been formally recognized. The differences between them can be demonstrated statistically but intergradation is so severe that it is often impossible to identify individual plants. Egyptian material is mostly var. *cylindrica* (Mediterranean region and southwest Asia), but specimens corresponding to other varieties have been collected. It is probably better for the moment to ignore the varietal classification, but with the understanding that there are several imperfectly separable geographic races.

97. **Pogonatherum** P. Beauv.

Slender perennials; ligule a line of hairs, these accrescent towards the base; inflorescence of solitary, terminal and axillary racemes; racemes fragile, bearing paired similar

spikelets, one sessile, the other pedicellate; internodes and pedicels short, columnar; spikelets laterally compressed; callus obtuse, long-bearded; lower glume cartilaginous, rounded on the back, obtuse; upper glume emarginate, with a long slender awn from the sinus; lower floret male with a palea, or barren and without a palea, or suppressed; upper lemma hyaline, shortly 2-fid, with a slender glabrous awn from the sinus; stamens 1 or 2; caryopsis ellipsoid. 3 species, tropical Asia, Australia.

1. **Pogonatherum paniceum** (Lam.) Hack., Allg. Bot. Z. Syst. 12: 178 (1906).
Syns. *Saccharum paniceum* Lam., Encycl. 1: 595 (1785); Tab. Encycl. 1: t. 40, 3 (1791).
Pogonatherum saccharoideum P. Beauv., Ess. Agrostogr. 176, 177 (1812).

Tufted perennial with stiff wiry culms to 60 cm; racemes 1.5-3 cm, dense, borne upon a flexuous peduncle; spikelets 2.5-3 mm, the white callus-hairs to 1.5 mm; lower glume a little shorter than the spikelet; lower floret male with 2 stamens; upper glume and upper lemma each with a slender flexuous awn 1-1.5 cm.

Cultivated as an ornamental (Dwarf Bamboo). Native to Afghanistan and Pakistan, eastwards to China, Sri Lanka, tropical southeast Asia and Australia.

98. **Sorghum** Moench, nom. conserv.

Annual or perennial, mostly robust, with or without rhizomes; ligule membranous or scarious, rarely a line of hairs; inflorescence a large terminal panicle with tough persistent branches bearing short fragile (except in cultivated species) racemes, these with paired dissimilar spikelets, one sessile, the other pedicellate; internodes and pedicels filiform; sessile spikelet dorsally compressed; callus obtuse; lower glume coriaceous, broadly convex across the back, becoming 2-keeled and narrowly winged near the tip, usually hairy; lower floret reduced to a hyaline lemma; upper lemma hyaline, 2-dentate at the tip, with a glabrous awn from the sinus, or awnless; caryopsis obovate in outline, dorsally compressed; pedicellate spikelet male or barren, linear-lanceolate to subulate, usually much narrower than the sessile, and awnless. About 20 species, Old World tropics and subtropics, 1 endemic to Mexico.

1. Perennial with well-developed rhizomes — 1. **S. halepense**
\+ Annual or short-lived perennial without rhizomes — 2

2. Racemes tough or tardily breaking up — 3
\+ Racemes fragile, readily breaking up at maturity — 4

3. Sessile spikelets persistent; grain commonly exposed by the gaping glumes — 3. **S. bicolor**
\+ Sessile spikelets persistent or tardily deciduous; grain enclosed by the glumes — 4. **S.** x **drummondii**

4. Panicle very large and full, 20-60 x 10-25 cm; sessile spikelets ovate — 2. **S. arundinaceum**
\+ Panicle long and narrow, scanty, 15-60 x 1-5 cm; sessile spikelets lanceolate — 5. **S. virgatum**

1. **Sorghum halepense** (L.) Pers., Syn. Pl. 1: 101 (1805).
Syns. *Holcus halepensis* L., Sp. Pl., ed. 1, 1047 (1753).
Holcus exiguus Forssk., Fl. Aegypt.-Arab. 174 (1775).
Andropogon halepensis (L.) Brot., Fl. Lusit. 1: 89 (1804).

Rhizomatous perennial to 1.5 m, slender to rather stout; panicle 10-55 cm, lanceolate to pyramidal in outline; primary branches compound, bare at the base, ultimately bearing racemes of 1-5 spikelet-pairs; sessile spikelet 4.5-5 (5.5) mm, elliptic; lower glume keeled above, the wings of the keels widening upwards to end in minute teeth, forming with the apex a distinctly equally 3-toothed tip, pilose on the back; upper lemma acute and minutely mucronate to 2-dentate and with an awn 1-1.6 cm; pedicellate spikelet 4.5-6.5 mm, lanceolate, male.

N, O, M; once cultivated for fodder (Johnson Grass), but now an uncommon weed of rice. Mediterranean region, eastwards to Pakistan and Kashmir (probably not native to India); cultivated for fodder in most warm regions, especially in North America.

NOTE: Because of its tenacious rhizomatous habit, *Sorghum halepense* has earned a bad reputation as a weed of cultivated fields. Worse than this, under certain circumstances its tissues can develop hydrocyanic acid and the plant then becomes a positive danger to livestock. The type of *Holcus exiguus* was collected at Rashid (Rosetta), Egypt, in 1761 by Forsskål (no. 50, holotype C).

2. **Sorghum arundinaceum** (Desv.) Stapf in Prain, Fl. Trop. Afr. 9: 114 (1917).
Syns. *Andropogon arundinaceus* Willd., Sp. Pl, ed. 4, 906 (1806), non Berg. (1767).
Rhaphis arundinacea Desv., Opusc. Sci. Phys. Nat. :69 (1831), based on *Andropogon arundinaceus* Willd.
Andropogon verticilliflorus Steud., Syn. Pl. Glumac. 1: 393 (1854).
Sorghum verticilliflorum (Steud.) Stapf in Prain, Fl. Trop. Afr. 9: 116 (1917).

Annual or short-lived perennial without rhizomes, to 4 m, often robust; panicle10-60 cm, linear to broadly spreading; primary branches compound, bare at the base, ultimately bearing racemes of 2-7 spikelet-pairs; sessile spikelet 4-9 mm, lanceolate to narrowly ovate; lower glume 2-keeled, the wings of the keels ending in minute teeth well below the glume-tip and the latter not appearing equally 3-toothed, or the wings not forming lateral teeth, glabrescent to white-pubescent, sometimes tomentose or fulvously pubescent; upper lemma awnless or more often with an awn 0.5-3 cm; pedicellate spikelet linear to lanceolate, male or barren, smaller than the sessile.

?N; unconfirmed in Egypt. Throughout Africa, extending to Australia, introduced to tropical America.

NOTE: *Sorghum arundinaceum* is the wild progenitor of the cereal *Sorghum bicolor* (q.v.) and one of the parents of the hybrid *S.* x *drummondii* (q.v.). Occasionally, cultivated sorghums, if left to go wild, will eventually revert to something resembling their wild ancestor. *S. arundinaceum* is common in much of Africa and is likely to occur in Egypt.

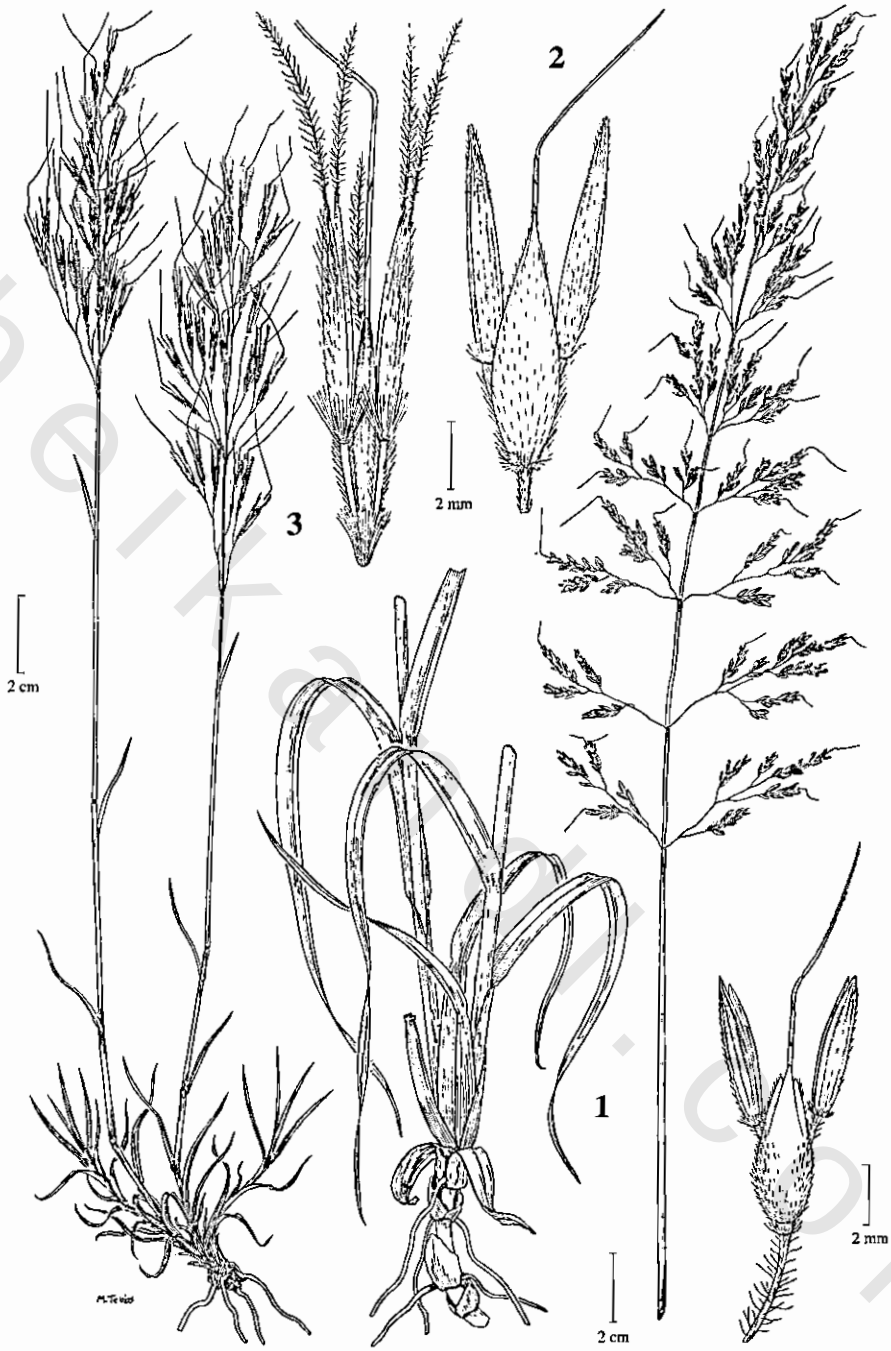


Plate 97. GRAMINEAE: *Sorghum halepense* 1, lower part and inflorescence; terminal triad of spikelets (down right). *Sorghum arundinaceum* 2, terminal triad of spikelets. *Chrysopogon plumulosus* 3, habit; triad of spikelets (up right). Drawn by Margaret Tebbs.

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3. **Sorghum bicolor** (L.) Moench, Methodus 207 (1794).
Syn. *Holcus bicolor* L., Mant. Alt. 301 (1771).

Annual or short-lived perennial without rhizomes, to 2.5 m, often robust; panicle to 25 cm, very variable, loose to very dense, erect or with a curved peduncle; primary branches compound, long or short, bearing stout compound racemes of 2-4 spikelet-pairs; sessile spikelet 4-6 mm, elliptic to obovate, indehiscent; glumes subequal, pale yellow to chestnut brown or almost black; upper lemma with a weak awn to 1 cm; caryopsis large, broadly obovoid or globular, exposed between the gaping glumes; pedicellate spikelet 3-4 mm, lanceolate, barren, , persistent.

N, O, M; cultivated cereal (Sorghum, Guinea Corn). Cultivated in tropical regions, particularly in the Old World.

NOTE: *Sorghum* is a widely cultivated, extremely important tropical cereal derived from the wild African species *Sorghum arundinaceum* (q.v.). It is sometimes treated as a variety or subspecies of its wild progenitor, but from a practical point of view it seems more convenient to accord separate species status to the crop and the wild plant. There is a multitude of cultivars that were treated by Snowden (The Cultivated Races of *Sorghum*, 1936) in a complex hierarchy of species, varieties and forms, nearly all of which are now accommodated in a single species, *S. bicolor*. The main races recorded as having definitely been grown in Egypt are these:

Sorghum caudatum Stapf
var. *natae* (Körn.) Snowden
Sorghum cernuum (Ard.) Host
var. *globosum* (Hack.) Snowden
Sorghum dochna (Forssk.) Snowden
var. *formosum* Snowden
var. *obovatum* (Hack.) Snowden
var. *technicum* (Körn.) Snowden
Sorghum durra (Forssk.) Stapf
var. *aegyptiacum* (Körn.) Snowden
var. *fiorii* (Chiov.) Snowden
var. *javanicum* (Hack.) Snowden
var. *luteolum* Snowden
var. *niloticum* (Körn.) Snowden
var. *rivulare* Snowden
Sorghum membranaceum Chiov.
var. *ehrenbergianum* (Körn.) Snowden

Others, less certain of indentification, were mentioned by Snowden. It is probable that many of these land-races are no longer grown, having been replaced by modern, more commercial varieties.

4. **Sorghum** x **drummondii** (Nees ex Steud.) Millsp. & Chase, Publ. Field Mus. Nat. Hist., Bot. Ser. 3: 21 (1903).
Syns. *Andropogon drummondii* Nees ex Steud., Syn. Pl. Glumac. 1: 393 (1854).
Andropogon sorghum (L.) Brot. var. *sudanense* Piper, Proc. Biol. Soc. Wash. 28: 33 (1915).
Sorghum sudanense (Piper) Stapf in Prain, Fl. Trop. Afr. 9: 113 (1917).

The hybrid between *Sorghum arundinaceum* and *Sorghum bicolor*. It can backcross with either parent to create hybrid swarms of varying degrees of intermediacy. It is usually recognized by its tardily disarticulating spikelets and slightly turgid caryopsis.

N, O, M, S; cultivated for fodder (Sudan Grass). Cultivated in the Old World tropics, also arising spontaneously wherever the parents grow together.

NOTE: *Sorghum* x *drummondii*, Sudan Grass, is a tardily disarticulating element selected for cultivation as a fodder grass. It is an annual, and therefore normally readily distinguishable from *Sorghum halepense*. However, if the habit of a specimen is not known then difficulties of identification are considerable. *Sorghum* x *drummondii* has larger spikelets (6-7.5 mm compared with 4.5-5 mm) with 11-13 nerves on the lower glume of the sessile spikelet (compared with 7-9 of which only 2-4 are at all conspicuous in *Sorghum halepense*) and a much less obviously 3-toothed tip to the glume.

5. **Sorghum virgatum** (Hack.) Stapf in Prain, Fl. Trop. Afr. 9: 111 (1917).
Syn. *Andropogon sorghum* (L.) Brot. subsp. *halepense* (L.) Hack. var. *virgatum* Hack. in DC., Monogr. Phan. 6: 504 (1889).

Annual to 1 m, slender; panicle 15-60 cm, scanty, narrow, the branches ultimately bearing racemes of 3-7 spikelet-pairs; sessile spikelet narrowly lanceolate, 6.5-7 mm, thinly hairy to almost glabrous; lower glume coriaceous below, chartaceous above, 2-keeled from the middle upwards, the keels spinously ciliate; upper lemma 2-lobed with an awn 0.8-1.6 cm from the sinus; pedicellate spikelet 6-7 mm, male.

N, O, M, De, S; damp sandy soils and margins of cultivation. West tropical Africa (Mauritania, Senegal, Niger, Chad) eastwards to Egypt and Sudan; distribution imperfectly known due to confusion with *S. arundinaceum*.

NOTE: In Flora of Tropical East Africa and Flora of Ethiopia, *Sorghum virgatum* is not considered distinct from *Sorghum arundinaceum*, and Doggett (*Sorghum*, 1970) considered it to be a hybrid between *S. arundinaceum* and *S. halepense*. It looks distinct enough in Egypt, with its scanty, narrow panicle, but there are plants that are less obviously different from *S. arundinaceum*. It is certainly the commonest wild sorghum in Egypt but may be no more than a local ecotype. For the present, however, the taxonomy is left alone and the element is retained as a species. There are numerous syntypes from Egypt (and elsewhere), including from Damietta (Ehrenberg), Alexandria (Wichura), Thebes (Unger) and Suez (Kotschy 882).

99. **Chrysopogon** Trin., nom. conserv.
Syn. *Vetiveria* Bory

Tufted perennials; ligule a short membrane or a line of hairs; leaf-blades linear, often harsh and glaucous; inflorescence a terminal panicle with whorls of slender branches bearing terminal racemes; racemes often reduced to a triad of 1 sessile and 2 pedicellate spikelets with linear pedicels, but sometimes with (2)3-10 spikelets-pairs below the terminal triad; sessile spikelet ± laterally compressed; callus elongated, obtuse to pungent, often large and conical; lower glume chartaceous to cartilaginous, rounded on the back, sometimes spinulose on the margins; upper glume often awned; lower floret barren and reduced to a hyaline lemma; upper lemma hyaline, entire or 2-dentate at the tip, with a glabrous or pubescent awn; caryopsis narrowly ellipsoid; pedicellate spikelets

well developed, male or barren, narrowly lanceolate, awned or awnless. About 36 species, tropical and warm temperate regions of the Old World.

NOTE: The distinction between *Chrysopogon* (raceme reduced to a triad) and *Vetiveria* (raceme with up to 10 spikelet-pairs) has now been abandoned because of an inconvenient number of intermediates ('*Chrysopogon*' with short racemes) especially in Australia.

1. Raceme reduced to a triad of 1 sessile and 2 pedicellate spikelets — 1. **C. plumulosus**
\+ Raceme composed of numerous spikelet-pairs in addition to the terminal triad — 2. **C. zizanioides**

1. **Chrysopogon plumulosus** Hochst., Jahresh. Vereins Vaterl. Naturk. Württemberg 3: 62 (1847).
Syns. *Chrysopogon quinqueplumis* Hochst. ex A. Rich., Tent. Fl. Abyss. 2: 450 (1850).
Andropogon quinqueplumis (Hochst. ex A. Rich.) Steud., Syn. Pl. Glumac. 1: 398 (1854).
Andropogon aucheri Boiss. var. *quinqueplumis* (Hochst. ex A. Rich.) Hack. in DC., Monogr. Phan. 6: 561 (1889).
Chrysopogon aucheri (Boiss.) Stapf var. *quinqueplumis* (Hochst. ex A. Rich.) Stapf, Bull. Misc. Inform., Kew 1907: 21 (1907).

Perennial to 90 cm; culms wiry; leaves cauline or sometimes forming a compact cushion, glaucous, glabrous to densely puberulent, with or without tubercle-based hairs; basal sheaths laterally compressed or not; panicle 3-7 cm, ovate in outline; sessile spikelet 4-6 mm, narrowly oblong; callus obliquely attached to the internode; upper glume with a plumose awn 0.7-1.5 cm; upper lemma with a puberulent awn 2-3 cm; pedicellate spikelets 4-7 mm, the lower glume, and often also the upper, with a plumose awn to 1.5 cm, sometimes glabrous at the tip; pedicels $^1/_3$-$^1/_2$ the length of the sessile spikelet.

GE; rocky ground. Southeast Egypt, Sudan, Eritrea, Ethiopia, Somalia, Kenya, Tanzania, Arabia.

2. **Chrysopogon zizanioides** (L.) Roberty, Bull. Inst. Franç. Afr. Noire, sér. A, 22: 106 (1960).
Syns. *Phalaris zizanioides* L., Mant. Alt. 183 (1771).
Andropogon muricatus Retz., Observ. Bot. 3: 43 (1783).
Anatherum muricatum (Retz.) P. Beauv., Ess. Agrostogr. 150, t. 22, 10 (1812).
Vetiveria muricata (Retz.) Griseb., Fl. Brit. West Indies 560 (1864).
Vetiveria zizanioides (L.) Nash in Small, Fl. South East U.S. 67 (1903).

Tufted perennial to 2 m; panicle oblong in outline, usually contracted, 13-30 cm, its longest racemes up to 5(7.5) cm long and bearing up to 10 spikelet-pairs; sessile spikelet 3.5-5 mm; callus rounded at the tip to fit the slightly hollowed apex of the internode; lower glume spinulose; upper glume awnless; upper lemma awnless or shortly mucronate.

N; cultivated grass (Vetiver) grown for the aromatic oils derived from the roots. Native to Pakistan, India, Nepal, Myanmar and Sri Lanka to southeast Asia, cultivated in

tropical Africa and introduced in the West Indies.

NOTE: *Chrysopogon zizanioides*, Vetiver, is principally grown for its aromatic oils, but is also useful for stabilising the soil on steep slopes when planted in quantity along the contours and creating terraces.

100. **Dichanthium** Willemet
Syn. *Eremopogon* Stapf

Annual or perennial; leaves sometimes aromatic; ligule membranous; inflorescence terminal or sometimes also axillary, of single or subdigitate racemes, these sometimes pedunculate, with or without homogamous pairs at the base; internodes and pedicels linear; sessile spikelet dorsally compressed; callus very short, obtuse; lower glume chartaceous to cartilaginous, broadly convex to slightly concave on the back, abruptly rounded on the flanks, with or without a circular pit; upper lemma stipitiform, entire or rarely minutely 2-dentate at the tip, with a glabrous or puberulent awn; caryopsis oblong in outline, dorsally compressed; pedicellate spikelet similar to the sessile, rarely herbaceous. About 20 species, Old World tropics.

1. Raceme solitary; lower glume of sessile spikelet pitted — 1. **D. foveolatum**
\+ Racemes subdigitate (rarely solitary); lower glume of sessile spikelet not pitted — 2. **D. annulatum**

1. **Dichanthium foveolatum** (Delile) Roberty, Boissiera 9: 170 (1960).
Syns. *Andropogon foveolatus* Delile, Descr. Égypte, Hist. Nat. 16, t. 8, 2 (1814).
Andropogon strictus Roxb., Fl. Ind., ed. 2, 1: 250 (1832).
Eremopogon foveolatus (Delile) Stapf in Prain, Fl. Trop. Afr. 9: 183 (1917).
Eremopogon strictus (Roxb.) A. Camus, Ann. Soc. Linn. Lyon, n.s. 68: 208 (1921).

Tufted perennial with silky-hairy basal leaf-sheaths and bearded culm-nodes; culms to 80 cm, wiry; inflorescence of solitary racemes, each subtended by a narrow spatheole, these terminal and axillary and loosely aggregated; raceme 1.5-4.5 cm, with 0-1 homogamous pairs at the base; sessile spikelet 2.5-4 mm, narrowly elliptic; callus-hairs 2-2.5 mm, conspicuous; lower glume cartilaginous, glabrous, shining, with a circular pit in the upper third, acute; upper lemma with an awn 1.2-1.8 cm; pedicellate spikelet as long as the sessile, with or without a pit.

N, D, R, GE, S; sandy and stony deserts. Mali, Mauritania, North Africa, Sinai, Arabia, Iran, Pakistan, India, Sri Lanka, Eritrea, Ethiopia, Somalia, Kenya, Tanzania.

NOTE: The type of *Andropogon foveolatus* was collected in Egypt by Delile (?isotype K).

2. **Dichanthium annulatum** (Forssk.) Stapf in Prain, Fl. Trop. Afr. 9: 178 (1917).
Syns. *Andropogon annulatus* Forssk., Fl. Aegypt.-Arab. 173 (1775).
Andropogon comosus Link, Hort. Berol. 1: 239 (1827), non Spreng. (1819).

Tufted perennial with conspicuously bearded culm-nodes, to 1 m; inflorescence of (1)2-15 subdigitate, shortly pedunculate racemes, the peduncles glabrous; racemes 3-7 cm, the spikelets subimbricate, with 0-6 smaller homogamous pairs at the base; sessile

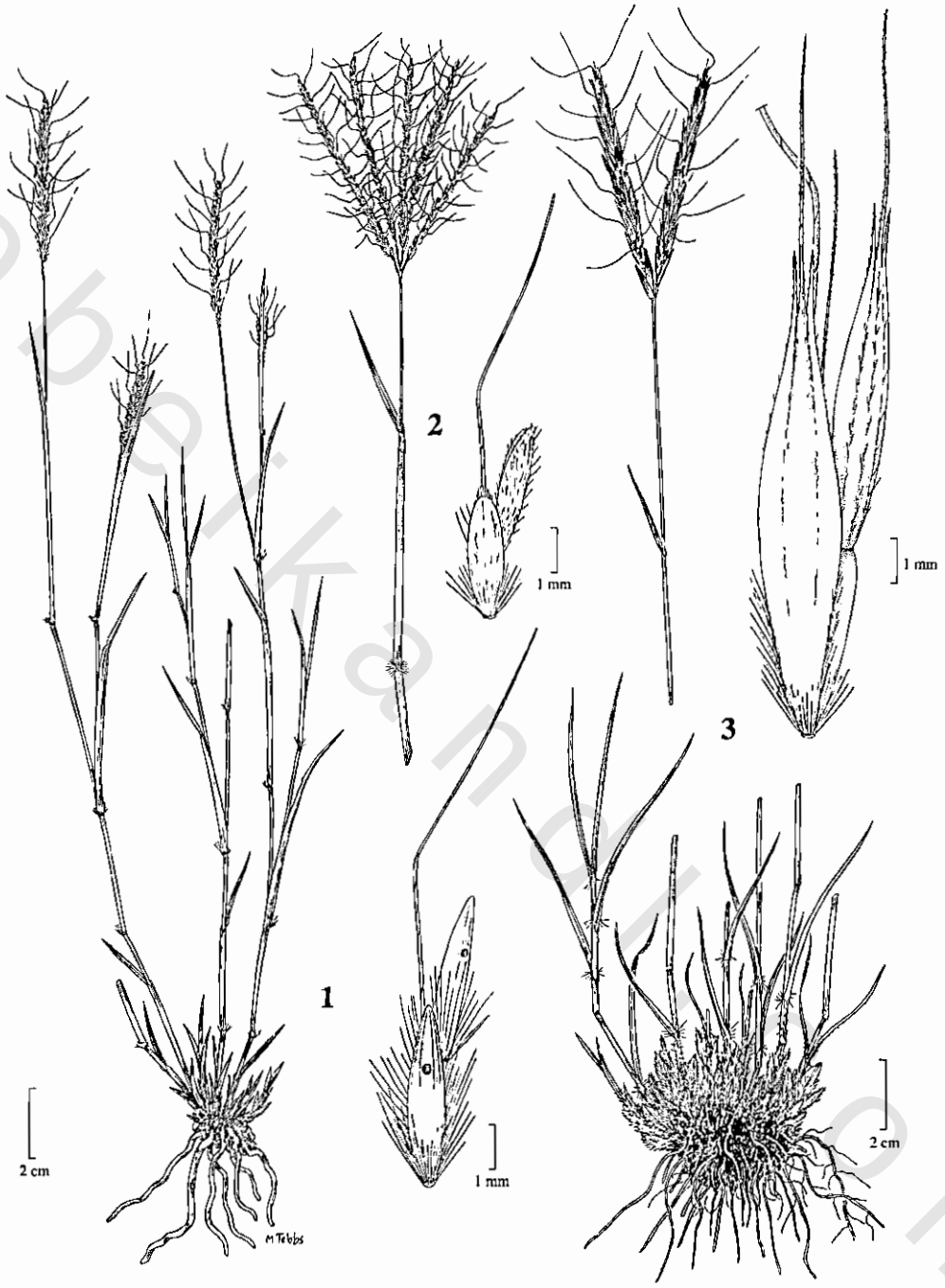


Plate 98. GRAMINEAE: *Dichanthium foveolatum* 1, habit; pair of spikelets (down right). *Dichanthium annulatum* 2, inflorescence; pair of spikelets (right). *Andropogon distachyos* 3, lower part and separate inflorescence; pair of spikelets (up right). Drawn by Margaret Tebbs.

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spikelet 2-6 mm, narrowly oblong; lower glume firmly cartilaginous, without a pit, slightly concave, pubescent to villous below, with tubercle-based hairs on the margins above, obtuse to subacute; upper lemma with an awn 0.8-2.5 cm; pedicellate spikelet as long as the sessile, without a pit.

N, O, M, De, S; canal banks, deep black soils and cultivated land. Senegal eastwards to India and Indonesia, introduced in southern Africa, tropical America and Australia.

NOTE: The type of *Andropogon annulatus* was collected at Rashid (Rosetta), Egypt, in 1762 by Forsskål (no. 127, holotype C). One of the original sheets of *A. comosus* was also collected in Egypt (?syntype K).

101. **Andropogon** L.

Annual or perennial; leaves not aromatic; ligule membranous or a line of hairs; inflorescence of paired or digitate (rarely solitary) racemes, terminal or axillary, the latter often numerous and crowded into a leafy false panicle; raceme-bases terete, rarely deflexed at maturity; racemes without homogamous pairs at the base (or these present but scarcely differentiated); internodes and pedicels filiform to obovoid; sessile spikelet dorsally or laterally compressed; callus obtuse, inserted in the concave tip of the internode; lower glume membranous to coriaceous, flat to concave or deeply grooved on the back, 2-keeled, the keels lateral or dorsal, sometimes narrowly winged; lower floret barren, reduced to a hyaline lemma; upper lemma hyaline, 2-lobed, awned in the sinus (rarely entire and awnless); caryopsis narrowly lanceolate to oblong in outline, subterete to plano-convex; pedicellate spikelet male or barren, rarely suppressed, never concave on the back, usually awnless. About 100 species, throughout the tropics.

1. **Andropogon distachyos** L., Sp. Pl., ed. 1, 1046 (1753).
Syn. *Pollinia distachya* (L.) Spreng., Pl. Min. Cogn. Pug. 2: 12 (1815).

Tufted perennial to 1 m; basal leaf-sheaths silky-pubescent below; racemes paired, terminal, 4-14 cm; internodes and pedicels shortly linear to slightly clavate, ciliate; sessile spikelet, including the callus, 0.8-1.6 cm; lower glume slightly convex to slightly concave on the back, herbaceous to thinly coriaceous, glabrous to pubescent; keels lateral, winged for $^1/_2$-$^2/_3$ their length, the membranous wings confluent to a caudate, asymmetrically 2-toothed tip; upper glume with an awn 0.4-1 cm; upper lemma 2-lobed to halfway, with an awn 1.5-3 cm; pedicellate spikelet 0.6-1.1 cm; lower glume lanceolate, herbaceous, 2-dentate, with a slender bristle 3-9 mm.

S; stony hillsides. Tropical and South Africa, coasts of the Mediterranean, Sinai, Arabia, Thailand.

102. **Cymbopogon** Spreng.

Robust perennials, rarely annual; leaves usually aromatic; ligule membranous or scarious; inflorescence of short paired racemes borne on a short common peduncle and ± enclosed by a boat-shaped spatheole, these crowded into a leafy false panicle; raceme-bases short, flattened, usually deflexed, the lower bearing a homogamous pair at the base; internodes linear, sometimes the pedicel of the homogamous pair swollen and ± fused to the internode; sessile spikelet dorsally compressed; callus obtuse, inserted in the concave tip of the internode; lower glume ± chartaceous, mostly concave, 2-keeled, the

keels usually lateral and winged near the tip, with or without intercarinal nerves; lower floret barren, reduced to a hyaline lemma; upper lemma hyaline or stipitiform, 2-lobed or rarely entire, with or without an awn from the sinus; caryopsis oblong in outline, subterete to plano-convex; pedicellate spikelet male or barren, about as long as the sessile but never concave on the back, awnless. About 40 species, Old World tropics and subtropics, introduced to tropical America.

1. Leaf-blades rounded to cordate at the base;
lower glume of sessile spikelet with a deep median groove from the middle downwards, corresponding to a keel on the inside — 3. **C. martinii**
\+ Leaf-blades narrow or attenuate at the base;
lower glume of sessile spikelet flat or concave on the back — 2

2. Lower glume of sessile spikelet flat on the back but often dimpled below, the keels narrowly winged — 3
\+ Lower glume of sessile spikelet concave on the back, the keels wingless — 5

3. Sessile spikelet awnless — 5. **C. citratus**
\+ Sessile spikelet awned — 4

4. Lower glume of sessile spikelet narrowly lanceolate, usually nerveless between the keels — 6. **C. flexuosus**
\+ Lower glume of sessile spikelet elliptic-lanceolate, usually 2- to 3-nerved between the keels — 4. **C. nardus**

5. Lowermost pedicel swollen and barrel-shaped — 1. **C. schoenanthus**
\+ Lowermost pedicel slender, not swollen — 2. **C. jwarancusa**

1. **Cymbopogon schoenanthus** (L.) Spreng., Pl. Min. Cogn. Pug. 2: 14 (1815).
Syn. *Andropogon schoenanthus* L., Sp. Pl., ed. 1, 1046 (1753).

Tufted perennial to 1.2 m; leaf-blades attenuate at the base; false panicle 5-40 cm, narrowly oblong in outline, loose or dense; racemes 1-3 cm, woolly-villous with hairs 2-4 mm, the lowermost pedicel swollen, its adjacent internode very short; sessile spikelet 4-7 mm, narrowly lanceolate; lower glume chartaceous, glabrous to pubescent on the back, nerveless and concave between the keels, these sharply inflexed throughout and wingless; awn of upper lemma 5-9 mm, almost straight, scarcely differentiated into column and limb; pedicellate spikelet 4-7 mm, narrowly lanceolate.

Represented by 2 subspecies, separated by the Sahara, which converge in Egypt:

subsp. **schoenanthus**
Syns. *Andropogon laniger* Desf., Fl. Atlant. 2: 379 (1799).
Andropogon circinnatus Hochst. & Steud. in Steud., Syn. Pl. Glumac. 1: 387 (1854).
Andropogon jwarancusa Jones subsp. *laniger* (Desf.) Hook.f., Fl. Brit. Ind. 7: 203 (1896).
Cymbopogon circinnatus (Hochst. & Steud.) Hochst. ex Hack. in DC., Monogr. Phan. 6: 599 (1889).

Inflorescence loose with racemes 2-3 cm; spatheole 2.3-3 cm; lower glume of sessile spikelet glabrous.

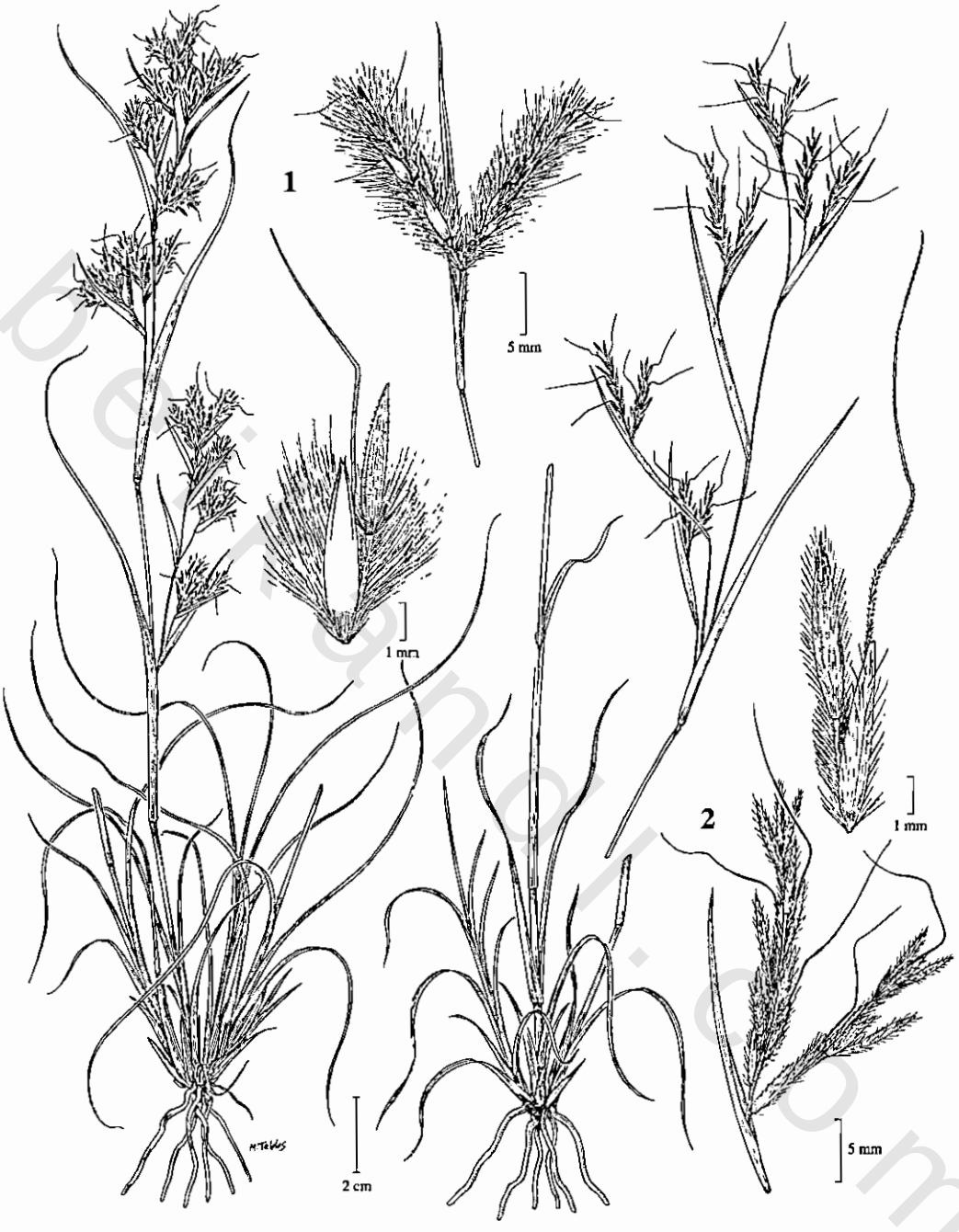


Plate 99. GRAMINEAE: *Cymbopogon schoenanthus* 1, habit; pair of racemes (up right); spikelet pair (middle right). *Hyparrhenia hirta* 2, lower part and inflorescence; pair of racemes (down right); spikelet pair (middle right). Drawn by Margaret Tebbs.

S; sandy soils. Sinai, Africa north of the Sahara (Morocco, Algeria), Somalia, Djibouti, Arabia.

subsp. **proximus** (Hochst. ex A. Rich.) Maire & Weiller, Fl. Afr. Nord 1: 287 (1952).
Syns. *Andropogon sennarensis* Hochst., Flora 27: 243 (1844).
Andropogon proximus Hochst. ex A. Rich., Tent. Fl. Abyss. 2: 464 (1850).
Andropogon jwarancusa Jones var. *sennarensis* (Hochst.) Hack. in DC., Monogr. Phan. 6: 600 (1889).
Andropogon jwarancusa Jones var. *proximus* (Hochst. ex A. Rich.) Hack. in DC., Monogr. Phan. 6: 601 (1889).
Cymbopogon sennarensis (Hochst.) Chiov., Int. Alc. Gram. Essenze Col. Eritrea 16 (1909).
Cymbopogon sennarensis (Hochst.) Chiov. var. *proximus* (Hochst. ex A. Rich.) Chiov., Int. Alc. Gram. Essenze Col. Eritrea 16 (1909).
Cymbopogon proximus (Hochst. ex A. Rich.) Stapf in Prain, Fl. Trop. Afr. 9: 271 (1919).

Inflorescence dense with racemes 1-2 cm; spatheole 1.3-2 cm; lower glume of sessile spikelet pubescent on the back.

De, S; sandy soils and rocky slopes. Egypt, Africa south of the Sahara from Mauritania to Ethiopia and Kenya.

2. **Cymbopogon jwarancusa** (Jones) Schult., Mant. 2: 458 (1824).
Syn. *Andropogon jwarancusa* Jones, Asiat. Res. 4: 109 (1775).

Tufted perennial to 1.5 m; leaf-blades attenuate at the base; false panicle 15-40 cm; racemes 1.3-2.2 cm, the lowermost pedicel not swollen, free from the adjacent internode; sessile spikelet 4.5-5.5 mm, lanceolate; lower glume chartaceous, shallowly concave on the back, the keels sharply inflexed throughout and wingless; awn of upper lemma 0.7-1 cm, with distinct column and limb; pedicellate spikelet *c.* 6 mm.

N; cultivated as a condiment and for medicinal purposes. Native to Arabia, Iraq, Iran, Afghanistan, Pakistan, India.

3. **Cymbopogon martinii** (Roxb.) Watson in Atkins., Gaz. NW. India 392 (1882).
Syns. *Andropogon martinii* Roxb., Fl. Ind. 1: 280 (1820).
Andropogon schoenanthus L. var. *martinii* (Roxb.) Hook.f., Fl. Brit. Ind. 7: 204 (1896).

Tufted perennial to 3 m; leaf-blades cordate at the base and often amplexicaul; false panicle to 30 cm; racemes 1.5-2 cm, the lowermost pedicel swollen and barrel-shaped; internodes and pedicels densely ciliate along the margins, sparsely pilose on the back; sessile spikelet 4-4.5 mm, elliptic-oblong or oblong; lower glume flat on the back in the upper half and with a deep V-shaped groove in the lower (this corresponding to a prominent keel on the inside), keels winged above; upper lemma deeply bifid, with an awn 1.2-1.8 cm; pedicellate spikelet *c.* 4 mm.

N, O; cultivated for its aromatic oil (Palmerosa oil). Native to India and Pakistan, cultivated throughout the tropics for Palmerosa and Ginger-grass oils.

4. **Cymbopogon nardus** (L.) Rendle in Hiern *et al.*, Cat. Afr. Pl. 2: 155 (1899).
Syns. *Andropogon nardus* L., Sp. Pl., ed. 1, 1046 (1753).
Andropogon confertiflorus Steud., Syn. Pl. Glumac. 1: 385 (1854).
Cymbopogon confertiflorus (Steud.) Stapf, Bull. Misc. Inform., Kew 1906: 355 (1906).
Cymbopogon afronardus Stapf in Prain, Fl. Trop. Afr. 9: 279 (1919).

Tufted perennial to 3 m; leaf-blades attenuate at the base; false panicle 15-60 cm, dense, ± interrupted; racemes 10-20 cm, the lowermost pedicel not swollen, free from the adjacent internode; sessile spikelet (3)3.5-7 mm, elliptic-lanceolate; lower glume subchartaceous with 0-4 intercarinal nerves and sometimes with 1-3 dimples in the lower half, slightly convex to shallowly concave between the keels, these sharp and becoming winged in the upper half; upper lemma 2-fid to almost halfway, the awn 0.5-1.5 cm (in African material; absent in material originating from Asia); pedicellate spikelet 3.5-6 mm.

N; cultivated for its aromatic oil (Citronella). Native to eastern Africa from Sudan to South Africa, extending through southern India and Sri Lanka to Myanmar.

5. **Cymbopogon citratus** (DC.) Stapf, Bull. Misc. Inform., Kew 1906: 357 (1906).
Syn. *Andropogon citratus* DC., Cat. Pl. Horti Monsp. 78 (1813).

Tufted perennial to 2 m; leaf-blades attenuate at the base; false panicle to 30 cm; racemes 1.5-1.7 cm, the lowest pedicel not swollen, free from the adjacent internode; internodes and pedicels pilose along the margins and on the back; sessile spikelet *c.* 6 mm, lanceolate; lower glume flat on the back or slightly concave in the lower half, nerveless between the keels, these narrowly winged above; upper lemma awnless; pedicellate spikelet *c.* 4.5 mm.

N; cultivated for its aromatic oil (Lemon-grass oil). Cultivated grass of unknown wild origin, widely grown in the tropics.

NOTE: *Cymbopogon citratus* rarely flowers but can be recognized by the strong smell of lemon issuing from the bruised foliage.

6. **Cymbopogon flexuosus** (Nees ex Steud.) Watson in Atkins., Gaz. NW India 392 (1882).
Syn. *Andropogon flexuosus* Nees ex Steud., Syn. Pl. Glumac. 1: 388 (1854).

Tufted perennial to 2.5 m; leaf-blades attenuate at the base; false panicle to 60 cm, broad and decompound; racemes 1.5-1.7 cm, the lowest pedicel not swollen, free from the adjacent internode; internodes and pedicels pilose on the margins, glabrous on the back; sessile spikelet *c.* 4.5 mm, narrowly lanceolate; lower glume subchartaceous, with 0-1 intercarinal nerves, the keels narrowly winged above; upper lemma with an awn 1-1.1 cm; pedicellate spikelet *c.* 4 mm.

N; cultivated for its aromatic oil (Oil of Malabar). Native to India, cultivated in the tropics and naturalized in Indonesia.

103. **Hyparrhenia** E. Fourn.

Annual or perennial; leaves never aromatic; ligule scarious; inflorescence of paired racemes, each pair supported on a peduncle and subtended by a sheathing spatheole, these crowded into a large leafy false panicle; racemes short, slender, each borne upon a short raceme-base which is often deflexed at maturity, and with up to 2 homogamous pairs, these male or barren, awnless and tardily deciduous; internodes and pedicels linear; sessile spikelet narrowly lanceolate to lanceolate-oblong, dorsally compressed or terete; callus obtuse to pungent, applied obliquely to the top of the internode with its tip free; lower glume coriaceous, broadly convex across the back and sides, without keels or these developed only in the upper third; upper glume awnless; lower floret reduced to a hyaline lemma; upper lemma stipitiform, 2-dentate, passing between the teeth into a stout awn; caryopsis oblong in outline, subterete; pedicellate spikelet male or barren, narrowly lanceolate, usually a little longer than the sessile, awnless or aristulate from the lower glume. 55 species, mainly Africa, a few species extending to other tropical regions, 1 Mediterranean region.

1. **Hyparrhenia hirta** (L.) Stapf in Prain, Fl. Trop. Afr. 9: 315 (1918).
Syn. *Andropogon hirtus* L., Sp. Pl., ed. 1, 1046 (1753).

Tufted, shortly rhizomatous perennial to 0.6(1) m; false panicle to 30 cm, typically scanty; spatheoles 3-8 cm, linear-lanceolate; peduncle about as long as the spatheole, with or without spreading white hairs above; racemes 2-4 cm, never deflexed, 8- to 13 (16)-awned per pair, villous with white hairs; raceme-bases unequal, the upper 2.5-5 mm, filiform; homogamous pairs 1 at the base of the lower or both racemes; sessile spikelet 4-6.5 mm, villous; awn 1-3.5 cm; pedicellate spikelet 3-7 mm, white-villous, the pedicel with a subulate tooth 0.2-1 mm.

N, M, De, R, GE, S; desert wadis, sandy soils, rocky slopes. Mediterranean region, Sinai, eastwards to Pakistan and southwards to South Africa, but absent from much of tropical Africa.

104. **Themeda** Forssk.

Annual or perennial; ligule membranous; inflorescence composed of solitary racemes embraced by sheathing spatheoles, these mostly in fan-shaped bunches on flexuous peduncles and gathered into a leafy false panicle; racemes comprising 2 homogamous pairs forming an involucre, and 1-4 sessile spikelets with their pedicellate attendants; internodes linear; homogamous spikelets all sessile, persistent; sessile spikelet subterete or dorsally compressed; callus obtuse to pungent; lower glume coriaceous, obtuse; lower floret reduced to a hyaline lemma; upper lemma stipitiform and passing directly into the pubescent awn, rarely hyaline and awnless; caryopsis lanceolate in outline, channelled on one side; pedicellate spikelet male or barren, narrowly lanceolate, awnless, with a long slender callus as long as or longer than the true pedicel (this often reduced to a minute stump). 18 species, tropics and subtropics of the Old World, mainly in Asia.

1. Sessile spikelet 1, glabrous except for the pubescent tip, with an awn 2.5-7 cm — 1. **T. triandra**
+ Sessile spikelets 2-4, rufously pubescent, awnless or with an awn to 1 cm — 2. **T. villosa**

1. **Themeda triandra** Forssk., Fl. Aegypt.-Arab. 178 (1775).
Syns. *Anthistiria imberbis* Retz., Observ. Bot. 3: 11 (1783).

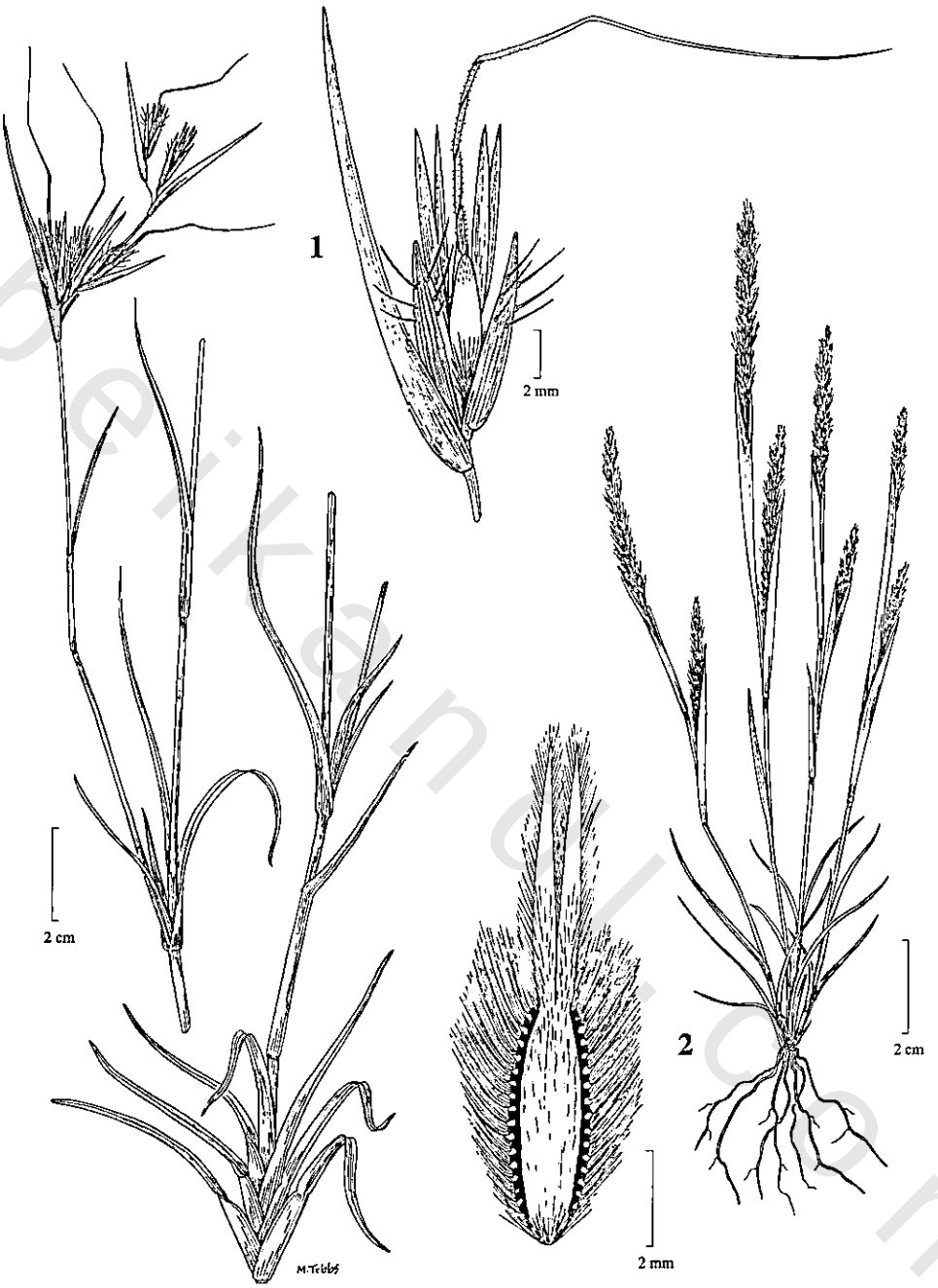


Plate 100. GRAMINEAE: *Themeda triandra* 1, lower part and inflorescence; raceme (up right). *Elionurus royleanus* 2, habit; glume of sessile spikelet (down left). Drawn by Margaret Tebbs.

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Anthistiria glauca Desf., Fl. Atlant. 2: 380, t. 254 (1799).
Themeda forsskaolii Hack. in DC., Monogr. Phan. 6: 659 (1889), nom. suprfl., based on *Anthistiria imberbis* Retz.
Themeda triandra Forssk. var. *imberbis* (Retz.) Hack., Proc. Rhodesia Sci. Assoc. 7: 63 (1908).
Themeda triandra Forssk. var. *glauca* (Desf.) Hand.-Mazz., Symb. Sin. 7: 1315 (1936).

Slender tufted perennial to 2 m (but usually much less); false panicle to 30 cm; spatheole 1.5-3.5 cm, glabrous to tuberculate-hairy; raceme with 1 fertile spikelet; involucral spikelets 0.6-1.4 cm, narrowly elliptic, glabrous or tuberculate-hairy; sessile spikelet 0.6-1.1 cm, including the pungent, rufously bearded, 2-4 mm callus; lower glume brown to pallid, smooth except for the appressed-pubescent tip; awn 2.5-7 cm; pedicellate spikelet 0.6-1.4 cm, glabrous to tuberculate-hairy.

N, De; sandy and stony ground. Tropical and subtropical regions of the Old World.

2. **Themeda villosa** (Poir.) A. Camus in Lecomte, Fl. Indo-Chine 7: 364 (1922).
Syn. *Anthistiria villosa* Poir., Encycl. Lam. Suppl. 1: 396 (1814).

Robust tufted perennial to 3 m; false panicle to 60 cm; spatheole 2.5-3.5 cm, glabrous; raceme with 2-4 fertile spikelets; involucral spikelets 0.5-1.3 cm, lanceolate, minutely pubescent, sometimes rufously ciliate on the margins; sessile spikelet 7-8 mm, including the cuneate, rufously bearded, 2 mm callus; lower glume densely and rufously pubescent; awn absent or to 1 cm; pedicellate spikelet 1-1.2 cm, glabrous.

N; once cultivated as an ornamental (e.g. in El Saff in the 1950s), but there are no recent records. Native to India and Nepal, extending northwards to China, southwards to Sri Lanka, and eastwards to Malaysia, Indonesia and the Philippines.

105. **Elionurus** Kunth ex Willd.

Annual or perennial; ligule a short densely ciliate membrane; inflorescence a single raceme, these terminal or sometimes axillary and gathered into a leafy false panicle; racemes flexuous, dorsally flattened; internodes columnar to subclavate; sessile spikelet lanceolate to narrowly ovate; callus often large, applied obliquely to the tip of the internode; lower glume subcoriaceous to herbaceous, broadly convex, smooth or sometimes toothed on the keels, laterally 2-keeled, the keels ciliately fringed and often bordered with an oil-streak, mostly cuspidate to a 2-fid tip; lower floret reduced to a hyaline lemma; upper lemma entire and awnless; caryopsis elliptic in outline, dorsally compressed; pedicelleate spikelet well developed, muticous or aristulate, the pedicel resembling the internode. 15 species, tropical Africa extending to Pakistan and India, tropical America, 1 species in Australia.

1. **Elionurus royleanus** Nees ex A. Rich., Tent. Fl. Abyss. 2: 471 (1850).
Syn. *Andropogon elegantissimus* Steud. var. *arabicus* Steud., Syn. Pl. Glumac. 1: 365 (1854).

Annual to 35 cm, fastigiately branching; racemes 2-6 cm, embraced below by a reddish spathe, gathered into fascicles; internodes bearded towards the top; sessile spikelet lanceolate; callus *c.* 1 mm, obconical; lower glume with body 5-6 mm, glabrous to

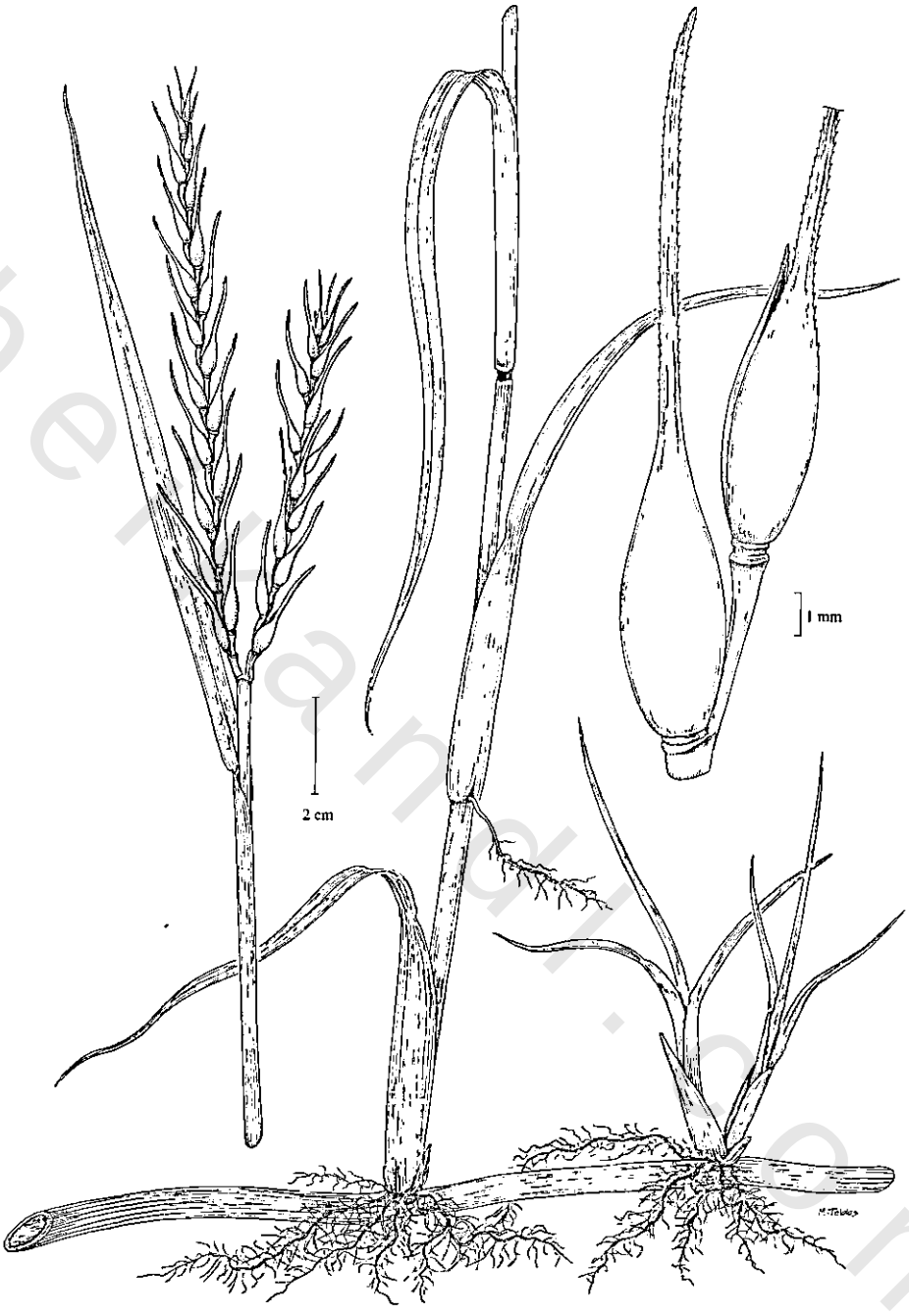


Plate 101. GRAMINEAE: *Vossia cuspidata*, lower part and inflorescence; pair of spikelets (right). Drawn by Margaret Tebbs.

villous on the back, with tufts of long hair arising from blunt teeth along the margins, divided above into 2 flattened tails 4-6 mm; pedicellate spikelet 0.6-2 cm, narrowly lanceolate, caudate-acuminate to a subulate tip.

De, R, GE; rocky ground. Mauritania, eastwards to northwest India.

106. **Vossia** Wall. & Griff., nom. conserv.

Aquatic perennial; ligule a short pilose membrane; inflorescence of terminal, digitate (rarely solitary) racemes; racemes dorsally flattened, tardily breaking up at maturity; internodes thickened, clavate, hollowed at the tip; sessile spikelet flat or slightly convex across the back; callus truncate with irregular central convexity, but no obvious central peg; lower glume coriaceous, 2-keeled, smooth except for the scabrid keels, narrowly winged above and drawn out into a long linear flattened tail; lower floret male, with hyaline lemma and palea; upper lemma entire and awnless; pedicellate spikelet resembling the sessile, the pedicel free. 1 species, Egypt, tropical Africa, India.

1. **Vossia cuspidata** (Roxb.) Griff., Not. Pl. Asiat. 3, Index 12 (1851).
   Syns. *Ischaemum cuspidatum* Roxb., Fl. Ind. 1: 324 (1820).
   Vossia procera Wall. & Griff., J. Asiat. Soc. Bengal 5: 573 (1836), nom. superfl., based on *Ischaemum cuspidatum* Roxb.

Culms submerged or floating, to 7 m and to 1 cm diam., spongy, with fibrous roots from the nodes, emerging 1-2 m out of the water; leaf-blades 30-90 x 0.6-1.8 cm; racemes 1-12, each 10-30 cm; sessile spikelet narrowly ovate; lower glume 2-4 cm, the body 6-8 mm and yellowish, the tail green; pedicellate spikelet a little smaller than the sessile

N; in standing water. Distribution as for the genus.

NOTE: Throughout its range the species flowers infrequently and may be under-recorded. It has never been known to flower in Egypt and its abundance here has only recently been noted; the species had not been included in any Flora or checklist previous to Boulos (1995). There is little by which to identify it except for its habit; it forms dense submerged or floating populations along the banks of the Nile.

107. **Hemarthria** R. Br.

Tufted or stoloniferous perennials; ligule a very short ciliate membrane; inflorescence a single raceme embraced below by the subtending sheath, borne in the upper axils of the culm; racemes tough, dorsally compressed; internodes thickened, clavate, nearly always obliquely articulated, fused to the adjacent pedicel; sessile spikelet dorsally compressed; lower glume rigidly herbaceous, broadly convex, 2-keeled, smooth, indistinctly winged above, obtuse, caudate or 2-fid at the tip; lower floret reduced to a hyaline lemma; upper lemma entire and awnless; caryopsis narrowly obovate in outline, slightly dorsally compressed; pedicellate spikelet similar to the sessile; pedicel flattened, broadly linear. 12 species, Old World tropics and subtropics, possibly also native in America.

1. **Hemarthria altissima** (Poir.) Stapf & C.E. Hubb., Bull. Misc. Inform., Kew 1934: 109 (1934).
   Syn. *Rottboellia altissima* Poir., Voy. Barbarie 2: 105 (1789).

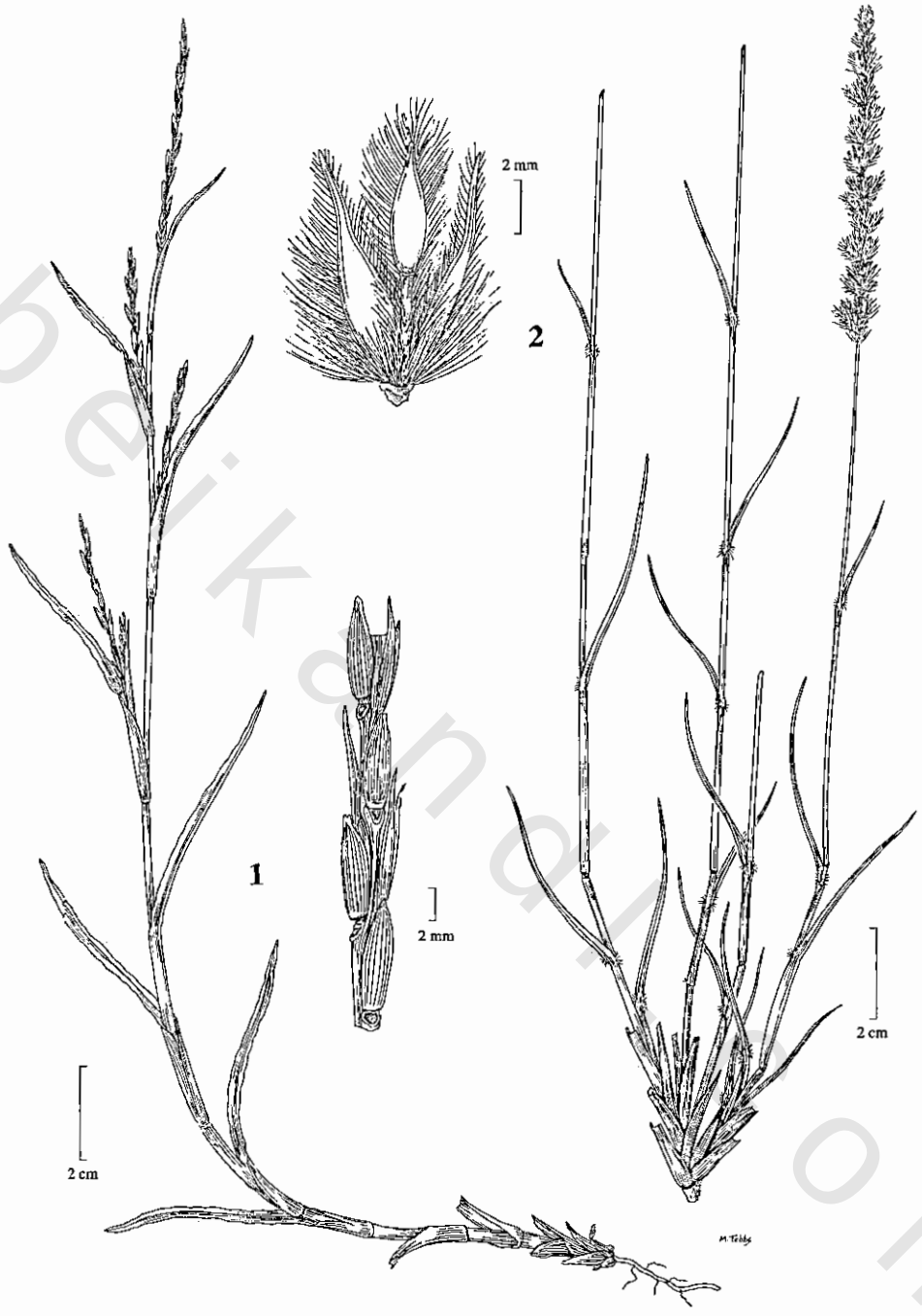


Plate 102. GRAMINEAE: *Hemarthria altissima* 1, habit; part of raceme (middle right). *Lasiurus scindicus* 2, habit; single joint of raceme (up left). Drawn by Margaret Tebbs.

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Stoloniferous perennial; culms to 1 m, prostrate and rooting at the nodes below; racemes 4-10 cm; sessile spikelet elliptic-oblong with a triangular callus; lower glume 4-6 mm, obtuse to emarginate; pedicellate spikelet 4-6 mm, narrowly triangular, truncate at the base and without a callus, subacute to acute.

N, M; irrigation canals, rice fields and other wet places. Tropical Africa, southwards to the Cape, northwards to southern Europe and southwest Asia, also in Madagascar, a few records from Myanmar, Thailand, Borneo.

108. **Lasiurus** Boiss.

Perennial; ligule a line of hairs; inflorescence a single raceme, these terminal and axillary; raceme fragile, dorsally compressed, with 2 sessile and 1 pedicellate spikelet at each node (rarely 1 sessile and 2 pedicelled) or 1 sessile and 1 pedicellate; internodes stoutly clavate; sessile spikelet flat across the back; callus truncate with a central peg; lower glume subcoriaceous, 2-keeled, densely pilose on the back, ciliate on the keels, with a short 2-dentate or entire tail at the tip; lower floret male with hyaline lemma and palea; upper lemma entire and awnless; caryopsis oblong in outline, terete; pedicellate spikelet similar to the sessile or smaller, without a tail; pedicel free, resembling the internode. 1 species, Mali, eastwards through southwest Asia to northwest India.

1. **Lasiurus scindicus** Henrard, Blumea 4: 514 (1941).

Syns. *Saccharum hirsutum* Forssk., Fl. Aegypt.-Arab. 16 (1775), non *Rottboellia hirsuta* Vahl, nec *Lasiurus hirsutus* (Vahl) Boiss.
Triticum aegilopoides Forssk., Fl. Aegypt.-Arab. 26 (1775).
Rottboellia hirsuta Vahl, Symb. Bot. 1: 11 (1790), nom. superfl., based on *Triticum aegilopoides* Forssk.
Lasiurus hirsutus (Vahl) Boiss., Diagn. Pl. Orient. 3(4): 146 (1859), comb. illegit.

Culms often woody below, to 90 cm, simple or suffruticose, erect from a thick woody rhizome covered with firm, imbricate, often silky-hairy cataphylls; racemes to 10 cm, silky-villous from the internodes, pedicels and glumes; sessile spikelet 0.6-1.3 cm; lower glume lanceolate, often caudate, 2-dentate at the tip with divergent teeth, often spreading horizontally at maturity when dry; pedicellate spikelet usually 5-7 mm.

N, M, D, R, GE, S; sandy, stony and rocky soils. Distribution as for the genus.

NOTE: The nomenclatural history of *Lasiurus scindicus* is complex, but has been resolved by Cope (Kew Bull. 35: 451-452 (1980)). Briefly, *Saccharum hirsutum* and *Triticum aegilopoides* are probably the same taxon but are based on different types. All subsequent conbinations with the epithet '*hirsuta*' or equivalent are based on Vahl's *Rottboellia hirsuta* which was itself based, possibly inadvertantly, on *Triticum aegilopoides* and is therefore superfluous and illegitimate. *Saccharum hirsutum* has numerous syntypes, collected in Egypt, near Cairo, by Forsskål in 1761/2 (nos. 48, 1652-1660, all C). *Triticum aegilopoides* also came originally from Egypt (Alexandria), collected by Forsskål, but no type specimen has been found.

109. **Zea** L.

Syn. *Euchlaena* Schrad.

Robust, broad-leaved monoecious annuals (rarely perennial); female inflorescence

axillary, comprising a single raceme wrapped in 1 or more spathes; internodes fragile, swollen, bearing a single sessile spikelet without trace of pairing, distichous (in *Z. mays* the internodes much condensed and fused into a polystichous woody cob with paired spikelets at each node, both sessile); spikelets deeply sunk and almost enclosed by the internode, the callus obliquely truncate, flat (shallowly inserted on the surface of the cob in *Z. mays*, with short chaffy glumes exposing the grain); lower glume crustaceous, smooth, obscurely winged at the tip; lower floret barren; style single, very long, silky, pendulous from the inflorescence-tip; male inflorescence terminal, of digitate or paniculate racemes; internodes tough, narrow, bearing paired spikelets, one of them on a slender free pedicel; glumes chartaceous; both florets male. 4 species, Central America.

1. Female spikelets solitary, embedded in the hardened rhachis of a single raceme, this disarticulating at maturity 1. **Z. mexicana**
+ Female spikelets paired, gathered together in many rows on a thick woody cob, not disarticulating 2. **Z. mays**

1. **Zea mexicana** (Schrad.) Reeves & Mangelsd., Amer. J. Bot. 29: 817 (1942).
Syns. *Euchlaena mexicana* Schrad., Ind. Sem. Hort. Gott. (1833); Linnaea 8 (Litt.): 25 (1834).
Zea mays L. subsp. *mexicana* (Schrad.) Iltis, Phytologia 23: 249 (1972).

Robust annual with stilt-roots, to 2(3) m; leaf-blades 30-65 x 2.5-3.5 cm; female inflorescence comprising several racemes each wrapped in a sheath and several together enclosed by further sheaths; racemes 5-8 cm with 9-12 spikelets in a single row, embedded in the hardened axis, this disarticulating at maturity; spikelets solitary; male inflorescence (10)15-25 cm, comprising up to 20 paniculate racemes.

N; cultivated cereal (Teosinte). Originally from Mexico.

2. **Zea mays** L., Sp. Pl., ed. 1, 971 (1753).

Robust annual to 3(5) m; leaf-blades 50-90 x 3-12 cm; female inflorescence comprising 1-3(5) solitary, axillary racemes each enclosed by several sheaths; racemes to 30 cm, with numerous spikelets in 8-16(30) rows on a thickened cob, not disarticulating at maturity; spikelets paired; male inflorescence 15-25 cm, comprising numerous spreading paniculate racemes.

N; cultivated cereal (Maize, Corn). Originally from Central America, now cultivated throughout the tropics and subtropics, also grown for fodder in temperate regions.

NOTE: A naturally occurring hybrid between these two species of *Zea* was collected on Plant (Sirdar) Island, Aswan in 1927.

110. **Coix** L.

Monoecious annual or perennial; inflorescence axillary, compound, comprising 2 racemes separated by a prophyll, the one sessile and female, the other pedunculate and male, subtended by a globose or elongated bony utricle derived from a modified leaf-sheath; female raceme enclosed within the utricle, comprising 1 sessile spikelet and 2 pedicels; male raceme projecting from the mouth of the utricle, the spikelets in pairs or 3s and the pedicels free. About 5 species, tropical Asia.

1. **Coix lacryma-jobi** L., Sp. Pl., ed. 1, 972 (1753).

Coarse annual to 3 m; leaf-blades 10-45 x 2-5 cm, cordate at the base; utricles 0.5-1.5 cm, typically globose-ovoid, bony, shining, white or bluish; male raceme 3-5 cm, the spikelets 7-8 mm.

N; native to tropical Asia, cultivated throughout the tropics.

NOTE: *Coix lacryma-jobi*, Job's-tears, is grown for the bony utricles which can be used as beads, or for its ornamental value; the leaves and culms are also useful as fodder.

CYPERACEAE

Ihsan El-Habashy & L. Boulos (*Cyperus* and *Pycreus*)
Ilkka Kukkonen & David Simpson (all other genera)
Family editor: David Simpson

Perennials, rarely annuals, caespitose, or rhizome creeping, often stoloniferous, sometimes tuberous or with bulbils; culms mostly scapose and solid, trigonous to triquetrous, glabrous, edges scabrous, or terete, smooth; leaves sheathed, in 3 ranks, mostly basal or near the base, with or without ligules; blades usually glabrous, but apex and margins barbed; blades sometimes reduced; inflorescence unbranched to several times branched, umbel-like or paniculate, of 1-many spikelets; spikelets of 1-many glumes; glumes spirally or distichously arranged, each subtending 1 flower or sterile; flowers bisexual or unisexual, seldom dioecious; flowers with or without a bristle-like perianth; stamens 1-3, rarely more; stigmas 2-3; unisexual flowers with stamens subtended by a glume, and gynoecium in a prophyll (utricle) subtended by a glume; fruit a nutlet, trigonous or biconvex, sometimes winged. 108 genera, 5500 species, cosmopolitan.

Literature: Kükenthal, G. 1909 (repr. 1966). Cyperaceae-Caricoideae, in A. Engler (ed.). Das Pflanzenreich IV.20 (38): 1-821.
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Maire, R. 1957. Cyperaceae, in Maire, R. Flore de l'Afrique du Nord. IV: 1-180. Paris.
Mouterde, P. 1966. Cyperaceae, in Nouvelle flore du Liban et de la Syrie 1: 158-182. Beirut.
Haines, R.W. & Lye, K.A. 1983. The sedges and rushes of East Africa. East African Natural History Society. Nairobi.
Täckholm, V. 1974. Cyperaceae, in Students' Flora of Egypt, ed. 2, 771-790. Publ. Cairo Univ., Beirut.
Erteeb, F.B. & Sherif, A.S. 1985. Cyperaceae, in Jafri, S.M.H. & El-Gadi, A. (eds). Flora of Libya 120: 1-46. Tripoli.
Hooper, S.S. 1985. Cyperaceae, in Townsend, C.C. & Guest, E. (eds). Flora of Iraq 8: 331-406. Baghdad.
Feinbrun-Dothan, N. 1986. Cyperaceae, in Flora Palaestina 4: 346-375. Jerusalem.
El-Habashy, Ihsan E. M. 1988. Taxonomical and chemosystematic studies on *Cyperus* (Cyperaceae) in Egypt. Ph. D. Thesis, Botany Dept., Faculty of Science, Mansoura University.
Mandaville, J.P. 1990. Flora of Eastern Saudi Arabia 388-395. Kegan Paul International Ltd., London.
Boulos, L. 1995. Cyperaceae, in Flora of Egypt Checklist 210-214. Al-Hadara Publishing, Cairo. (*Cyperus* & *Pycreus* by Ihsan El-Habashy).
Kukkonen, I. 1998. Cyperaceae, in Rechinger, K.H. (ed.). Flora Iranica 173: 1-307. Graz.
Kukkonen, I. 2001. Cyperaceae, in Ali, S.I. & Qaiser, M. (eds). Flora of Pakistan 206: 1-277. Karachi.

1.	All flowers unisexual	12. **Carex**
+	At least some flowers bisexual	2
2.	Leaves reduced to basal sheaths (in submerged plants blades often elongate)	3
+	At least some basal leaves with blades	5
3.	Inflorescence a single spikelet	5. **Eleocharis**
+	Inflorescence of 2-many spikelets	4
4.	Glumes in spikelets distichously arranged	8. **Cyperus**
+	Glumes spirally arranged	2. **Schoenoplectus**
5.	Culm leafy with several elongate internodes; glumes truncate, hairy, scarious, metallic grey; perianth bristles absent	7. **Fuirena**
+	Culm with 1 much elongate internode; leaves basal; glumes not as above; perianth bristles present or absent	6
6.	Spikelets congested into pseudolateral spherical heads	3. **Scirpoides**
+	Spikelets not in pseudolateral spherical heads, or if present then the heads terminal	7
7.	Style-base enlarged, caducous	6. **Fimbristylis**
+	Style-base not enlarged, persistent	8
8.	Perianth bristles present	1. **Bolboschoenus**
+	Perianth bristles absent	9
9.	Glumes spirally arranged	4. **Isolepis**
+	Glumes distichous	10
10.	Nutlets with flat face towards spike axis	8. **Cyperus**
+	Nutlets with edge facing spike axis	11
11.	Inflorescence capitate or umbel-like; spikelets with more than (8-)10 glumes	9. **Pycreus**
+	Inflorescence capitate or paniculate; spikelets with less than 8 glumes	12
12.	Inflorescence of 1 capitate group of spikelets	10. **Schoenus**
+	Inflorescence of several groups of spikelets at culm nodes	11. **Cladium**

1. **Bolboschoenus** (Asch.) Palla

Literature: Browning, J.B.M. 1998. A contribution to the taxonomy of *Bolboschoenus* (Cyperaceae), with particular reference to fruit morphology and the African species. Diss., Univ. Natal 1: 1-254, 2: 1-176.

Perennials; rhizome creeping, sturdy, producing tubers; culms trigonous to triquetrous, smooth or scabrous along edges; leaves basal, up to equalling the culm; leaf-sheath soft; ligule 0; blade keeled, scabrous; inflorescence branched paniculate or sometimes umbel-like or capitate; bracts much exceeding the inflorescence; flowers bisexual, perianth bristles 4-7, unequal; stamens 3; stigmas 2-3; nutlet trigonous or biconvex. About 16 species, all continents except South America.

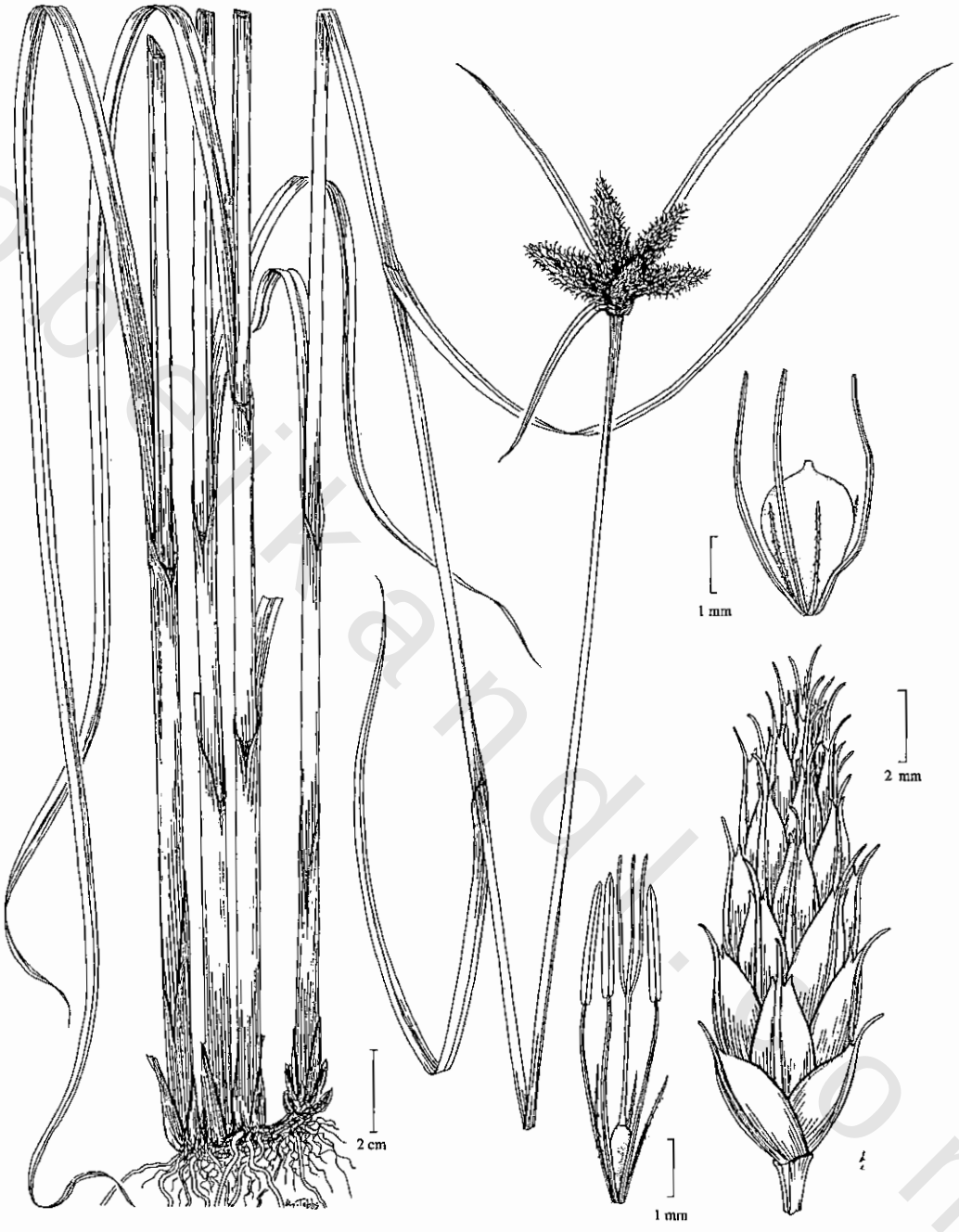


Plate 103. CYPERACEAE: *Bolboschoenus glaucus* habit; flower (down right); spikelet (further down right); nutlet (up right). Drawn by Margaret Tebbs.
Courtesy of BSBI.

1. **Bolboschoenus glaucus** (Lam.) S.G. Smith, Novon 5: 101 (1995).
Syns. *Scirpus glaucus* Lam., Tabl. Encycl. 1: 142 (1791).
Scirpus tuberosus Desf., Fl. Atlant. 1: 50 (1798).
Scirpus maritimus L. var. *tuberosus* (Desf.) Roem. & Schult., Syst. Veg. 2: 139 (1817).
Scirpus maritimus, sensu auct. mult.

Perennial 20-30 cm; rhizome creeping or with stolons ending in tubers 6-8 mm diam.; culms 1-1.5 mm diam., triquetrous, narrowly winged above, smooth or slightly scabrous; leaves equalling the culm or longer; leaf-sheath to 10 cm, soft, margins almost straight; blade to 25 cm, 1-2.5 mm wide, flat, folded or recurved, keeled, greyish-green, smooth; inflorescence to 2.5 cm, paniculate, with 1-4 spikelets; lateral spikelets with a peduncle to 1.2 cm; lowest bract longer than the inflorescence; spikelets 0.6-1.2 x 0.4-0.6 cm, ovoid or globular, brown; tubular prophyll to 5 mm, white, scarious; glumes 4-6 x 2-2.5 mm, cymbiform, ± hairy, brown, sides veinless, widely scarious, apex truncate, 3-fid, eroded, scarious, arista to 1.5 mm, straight to slightly recurved; perianth bristles 4-6, *c.* 1/2 of the nutlet, persistent; stigmas 3; nutlet 2.5-3 x 1.4-1.7 mm, obovoid, plano- convex, trigonous with rounded dorsal edge, apex conical, surface finely reticulate, glossy, epidermal cells small, brown to dark brown.

N; shallow water and artificial depressions. Southern Europe, North and southern Africa, southwest Asia to India, Central Asia.

2. **Schoenoplectus** (Rchb.) Palla, nom. conserv.
Syn. *Scirpus* L. Sect. *Schoenoplectus* Rchb.

Annuals or perennials; rhizome creeping, or with stolons; culms terete or trigonous, smooth; leaves reduced to 2-3, soft ephemeral leaf-sheaths; inflorescence pseudolateral, capitate, paniculate or umbel-like; lowest bract appearing continuous with the culm; glumes spirally arranged; flowers bisexual; perianth bristles plumose or retrorsely barbed or absent; stamens 2-3; stigmas 2-3; nutlet trigonous or biconvex, compressed, transversely rugulose or smooth. About 60 species, cosmopolitan.

1. Perennial 0.5-1.5 m, with long horizontal rhizome or stolons — 2
\+ Annual 10-50 cm, or perennial with short rhizome — 4

2. Perianth bristles plumose — 3. **S. litoralis** subsp. **thermalis**
\+ Perianth bristles retrorsely barbed — 3

3. Culm triquetrous — 1. **S. triqueter**
\+ Culm terete — 2. **S. corymbosus**

4. Perianth bristles present — 4. **S. mucronatus**
\+ Perianth bristles absent — 5

5. Culm septate — 5. **S. praelongatus**
\+ Culm not septate — 6. **S. supinus**

1. **Schoenoplectus triqueter** (L.) Palla, Verh. Zool.-Bot. Ges. Wien 38: 49 (1888).
Syn. *Scirpus triqueter* L., Mant. 29 (1767).

Perennial 0.5-1.25 m; rhizome creeping or stoloniferous, 2-4 mm diam.; culms 2-6(-9) mm diam., trigonous, smooth; leaf-sheaths 3, ephemeral, green or often with a reddish tint, mouth deeply oblique, margins scarious; blades mostly reduced to a mucro, uppermost to 5 cm, channelled, smooth, apex obtusely pointed; inflorescence 1.5-2.5 cm diam., of (1-)3-7 sessile spikelets, or branched; lowest bract to *c.* 3.5 cm, trigonous, smooth; primary branches 0-0.7(3) cm, each with (1-)2-4 sessile spikelets; secondary branches occasional, to 8 mm; spikelets 0.8-1.2 x 0.4-0.7 cm, ovoid; glumes rather loosely imbricate, 3-4 mm, cymbiform, mid-vein present, smooth, apex rounded, often truncate, margins scarious, ciliate; perianth bristles 4-6, about equalling the nutlet; stamens 3; anthers 1.5-2 mm; stigmas 2; nutlet 2.2-3.2 x 1.3-2 mm, ellipsoid or ovoid, biconvex or almost plano-convex, smooth, glossy, yellowish-brown.

M; alluvial meadows, lakes and canal banks, rice fields. Europe to China, Japan, Taiwan, Caucasus to Tadjikistan and northern India, southern Africa.

2. **Schoenoplectus corymbosus** (Roth ex Roem. & Schult.) J. Raynal in Peyre de Fabregues & Lebrun, Catal. Pl. Vasc. Niger. 343 (1976).
Syns. *Isolepis inclinata* Delile, Descr. Egypte, Hist. Nat, t. 50 (1814).
Isolepis corymbosa Roth ex Roem. & Schult., Syst. Veg. 2: 110 (1817).
Scirpus corymbosus Heyne ex Roth, Nov. Pl. Sp. 28 (1821), non L.
Scirpus inclinatus (Delile) Asch. & Schweinf. ex Boiss., Fl. Orient. 5: 381 (1882).
Schoenoplectus inclinatus (Delile) Lye, Bot. Notiser 124: 290 (1971).
Schoenoplectus corymbosus (Roth ex Roem. & Schult.) J. Rayn. var. *brachyceras* (A. Rich.) Lye, Nord. J. Bot. 3: 242 (1983).

Perennial to 1.5 m; rhizome short; culms 0.5-1 cm diam., terete, finely grooved, smooth, green or greyish-green; leaf-sheath to 12 cm, brown, disintegrating into fibres, mouth oblique, with broad scarious margins; blade reduced to a mucro; inflorescence 4.5-15 cm diam., paniculate or umbel-like; lowest bract 3-15 cm, terete, apex obtuse; primary branches 0.7-3(-10) cm, smooth or occasionally scabrous, with a group of 2-6 sessile spikelets, or with secondary branches; tubular prophyll often keeled, scabrous; secondary branches to 4 cm, with 2-4 sessile spikelets, or with ± differentiated tertiary branches; tertiary branches to 2 cm, with 1-3 spikelets; spikelets 5-8 x 2-4 mm, ovoid; glumes 3-4 mm, cymbiform; mucro smooth, sides inconspicuously veined, pale or reddish-brown, smooth, margins not or narrowly scarious, not fringed; perianth-bristles reduced or weakly developed, unequal, to half of nutlet; stamens 3; anthers *c.* 2 mm; stigmas 3; nutlet 1.8-2 x 1.2-1.3 mm, ellipsoid or obovoid, trigonous, plano-convex, edges obtuse, almost smooth, glossy, dark brown.

N, O, M; shallow water in pools and ditches. Most of Africa, Pakistan, India from Sind to Mysore, western India.

3. **Schoenoplectus litoralis** (Schrad.) Palla, Bot. Jahrb. 10: 299 (1889).
Syn. *Scirpus litoralis* Schrad., Fl. Germ. 142, t. 5, f. 7 (1806).

Perennial 0.6-1.2 m; rhizome short, *c.* 2 mm diam., stoloniferous; culms 3-4 mm diam., trigonous, smooth, green; leaf-sheath to *c.* 25 cm, green, smooth, scarious side sometimes reddish, mouth deeply oblique with broad scarious margins; ligule 0.5-1 mm, scarious, margins smooth; leaf-blades mostly reduced, some to 15 cm or longer, to 5 mm broad, obtusely pointed, keeled, thick or channelled, margins smooth; inflorescence 3.5-9 cm, paniculate or umbel-like; lowest bract to 12 cm or more, longer than the

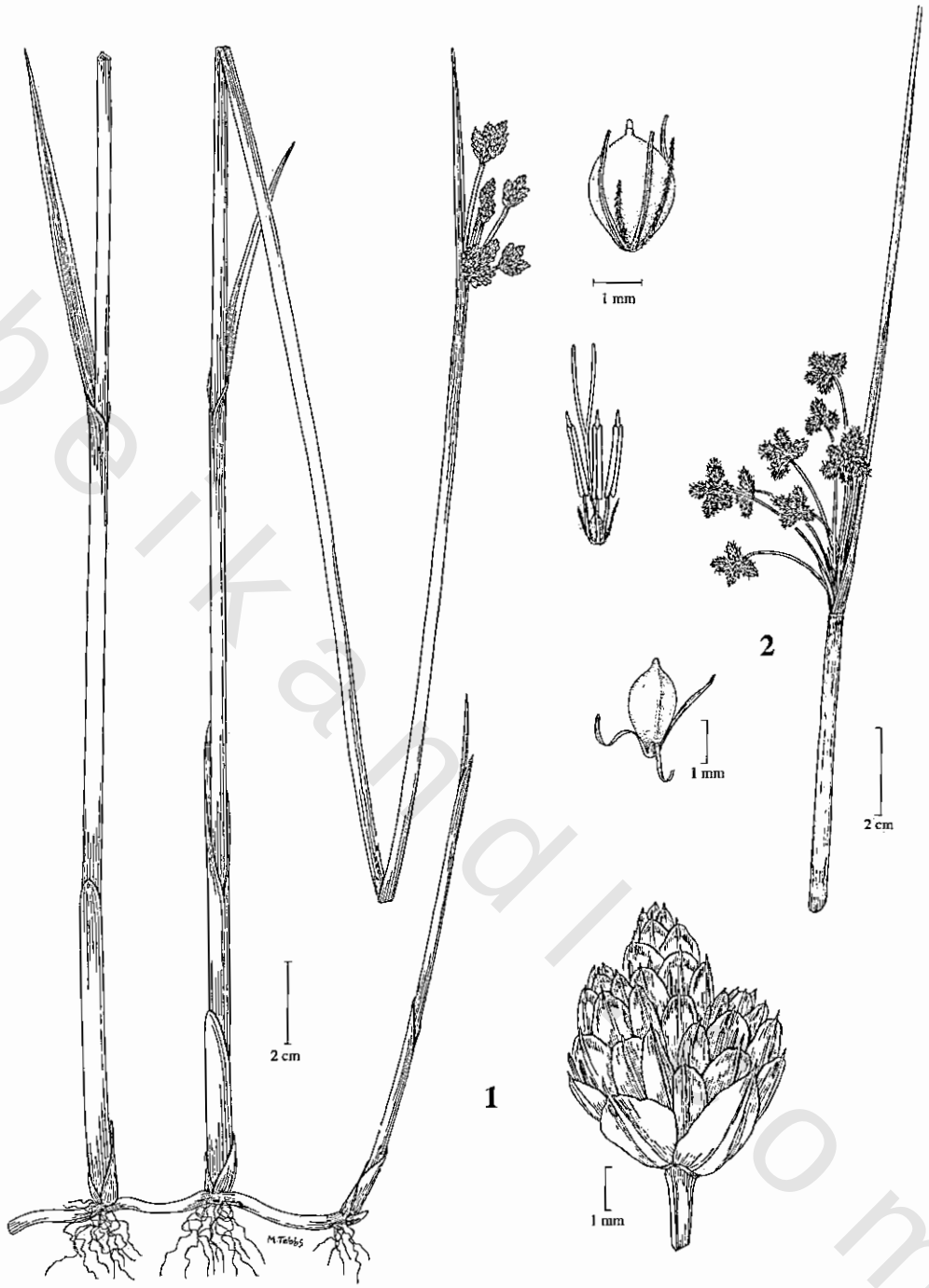


Plate 104. CYPERACEAE: *Schoenoplectus triqueter* 1, habit; spikelet (down right); flower (middle right); nutlet (up right). *Schoenoplectus corymbosus* 2, inflorescence; nutlet (middle left). Drawn by Margaret Tebbs. Courtesy of BSBI (*S. triqueter*).

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inflorescence, erect, trigonous, edges smooth; primary branches 2-14, to 7 cm, smooth or slightly scabrous; tubular prophyll to 1 cm, mouth oblique or 2-lobed; secondary branches to 1.5 cm, with 3-8 mostly solitary spikelets with occasional tertiary branches subtending 3-4 spikelets; tertiary branches to 1 cm; spikelets 0.7-1.8 x 0.3-0.5 cm, usually solitary, occasionally 2 together, ovoid; glumes 3-4 mm, cymbiform, apex rounded, arista to 0.7 mm, slightly recurved, sides obscurely veined, brown, margins scarious; perianth-bristles 4, upper half plumose; stamens 3; anthers *c.* 2 mm; stigmas 2; nutlet 1.6-2.3 x 1-1.5 mm, obovoid, apiculate, biconvex or almost plano-convex, very finely reticulate, dull or slightly glossy, dark brown.

One subspecies occurs in Egypt:

subsp. **thermalis** (Trab.) S. Hooper, in Saldanha & Nicolson (eds), Fl. Hassan Distr., Karnataka, India 698 (1976).

Syns. *Scirpus thermalis* Trab., in Batt. & Trab., Fl. Algérie, Monocot. 99 (1895).
Scirpus litoralis Schrad. subsp. *thermalis* (Trab.) Murbeck., Lunds Univ. Årskrift, N.F., Avd. 2, 18, 3: 18 (1922).
Scirpus subulatus Vahl, Emun. Pl. 2: 286 (1805).
Schoenoplectus litoralis subsp. *subulatus* (Vahl) T. Koyama in Dassanayake & Fosberg (eds), Fl. Ceylon 5: 157 (1985).
Scirpus pectinatus Roxburg, Fl. Ind. 1: 218 (1820).
Scirpus wardianus J. R. Drummond, J. As. Soc. Beng. 73: 147 (1904).

Culms 3-6 mm diam., basal parts terete, the distal obtusely trigonous, sides convex; leaf-blades to *c.* 15 cm, sometimes (in water) to 30 cm, *c.* 5 mm wide, keel and margins scabrous, apex long attenuate, acute; inflorescence 2-7 cm; lowest bract mostly ± equalling the inflorescence; secondary branches with 3-8 solitary spikelets.

N, O, M; shallow water, canals, ditches, rivers. Italy, Africa, Madagascar, Arabia to Pakistan, India, Thailand, Australia, New Guinea, Micronesia, reported from Japan (Okinawa).

4. **Schoenoplectus mucronatus** (L.) Palla, Verh. Zool.-Bot. Ges. Wien 38: 49 (1888).
Syn. *Scirpus mucronatus* L., Sp. Pl., ed. 1, 50 (1753).

Perennial 30-70 cm, with short rhizome, or annual, forming small tufts; root system small; culms 2-5 mm diam., trigonous, green or greyish-green, edges smooth; leaf-sheaths 2, the lower to 2.5 cm, the upper to 10 cm or more, green, mouth oblique, margins scarious; ligule present; blades reduced to a mucro; inflorescence congested into a capitate spherical group of 6-15, occasionally 1-3, sessile spikelets, to *c.* 2 cm diam.; lowest bract conspicuous, green, to more than 10 cm, at first upright, later reflexed, trigonous, smooth, adaxial side concave, apex obtuse; spikelets 0.7-1.8 x 0.4-0.5 cm, ovoid; glumes closely imbricate, 2.5-3.5 mm, cymbiform; mid-vein smooth, extending to a short mucro, sides many-veined, greyish-brown, often with a reddish tint; margins scarious, slightly recurved, fringed; perianth-bristles 6, longer than the nut, brown; stamens 3; anthers *c.* 1 mm; stigmas 3; nutlet 1.7-2 x 1.4-1.5 mm, obovoid, apiculate, trigonous, almost plano-convex, shallowly transversely rugulose, glossy, blackish-brown.

N; rice fields. Central and southern Europe to Japan and Malaysia, Africa, Madagascar, Australia, reported as a weed of rice fields from California.



Plate 105. CYPERACEAE: *Schoenoplectus litoralis* subsp. *thermalis* 1, lower part and inflorescence; nutlet (down right); glume (further down right). *Schoenoplectus mucronatus* 2, inflorescence. *Schoenoplectus praelongatus* 3, habit; glume (down right); nutlet (down left). *Schoenoplectus supinus* 4, habit; glume (up right). Drawn by Margaret Tebbs.

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5. **Schoenoplectus praelongatus** (Poir.) J. Raynal, Adansonia 16: 148 (1976).
Syn. *Scirpus praelongatus* Poir. in Lam., Encycl. 6: 764 (1804).

Annual 10-50 cm, forming tufts; root system small; culms 2-20 cm, shorter than the lowest bract, terete, 2-5 mm diam., greyish-green; leaf-sheaths 2(-3), the upper ± equalling the culm, the lower shorter, mouth oblique, margins narrowly scarious; blades usually reduced to a mucro, the uppper sheaths occasionally elongate to *c.* 7 mm; inflorescence 1-2.5 cm diam, congested into a spherical capitate group of 7-*c.* 30 sessile spikelets; lowest bract 4-36 cm, 2-5 mm diam., terete, articulate, greyish-green; spikelets 0.5-1.2 x 0.3-0.4 cm, ovoid or elongate-ovoid; glumes 3.5-4.5 mm, mid-vein area wide, at first green, with 3-5 veins extending into short mucro, sides obscurely veined, greyish-brown or brown, margins scarious, apex rounded; perianth-bristles 0; stamens 3; anthers *c.* 0.7 mm; stigmas 3; nutlet 1.4-1.6 x 1.1-1.3 mm, widely obovoid, trigonous, edges rather sharp, sides concave, surface transversely finely rugulose, slightly glossy, dark brown to blackish-brown.

N, O; weed of rice fields. Egypt, Pakistan to Vietnam, Philippines, Australia.

6. **Schoenoplectus supinus** (L.) Palla, Bot. Jahrb. 10: 299 (1888).
Syns. *Scirpus supinus* L., Sp. Pl., ed 1, 49 (1753).
Isolepis supina (L.) R. Br., Prodr. 1: 77 (1810).

Annual 5-30 cm, forming tufts; root system small, fibrous; culms 0.8-2 mm diam., terete or distal parts obscurely trigonous, grooved, green or greyish-green, smooth; leaf-sheaths 2-3, to 6.5 cm, the lowest short, ephemeral, bearing an occasional flower in its axil; the upper longer, mouth oblique, margins scarious; ligule to 0.8 mm, scarious; blades reduced to a mucro, or in uppermost sheath to 5 cm; inflorescence 0.7-2 cm diam., congested into a spherical capitate group of (1-)3-15 sessile spikelets, or occasionally 1 or a few spikelets pedunculate; lowest bract 2-16 cm, terete, apex rather obtuse, smooth, other bracts seldom green and longer than the spikelet; spikelets 0.5-1.2 cm, ovoid; glumes rather tightly imbricate, 2.1-2.7 mm, cymbiform, slightly keeled towards the apex, smooth; mucro *c.* 0.3 mm, sides obscurely veined, brown or colourless, scarious, margins smooth or minutely fringed; perianth-bristles reduced, occasionally 3-4, elongate, unequal, the longest shorter than the nutlet; stamens 3; anthers 0.5-0.7 mm; stigmas 3; nutlet 1.3-1.6 x 1-1.3 mm, broadly obovoid, apiculate, trigonous, conspicuously transversely rugulose with very fine longitudinal striations, glossy, blackish-brown.

N, O, M; wet ground by standing water, pools, rice fields. Europe, North Africa, Turkey, Caucasus, southern Siberia, Kazakhstan, Iran, Pakistan, to East Asia.

3. **Scirpoides** Scheuchz. ex Séguier.
Syns. *Holoschoenus* Link,
Scirpus L. Sect. *Holoschoenus* (Link) W.D.J. Koch

Perennials; rhizome short, producing stolons; culms terete; leaves basal, up to equalling the culm; inflorescence pseudolateral, branched, with 1-100 or more globose heads of congested spikelets; spikelets ovoid, with 10-30 spirally arranged glumes; flowers bisexual; perianth-bristles 0; stamens 3; stigmas 3; nutlet trigonous, plano-convex. About 3 species, Europe, Africa, ? Australia.

1. **Scirpoides holoschoenus** (L.) Sojàk, Cas. Narodn. Muzea 140: 127 (1972).
Syn. *Scirpus holoschoenus* L., Sp. Pl., ed. 1, 49 (1753).

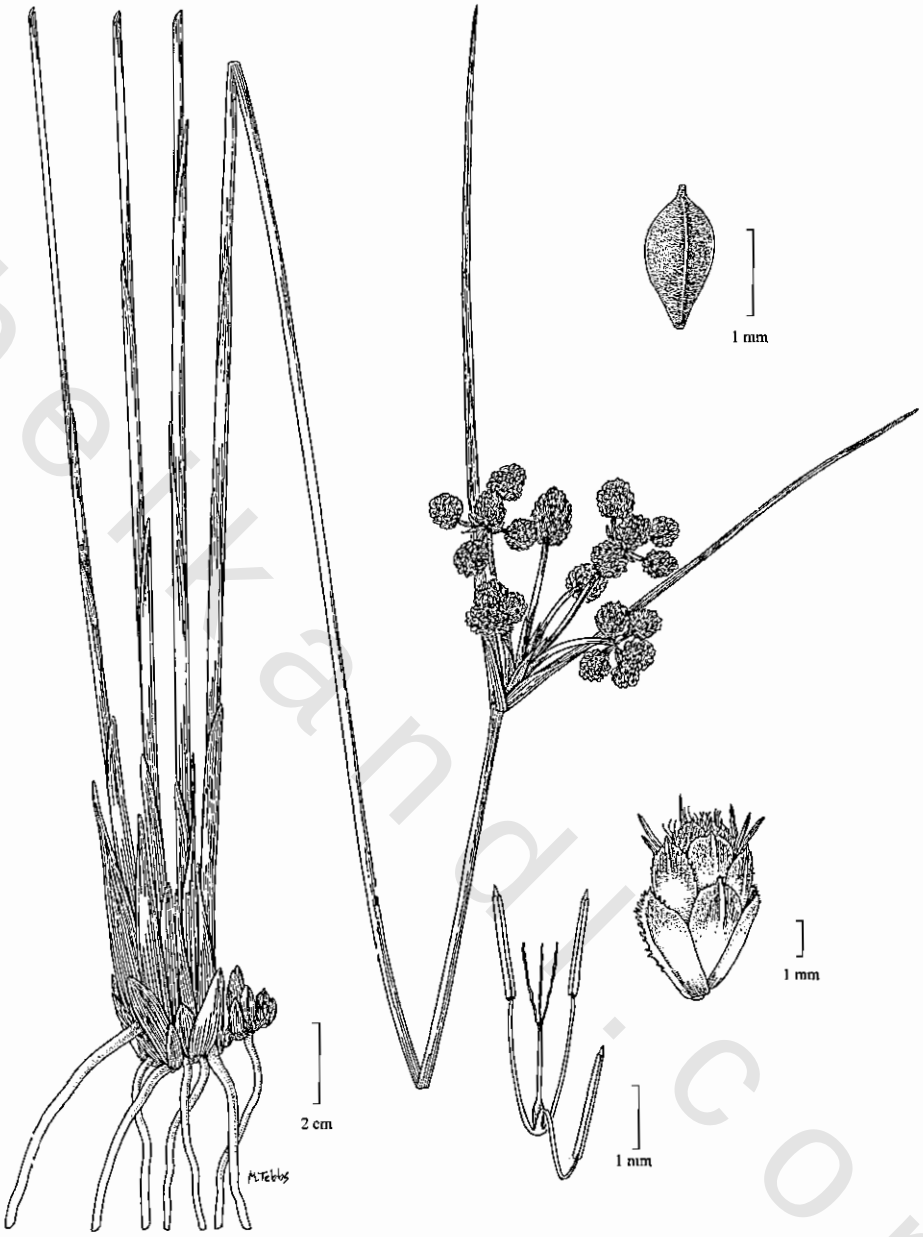


Plate 106. CYPERACEAE: *Scirpoides holoschoenus* subsp. *australis,* habit; flower (down right); spikelet (further down right); nutlet (up within). Drawn by Margaret Tebbs.
Courtesy of BSBI.

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Perennial to more than 1 m, forming tussocks; rhizome short, woody, producing stolons; culms 0.8-3.5 mm diam., smooth, terete or trigonous, scabrous above, greyish-green; leaves nearly completely reduced to ± equalling the culm; leaf-sheath 3-15 cm, from rather soft to rigid, greyish-brown or reddish-brown, scarious side conspicuously veined, mouth oblique; ligule 0 or incomplete; blades canaliculate, greyish-green, adaxial surface reduced, narrow, margins scabrous, apex flat, obtuse, scabrous; inflorescence of 1-100 or more globose heads of congested spikelets; bracts 1-3, leaf-like, lowest 1-20 cm, mostly erect, others when present shorter; primary branches to more than 10 cm; secondary branches to 3 cm; heads 0.3-1.5 cm diam., of 6-40 tightly congested spikelets; bracts and prophylls glume-like; spikelets 1.5-4 x 1-2 mm, ovoid to ± globose, with 10-30 glumes, 1-1.7 mm, cymbiform, keeled, mucronate, apical part barbed, sides 2-3-veined, brown or reddish-brown, margins narrowly scarious, ciliate; anthers 1-1.6 mm; nutlet 1-1.3 x 0.5-0.7 mm, ellipsoid or obovoid, trigonous, plano-convex, edges rather sharp, apex mucronate, sides finely reticulate with black areole, almost smooth, glossy.

One subspecies occurs in Egypt:

subsp. **australis** (L.) Sojàk, Acta Mus. Nat. Prag 141: 61 (1972).
Syns. *Scirpus australis* L., Syst. Veg., ed. 13, J.A. Murray (ed.) 85 (1774).
Scirpus holoschoenus L. subsp. *australis* (L.) Arcang., Comp. Fl. Ital. 732 (1882).
Scirpus holoschoenus L. var. *australis* (L.) Sm., Fl. Brit. 53 (1800).
Holoschoenus australis (L.) Rchnb., Fl. Germ. Excurs. 76 (1830).
Holoschoenus vulgaris Link var. *australis* Nyman, Consp. Fl. Europ. 765 (1882).
Holoschoenus romanus (L.) Fritsch var. *australis* (L.) Bech., Candollea 4:142 (1929).

Perennial 25-90 cm; culms 0.8-3.5 mm diam; leaves *c.* 1/2 to *c.* ± as long as the culm; leaf-sheath 3-10 cm; inflorescence of 1 to *c.* 30 heads of spikelets; bracts 1-3 leaf-like, lowest 2-20 cm, mostly erect, others shorter, patent or reflexed; primary branches to 4 cm; secondary branches occasional, to 1 cm.

N, O, M; wet meadows, springs, canal banks and lakes. North Africa, southern Europe to southwest Siberia, Kazakhstan, Kirgizia, Tadjikistan, Iraq, Iran, Afghanistan, Pakistan.

4. **Isolepis** R. Br.
Syn. *Scirpus* L. Sect. *Isolepis* (R.Br.) Griseb.

Terrestrial or aquatic annuals or perennials; rhizome short or creeping; culms erect or creeping or floating, usually terete; leaves from reduced to longer than the culm; ligule 0; inflorescence of 1-15, occasionally numerous, pseudolateral sessile spikelets in a globose head; bracts several, leaf-like and exceeding the inflorescence; spikelets with up to *c.* 30 spirally-arranged glumes; flowers bisexual, perianth bristles 0; stamens 1-3; stigmas 2-3; nutlet trigonous or biconvex. 69 species, worldwide.

1. **Isolepis setacea** (L.) R. Br., Prodr. 222 (1810).
Syns. *Scirpus setaceus* L., Sp. Pl., ed. 1, 49 (1753).
Schoenoplectus setaceus (L.) Palla in W.D.J. Koch, Syn. Fl. Germ., ed. 3, 3: 2538 (1905).

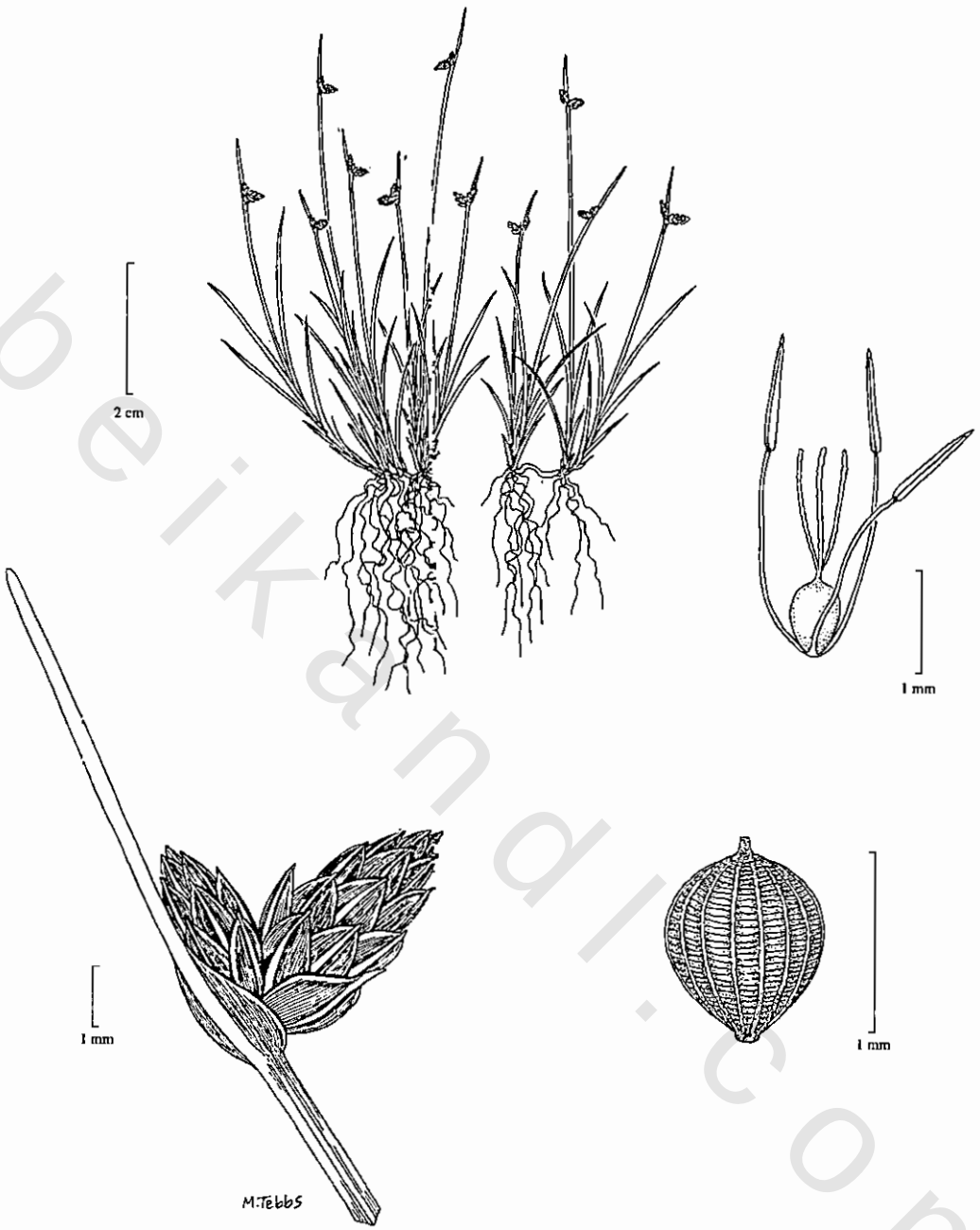


Plate 107. CYPERACEAE: *Isolepis setacea*, habit; inflorescence (down left); flower (up right); nutlet (down right). Drawn by Margaret Tebbs.
Courtesy of BSBI.

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Annual 2.5-20 cm, forming small tussocks; roots fibrous; culms 0.2-0.3 mm diam., terete, smooth, green or yellowish-green; leaves mostly reduced, usually with 1 complete leaf at the base of the culm; leaf-sheath to 2 cm, the lowest bladeless, scarious, often reddish; the longest much overtopping lower ones, yellowish-green or lower part often reddish; mouth wide, scarious, oblique; blades 0.1-2 cm, as wide as the culm, channelled, smooth, apex obtuse; inflorescence of 1-2 sessile spikelets; bract as long as the spikelet or to 1 cm, basal part (sheath) scarious, keeled, often reddish-brown; spikelets 2-5 mm, globose or ovoid, with up to *c.* 30 glumes; if 2 spikelets, the lower with obtuse, glume-like prophyll; glumes 1.3-1.5 mm, cymbiform, keeled, mid-vein prominent, at first green, smooth, barely reaching the obtuse apex, sides with 3-5 fine veins, reddish-brown or sometimes colourless, scarious; stamens 2; stigmas 3; nutlet 0.7-0.9 x 0.5-0.6 mm, obovoid, unequally biconvex, with wide stipe and narrow beak, trabeculate with conspicuous longitudinal ribs, brown, sometimes whitish.

N; water courses, boggy soils. Europe, North Africa, mountains of East Africa, Syria, Lebanon, Turkey, Iran, Pakistan, Caucasus, Kazakhstan, Uzbekistan, Tadjikstan to western China and Sikkim, introduced to western North America and Tasmania.

5. **Eleocharis** R. Br.

Annuals or perennials; rhizome horizontal, frequently producing stolons, sometimes ending in a tuber or bulbil; leaves reduced; lowest open sheaths loosely surrounding the culm base, scarious, soon disintegrating; above them 2 closed sheaths tightly surrounding the culm base; blades 0; ligule 0; inflorescence a single spikelet; glumes spirally arranged, all fertile or lowest 1-2 sterile; flowers bisexual; perianth-bristles 3-8, conspicuous or small, retrorsely barbed, occasionally absent; stamens 3(-2); stigmas 2-3; style-base persistent on top of mature nutlet, distinguished by its softer, often spongy texture, in most cases bulbous and clearly separated from nutlet by constriction; nutlet 0.5-2.5 mm, excluding the style-base, trigonous or biconvex. About 150 species, cosmopolitan.

1. Annual or perennial, forming small tufts, with fibrous roots or stolons; rhizomes absent — 2
\+ Perennial, with horizontal rhizome — 4

2. Plant forming mats, often submerged; some roots with bulbils — 1. **E. parvula**
\+ Plant tufted, or later with short stolons; bulbils absent — 3

3. Plant without stolons — 3. **E. geniculata**
\+ Plant later producing short stolons — 4. **E. caduca**

4. Plant 3-30 cm; culms 0.2-0.7 mm diam., terete or obscurely angled; style-base very small, triangular — 5. **E. quinqueflora**
\+ Plant 20-40 cm; culms 1-2 mm diam., terete, style-base with a bulbous style-base — 2. **E. palustris** subsp. **iranica**

1. **Eleocharis parvula** (Roem. & Schult.) Link ex Bluff, Nees & Schauer, in Bluff & Fingerhuth, Comp. Fl. Germ., ed. 2, 1: 93 (1836).
Syns. *Scirpus pollicaris* Delile, Descr. Egypte, Hist. Nat. 50 (1814), nom. nud.
Scirpus parvulus Roem. & Schult., Syst. Veg. Gen. 2: 124 (1820).
Eleogiton parvula (Roem. & Schult.) Link, Hort. Berol. 1: 285 (1827).

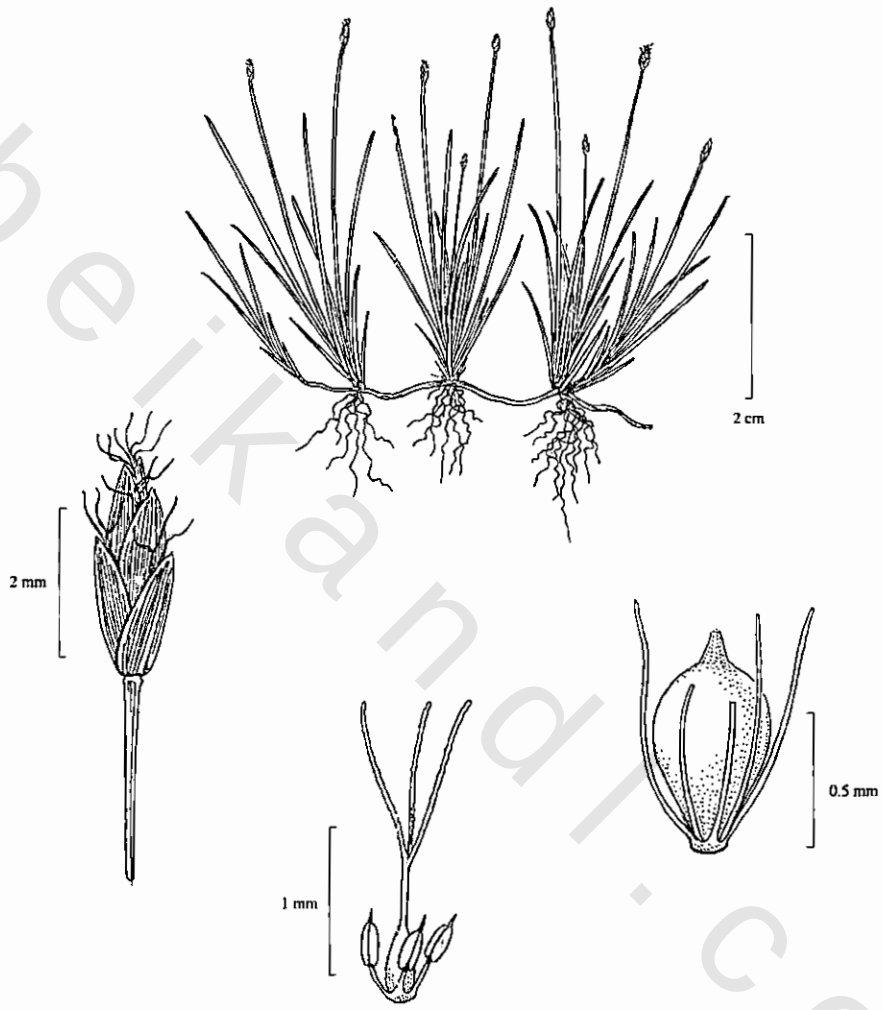


Plate 108. CYPERACEAE: *Eleocharis parvula*, habit; inflorescence (down left); flower (down middle); nutlet (down right). Drawn by Margaret Tebbs.
Courtesy of BSBI.

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Delicate perennial to 10 cm, forming mats; roots fibrous, often with minute tuberous stolons; culms 2-7 cm, capillary, greenish or straw-coloured, often spongy and translucent, terete, somewhat striate when dry; upper sheaths inconspicuous; spikelets 2-3.5 mm, broadly ovate, 2-9-flowered; scales ovate, slighly keeled, obtuse or acute, striate and chartaceous, green to yellowish, often dull brown on the sides; lowest scale, half the length of the spikelet; stamens 3; style 3-fid; nutlet 0.8-1.4 mm, ovoid, straw-coloured, equilaterally triangular with prominent angles, smooth, glossy, sometimes slightly striate-reticulate; style-base very short, triangular, greenish; bristles, equalling or exceeding the nutlet, straw-coloured.

N, M; rice fields. Europe, North Africa, North and Central America.

2. **Eleocharis palustris** (L.) Roem. & Schult., Syst. Veg. 2: 151 (1817).
Syns. *Scirpus palustris* L., Sp. Pl., ed. 1, 47 (1753).
Eleocharis crassa Fisch. & C.A. Mey. ex Zinserling, Fl. URSS, 3: 582 (1935).
Eleocharis crassa Fisch. & C.A.Mey. ex Becker, Bull. Soc. Moscou 31(1): 75 (1858), nom. nud.
Eleocharis kitamurana T. Koyama, Acta Phytotax. Geobot. 17: 48 (1957).

Tufted perennial to 90 cm; rhizome horizontal, *c.* 2 mm diam., culm arising just at or near the rhizome nodes; culms 1.5-2.5 mm diam., terete, green or greyish-green, with 12-28 vascular bundles in cross-section; open sheaths *c.* 1 cm; lower closed sheaths soon disintegrating, mouth oblique; the upper to 20 cm, mouth straight, margins scarious; spiklelets elongate-ellipsoid or ovoid, subacute, with more than 50 glumes; 2 basal glumes 1.4-2.5 mm, sterile, usually equal; margins scarious, apex rounded; glumes cymbiform, narrow, mid-vein not reaching the rounded or acutish apex, margins scarious; perianth-bristles of equal length, equalling the nutlet (including the style-base), light brown; stamens 3; stigmas 2; nutlet subglobose, ovoid or obovoid, glossy, finely or obscurely reticulate; style-base ± as long as wide, mitriform, sides convex, whitish or brownish, reticulate or trabeculate, distinctly constricted from the nutlet.

One subspecies occurs in Egypt:

subsp. **iranica** Kukkonen, Ann. Bot. Fennici 32: 156 (1995).

Perennial 20-40 cm; culms 1.5-2 mm diam., deeply grooved, with 10-16 veins; vascular bundles 12-15 in cross-section; lower closed sheaths 15-30 mm, mostly reddish-brown along their entire length, the upper 3.5-8 cm, lower part mostly reddish-brown, upper part green; spikelets 0.9-1.7 x 0.3-0.4 cm, with closely imbricating glumes; glumes 2.5-3 mm, with narrow brown or dark brown area on both sides of the mid-vein; anthers 2-2.5 mm; nutlet 1.3-1.5 x 0.9-1.1 mm (excluding the style-base), yellow or yellowish-brown, glossy, obscurely reticulate; style-base *c.* 0.5 x 0.4 mm.

N, O, M; swamps, wet meadows, canal banks. Egypt, eastern Turkey, Iraq, Iran, Afghanistan, Pakistan.

3. **Eleocharis geniculata** (L.) Roem. & Schult., Syst. Veg. 2: 150 (1817).
Syns. *Scirpus geniculatus* L., Sp. Pl., ed. 1, 48 (1753).
Scirpus caribaeus Rottb., Descr. Pl. Rar. 24 (1772).
Eleocharis capitata R.Br., Prodr. 1: 225 (1810), non *Scirpus capitatus* L.
Eleocharis caribaea (Rottb.) Blake, Rhodora 20: 24 (1918).

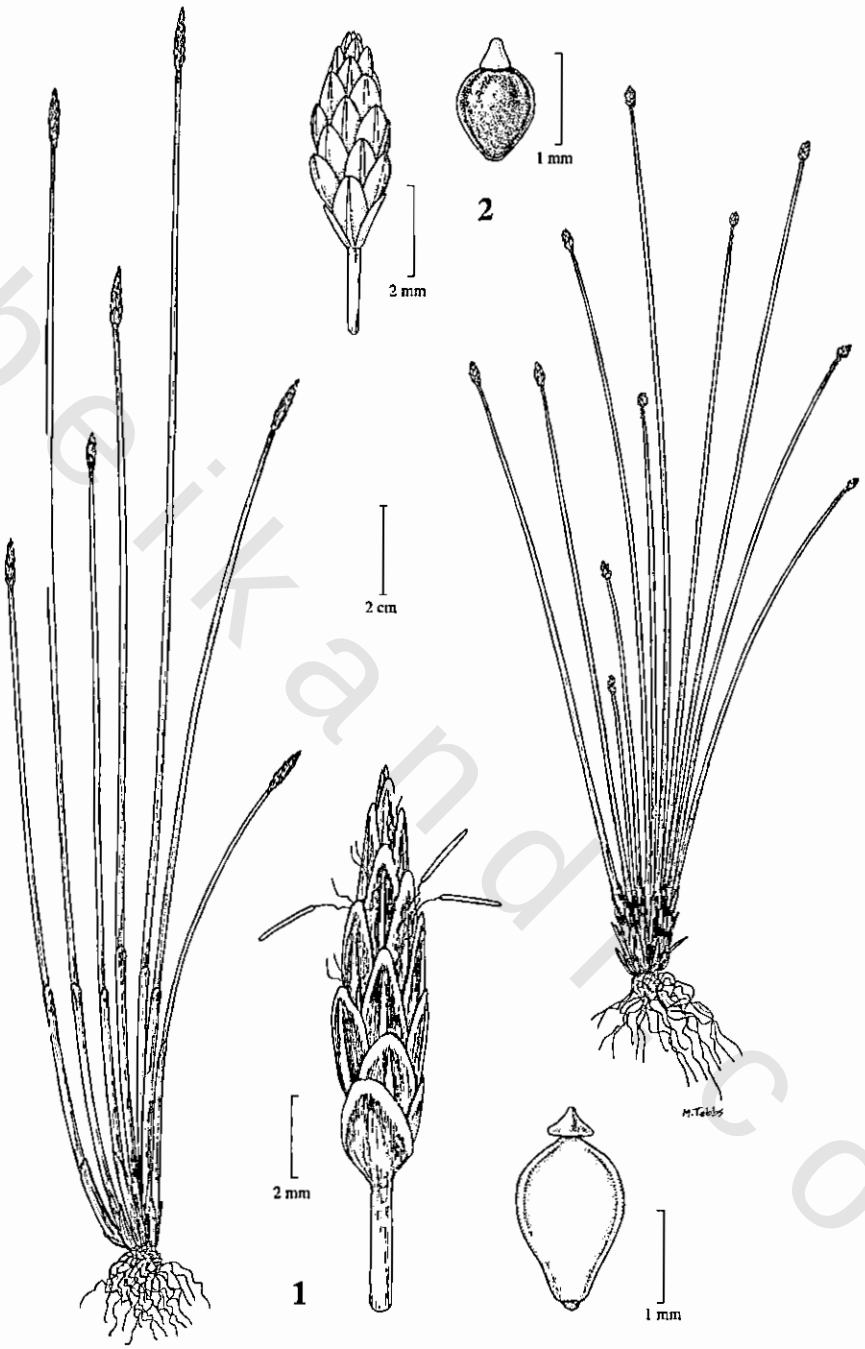


Plate 109. CYPERACEAE: *Eleocharis palustris* 1, habit; spikelet and nutlet (down right). *Eleocharis geniculata* 2, habit; spikelet and nutlet (up left). Drawn by Margaret Tebbs.

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Tufted glabrous annual 12-25 cm; roots fibrous, white; culms 0.5-1 mm diam., green, terete, grooved; open sheaths *c.* 5 mm wide, scarious; the lower to 1.5 cm, closed, reddish-brown or green, mouth oblique; the upper to 5 cm, green or basal parts reddish, 5-veined, mouth oblique, margins narrowly scarious; blades 0 or minute tip present; spikelets 3-6 x 3-4 mm, ovoid or globular, with *c.* 50 closely imbricating glumes; basal glume fertile; glumes 1.7-2.2 mm, cymbiform, rounded, mid-vein not very distinct, not reaching apex, sides greyish-brown, margins narrowly scarious; perianth-bristles 6-8, as long as or longer than nutlet, brown; stamens 3; anthers 0.5-0.7 mm; stigmas 2; nutlet 0.8-1 x 0.6-0.8 mm (excluding the style-base), obovoid, biconvex, apex rounded, basal part gradually tapering, obscurely reticulate, glossy, black; style-base 0.1-0.2 x 0.3-0.4 mm, clearly demarcated from the nutlet, white.

N; rice fields, marshlands, wet meadows. Italy, Africa, Madagascar, Iraq, Pakistan, India, China to Malaysia and Australia, North and South America.

4. **Eleocharis caduca** (Delile) Schult., Mantissa 2: 88 (1824).
Syns. *Scirpus caducus* Delile, Descr. Egypte, Hist. Nat. 9 (1814).
Eleocharis caribea sensu Täckh., Stud. Fl. Egypt, ed. 2, 780 (1974).

Tufted perennial to 12 cm; stolons 0.8-1 mm diam; culms *c.* 0.5 mm diam., terete or obscurely trigonous above; lowest open sheaths disintegrating, lower closed sheath to *c.* 6 mm; the upper to 2 cm, yellow, brownish or reddish, mouth oblique; blades 0; spikelets 3-7 x 1-3 mm, obovoid to ellipsoid, greenish-brown, with to *c.* 100 glumes; basal glume mostly sterile, *c.* 2 mm, green later greyish, with scarious margins; glumes 2-2.3 mm, cymbiform, obtuse, mid-vein green, sides veinless or obscurely veined, brownish, with scarious margins; perianth-bristles 6-7, of ± equal length, longer than nutlet, colourless to brownish; stamens 3, anthers *c.* 1.4 mm; stigmas 2; nutlet 0.7-0.8 x 0.6-0.7 mm, broadly obovoid, glossy, obscurely striate and punctate, style-base *c.* 0.4 x 0.4 mm, trigonous, white, later brownish.

N, O, S; littoral marshes, Nile and canal banks, wet meadows. Western Africa, Crete, Libya, Egypt to Madagascar.

5. **Eleocharis quinqueflora** (Hartmann) Schwartz, Mitt. Thür. Bot. Ges. 1: 89 (1949).
Syns. *Scirpus quinqueflorus* Hartmann, Prim. Lin. Inst. Bot., ed. 2, 85 (1767).
Scirpus pauciflorus Lightf., Fl. Scotica 2: 1078 (1777).
Eleocharis pauciflora (Lightf.) Link, Hort. Berol. 1: 284 (1827).
Eleocharis obscura T. Koyama, Acta Phytotax. Geobot. 17: 102 (1958).

Tufted perennial 5-30 cm; rhizome short; stolons to 10 cm, ending in a bulbil; culms 0.2-0.7 mm diam., green, ± terete or obscurely angled; open sheaths to 7 mm, loosely surrounding basal parts of tuft; lower closed sheath to 1 cm; the upper to 3 cm, mouth oblique; blades 0 or minute tip; spikelets 4-8 x 2-4 mm, fusiform, later ± globose, few-flowered, with 5-8 glumes; basal glume 3-4.5 mm, fertile or sterile, clasping, cymbiform, obtuse, margins scarious; glumes 3.5-4.5 mm, cymbiform, subacute, mid-vein brown, veins obscure; perianth bristles 3-7, equal to or slightly longer than nutlet; stamens 3; anthers *c.* 1.5 mm; style *c.* 1 mm; stigmas 3; nutlet 1.4-2 x 1-1.2 mm (excluding the style-base), trigonous, ± plano-convex, reticulate, yellowish-brown; style-base trigonous, conical when fresh, not clearly constricted from nutlet and confluent with style when dry.

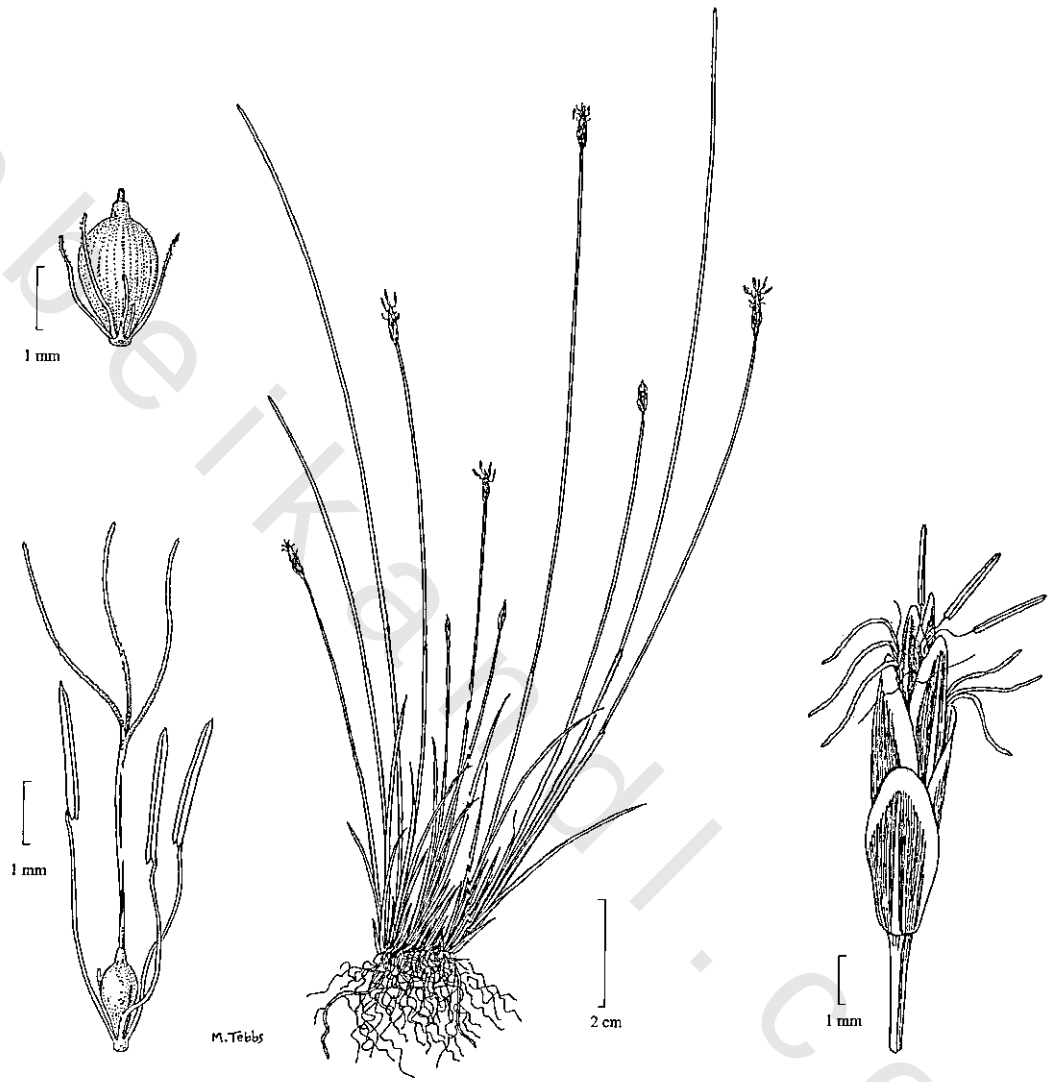


Plate 110: CYPERACEAE: *Eleocharis quinqueflora*, habit; spikelet (right); flower (down left); nutlet (up left). Drawn by Margaret Tebbs.
Courtesy of BSBI.

Oberkassel.com

N; rice fields, canal banks. Circumboreal, northern and Central Europe, northwest Africa, Egypt, Iraq, Turkey, Caucasus, Afghanistan, Pakistan, Central Asia, Siberia, China, Kamchatka, Nepal.

6. **Fimbristylis** Vahl, nom. conserv.

Annuals or perennials; culms scapose; leaves ligulate or eligulate; upper leaves short, or sometimes present as bladeless sheaths only; bracts short or overtopping inflorescence; inflorescence branched or umbel-like with several to more than 50 spikelets, primary branches with basal tubular prophyll; spikelets solitary or geminate, seldom 3 together on a common peduncle; glumes several to 40 or more, spirally arranged; rachis articulate, usually with scarious wings; perianth-bristles 0; stamens 1-3, seldom 0; stigmas 2-3; style-base articulating from nut, caducous; nutlet biconvex or globose. About 200 species, warm regions of the world.

1. Apical part of glumes glabrous — 1. **F. bisumbellata**
\+ Apical part of glumes tomentose — 2. **F. sieberiana**

1. **Fimbristylis bisumbellata** (Forssk.) Bubani, Dodecanthea 30 (1850).
Syns. *Scirpus bisumbellatus* Forssk., Fl. Aegypt.-Arab. 15 (1775).
Fimbristylis dichotoma auct., non (L.) Vahl, Enum. Pl. 2: 287 (1805).

Greyish-green annual, forming small tufts, (3-)10-35 cm; roots fibrous; culms terete, 0.5-1 mm diam., glabrous; leaves *c.* 1/2 of culm length; sheaths open, villous in upper parts; the lowest bladeless, 2-carinate, with scarious margins; ligule a compact fringe of hairs; blades 0.5-1 mm wide, flat, adaxial side almost glabrous, abaxial side villous especially in proximal parts, margins towards the apex scabrous; inflorescence to 5 cm diam., with 15-30 spikelets, mostly solitary, occasionally a few sessile grouped together; lowest bract usually shorter than inflorescence; peduncles grooved; spikelets 3.5-4.5 x 1.3-1.5 mm, narrowly ellipsoid, ± angular, acute, light brown to greyish-brown; rachis brown, with scarious wings; glumes 1.3-1.8 x *c.* 1 mm, ovate, glabrous or slightly hirsute, keeled, with a prominent mid-vein, arista conspicuous, margins scarious, slightly ciliate; stamen 1, sometimes 0; filaments scarious, compressed; anthers *c.* 1 mm; style *c.* 1 mm, flat, ciliate, brown; style-base *c.* 0.25 x 0.25 mm, whitish; stigmas 2; nutlet *c.* 0.8 x 0.7 mm, biconvex, broadly obovoid, trabeculate, yellowish to almost white.

N; marshy places, Nile and canal banks, ditches, rice fields. Canary Islands, Mauritania, Mediterranean Europe from Spain to Greece, Egypt, Palestine, Lebanon, Syria, Turkey, Caucasus, Iran, Turkmenistan, Afghanistan, Pakistan, tropical Africa, Madagascar, Malaysia, Australia, New Zealand.

NOTE: The type of *Scirpus bisumbellatus* was collected in Egypt, "Habitat in locis littorelis inundatis insularum Niloticarum" in 1761, Forsskål, C-Forssk.; microf. 96: 13-14 (C).

2. **Fimbristylis sieberiana** Kunth, Enum. Pl. 2: 237 (1837).
Syns. *Fimbristylis ferruginea* (L.) Vahl var. *sieberiana* (Kunth) Boeck., Linnaea 37:17 (1871).
Fimbristylis ferruginea (L.) Vahl subsp. *sieberiana* (Kunth) Lye, Nord. J. Bot. 2:335 (1982).

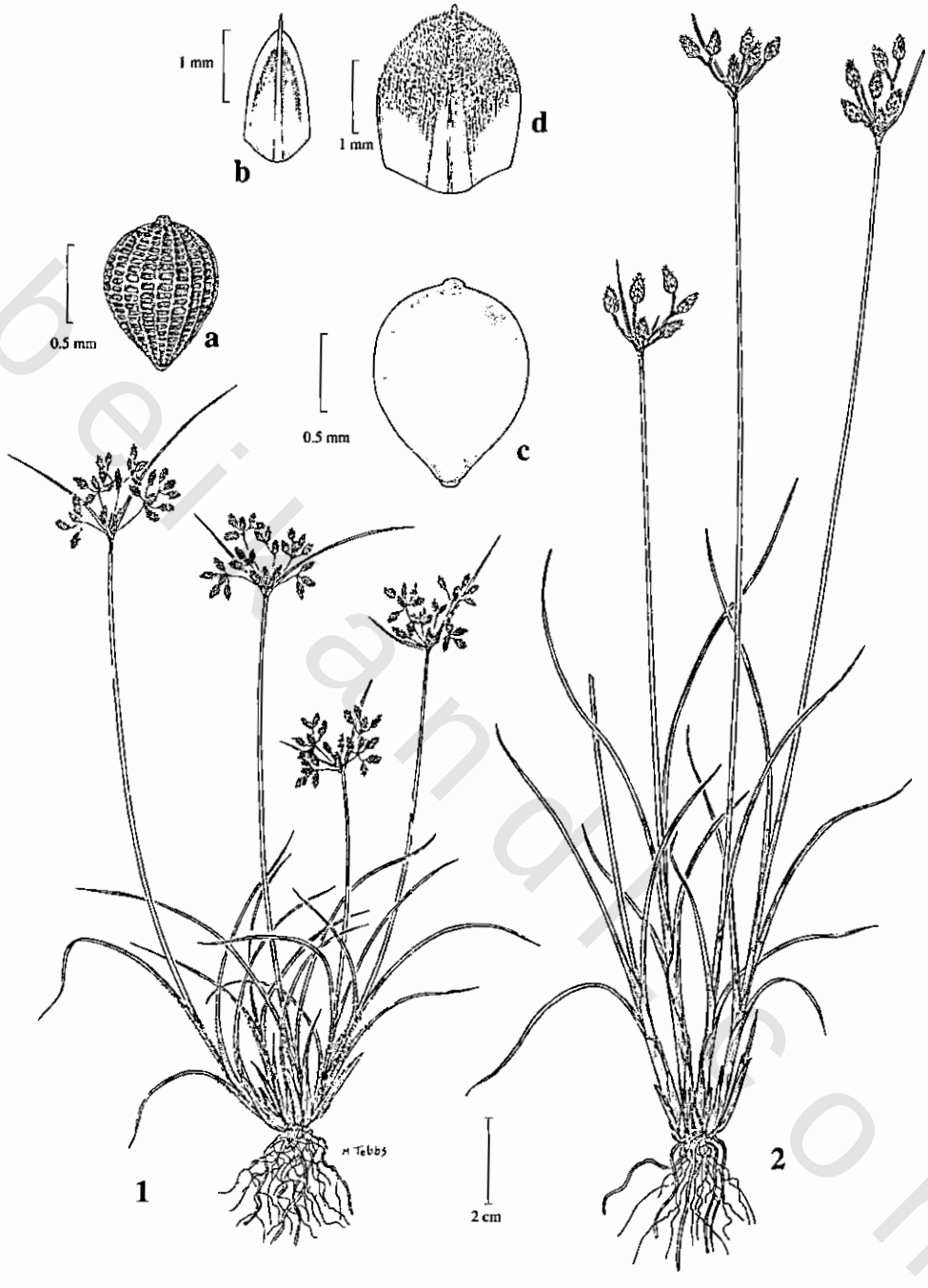


Plate 111. CYPERACEAE: *Fimbristylis bisumbellata* 1, habit; nutlet (a); glume (b). *Fimbristylis sieberiana* 2, habit; nutlet (c); glume (d). Drawn by Margaret Tebbs.

Caespitose perennial 30-60 cm; roots fibrous; rhizome short; culms 1-2.5 mm diam., terete below, upper part often compressed, grooved, glabrous; leaves to 30 cm, shorter than the culm; sheaths membranous, glabrous or upper parts often slightly pubescent; ligule a fringe of hairs; blades 0.75-1.5 mm broad, flat or involute, abaxial side with 3-7 prominent veins, adaxial side with 2 veins along the margins; margins scabrous especially towards the apex; inflorescence 2-5 x 1-5 cm, of 3-6 spikelets, mostly pedunculate, solitary, or often with 1-2 sessile spikelets; lowest bract shorter than the inflorescence, or occasionally longer, glabrous with scabrous margins, basal parts often with slightly pubescent scarious margins; spikelets 4-9 x 2-4 mm, terete, acutish, brown to greyish-brown, glabrous; rachis winged, castaneous; glumes *c.* 3 x 2.5 mm, coriaceous, deciduous, broadly ovate, slightly keeled, 1-veined, mucronulate, straw-coloured below, light brown above, apical parts grey-tomentose; stamens 3; filaments 2.5 mm; anthers *c.* 1 x 0.2 mm, narrowly ellipsoid, connective tip mucro; style 1-1.2 mm, flat, ciliate, brown; stigmas 2, *c.* 0.8 mm, basal parts flat, ciliate; nutlet 1.4-1.6 x 1-1.2 mm, biconvex, globose or broadly obovoid, white or yellowish; stipe *c.* 0.2 mm.

N, O, De; moist ground along canals, fields, gardens. Spain, Crete, Cyprus, North Africa, Palestine, Syria, Turkey, Caucasus, Iraq, Arabia, Iran, Afghanistan, tropical and southern Africa, Malaysia, northern Australia.

7. **Fuirena** Rottb.

Caespitose perennials; culms straight or base ascending, with elongate internodes, pubescent above; leaves about as long as the internodes; sheaths papillose or pubescent; ligule present; blades pubescent; inflorescence of overlapping spikelets; spikelets with spirally arranged glumes; flowers bisexual, perianth-bristles or scales present or absent, stigmas 3; nutlet with persistent style-base. About 30 species, tropical and subtropical regions of the world.

1. Leaves 2-5 mm broad, papillose below; nutlet 1.4-1.5 mm — 1. **F. pubescens**
\+ Leaves 5-8 mm broad, both sides pubescent; nutlet 0.8-1 mm — 2. **F. ciliaris**

1. **Fuirena pubescens** (Poir.) Kunth, Enum. Pl. 182 (1837).
Syns. *Carex pubescens* Poir., Voy. Barbarie 2: 254 (1789).
Scirpus pubescens (Poir.) Lam., Tabl. Encycl. 1: 139 (1791).

Caespitose perennial 25-75 cm; rhizome horizontal, short; culms 1.5-2 mm diam., trigonous, with 4-7 internodes, the basal short, the distal pubescent or papillose; leaves 4-7, spreading, ± as long as the internodes, the lower often bladeless; lowest sheaths *c.* 1 cm, bladeless, soft, pubescent, the others to 5 cm, loosely fitting, papillose, glabrous or the upper pubescent; mouth slightly oblique, widely scarious; ligule *c.* 1.5 mm, scarious, light brown, the upper pubescent, ciliate; blades to 20 cm, 2-5 mm wide, longest in middle of the culm, keeled, flat, greyish-green; margins narrowly recurved, lower side papillose, apex trigonous, acute, pubescent; inflorescence of 4 sessile spikelets, if more, the lower pedunculate; peduncle short, pubescent, with tubular prophyll; bracts truncate, longer than the spikelets; spikelets 7-9.5 x *c.* 4 mm, with 40-50 glumes; prophyll *c.* 2.6 mm, 2-veined, pubescent; glumes 4.7-5.1 mm, cymbiform, pubescent, truncate, arista 1.5-1.7 mm, scabrous; perianth-bristles absent or diminutive; stamens 2-3; anthers *c.* 2.2 mm; nutlet 1.4-1.5 x 0.7-0.9 mm, obovoid, trigonous, edges rather sharp, sides convex, wrinkled when dry, white, glossy, finely reticulate, style-base *c.* 0.3 x 0.3 mm, trigonous, traberculate, white.

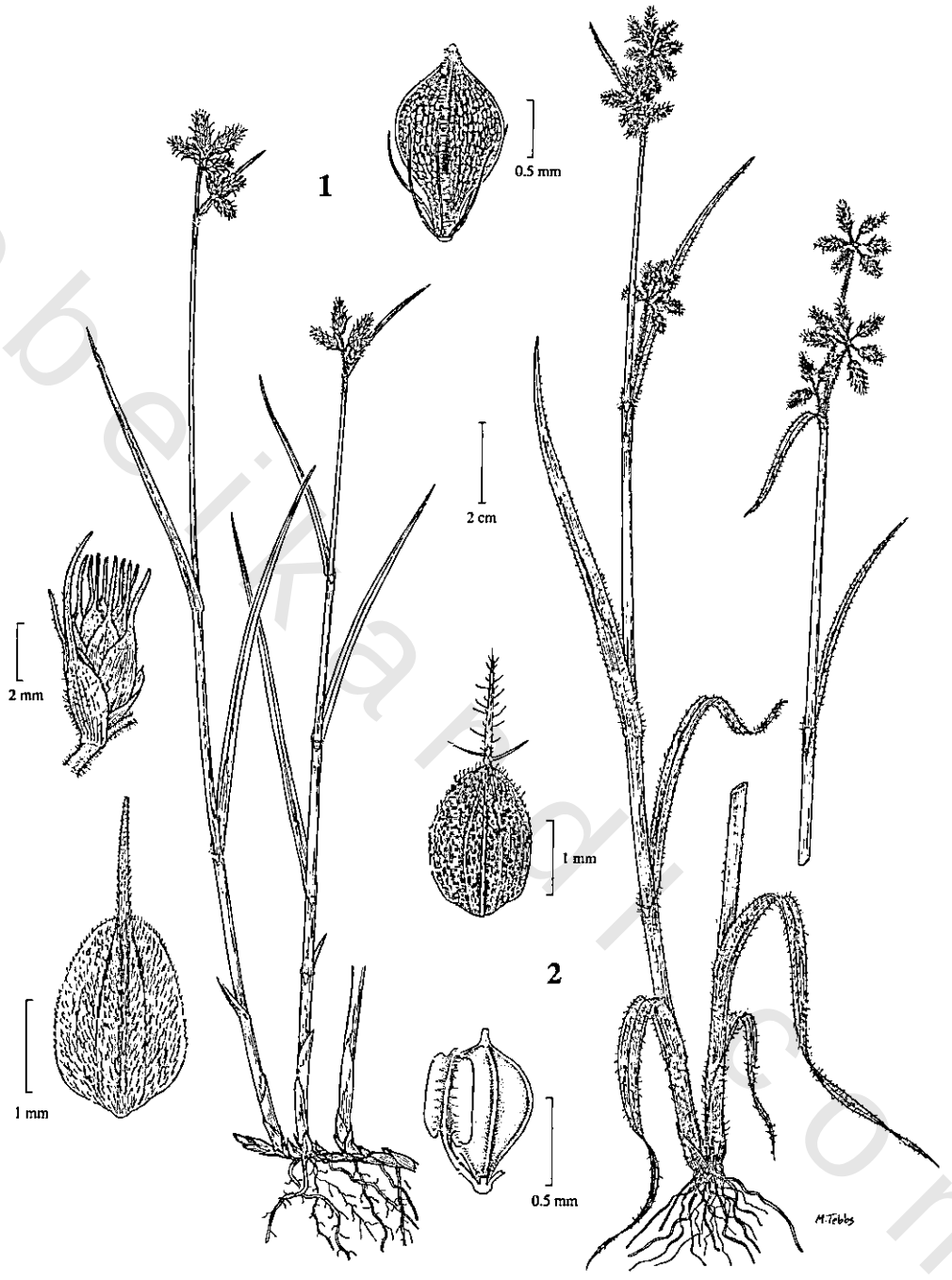


Plate 112. CYPERACEAE: *Fuirena pubescens* 1, habit; glume (down left); spikelet (middle left); nutlet with 3 perianth segments attached (up right). *Fuirena ciliaris* 2, habit; glume (middle left); nutlet with 1 perianth segment attached and 2 removed (down left). Drawn by Margaret Tebbs and Madgy El-Gohary.

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N, O, M; canal banks, moist ground. Portugal, Mediterranean region, eastwards to Afghanistan, Pakistan and northwest India, tropical and southern Africa.

2. **Fuirena ciliaris** (L.) Roxb., Fl. Ind. 1: 184 (1820).
Syn. *Scirpus ciliaris* L., Mant. 1: 182 (1767).

Tufted annual or perennial to 37 cm; rhizome short; culms 1-2 mm diam., with 3-4 internodes, obtusely trigonous, grooved, pubescent; lower leaf-blades short or reduced, the upper to 13 cm, much wider than the culm; sheaths to *c.* 3 cm, pubescent, green, later yellowish, mouth from almost straight to oblique; ligule 0.5-1 mm, forming a collar around the culm, line of attachment concave; blades 5-8 mm wide, flat, both sides pubescent, margins and apex smooth; inflorescence of 2-3 partial inflorescences, often 2 in the same leaf axil, peduncles to 4.5 cm, pubescent, with a puberulent, tubular prophyll; bracts ± equalling the inflorescence; partial inflorescences 0.8-1.2 x 1.2-2 cm, often wider than long, with 3-12 spikelets, compact or peduncles to *c.* 6 mm; spikelets to 1.2 x 0.3 cm, ovoid to cylindrical, blackish, with up to 100 or more spirally arranged glumes; spikelet bracts to 3.5 mm, truncate; prophyll *c.* 2.5 mm, rounded, pubescent; glumes to 3.5 mm, inclusive the arista to 1.7 mm; 3-veined, mid-vein extending to pubescent arista, sides with 2-3 veins, margins finely pubescent; flowers with 3 peduncled perianth-scales; peduncle *c.* 0.4 mm; scales *c.* 0.5 x 0.5 mm, 3-veined apiculate, yellowish or brown; stamens 2-3; anthers 0.5-0.8 mm; stigmas 3; nutlet 0.8-1 x *c.* 0.5 mm, ovoid to obovoid, trigonous, smooth, yellowish; sides convex, edges pronounced, smooth.

N; rice fields, moist depressions. Egypt, tropical Africa to Australia.

8. **Cyperus** L., nom. conserv.
Syns. *Papyrus* Willd., *Juncellus* (Griseb.) C. B. Clarke, *Chlorocyperus* Rikli, *Acorellus* Palla

Annuals with fibrous roots or rhizomatous perennials; culms trigonous, rarely terete; flowers bisexual or distally male only, distichously arranged in prophyllate spikelets; spikelets usually lanceolate in outline, ± flattened or elliptic in section, digitately or spicately arranged in rayed or sessile, simple or branched spikes, subtended by secondary bracts (bracteoles), the whole forming a 1-3 times branched umbel-like or capitate inflorescence, subtended by 1 or more whorls of 3 primary bracts; glumes falling before the rachilla and ± at the same time as the ripe nutlet; stamens 1-3; style 1; stigmas 3; nutlet trigonous or triquetrous, or stigmas 2 and then nutlet biconvex with its flat face towards the widened side of the rachilla. About 600 species, tropical and subtropical regions, extending to northern Central Europe and South Africa.

1. Culms with transverse septa, showing as rings when dry — 6. **C. articulatus**
+ Culms without transverse septa even when dry — 2

2. Bracts numerous (up to 25), subequal in length — 1. **C. alternifolius** subsp. **flabelliformis**
+ Bracts less numerous, unequal in length — 3

3. Primary branches of inflorescence 50 or more, subequal in length — 2. **C. papyrus**
+ Primary branches of inflorescence much less, unequal in length — 3

4. Spikelets spicately arranged along the rachis in ± elongated spikes 5
+ Spikelets digitately or very shortly spicately arranged in a central sessile head, with or without additional unbranched spikes 13

5. Spikes cylindric, oblong-cylindric or oblong 6
+ Spikes obovoid, rounded or fan-shaped, if oblong then bulb also present or stolons 8

6. Spikelets linear, nutlet 1 mm or more 3. **C. digitatus** subsp. **auricomus**
+ Spikelets oblong, oblong-lanceolate, or ovate; nutlet to 0.9 mm 7

7. Spikelets 1.5-2 mm broad; glumes with a distinct green keel above, excurrent in an excurved mucro to 0.5 mm; nutlet 0.6-0.7 x 0.4-0.5 mm 4. **C. imbricatus**
+ Spikelets 1-2.5 mm broad; glumes rounded or with a narrow keel, excurrent in a short straight mucro; nutlet 0.8-0.9 x 0.5-0.6 mm 5. **C. alopecuroides**

8. Culm base with bulb enclosed in a hard brown irregularly splitting scale 9
+ Culm base with or without tubers, when young covered by membranous scales soon disintegrating into fibres 10

9. Bulbs 0.5-1 cm diam.; bracts distinctly separated from one another, or only the lowest obvious; spikelets 2-3 mm broad; glumes 4-5 mm, mucronulate; nutlet 2 x 1.1-1.25 mm 11. **C. bulbosus**
+ Bulbs to 5 mm diam.; bracts close together; spikelets 3.5-4 mm broad; glumes 3-3.5 mm, with long excurved mucro to 0.5 mm; nutlet 1.1-1.5 x 0.5-0.8 mm 12. **C. microbolbos**

10. Plant rhizomatous but not bearing tubers 7. **C. schimperianus**
+ Plant with slender rhizome ending in tubers 11

11. Underground parts stoloniferous, soft, with pale scales, producing globose or ovoid tubers, smooth, hairy when old; culm thickened in the lower part by numerous leaf-sheaths but not swollen; spikelets in short spikes; glumes golden yellow to pale brown 9. **C. esculentus**
+ Underground parts rhizomatous, woody, with dark scales, soon becoming fibrous, producing ellipsoid tubers covered with dark fibres and persisting as hard swollen bases to the culms; glumes yellow to dark red-purple 12

12. Spikelets yellow-silvery or pale brown; glumes 2-2.5 x 1 mm, obtuse, very closely imbricate 10. **C. maculatus**
+ Spikelets ± colourless, straw-yellow or red-brown to dark red-purple or a mixture of those colours; glumes (2.5-) 2.75-4(-5) x *c.* 2 mm, obtuse-acute, not closely imbricate 8. **C. rotundus**

13. Inflorescence branched 14
+ Inflorescence capitate or pseudolateral 17

14. Spikelets 2.5 mm broad or more 15
+ Spikelets less than 2.5 mm broad 16

15. Annual with fibrous roots; nutlet sharply trigonous, equal sided 14. **C. compressus**
+ Perennial with sand-binding roots; nutlet concave-convex, only slightly angled ventrally 19. **C. conglomeratus**

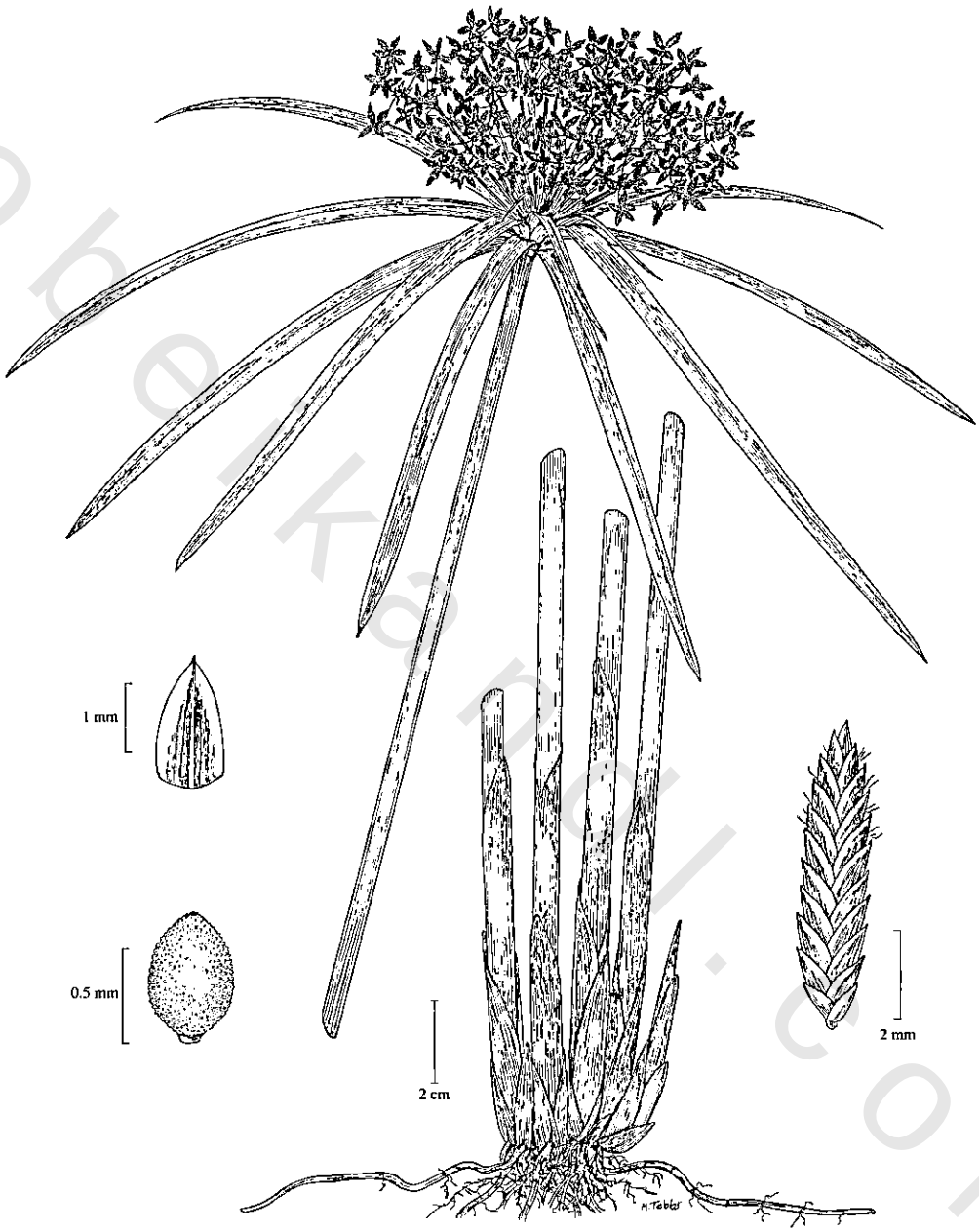


Plate 113. CYPERACEAE: *Cyperus alternifolius* subsp. *flabelliformis*, inflorescence and lower part; spikelet (right); glume (middle left); nutlet (down left). Drawn by Margaret Tebbs.

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16. Spikelets 1 mm diam.; glumes 0.5-0.7 x 0.6-0.9 mm, orbicular to broadly ovate, with straight mucro; nutlet 0.5 x 0.3 mm 15. **C. difformis**
\+ Spikelets *c.* 1.5 mm diam.; glumes 1-1.5 x 0.8-1 mm, ovate, with recurved mucro; nutlet 0.7-0.9 x 0.3-0.4 mm 16. **C. fuscus**

17. Annual; glumes distichously arranged, but seemingly irregular due to twisting of rachilla; stamens 1(-2) 13. **C. michelianus** subsp. **pygmaeus**
\+ Perennial; glumes distichous; stamens 3 19

18. Plant with ± bulbous base, leafy; inflorescence capitate; bracts 3-6, excurved or spreading; glumes 7-8 x 5-6 mm, excurrent into a mucro 0.5-1.5 mm; nutlet 3-3.5 x 1.5-2 mm, compressed; trigonous 18. **C. capitatus**
\+ Plant without bulbous base; leaves few, much reduced; inflorescence pseudolateral; bracts 2, the lowest erect and culm-like; glumes *c.* 2.2 x 2.2 mm, obtuse or with short incurved apicula; nutlet 1.2-1.5 x 0.7-1 mm, dorsiventrally plano-convex, rarely biconvex 17. **C. laevigatus**

1. **Cyperus alternifolius** L., Mant. 28 (1767).

Robust, tufted, blue-green perennial; roots reddish-brown, with numerous rootlets; rhizome creeping, short, thick, woody, covered with dark brown scales; culms clustered, 0.25-1.5 m, obtusely trigonous to subterete, with longitudinal ridges, thickened at base by leaf-sheaths and short black scales; leaf-sheaths long, loose, papery, ending in a triangular limb with acute apex; leaf-blades present only on the first sterile shoots; inflorescence umbel-like, 2-3 times branched, large; bracts 10-25, subequal, 13-40 x 0.4-1.5 cm, distinctly spaced, leafy, flat, much exceeding the branches, acuminate, glabrous-scabrid on margin and lower surface; primary branches 6-28, subequal, 3-10 cm; secondary branches 1-3 cm, with tertiary branches; spikes with 3-10 (-15) digitately arranged spikelets, broadly ovoid to spherical; rachis *c.* 1.5 mm; spikelets 0.3-1.2 x 0.1-0.3 mm, ovate to oblong-linear, compressed, acute, 10-40-flowered, shining greenish-yellow to pale brown; rachilla straight, quadrangular, wingless, persistent; glumes 1.5-2.4 x 1.2-1.4 mm, lanceolate to ovate, densely imbricate, acute, with 3-veined keel, excurrent in a short mucro, sides membranous, veinless, with hyaline margins; stamens 3; anthers 1-1.25 mm; style 1-1.2 mm; stigmas 3, long, papillose; nutlet 0.6-0.8 x 0.4-0.5 mm, broadly ellipsoid to slightly obovoid, minutely apiculate, broadly stipitate, minutely papillose, yellowish-brown.

One subspecies occurs in Egypt:

subsp. **flabelliformis** (Rottb.) Kük. in Engl., Pflanzenr. 101 (IV. 20): 193 (1936).
Syns. *Cyperus involucratus* Rottb., Deser. Pl. Rar. Progr. 22 (1772).
Cyperus flabelliformis Rottb., Dese. Ic. Nov. Pl. 42, t. 12, f. 2 (1773).
Cyperus gradatus Forssk., Fl. Aegypt.-Arab. 13 (1775).
Cyperus flabelliformis Rottb. var. *obtusangulus* Boeck, Linnaea 35: 566 (1868).

N; cultivated in gardens, also a garden escape. Tropical and South Africa (Natal), escape or cultivated elsewhere.

NOTE: According to Täckholm & Drar (1950) *Cyperus alternifolius* subsp. *flabelliformis* was introduced into Egypt during the reign of Khedive Ismail between 1870 and 1880,

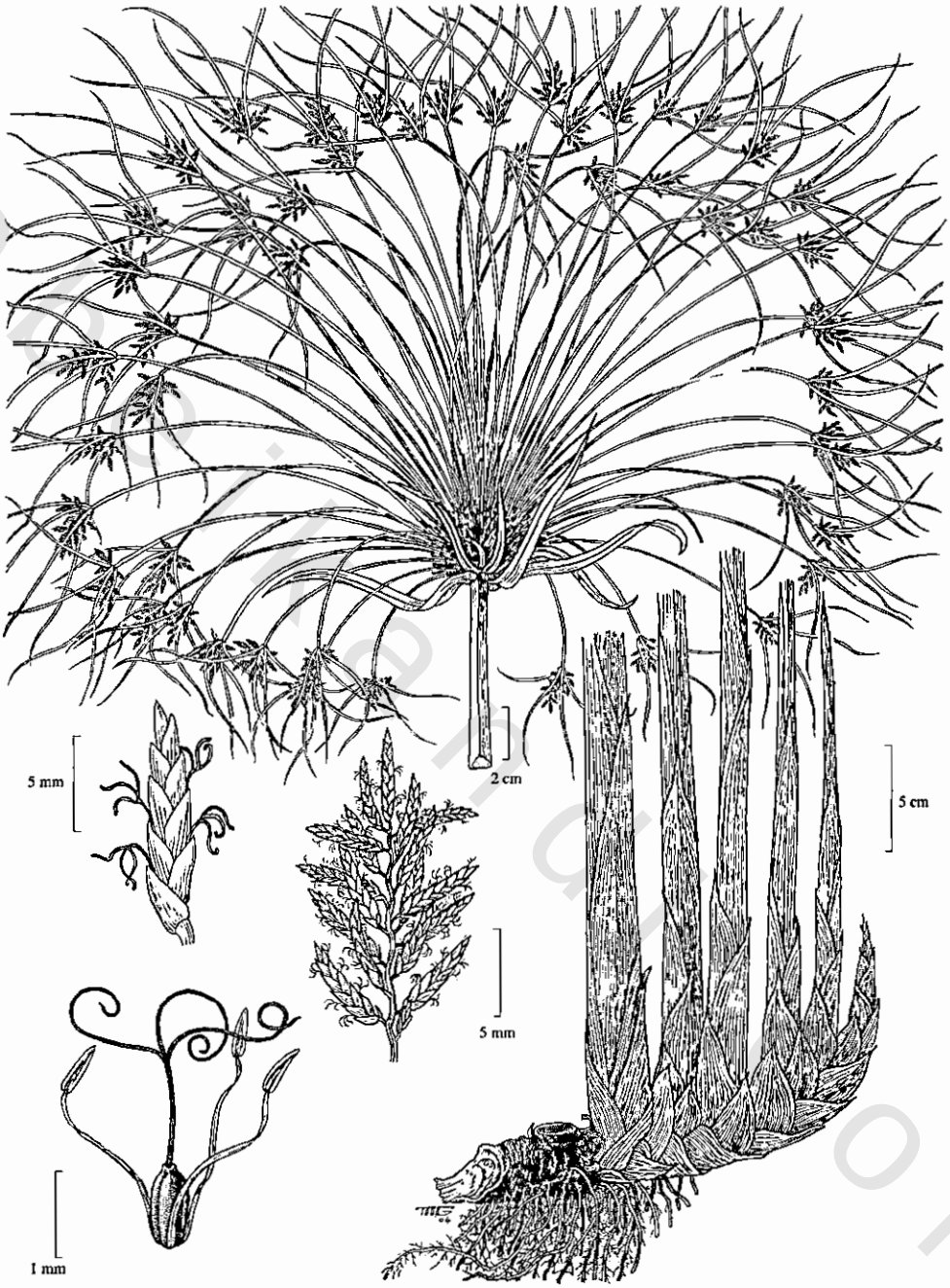


Plate 114. CYPERACEAE: *Cyperus papyrus* lower part with rhizome and inflorescence; spike, spikelet and flower (down left). Drawn by Magdy El-Gohary.

and was cultivated in public gardens. The plant is now a cultivated ornamental, and is also recorded as an escape of cultivation along canals and around ponds.

2. **Cyperus papyrus** L., Sp. Pl., ed. 1, 47 (1753).

Syns. *Chlorocyperus papyrus* (L.) Rikli, Pringsheims Jahrb. Wiss. Bot. 27: 563 (1895).

Papyrus antiquorum Willd., Abhandl. Akad. Wiss. Berlin 1812: 70 (1816) p. p.

Cyperus papyrus L. subsp *antiquorum* (Willd.) Chiov., Mem. R. Istit. Bot. Modena 1: 73, t. 2, f. 4 et t. 4, f. 4 (1931).

Cyperus papyrus L. subsp *hadidii* Chrtek & Slaviková, Preslia 49: 183 (1977).

Robust, tufted, glabrous perennial; roots numerous, with many rootlets; rhizome short, thick, creeping, woody, densely covered by blackish scales; culms 2-3 m, 1-5 cm diam., terete to triangular, with obtuse angles, spongy, smooth, thickened at base by leaf-sheaths, leafless, except the sterile shoots; leaf-sheaths papery, purplish-brown to blackish dorsally, narrow, membranous, red-dotted, splitting ventrally, ending in a triangular limb with acute apex, margins scabrid; inflorescence umbel-like, twice branched; bracts 4-10, 4-8 cm, lanceolate, acuminate, margins scabrid; primary branches 50-100(-150), subequal, 10-50 cm, often sterile, slender, triangular to terete with tubular prophylls 2-5 cm; bracteoles 3-5, filiform, margins scabrid, the 3 longest 4-10 cm x 0.5-1.5 mm, often exceeding the spike-cluster; secondary branches 3-5, 0-4 cm; spikes 1-2.5 x 0.6-1.2 cm, digitate oblong-cylindrical, with numerous erect-patent to patent spikelets; rachis with small ridges below each spikelet; spikelets 3-8 x 0.7-1 mm, spicately arranged, linear, subterete, acute, 6-16-flowered, pale to golden brown; rachilla flattened, winged, persistent; glumes 1.5-2 x 1-1.3 mm, elliptic-ovate, ± densely imbricate, with a green 3-veined keel ending below the obtuse or mucronulate apex, sides golden to pale brown, with 2 parallel veins and broad hyaline, yellow, veinless margin, decurrent into membranous golden, oblong wings; stamens 3; anthers 1-1.3 mm; style *c.* 1 mm; stigmas 3; nutlet 0.7-1 x 0.3-0.5 mm, oblong-triangular, with obtuse angles, shortly apiculate, yellowish to brown.

N (Damietta), O (Wadi Natrun), also cultivated in garden ponds. Native to tropical Africa, Madagascar, Mascarene Islands, cultivated elsewhere.

3. **Cyperus digitatus** Roxb., Fl. Ind. 1: 209 (1820).

Robust tufted perennial; roots wiry, pale; rhizome to 1.2 cm diam., woody, creeping, covered with brown scales or its black fibrous remains; culms 0.5-1.5 m, 0.3-1 cm diam., sharply trigonous, with concave sides, smooth, leafy and thickened below the sheaths; leaves few, basal, shorter than the culm; leaf-sheaths papery, yellow to purplish or brown on dorsal side, splitting on the membranous, red-dotted ventral side; ligule absent; leaf-blade 0.4-1.2 cm broad, flat, glaucous on the long acuminate tip, scabrid on midrib and margins; inflorescence umbel-like, once branched; bracts 3-6, to 60 cm, leaf-like, erect or spreading; primary branches 2-5(-8), unequal, 0.5-15 cm, smooth, often terete; spikes 1-5 x 0.8-2 cm, digitately arranged, lax, oblong, rarely cylindric, with numerous spreading, spicately arranged spikelets; rhachis golden, smooth; spikelets 0.4-2(-2.4) cm x 0.8-1(-1.5) mm, crowded, erect-patent to patent, linear, acute, slightly compressed, 6-36-flowered; rachilla straight, persistent; glumes 1.7-2.5 x *c.* 1 mm, ovate-elliptic, obtuse, with green keel excurrent in a short mucro, sides with 2 parallel veins and wide

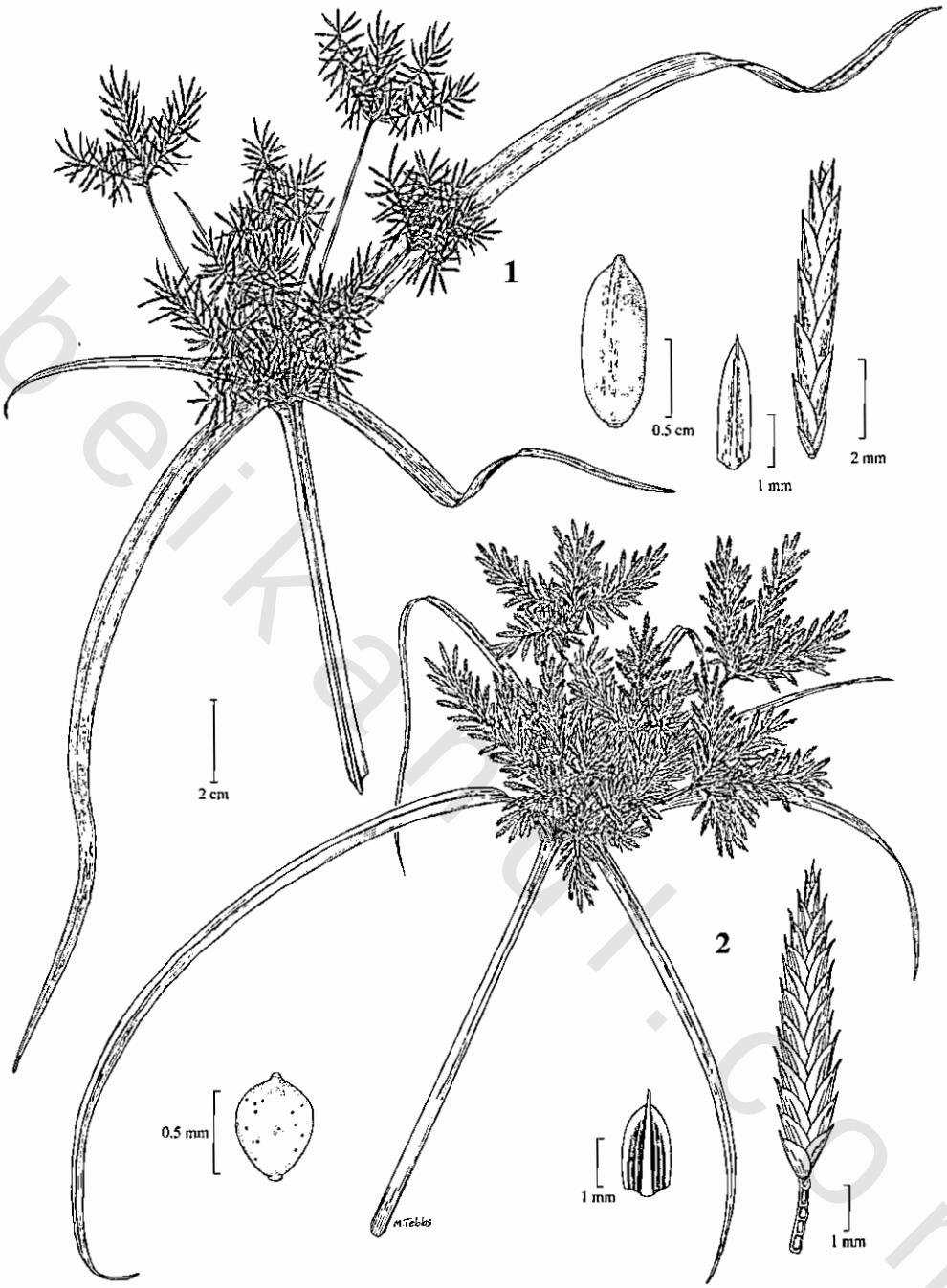


Plate 115. CYPERACEAE: *Cyperus digitatus* subsp. *auricomus* 1, inflorescence; nutlet (right); glume and spikelet (further right). *Cyperus imbricatus* 2, inflorescence; glume (down right); spikelet (further right); nutlet (left). Drawn by Margaret Tebbs.

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veinless margins, decurrent in oblong golden wings; stamens 3; anthers *c.* 1.25 mm; style *c.* 1.5 mm; stigmas 3; nutlet 1-1.4 x 0.3-0.4 mm, oblong to narrowly ellipsoid, minutely apiculate, shortly stipitate, slightly papillose, olive-green to dark brown.

One subspecies occurs in Egypt:

subsp. **auricomus** (Sieb. ex Spreng.) Kük., Bot. Notiser 1934: 65 (1934).
Syns. *Cyperus ornithopodioides* Delile, Descr. Egypte, Hist. Nat. Ill. 50 (1814), nom. nud.
Cyperus auricomus Sieb. ex Spreng., Syst. Veg. 1: 230 (1824).
Cyperus digitatus Roxb. subsp. *auricomus* (Sieb. ex Spreng.) Kük. var. *abbreviatus* Kük. in Engl., Pflanzenr. 101 (IV. 20): 58 (1935).

N, M; marshes, ditches, canal banks. Widespread throughout Africa, Madagascar, northern Australia.

4. **Cyperus imbricatus** Retz., Obs. Bot. 5: 12 (1788).
Syns. *Cyperus radiatus* Vahl, Enum. Pl. 2: 369 (1806).
Cyperus involucratus Poir. in Lam., Encycl. 7: 253 (1806).
Cyperus verticillatus Roxb.. Fl. Ind. 1: 209 (1820).
Cyperus digitatus Nees in Wight, Contrib. Bot. Ind. 85 (1834), non Roxb. (1820).

Robust tufted perennial; rhizome short, thick, woody; roots fleshy, reddish-brown; culms 0.25-1.2 m, 0.3-1 cm diam., slender, glabrous; leaves few, basal, shorter than the culms; leaf-sheaths short, papery dorsally, purplish brown, membranous ventrally, red-dotted and splitting; ligule absent; leaf-blade flat or folded, 3-8 mm wide, pale green beneath, gradually acuminate, margins scabrid; inflorescence capitate or umbel-like and once or twice branched; bracts 3-6, leaf-like, 15-50 cm, slightly wider than leaves, erect or spreading; primary branches 3-8, unequal, 0-20 cm, terete to compressed-terete, smooth; secondary branches absent or very short; spikes 1.5-3(-3.5) x 0.5-1 cm, digitately arranged, oblong to cylindric, sessile or subsessile, with up to 70 spikelets per spike; rhachis hidden by the spikelets, glabrous; spikelets 3-12 x 1.5-2 mm, spicately arranged, oblong, compressed, with up to 50 flowers; rhachilla ± quadrangular in cross-section, persistent; glumes 1-1.5 x *c.* 1 mm, ovate, densely imbricate, obtuse, with a narrow distinct, green 3-veined keel above, excurrent into recurved mucro to 0.5 mm, the sides reddish to golden, veinless, decurrent into narrow hyaline wings; stamens 3; anthers *c.* 0.3 mm; style *c.* 0.3 mm; stigmas 3, short; nutlet 0.6-0.7 x 0.4-0.5 mm, obovoid to ellipsoid, trigonous with acute angles, minutely apiculate, shortly stipitate, irregularly pitted, glossy, reddish-yellow.

N; Nile banks. Egypt, tropical Africa, Madagascar, Seychelles, Afghanistan, India, Sri Lanka, Myanmar, China, East Indies, Philippines, Central and South America.

5. **Cyperus alopecuroides** Rottb., Descr. Pl. Rar. Progr. 20 (1772).
Syns. *Cyperus fastigiatus* Forssk., Fl. Aegypt.-Arab. 14 (1775).
Cyperus dives Delile, Descr. Egypte, Hist. Nat. 149, t. 4, f. 3 (1814).
Juncellus alopecuroides (Rottb.) C. B. Clarke, Fl. Br. Ind. 6: 595 (1893).
Chlorocyperus alopecuroides (Rottb.) Grossh., Fl. Kavkaz. 1: 150 (1928).

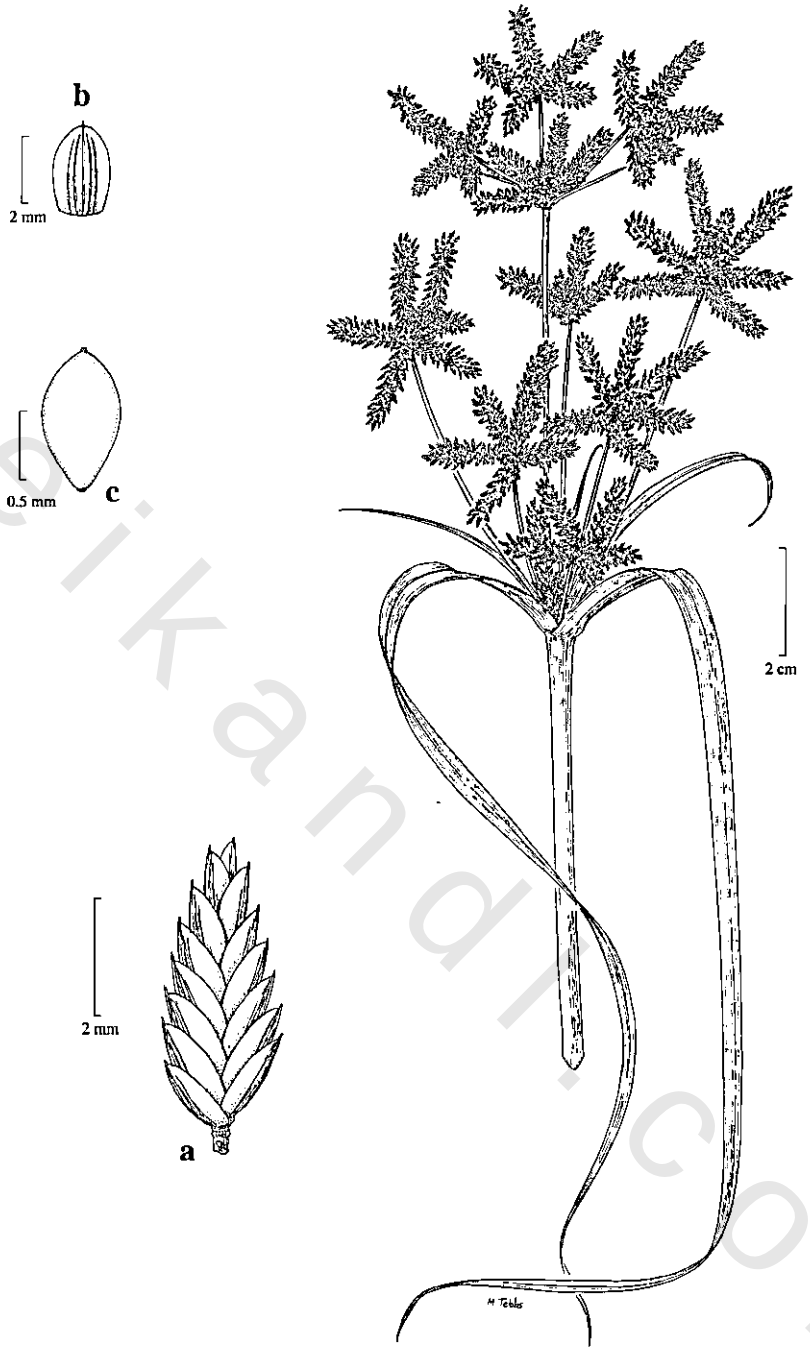


Plate 116. CYPERACEAE: *Cyperus alopecuroides*, inflorescence; spikelet (a); glume (b); nutlet (c). Drawn by Margaret Tebbs.

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Robust tufted perennial, with fleshy roots; rhizomes short, thick, woody; culms 0.9-1.5 m x 0.4-1 cm, generally solitary, stout, trigonus, leafy and thickened below by sheaths and intravaginal shoots; leaves shorter than the culms; leaf-sheaths papery; ligule absent; leaf-blades 0.5-1.5 cm wide, flat or folded, bright green above, pale green beneath, scabrid on the margin and upper surface, the midrib beneath and lateral veins above forming ridges; inflorescence umbel-like, 1-2 times branched, rarely capitate; bracts 4-7, leaf-like, to 70 cm; primary branches 5-10, unequal, to 25(-30) cm, smooth, subterete to trigonous below the spikes; secondary rays absent or short; spikes 1.5-5 x 0.5-1.5 cm, digitate, oblong-cylindric; rhachis hidden by numerous densely sessile spikelets; spikelets 3-7(-9) x 1-2.5 mm, spicately arranged, ovate to oblong-lanceolate, acute, slightly compressed, 6-25(-30)-flowered, reddish to golden; rhachilla straight, ± quadrangular in cross-section; glumes 1.4-1.7(-2) x *c.* 1 mm, ovate-elliptic, very densely imbricate, keel flat, broad, green, 3-7-veined, excurrent into a short straight mucro, the sides thin, veinless, golden with reddish stripes, enrolled in fruit, with narrow, white, decurrent wings; stamens 2 or 3; anther *c.* 0.8 mm; style 0.75 mm; stigmas 2(-3), papillose; nutlet 0.8-0.9 x 0.5-0.6 mm, ellipsoid to slightly obovoid, compressed, plano-convex or unequally 3-sided, minutely apiculate, shortly stipitate, minutely reticulate, glossy, golden-yellow to brown.

N, M, De; Nile and canal banks, drains, ditches, pools, lakes, rice fields, marshy ground. Macaronesia, eastern Mediterranean region, Iraq, Caucasus, Arabia, India, Malaysia, tropical and southern Africa, Madagascar, Seychelles, West Indies (Gaudeloupe Islands), tropical Australia.

NOTE: *Cyperus dives* was described as having long inflorescence branches, narrow keeled glumes, 3 stamens, 3 stigmas and 3-sided nutlets. *Cyperus alopecuroides* was described as less robust than *C. dives,* having short branches, broad and flat, keeled glumes, 2 stamens, 2 stigmas and plano-convex nutlets. These characters are not constant. Many specimens were examined in which flowers on the same plant were found to have 2 or 3 stigmas, or 1 of the 2 stigmas branched, and the nutlet is either plano-convex or unequally 3-sided. Therefore both species are treated here as conspecific and *Cyperus dives* is listed as a synonym of *Cyperus alopecuroides.*

6. **Cyperus articulatus** L., Sp. Pl., ed. 1, 44 (1753).
   Syns. *Cyperus niloticus* Forssk., Fl. Aegypt.-Arab. 13 (1775).
   Chlorocyperus articulatus (L.) Rikli, Pringsheims Jahrb. Wiss. Bot. 27: 563 (1895).
   Cyperus articulatus L. var. *fistulosus* Kük. in Engl., Pflanzenr. 101 (IV. 20): 79 (1935).

Glabrous, robust, leafless rhizomatous perennial; roots brownish, with numerous long rootlets; stolon 2-9 mm diam., often woody, covered with scales or its remains of fibres; scales to 3 cm, ovate-lanceolate, with brown veins, purplish-brown to blackish; culms 0.7-1.6 m, 0.4-1.2 cm diam., terete, rarely flattened, gradually narrowed towards the inflorescence, stout, smooth, pith filled with transverse septa at 1-6 cm intervals, showing as rings when dry; leaves represented only by 2-5 leaf-sheaths; leaf-sheaths loose, papery; inflorescence umbel-like, 1-2 times branched; bracts often 3, 1-1.5(-2) cm, broadly lanceolate, ± equal, with acute tip and membranous red-dotted margin; rays 6-15(-20), unequal; primary branches 1-15 cm, terete to flattened, slender; spikes broadly ovoid to rounded, with numerous subdigitately arranged spikelets; rhachis to 4 mm, smooth; spikelets 0.5-4.5 x 0.1-0.2 cm, linear, compressed, acute, glossy, yellowish to

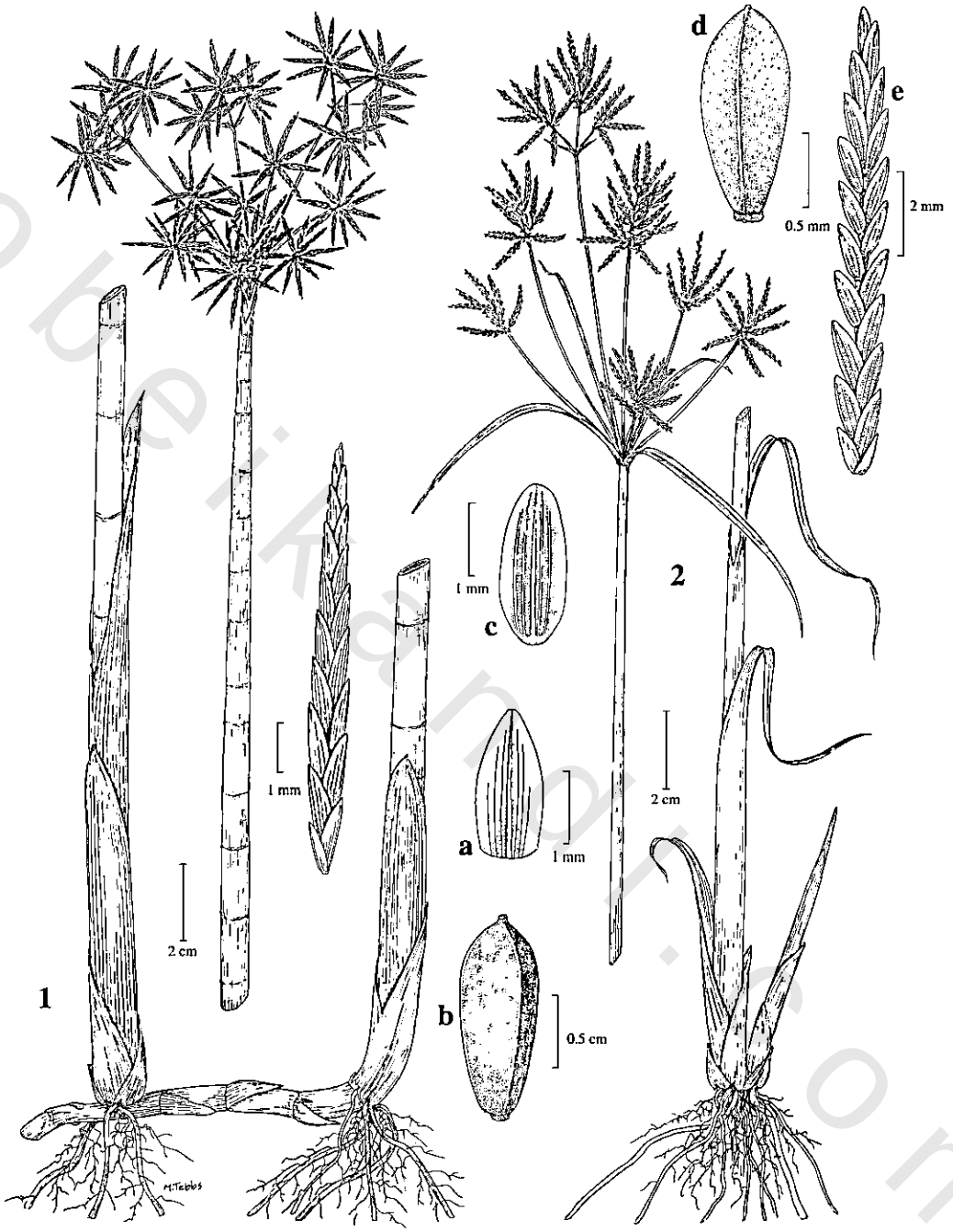


Plate 117. CYPERACEAE: *Cyperus articulatus* 1, inflorescence and lower part; spikelet (within); glume (a); nutlet (b). *Cyperus schimperianus* 2, inflorescence and lower part; glume (c); nutlet (d); spikelet (e). Drawn by Margaret Tebbs.

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pale brown, to 52-flowered; rhachilla persistent, winged, wings oblong or elliptic, membranous, persistent and connected with rhachilla; glumes 2.5-3 x *c.* 1.5 mm, ovate, imbricate, with narrow green keel ending below the obtuse apex; with 3 veins on each side; stamens 3; anthers *c.* 1 mm; style *c.* 0.4 mm; stigmas 3, long; nutlet 1.3-1.5 x 0.4-0.6 mm, oblong-ellipsoid, equally trigonous with acute angles and flat faces, minutely apiculate, stipitate, smooth, glossy, dark brown to purplish-black.

N, M, De, S: canal banks, lakes, pools, marshy ground. Egypt, tropical Africa, Madagascar, Mauritius, Reunion, Seychelles, Arabia, Palestine, India, North and Central and South America.

7. **Cyperus schimperianus** Steud., Synop. Pl. Cyp. 34 (1854).
Syns. *Cyperus truncatus* A. Rich.. Tent. Fl. Abyss. 2: 487 (1851), non Turcz (1838).
Cyperus tegetum C. B. Clarke, J. Linn. Soc. 21: 160 (1884), p.p., non Roxb. (1832).

Robust rhizomatous perennial, without tubers; roots brown, with long dense rootlets; rhizomes 0.5-1 cm diam., woody, purplish-brown, bearing purplish-veined dark brown scales; culms 0.3-1.2 m, 1-5 mm diam., almost terete to triquetrous below the inflorescence, thickened at base by leaf sheaths, ridged; leaves few, basal, shorter than culm; leaf-sheaths long, rather wide, papery, soon splitting, only the upper ones carrying blades; ligule absent; leaf-blades 2-20 x 0.2-0.4 cm, flat, gradually acuminate, margins scabrid on the upper part; inflorescence umbel-like, 1-2 times branched; bracts 4-7, to 30 cm, erect or spreading, the lowest much exceeding the branches; primary branches 5-10, to 8(-14) cm, terete; spikes ovoid, with few subdigitately arranged spikelets; rhachis 0.3-1.5 cm, glabrous; spikelets 0.5-2(-2.7) cm x 1.5-2(-2.5) mm, linear-oblong, obtuse, compressed, with up to 24 flowers, pale to red blackish-brown, often drooping; rhachilla persistent, winged, wings narrowly-oblong, separating from the glume, finally deciduous; glumes 1.5-2.8(-3) x 1 (-1.5) mm, ovate-lanceolate, obtuse, loosely imbricate, with a very narrow green keel, with 2 veins and narrow hyaline margins especially above; stamens 3; anthers to 2.5 mm; style to 2.5 mm; stigmas 3; nutlet 1.4-1.6 x 0.5-0.8 mm, ellipsoid, trigonous, clearly stipitate, papillose, yellowish-brown, rarely produced.

N, M; marshes, alluvial banks, rocky damp ground. Egypt, tropical Africa especially the Nile region in Sudan, Ethiopia, Kenya, Uganda, Tanzania, also in Zaïre.

8. **Cyperus rotundus** L., Sp. Pl., ed. 1, 45 (1753).

Perennial rhizomatous, with woolly brownish roots; rhizomes 1-5 mm diam., numerous, creeping, wiry, purplish-brown, bearing purple-veined, red-brown scales or their fibrous remains, ending in a swollen ellipsoid, woody tuber *c.* 2.5 x 1.2 cm, covered with fibres; culms 0.15-1.3 m, 1-4(-6) mm broad, rigid, triquetrous, or terete to triquetrous below inflorescences, ridged; leaves several, basal, crowded or cauline, shorter or longer than culms; leaf-sheaths short to rather long, dorsally papery, ridged, ventrally membranous, red-dotted, soon splitting; ligule very small or absent; leaf-blades 2-7(-9) mm wide, flat, gradually acuminate, margins scabrid in the upper part; inflorescence umbel-like,1-2 times branched; bracts 3-9, leaf-like, unequal, the 2-3 longest generally exceeding the branches; primary branches 3-9, unequal, 0.5-5(-13) cm, compressed, smooth; spikes ovoid to fan-shaped, lax, with few subdigitately arranged spikelets; rhachis glabrous or slightly scabrid, flexuose, sometimes with short or long secondary rays; spikelets 1-4(-6) x *c.* 0.2 cm, to 40-flowered, compressed, acute, becoming obtuse in fruit, ± colourless,

straw-yellow to purple-red; glumes (2.5-)2.8-4(-5) x *c.* 2 mm, ovate-elliptic or oblong-lanceolate, thin except for the green, minutely excurrent 3-veined keel, each side with 2-3 parallel veins; margins hyaline or red-dotted persistent wing to the node below; stamens 3; anthers 1.5-2.5 mm; style *c.* 1 mm; stigmas 3; nutlet 1.1-1.8(-2) x 0.5-1 mm; ellipsoid to oblong, with flat faces sharp angles, minutely apiculate, smooth, red to dark brown or black, rarely produced.

Two varieties occur in Egypt:

1. Leaves often basal, with short leaf-sheaths; glumes ovate-elliptic, obtuse; bracts to 2 times longer than primary inflorescence branches; spikelets almost colourless to dark red-brown var. **rotundus**
+ Leaves often cauline, with long leaf-sheaths; glumes oblong to lanceolate, obtuse to acute; bracts 2-4 times longer than primary inflorescence branches; spikelets almost colourless or brown with a little mixture of red var. **fenzelianus**

var. **rotundus**

Syns. *Cyperus tuberosus* Rottb., Descr. Pl. Rar. Progr. 18 (1872) et Descr. Ic. Rar. Nov. Pl. 28, t. 7, f. 1 (1773).
Cyperus hexastachyos Rottb., Descr. Ic. Rar. Nov. Pl. 28, t. 14, f. 2 (1773).
Cyperus comosus Sibth. & Sm., Fl. Graec. Prodr. 1: 31, f. 44 (1806).
Cyperus rotudnus L. var. *macrostachyos* Boiss., Fl. Orient. 5: 377 (1882).
Cyperus rotundus L. forma *comosus* (Sibth. & Sm.) K. Richter, Pl. Europ. 1: 135 (1890).
Cyperus subcapitatus C. B. Clarke, Fl. Br. Ind. 6: 616 (1893).
Chlorocyperus rotundus (L.) Palla, Allg. Bot. Zeit. 6: 61 (1900).
Cyperus rotundus L. var. *subcapitatus* (C. B. Clarke) Kük. in Engl., Pflanzenr. 101 (IV. 20): 112 (1935).

Rhizomes 1-2 mm diam., culms often triquetrous; leaves often basal with short leaf-sheaths; bracts to 3 times longer than branches; spikelets few per spike, pale to dark red-purple; glumes ovate-elliptic, obtuse, with 2 parallel veins on each side.

N, O, M, D, R, GE, S; cultivated fields, orchards, gardens, moist ground, canals, roadsides, waste land. Tropical and subtropical regions.

var. **fenzelianus** (Steud.) Habashy in Boulos, Fl. Egypt Checklist 213 (1995).

Syns. *Cyperus fenzelianus* Steud., Syn. Pl. Cyp. 33 (1854).
Cyperus ochreoides Steud., Syn. Pl. Cyp. 34 (1854).
Cyperus pallescens Boiss., Fl. Orient. 5: 376 (1882), non Desf. (1798).
Cyperus longus L. var. *pallidus* Boeck, Linnaea 36: 280 (1870).
Cyperus longus L. var. *pallescens* C. B. Clarke, J. Linn. Soc. 21: 164 (1844), excl. syn. *C. mitis* Steud.

Similar to var. *rotundus,* but rhizomes to 5 mm diam., culms terete, triquetrous below inflorescence; leaves cauline, with long leaf-sheaths; bracts twice longer than branches; spikelets many per spike, almost colourless to 2-coloured (brown with a little mixture of red); glumes oblong-lanceolate, obtuse-acute, with 2-3 parallel veins on each side.

N, O, M, D; cultivated, waste and moist grounds, orchards, gardens, canal banks. Egypt, northern and northwest tropical Africa, India, Arabia, naturalized elsewhere.

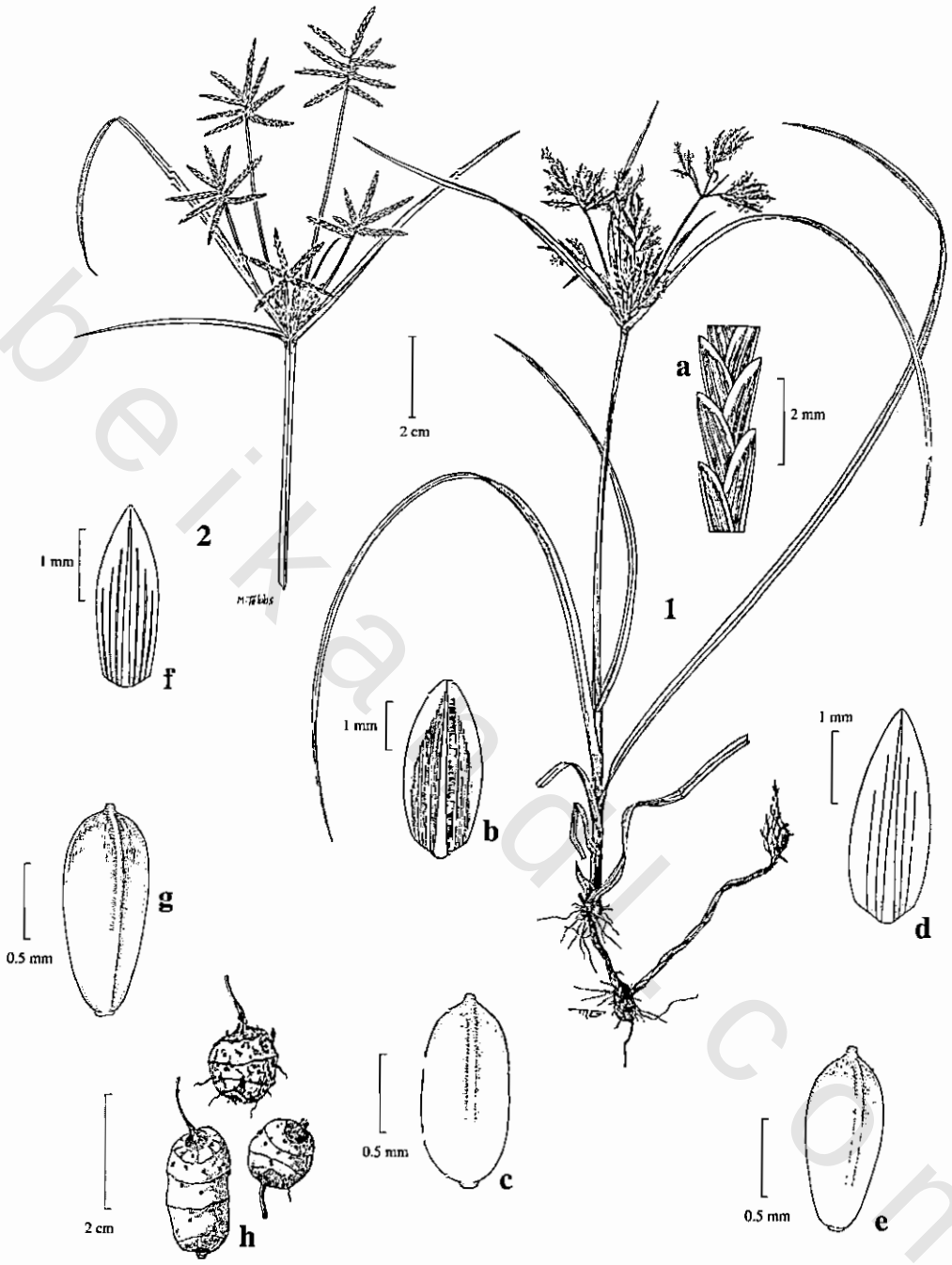


Plate 118. CYPERACEAE: *Cyperus rotundus* 1, habit; part of spikelet (a); var. *rotundus*: glume (b), nutlet (c); var. *fenzelianus*: glume (d), nutlet (e). *Cyperus esculentus* 2, inflorescence; glume (f), nutlet (g), tubers (h). Drawn by Margaret Tebbs and Magdy El-Gohary.

NOTE: *Cyperus rotundus* is a well-known invasive weed of the tropics and subtropics. It is polymorphic and readily propagates vegetatively, perennating by tubers.

9. **Cyperus esculentus** L., Sp. Pl., ed. 1, 45 (1753).
Syns. *Cyperus aureus* Ten., Fl. Napol. 1: 8 (1811).
Cyperus melanorhizus Delile, Descr. Egypte, Hist. Nat., Illustr. 50 (1814).
Cyperus tenorii Presl ex Link, Hort. Reg. Bot. Berol. 1: 318 (1827).
Cyperus tenorianus Roem. & Schult., Syst. Veg. II, 2 Mant. 544 (1827).
Cyperus buchananii Boek., Cyper. Nov. 1: 4 (1888).
Chlorocyperus aureus (Ten.) Palla, Allg. Bot. Zeitschr. 9: 69 (1903).
Pycreus esculentus (L.) Hayek, Feddes Repert. 30 (3): 147 (1932).

Glabrous, robust, stoloniferous perennial; roots fibrous, pale to dark brown; stolons numerous, 0.5-1.5 mm diam., slender, soft, covered with ovate-lanceolate acute, purple-veined scales, ending in ovoid to globose tubers to 1 cm diam., yellow or light brown, transversely ringed, smooth or hairy when old; culms 15-60 x 0.15-0.45 cm, triquetrous, rigid, erect, smooth, slightly thickened at base by several leaf-sheaths, but not swollen; leaves few to numerous, basal, rigid, usually shorter than the culm, sometimes equalling or exceeding the culm; leaf-sheaths often short, papery dorsally, hyaline ventrally, with red dots, becoming fibrous with age, veined with purple; ligule absent; leaf-blade to 9 mm wide, flat, erect or spreading, with 2 parallel margins, suddenly acuminate, often with a rounded tip, scabrid at the upper part; inflorescence umbel-like, 1-2 times branched; bracts 3-9, unequal, longest to 17 cm, erect or spreading, slightly exceeding the branches; bracteoles usually long; primary rays 3-10, unequal, to 11(-15) cm; spikes ovoid, with few to numerous spicately arranged spikelets; rhachis weakly scabrid; spikelets 0.5-2.4 cm x 1-2(-3) mm, linear-oblong acute, becoming obtuse in fruit, ± compressed, 32-flowered, golden-yellow to pale brown; rhachilla slightly flexuous, quadrangular, persistent, winged, wings transparent or red-dotted; glumes 2-3 (-3.75) x 1.5-1.8 mm, ovate to elliptic, imbricate when young, spreading with age, truncate at base, with narrow keel, obtuse or minutely mucronate, margin hyaline especially above; with 3 or more raised parallel veins on each side, the margins veinless; stamens 3; anthers to 2 mm, linear; style to 2 mm; stigmas 3; nutlet 1.5-1.8 x 0.7-1 mm, obovoid to ellipsoid, trigonous, apiculate, stipitate, very finely dotted, glossy, greyish-brown.

N, M, GE; Moist ground, rice fields, also cultivated in sandy soils. Cape Verde Islands, Madeira, Azores, southern and southwestern Europe, southwest Russia, Egypt, Palestine, Syria, Turkey, Caucasus, Iran, India, Maldive Islands, Malaysia, Australia, tropical Africa, Madagascar, Mauritius and North, Central and South America.

10. **Cyperus maculatus** Boek. in Peters, Naturw. Reise Mossamb. Bot. 6 (2): 539 (1864).
Syn. *Cyperus longus* L. var. *maculatus* (Boeck.) Boeck., Linnaea 36: 282 (1870).

Rhizomatous, bulbous glaucescent perennial; roots dense, with many rootlets; rhizome 0.1-2.5 cm diam., numerous, creeping, slender, purplish-brown, bearing purple-veined, reddish-brown scales or their fibrous remains, basal parts of the plant swollen, woody; culms 15-55 x 0.1-0.3 cm, subterete to triangular below inflorescence, rigid, ridged, glaucous; leaves few, basal, crowded, shorter or ± equalling the culms; leaf-sheaths short, dorsally papery, ridged, ventrally membranous; red-dotted; ligule absent; leaf-blade 1.5-3 mm wide, flat, glaucous, gradually acuminate, margins scabrous in the upper part; inflorescence umbel-like, once, rarely 2 times branched; bracts 3-5, leaf-like,

unequal, the longest to 30 cm; branches 1-6, to 6 cm, terete, smooth; spikes broadly ovoid, lax to dense, with subdigitate erect to spreading spikelets; rhachis to 1 cm, flexuous, glabrous, sometimes with short secondary branches; spikelets 1-5 x 0.1-0.2 cm, linear, to 55-flowered, acute, becoming obtuse in fruit, straight or curved, yellow-silvery to pale brown; sometimes dark-spotted, compressed; rhachilla persistent, with narrow, transparent wings; glumes 2-2.5 x 1 mm, ovate-elliptic, very closely imbricate, not spreading even in fruit, obtuse, with narrow green-yellowish keel, with 2 parallel veins and broad to narrow hyaline margins; stamens 3; anther to 1.5 mm; style *c.* 1 mm; stigmas 3; nutlet 1-1.2 x 0.4-0.6 mm, ellipsoid-oblong, trigonous, with flat faces and sharp angles, minutely apiculate, stipitate, smooth, brown.

N, O (Dakhla); Nile banks, marshes, moist ground. Egypt, tropical Africa, Madagascar.

11. **Cyperus bulbosus** Vahl, Enum. Pl. 2: 342 (1806).
Syns. *Cyperus jeminicus* Retz., Obs. Bot. 4: 11 (1786), non Rottb. (1772).
Cyperus polyphyllus Vahl, Enum. Pl. 2: 317 (1806).
Cyperus bulbiformis A. Dietr., Sp. Pl., ed. 6, 2: 324 (1833).
Cyperus rotundus Kunth, Enum. Pl. 2: 58 (1837) p.p., non L. (1753).

Glabrous, stoloniferous and bulbous perennial; culms solitary or branched; roots brown; stolons numerous, capillary, with yellow to brownish scales; bulb 0.5-1 cm diam., ovoid, formed at the end of stolons, obvious in young plants, enclosed in a hard dark brown to black striate coat which splits irregularly into lanceolate valves; culms (5-)10-30 cm x 0.5-1 mm, arising from the bulbs, often branched, compressed-triquetrous, erect, slender, smooth; leaves numerous, basal, equaling or exceeding the culm; leaf-sheaths often long, papery dorsally, with purplish veins, hyaline ventrally with red dots; ligule absent; leaf-blade 1-4 mm wide, flat, often recurved, apex caudate, margins scabrid in the upper parts; inflorescence umbel-like, once branched, compact, of 1 terminal sessile spike, the largest spike with longest rhachis, and 3-6 short branches to 4 cm; bracts 3-6, leaf-like, unequal, distinctly separated from each other or only the lowest obvious, the lowest to 15 cm, exceeding the branches; spikes oblong, with up to 20 spicately arranged spreading spikelets; rhachis to 3 cm; spikelets 0.5-1.2 cm x 2-3 mm, linear, acute, compressed, dark reddish-brown, to 14-flowered; rhachilla flexuous, fragile, broadly winged; wings persistent, membranous, yellow glumes 4-5 x 2 mm, oblong-ovate to lanceolate, acute, minutely mucronulate, with narrow yellowish-green keel, shiny reddish many-veined sides and very narrow hyaline margins; stamens 3; filaments membranous; anthers 1.2-2 mm, linear; style to 4 mm, slender; stigmas 3; nutlet 2 x 1.1-1.25 mm, obovoid to ellipsoid, trigonus with acute angles to compressed-trigonus with obtuse angle, apiculate, minutely papillose, black, with white silica bodies.

GE; moist rocky hillsides and wadis. Southeast Egypt, tropical Africa, Arabia, Iran, Pakistan, India, Sri Lanka, Malaysia, Australia.

12. **Cyperus microbolbos** C. B. Clarke in Dyer, Fl. Trop. Afr. 8: 354 (1902).

Glabrous slender, stoloniferous perennial, with basal bulb; roots pale brown; stolons numerous, capillary, easily confused with the roots, covered by yellowish-brown scales, terminating in a minute ovoid to ellipsoid bulb to 5 mm diam., enclosed in a hard shining dark brown to black striate coat which splits irregularly into lanceolate valves; culms 5-15 cm x 0.75-1 mm, arising from bulbs, cylindrical, erect, subterete to compressed-triquetrous, smooth; leaves few, basal, twice as long as culms; leaf-sheaths papery, pale

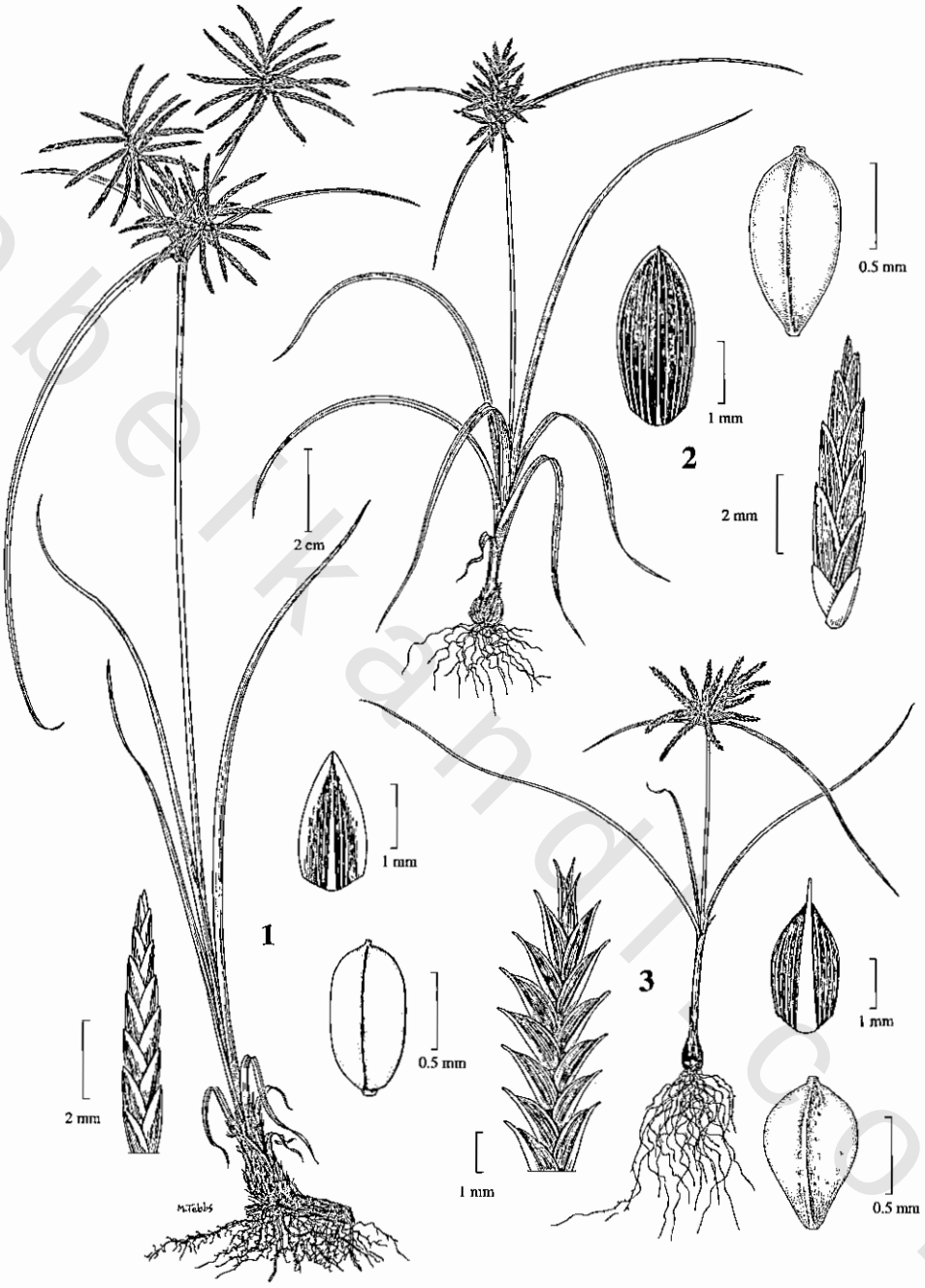


Plate 119. CYPERACEAE: *Cyperus maculatus* 1, habit; spikelet (down left); glume (middle right); nutlet (down right). *Cyperus bulbosus* 2, habit; glume (middle right); nutlet (up right); spikelet (down right). *Cyperus microbolbos* 3, habit; spikelet (left); glume (middle right); nutlet (down right). Drawn by Margaret Tebbs.

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brown with pale veins, membranous ventrally in the upper part; ligule absent; leaf-blade to 2 mm wide, channelled, recurved, acute; margins scabrid in the upper part; inflorescence compact, once branched, of 1 sessile spike to 1-2 unequal rays, to 1 cm, subterete; bracts 2-3, spreading, leaf-like, unequal, usually 2 longer than the inflorescence, the longest to 10 cm; spikes of 3-7, with digitately arranged spreading spikelets; rhachis to 6 mm long, smooth; spikelets 1-2.5 cm x 3-4 mm, oblong acute, compressed, reddish-brown, to 40-flowered, with patent glumes; rhachilla quadrangular, flexuous, persistent, winged; wings elliptic, membranous or pale yellow, persistent; glumes 3-3.5 x 2-2.2 mm, narrowly ovate, with a broad yellowish-green keel, excurrent in a short recurved mucro to 0.5 mm, with reddish-brown, shining, many-veined sides, margins very narrow and hyaline; stamens 3; anthers 1.5-2 mm, linear-oblong; style to 2.5 mm; stigmas 3, coiled; nutlet 1.1-1.5 x 0.5-0.8 mm, ellipsoid-trigonous, apiculate and broadly stipitate, minutely papillose, dark brown to black, with white silica bodies.

GE; coastal sand. Southeast Egypt, Sudan, Eritrea.

13. **Cyperus michelianus** (L.) Delile, Descr. Egypte, Hist. Nat., Ill. 50 (1814).
Syns. *Scirpus michelianus* L., Sp. Pl., ed. 1, 52 (1753).
Dichostylis micheliaana (L.) Nees, Linnaea 9: 289 (1834).

Tufted glabrous annual; roots fibrous, reddish; culms 2-28 cm x 1-1.5 mm, diffuse or long, ridged, often bulbously thickened by shoots and sheaths at base; leaves basal, shorter or longer than culms; leaf-sheaths papery dorsally, with purple veins, membranous ventrally, purple-dotted, the outermost becoming fibrous; ligule absent; leaf-blades 1-2 mm broad, flat or keeled below, gradually acuminate, scabrid at the mid-vein and towards the apex; inflorescence capitate, 0.5-1.7 cm across, lobed; bracts 3-8, leaf-like, much longer than the inflorescence, suberect to spreading, broadened at the base; spikelets numerous, 2.5-5 (-7) x 1.2-2 mm, sessile, tightly clustered, oblong-lanceolate, compressed, 8-24 (-28)-flowered; rhachilla thin, often spirally contorted, wingless, persistent; glumes 2-2.5 x 0.5-1 mm, ovate-lanceolate, densely imbricate, distichous, but often seemingly placed irregularly due to the twisted rhachilla; keel narrow, green, sharp above, excurrent in a ± long recurved channelled mucro, spinulose, sides hyaline or yellowish-white, 1-3-veined; stamens 1(-2); anthers 0.3-0.5 mm; style 0.5-0.8 mm; stigmas 2(-3); nutlet 0.8-1 x 0.3-0.4 mm, ellipsoid-oblong, plano-convex or trigonus, apiculate, with or without crystalline rim, minutely papillose, golden to brown.

One subspecies occurs in Egypt:

subsp. **pygmaeus** (Rottb.) Asch. & Graebn., Syn. Mitteleur. Fl. 2, 2: 273 (1904).
Syns. *Cyperus pygmaeus* Rottb., Descr. Ic. Rar. Nov. Pl. 20, t. 14, f. 4, 5 (1773).
Dichostylis pygmaea (Rottb.) Nees, Linnaea 9: 289 (1834).
Juncellus pygmaeus (Rottb.) C.B. Clarke in Hook., Fl. Br. Ind. 6: 59 (1893).

N; Nile and canal banks, muddy edges of Nile islands. East Mediterranean region, Caucasus, Iraq, Iran, India, China, Japan, New Guinea, Philippines, Malaysia, Australia, tropical Africa, Madagascar.

14. **Cyperus compressus** L., Sp. Pl., ed. 1, 46 (1753).
Syns. *Cyperus conglomeratus* Willd., Enum. Pl. Horti Berol. Suppl. 5 (1813) nom. nud., non Rottb. (1772).
Chlorocyperus compressus (L.) Palla, Denkschr. Akad. Wiss. Wien, Math.-Nat. Kl. 84: 451 (1909).

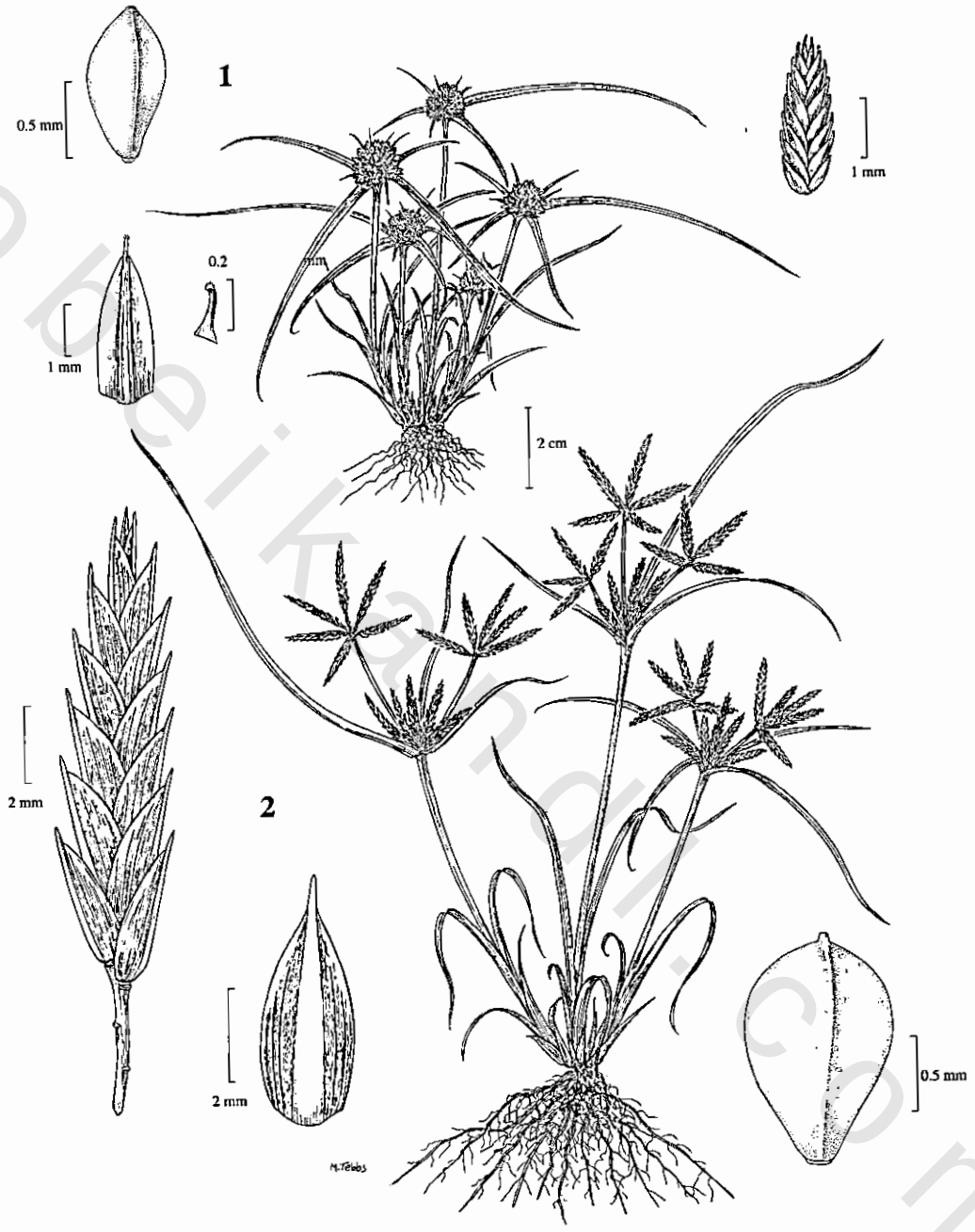


Plate 120. CYPERACEAE: *Cyperus michelianus* subsp. *pygmaeus* 1, habit; spikelet (right); glume and its enlarged tip (down left); nutlet (up left). *Cyperus compressus* 2, habit; glume (down left); spikelet (further left); nutlet (down right). Drawn by Margaret Tebbs.

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Glabrous tufted annual, depauperate to robust; roots fibrous, purplish-red; culms (5-)15-50(-65) cm, (0.5) 1-3(-5) mm diam., caespitose or rarely solitary, subterete and compressed at the base, sharply triquetrous below the inflorescence, rigid, smooth; leaves few, basal, shorter to slightly longer than the culms; leaf-sheaths mostly short, grey to purplish-red, papery dorsally, veined with reddish-purple, membranous ventrally, red-dotted, soon split; ligule absent; leaf-blade (0.5-)2-6 mm wide, flat or channelled, gradually acuminate, margins scabrid near the apex; inflorescence capitate, or once branched, rarely with very short secondary branches; bracts 3-6(-8), leaf like, unequal, the lowest to 30 cm, much exceeding the branches, spreading or erect; branches to 8, unequal, to 15 cm, subterete to triquetrous, slender, smooth; spikes few, broadly ovoid; rhachis to 1.5 cm, with up to 10 spikelets; spikelets 0.5-3.5 x 0.25-0.5 cm subdigitately arranged, linear-oblong, acute, compressed, to 40-flowered, green, becoming yellowish-brown when ripe; rhachilla quadrangular, flexuous, persistent, elongate by age; winged; wings thin, membranous, caducous; glumes 3-4(-5) x 2-2.5 mm, ovate lanceolate, rigid, with broad green keel excurrent in a mucro 0.5-0.8(-1.5) mm, slightly recurved, many-veined, with a wide hyaline margins giving a silvery appearance to the spikelets; stamens 3; anthers 0.8-1 mm; style to 1.5 mm; stigmas 3; nutlet 1.1-1.5 x 0.7-1.1 mm, obovoid, trigonous, shortly apiculate, broadly stipitate, minutely papillose, dark brown.

N (Damietta); moist ground. Egypt, tropical regions of the world.

NOTE: Most variation in this species depends on age, such that spikelets and branches increase in length and glumes become spreading.

15. **Cyperus difformis** L., Cent. Pl. 2: 6 (1756).
Syns. *Cyperus protractus* Link, Hort. Berol. 1: 305 (1827) non Delile (1814).
Cyperus goeringii Steud., Syn. Pl. Cyp. 24 (1854).
Cyperus oryzetorum Steud., Syn. Pl. Cyp. 24 (1854).
Cyperus lateriflorus Torr., Bot. U.S. & Mex. Bound. 2: 226 (1859).

Glabrous annual; roots fibrous, purplish-red; culms 10-25 cm x 2-3(-4) mm, solitary or clustered, sharply trigonous, soft; leaves few, basal, mostly shorter than the culms, sometimes longer, with long sheaths; leaf-sheaths papery dorsally, veined with reddish-purple, with transverse intercostal ridges, membranous ventrally and red-dotted, basal sheaths without leaf-blades; ligule to 1.5 mm, membranous, obtuse, leaf-blade 2-6 (-8) mm wide, flat or channelled, abruptly narrowed to acuminate apex, scabrid on the margins near the apex; inflorescence umbel-like, mostly 1-2 times branched; bracts 2-4, unequal, the lowermost to 30 cm, much exceeding the branches; primary branches 3-10, unequal, to 7 cm, trigonous, smooth; spikes 0.5-1.2 cm diam., globose, dense, sometimes very shortly branched; spikelets 3-7 x 1 mm, digitately arranged, crowded, linear-oblong, obtuse, subcompressed, to 30-flowered; rachilla wingless, quadrangular, persistent, red; glumes 0.5-0.7 x 0.6-0.9 mm, ± orbicular to broadly obovate; truncate at base, keeled towards the obtuse apex, ending in a very short mucro, reddish-purple, sometimes pale greenish-yellow, sides veinless, with broad hyaline upper margins and 3-veined green keel; stamens 2; style very short; stigmas 3, the style and stigma to 0.4 mm; nutlet 0.5 x 0.3 mm, ellipsoid to slightly obovoid, triquetrous, shortly apiculate, with minutely papillose surface, glossy, yellow to pale brown.

N, O, M; rice fields, canal banks, ditches, marshes. Portugal, Mediterranean Europe, Cyprus, Egypt, tropical Africa, Palestine, Syria, Turkey, Caucasus, Iraq, Arabia, Iran,

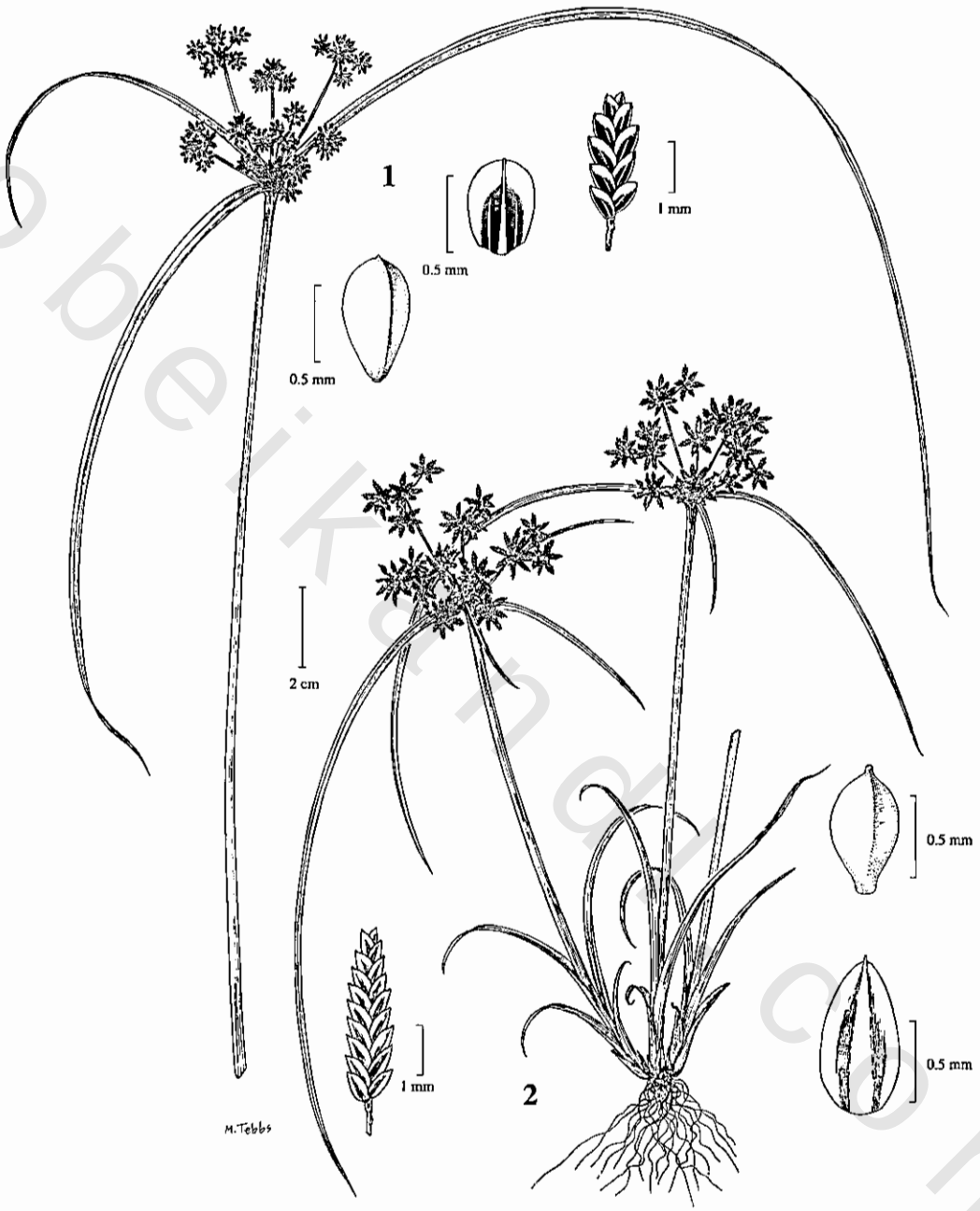


Plate 121. CYPERACEAE: *Cyperus difformis* 1, inflorescence; nutlet and glume (up right); spikelet (further up right). *Cyperus fuscus*, habit; spikelet (down left); glume (down right); nutlet (middle right). Drawn by Margaret Tebbs.

Afghanistan, India, Central Asia, Korea, China, Japan, Philippines, Sumatra, Java, Hawaii, Australia, introduced to North and Central America.

NOTE: *Cyperus difformis* is a very troublesome, widespread weed in rice fields, especially in the Nile Delta. The plants vary from weak to robust and the culms from short and slender to long and wide to 4 mm broad. The leaf-blade varies from narrow to wide, up to 8 mm broad. This species is often confused with *Cyperus fuscus,* but separated by glume shape and length.

16. **Cyperus fuscus** L., Sp. Pl., ed. 1, 46 (1753).

Syns. *Cyperus ferrugineus* Forssk., Fl. Aegypt.-Arab. 14 (1775).
Cyperus virescens Hoffm., Deutschl. Fl., ed. 2, 1: 21 (1791).
Cyperus fuscus L. forma *virescens* (Hoffm.) Vahl, Enum. Pl. 2: 336 (1806).
Cyperus protractus Delile, Descr. Egypte, Hist. Nat. 152, t. 5, f. 3 (1814).
Cyperus calidus A. Kerner, Österr. Bot. Zeitschr. 14: 84 (1864).
Cyperus fuscus L. forma *calidus* (A. Kerner) Asch. & Graebn., Synops. Mitteleur. Fl. 2, 2: 276 (1904).

Glabrous tufted annual; roots fibrous, reddish; culms 5-30(-50) cm x 1-3 mm, caespitose, triquetrous with concave sides; leaf-sheaths loose, membranous, brownish-purple, red-veined and spotted; ligule to 1 mm, obtuse, membranous; leaf-blades 1-3 mm broad, flat, acuminate, with rough tip; inflorescence capitate or umbel-like, 1-2 times branched; bracts 3-6, leaf-like, unequal, the lowest to 20 cm, much exceeding the branches, broader than the leaf-blade; primary branches 3-8(-10), unequal, to 4.5 (-5.5) cm, flattened, smooth; spikes subspherical, dense; rhachis short or absent, sometimes with very short branches; spikelets 3-6 x *c.* 1.5 mm, lanceolate to oblong, obtuse, slightly compressed, to 30-flowered; rhachilla quadrangular, wingless, persistent and elongate in fruit; glumes 1-1.5 x 0.8-1 mm, ovate, obtuse, imbricate, spreading later, with broad keel, flattened below, sharp above, 3-veined, excurrent in a recurved mucro, sides veinless, dark purple with a hyaline margin; stamens 2; style to 0.2 mm; stigmas 3; nutlet 0.7-0.9 x 0.3-0.4 mm, narrowly obovoid to ellipsoid, trigonous, distinctly apiculate, shortly stipitate, with pale margins, greenish to golden brown.

N, O (Bahariya), M, De; rice fields, edges of springs, moist ground. Europe (excluding northern regions), North Africa, Cyprus, Palestine, Lebanon, Syria, Turkey, Caucasus, Arabia, Iraq, Iran, Pakistan, Afghanistan, Central Asia, China, North America.

NOTE: *Cyperus fuscus* is a variable species and may be confused with *Cyperus difformis.* It can be separated by glume shape and length.

17. **Cyperus laevigatus** L., Mant. Alt. 179 (1771).

Rhizomatous mat-forming perennial; roots fibrous, reddish, sometimes sand-binding; rhizomes 1-5 mm diam., horizontally creeping, with very short or elongate internodes and purple-red scales; culms 3-95 cm x 0.5-3 mm, tufted or solitary, terete or obscurely trigonus, wiry, often curved, ridged, smooth; leaves few, much reduced; leaf-sheaths papery, reddish-brown, loose, broader than the culm; inflorescence pseudolateral; bracts 2(3), unequal, dilated at the base, the lowermost 2-7 cm, erect, culm-like, much exceeding the inflorescence, the upper small, glume-like, spikelets 1-50, sessile, clustered, 0.4-2.3 x 0.2-0.3 cm, 8-75-flowered, straight or curved, slightly compressed or subterete, acute, stramineous or dark purple; rhachilla persistent, quadrangular, accrescent and becoming

curved, wingless, with deep sides, pitted with prominent transverse glume scars; glumes *c.* 2.2 x 2.2 mm, ovate to broadly ovate, imbricate, apiculate or obtuse, 3-5-veined, sides faintly-veined, sometimes with a hyaline edge; stamens 3; filaments flat, persistent; anthers 0.7-1.5 mm; style long; stigmas 2; nutlet 1.2-1.5 x 0.7-1 mm, ellipsoid, rarely obovoid, apiculate with a small persistent style-base, dorsiventrally plano-convex, rarely biconvex, minutely reticulate by the walls of the quadrate surface cell-walls, glossy, stramineous to brown or dark grey.

Two varieties occur in Egypt:

1. Spikelets subterete; glumes closely imbricate, length/width ≤1, broadly ovate, shortly apiculate, often incurved, rarely obtuse, usually pale var. **laevigatus**
+ Spikelets slightly compressed; glumes not closely imbricate, length/width >1, ovate, long incurved apiculate, usually dark var. **distachyos**

var. **laevigatus**

Syns. *Cyperus mucronatus* Rottb., Descr. Pl. Rar. Progr. 17 (1772).
Cyperus lateralis Forssk., Fl. Aegypt.-Arab. 13 (1775).
Cyperus laevigatus L. var. *caespitosus* C. B. Clarke, J. Linn. Soc. 20: 282 (1883).
Juncellus laevigatus (L.) C. B. Clarke in Hook., Fl. Br. Ind. 6: 596 (1893).
Chlorocyperus laevigatus (L.) Palla, Allg. Bot. Zeitschr. 6: 221 (1900).
Acorellus distachyos (All.) Palla x *laevigatus* (L.) Palla, Allg. Bot. Zeitschr. 9: 166 (1903).
Acorellus laevigatus (L.) Palla in W. D. J. Koch, Syn. Deutsch. Schweiz. Fl., ed. 3, 2: 2558 (1905).
Cyperus laevigatus L. var. *ramlehensis* Sickenb., Contr. Fl. Egypt. 299 (1901).
Cyperus laevigatus L. var. *pallae* Kneuck. ex Kük. in Engl., Pflanzenr. 101 (IV. 20): 323 (1936).

Spikelets subterete in cross-section; glumes closely imbricate, broadly ovate, length/ width ≤1, shortly apiculate, rarely obtuse, apicula often incurved, usually pale.

N, O, M, D, R, GE, S; moist alluvial and sandy soils, canal banks, near wells and springs, shallow brackish water, edges of salt marshes. Macaronesia, Mediterranean region, Sinai, Palestine, Syria, Turkey, Iraq, Iran, Afghanistan, Pakistan, India, Polynesia, Australia, tropical and southern Africa, southern North America, Central and South America.

var. **distachyos** (All.) Coss. & Durand, Expl. Alg. Bot. 2: (1868).

Syns. *Cyperus distachyos* All., Auct. Fl. Pedem. 48, t. 2, f. 5 (1789).
Cyperus junciformis Cav., Icones 3: 1, t. 204, f. 1 (1795).
Cyperus laevigatus L. var. *pictus* Boeck., Linnaea 35: 487 (1868).
Chlorocyperus junciformis (Cav.) Rikli, Jahrb. Wiss. Bot. 27: 563 (1895).
Acorellus distachyos (All.) Palla, Allg. Bot. Zeit. 9: 68 (1903).

Similar to var. *laevigatus* but spikelets slightly compressed in cross-section; glumes not closely imbricate, ovate, length/ width >1, with long incurved apicula, usually dark.

N, O, M, De, S; same habitats as var. *laevigatus*. Madeira, Tenerife, Mediterranean region, Cyprus, Sinai, Palestine, Syria, Turkey, Iraq, Arabia, Pakistan, India, Central Asia, South Australia, Mexico, Ecuador.

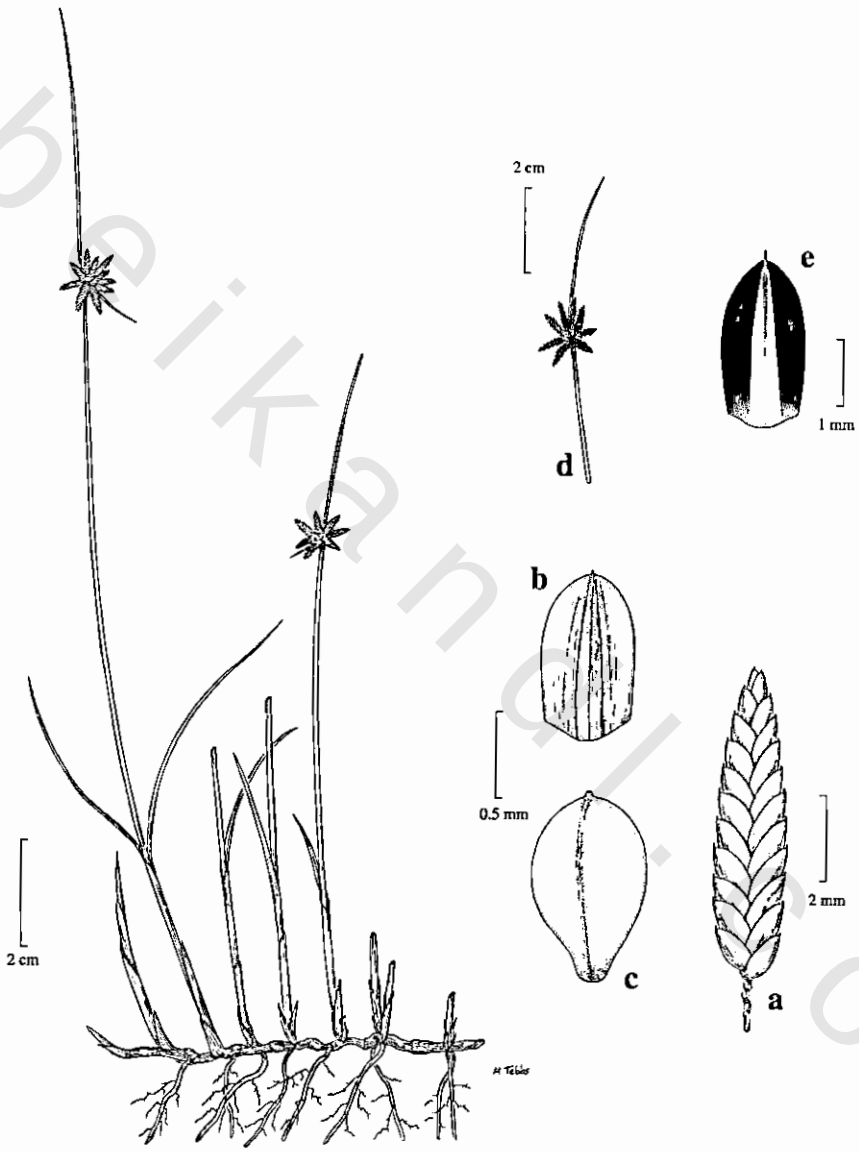


Plate 122. CYPERACEAE: *Cyperus laevigatus* var. *laevigatus*, habit; spikelet (a); glume (b); nutlet (c); var. *distachyos* (d), inflorescence; glume (e). Drawn by Margaret Tebbs.

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18. **Cyperus capitatus** Vend., Fasc. Plant. 5 (1771).
Syns. *Schoenus mucronatus* L., Sp. Pl., ed. 1, 42 (1753), non *Cyperus mucronatus* Rottb. (1772).
Scirpus kalli Forssk., Fl. Aegypt.-Arab. 15 (1775).
Cyperus aegyptiacus Gloxin, Obs. Bot. 20, t. 3 (1785).
Cyperus macrorrhizus Nees in Wight, Contr. Fl. Ind. 73 (1834).
Galilea mucronata (L.) Parl., Fl. Palerm. 1: 299 (1845).
Cyperus schoenoides Griseb., Spic. Fl. Rum. et Bith. 2: 421 (1846).
Chlorocyperus aegyptiacus (Gloxin) Rikli in Pringsheim, Jahrb. Wiss. Bot. 27: 564 (1895).
Cyperus kalli (Forssk.) Murb., Contr. Fl. Tun. 3: 24 (1899).
Cyperus mucronatus (L.) Briq., Prodr. Fl. Corse 1: 225 (1910).

Tough, creeping, glaucous (in vivo), yellowish (dried) perennial; roots sand binding; rhizomes 2-3 mm diam., much elongate, horizontal, bearing acute scales; scales pale brown, becoming dark brown and purple-veined with age; culms 10-18 cm x 2-4 mm, stout, erect or incurved, terete at the base, subterete towards the tip, thickened basally by several leaf-sheaths, almost bulbous at base; leaves tough, equalling or longer than the culms; leaf-sheaths papery dorsally, hyaline ventrally, becoming fibrous with age, red-brown or pale purple-brown; ligule absent; leaf-blades 2.5-6 mm wide, flexuous or recurved, flat or shallowly concave in the lower part, semi-circular towards the apex and narrowed to an indurate pungent tip, the margins often enrolled, scabrid; inflorescence 1.5-4 cm diam., capitate, spherical or lobed, with 1 to several ± confluent spikes; bracts 3-6, leaf-like, the longest to 20 cm, much exceeding the inflorescence, erect, spreading or recurved, dilated at the base; spikelets 1-1.5 x 0.35-0.45 cm, numerous, densely crowded, lanceolate, compressed, acute, 11-15-flowered; rhachilla hardened, quadrangular, fragile, barred transversely by the glume-scars, wingless; glumes 7-8 x 5-6 mm, broadly ovate; irregularly distichous, loosely imbricate, with a green keel above, indistinct below, but excurrent in a rigid mucro 0.5-1.5 mm, sides with numerous slender veins, only conspicuous towards the apex, margins narrow and hyaline; stamens 3; filament membranous; anthers *c.* 1.5 mm; style 1.5 mm; stigmas 3; nutlet 3-3.5 x 1.5-2 mm, narrowly obovoid-ellipsoid, compressed-trigonous, shortly apiculate, densely and minutely dotted, blackish-brown.

N, O (Siwa), M, S; mainly on sandy shores and maritime sand dunes, rarely deep inland (Siwa Oasis). Canary Islands, Portugal, Mediterranean Europe in France, Corsica, Sardinia, Italy, Malta, Sicily, Spain, Albania, Balkan, Greece, Crete, Turkey, Cyprus, North Africa from Morocco to Egypt, Palestine, Syria.

19. **Cyperus conglomeratus** Rottb., Descr. Pl. Rar. Progr. 16 (1772).
Syns. *Cyperus jeminicus* Rottb., Descr. Pl. Rar. Progr. 24 (1772).
Cyperus effusus Rottb., Descr. Pl. Rar. Progr. 16 (1772).
Cyperus complanatus Forssk., Fl. Aegypt.-Arab. 14 (1775).
Cyperus aucheri Jaub. & Sp., Ill. Pl. Orient. 2: 1, t. 101 (1844).
Cyperus pungens Boeck., Linnaea 35: 537 (1868).
Cyperus curvulus Boeck., Linnaea 35: 541 (1868).
Cyperus proteinolepis Boeck. forma *pumilus* Boeck., Linnaea 35: 523 (1868).
Cyperus conglomeratus Rottb. var. *effusus* Boiss., Fl. Orient. 5: 369 (1882).
Cyperus conglomeratus Rottb. var. *aucheri* (Jaub. & Sp.) C. B. Clarke in Durand & Schinz., Consp. Fl. Afr. 5: 554 (1894).

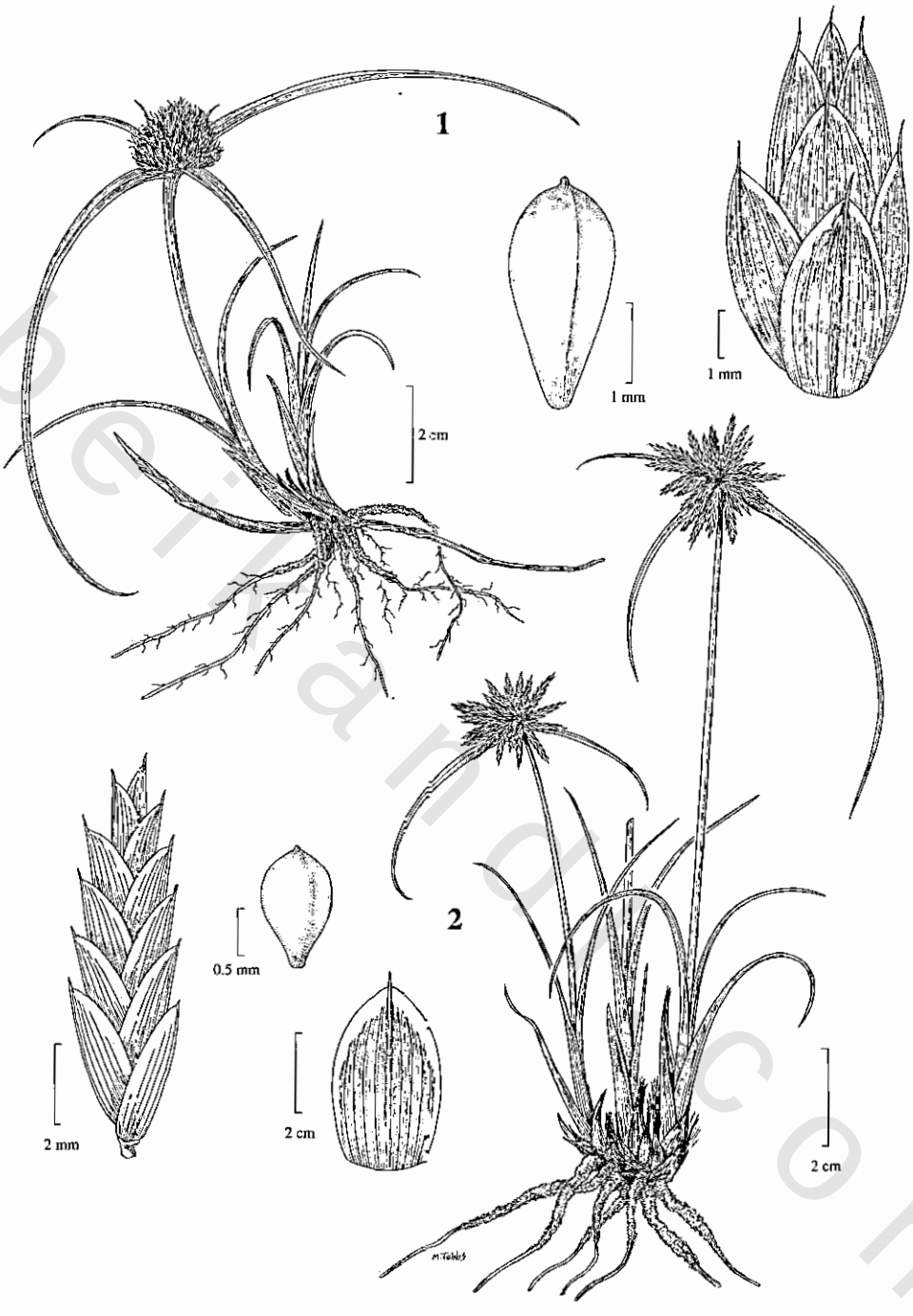


Plate 123. CYPERACEAE: *Cyperus capitatus* 1, habit; nutlet (right); spikelet (further right). *Cyperus conglomeratus* 2, habit; glume (down left); nutlet (middle left); spikelet (further left). Drawn by Margaret Tebbs.

Opelia not for sale

Cyperus conglomeratus Rottb. var. *effusus* (Rottb.) Kük. in Engl., Pflanzenr. 101 (IV. 20) 275 (1936) non Boiss. (1882).
Cyperus conglomeratus Rottb. forma *pumilus* (Boeck.) Kük. in Engl., Pflanzenr. 101 (IV. 20) 274 (1936).
Cyperus conglomeratus Rottb. var. *multiculmis* (Boeck.) Kük. in Engl., Pflanzenr. 101 (IV. 20): 274 (1936).
Cyperus conglomeratus Rottb. var. *effusus* (Rottb.) Kük. forma *curvulus* (Boeck.) Kük. in Engl. Pflenzenr. 101 (IV. 20): 275 (1936).
Cyperus conglomeratus Rottb. forma *strictus* Kük. in Engl., Pflanzenr. 101 (IV. 20): 274 (1936).

Creeping yellowish-green perennial, tufted at intervals; roots long, thick, covered with sand-binding hairs; rhizomes 4-5 mm diam., short and branched, or elongate, covered by acute purple-brown scales, or their fibrous remains; culms 5-60 cm x 2-3.5 mm, solitary or clustered, terete, subtrigonous or ridged, erect, rigid, glabrous; leaves basal, equalling or shorter than culms; leaf-sheaths papery, red-brown dorsally, membranous and red-dotted ventrally, soon splitting, persistent as brown fibres; ligule absent; leaf-blade 1-3 mm wide, hard, crescentiform, flattened towards the sharp tip, margins scabrid, sometimes enrolled; inflorescence capitate, 1-4 cm diam., or once-branched; bracts 2-5, leaf-like, unequal, the longest 5-30 cm, erect or spreading, exceeding the inflorescence, ± dilated at base; primary branches 2-5(-7), unequal, to 6 cm; spikes broadly ovate to spherical, of digitate clusters of spikelets; spikelets 1-2.3 cm x (2-)3-4(-5) mm, subterete, subcompressed or compressed, oblong-lanceolate, acute; rhachilla much-flattened laterally, wingless, elongate and curving during maturation; glumes (3-) 4-5(-5.5) x 2.5-3 mm, ± closely imbricate, ovate, obtuse to acute, cartilagineous, sharply apiculate, apicula *c.* 0.5 mm, incurved, straight or recurved, rounded dorsally, keeled, green above, with 10-14 subequal veins, sometimes indistinct, margins hyaline; stamens 3; filaments white, wide; anthers 2.5-3.5 mm; style *c.* 2 mm; stigmas 3; nutlet 1.5-2.5 x 1-1.5 mm, obovoid, slightly angled ventrally, minutely papillose to ± smooth, brown.

N, O (Siwa), M, De, R, GE, S; inland and coastal sand dunes, desert sandy plains. Mauritania, Morocco, Algeria, Tunisia, Libya, Egypt, Palestine, Syria, Iraq, Arabia, Iran, Afghanistan, Pakistan, Senegal, Mali, Niger, Chad, Central African Republic, Sudan, Ethiopia, Eritrea, Somalia.

NOTE: *Cyperus conglomeratus* is a drought-resistant species, widely distributed in arid regions from Senegal to Pakistan, with a wide range of variation in its populations. Many taxa were described due to its variable morphology and habit, these are listed here as synonyms.

9. **Pycreus** P. Beauv.
Syn. *Cyperus* L. Subgen. *Pycreus* (P. Beauv.) C. B. Clarke

Annuals or perennials; flowers bisexual, distinctly arranged on a flattened, usually winged rhachilla, in much-flattened, many-flowered, typically lanceolate spikelets; spikelets digitately or spicately arranged in spikes, the inflorescence umbel-like or capitate, accompanied by leafy bracts; glumes deciduous, with or before the ripe nut, from the more persistent rachilla; stamens (1) 2-3; stigmas 2; nutlet laterally flattened, with 2 angles, one against the rhachilla. About 90 species, warmer parts of the world, but especially Africa.

1. Perennial; culm decumbent at base, erect above, branched, noded; leaves borne at intervals up the clum — 1. **P. mundtii**
+ Annual or perennial; culm erect, unbranched, without nodes; leaves basal — 2

2. Nutlet horizontally banded with silvery wavy lines; stamens 3 — 2. **P. flavescens**
+ Nutlet minutely puncticulate; stamens 2, rarely 1 — 3

3. Spikelets 1-1.5 mm wide; glumes acute; rhachilla winged — 3. **P. polystachyos**
+ Spikelets 2-3 mm wide; glumes obtuse; rhachilla wingless — 4. **P. flavidus**

1. **Pycreus mundtii** Nees, Linnaea 10: 131 (1836).
Syns. *Cyperus mundtii* (Nees) Kunth, Enum. Pl. 2: 17 (1837).
Cyperus turfosus Salzm. ex Boiss., Voy. Bot. Midi Esp. 2: 626 (1841).
Cyperus cruentus sensu Baker, Fl. Maurit. 408 (1877), non Retz. (1789).
Chlorocyperus mundtii (Nees) Rikli in Pringsheim, Jahrb. Wiss. Bot. 27: 563 (1895).
Chlorocyperus distichophyllus Steud., Flora 25: 582 (1842).
Cyperus mundtii (Nees) Kunth forma *distichophyllus* (Steud.) Kük., Wiss. Ergebn. Schwed. Rhodes.-Kongo-Exped. 1911-1912, 1: 2 (1921).

Stoloniferous glabrous perennial; roots elongate, pale, with numerous root hairs; stolons 1-3 mm diam., creeping, soft, smooth, with elongate internodes and short brown-black scales; culms 1-6 x 0.1-0.4 cm, decumbent at base, robust and erect above, trigonous below inflorescence, covered and thickened by leaf-sheaths up to the middle or above, rooting at the widely spaced nodes, with side branches; leaves numerous, tristichous on the sterile branches, distichous on the fertile; leaf-sheaths yellowish-brown, with a membranous red-dotted area above; ligule absent; leaf-blade 2-12 x 0.3-0.6 cm, flat, lanceolate, scabrid on the margins and midrib; inflorescence umbel-like, 1-2 times branched; bracts 3-5, leaf-like, to 8 cm, unequal, shorter than or slightly exceeding the branches; primary branches 4-8, unequal, to 5(-7) cm, with tubular 2-fid reddish-brown prophylls at the base; secondary branches to 2.5 cm; spikes 2-9 subdigitate clusters of spikelets, broadly ovate to spherical; rhachis to 3 mm, zig-zag; spikelets 0.4-1.4 x 0.2-0.3 cm, ovate to oblong-lanceolate, ± compressed, 10-32-flowered; rhachilla quadrangular, erect, persistent, wingless; glumes 1.5-2.2 x 1-1.5 mm, ovate, obtuse, with yellowish-green, 3-5-veined keel, sides yellow with reddish-brown patches; stamens 3; anther 0.8-1 mm, stigmas 2, long; nutlet 0.9-1.1 x 0.5-0.6 mm, obovoid to ellipsoid, compressed or biconvex, apiculate, pale to dark brown with raised dots.

N, O; around wells, marshes, moist sandy ground. Cape Verde, Morocco, Libya, Egypt, Syria, tropical West, Central and East Africa, Madagascar, South Africa, Cuba, Brazil.

2. **Pycreus flavescens** (L.) Rchb., Fl. Germ. Excurs. 72 (1830).
Syns. *Cyperus flavescens* L., Sp. Pl., ed. 1, 46 (1753).
Chlorocyperus flavescens (L.) Rikli in Pringsheim, Jahrb. Wiss. Bot. 27: 563 (1895).

Tufted glabrous annual or perennial, with pale fibrous roots; rhizomes short; culms 5-42 x 0.1-0.15 cm, clustered, triquetrous, ridged; leaves basal, shorter to longer than the culm; leaf-sheaths papery dorsally, membranous towards the apex, red-dotted ventrally, often veined with purple; ligule absent; leaf-blade 0.5-2 mm broad, linear, soft, acuminate, scabrid on margins and midrib; inflorescence capitate to contracted



Plate 124. CYPERACEAE: *Pycreus mundtii* 1, habit; spikelet (down left), glume (down right); nutlet (further down right). *Pycreus flavescens* 2, habit; spikelet (down right); glume (up within); nutlet (middle left); cross-section in nutlet (down left). Drawn by Margaret Tebbs.

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umbel-like; primary bracts 2-4, leaf-like, to 20 cm, unequal; branches absent or 1-3, unequal, to 5 cm, with purplish-brown tubular prophyll; spikes broadly ovate to hemispherical, with few subdigitately arranged spikelets; rhachis to 4 mm; spikelets 0.5-2 x 0.2-0.3 cm, oblong, abruptly acute, straw-coloured to golden, channelled laterally by the concave side of the zig-zagged wingless rhachilla, 8-30(-50)-flowered; glumes 2-2.5 x 1.5-2.1 mm, broadly elliptic, cymbiform, obtuse to truncate, with 3-veined green keel; stamens 3; anthers *c.* 0.5 mm; style long; stigmas 2; nutlet 0.7-1 x 0.6-0.8 mm, elliptic-obovoid to oblong, biconvex, apiculate, yellowish-brown to dark brown, surface with vertically elongate narrow cells in irregular brands, the raised ends producing white silvery wavy lines.

N, De: rice fields, swamps, edges of salt marshes. Tropical and subtropical regions of the Old and New World.

3. **Pycreus polystachyos** (Rottb.) P. Beauv., Fl. Oware 2: 48 (1816).
Syns. *Cyperus polystachyos* Rottb., Descr. Pl. Rar. Progr. 21 (1772).
Cyperus odoratus L., Sp. Pl., ed. 1, 46 (1753) p.p.
Pycreus odoratus (L.) Urb., Symb. Antill. 2: 164 (1900) non *Cyperus odoratus* L.
Chlorocyperus polystachyos (Rottb.) Rikli in Pringsheim, Jahrb. Wiss. Bot. 27: 563 (1895).
Cyperus fascicularis Poir., Voy. Barb. 2: 88 (1789).
Cyperus polystachyos Rottb. var. *laxiflorus* Benth., Fl. Austral. 7: 261 (1878).

Glabrous annual or tufted perennial; roots fibrous, brown; rhizomes short, woody, without stolons; culms 10-60 cm x 1-2 mm, triquetrous, rigid, smooth, slender but firm; leaves basal, often shorter than culm; leaf-sheaths long, the outer purple-veined; ligule absent; leaf-blade 2-4 mm broad, acuminate, scabrid on the margins and mid-vein above; inflorescence often capitate, rarely umbel-like; bracts 3-6, leaf-like, spreading, unequal, the lower to 15 cm, exceeding the inflorescence; primary branches 3-8, unequal, to 2 cm, terete, with 2-fid tubular brown prophyll; secondary branches, when present, very short; spikes shortly pinnate; spikelets 0.5-1.5 cm x 1-1.5 mm, linear, acute, compressed, crowded, fasciculate, parallel-edged, 8-23-flowered; rhachilla flexuose or almost straight, articulate, with hyaline persistent narrow wings; glumes 1.5-2.2 x 1 mm, elliptic-ovate, acute; with acute green 3-veined keel, sides veinless; stamens 2, rarely 1; anthers 0.4-0.5 mm; style to 1.25 mm; stigmas 2; nutlet 1-1.1 x 0.4-0.5 mm, oblong with parallel margins, compressed, slightly asymmetric, with slightly convex sides, rounded to truncate at the shortly apiculate apex, minutely puncticulate, brown to grey with a metallic shine.

O (Bahariya, Kharga); marshes, spring edges, ditches, moist sandy ground. Cape Verde, Azores, France, Italy, Hungary, Morocco, Algeria, Egypt, tropical and South Africa, Madagascar, Mauritius, Seychelles, Palestine, Iraq, Pakistan, India, Sri Lanka, Mayanmar, Thailand, Malaysia, Vietnam, New Guinea, Philippines, Indonesia, China, Hong Kong, Korea, Japan, Taiwan, Australia, Central and South America.

4. **Pycreus flavidus** (Retz.) Koyama, J. Jap. Bot. 51: 316 (1976).
Syns. *Cyperus flavidus* Retz., Obs. Bot. 5: 13 (1788).
Cyperus globosus All., Auct. Fl. Pedem. 49 (1789).
Pycreus globosus (All.) Reichb., Fl. Germ. Excurs. 140 (1830).
Chlorocyperus globosus (All.) Palla, Allg. Bot. Zeitschr. 6: 60 (1900).

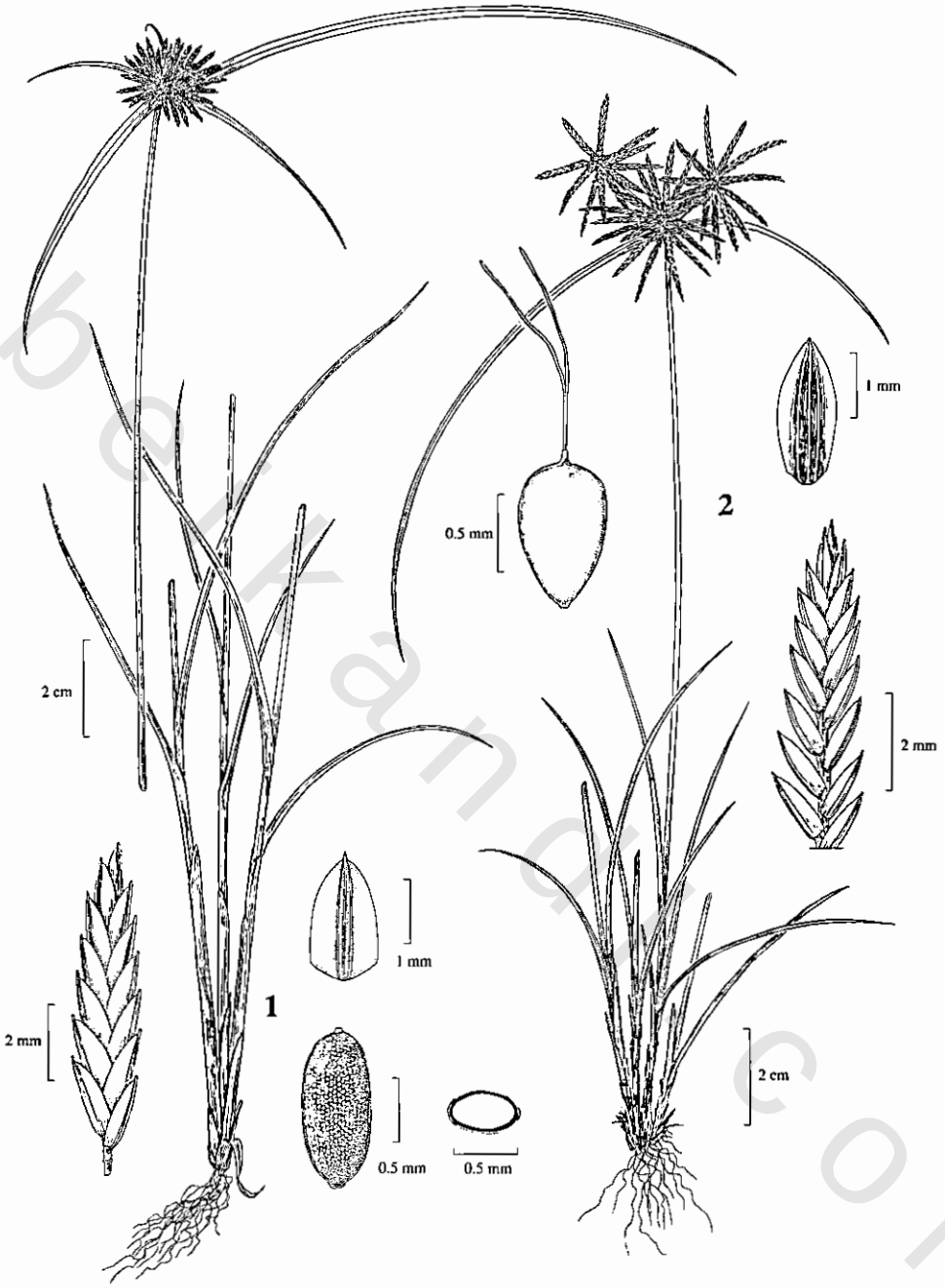


Plate 125. CYPERACEAE: *Pycreus polystachyos* 1, inflorescence and lower part; spikelet (down left); glume (middle right); nutlet (down right); cross-section in nutlet (further down right). *Pycreus flavidus* 2, habit; spikelet (middle right); glume (up right); nutlet (middle left). Drawn by Margaret Tebbs.

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Tufted glabrous annual or perennial; roots fibrous, yellowish; rhizomes short; culms 10-50 cm x 1-2 mm, clustered, triquetrous, rigid, ridged, leaves basal, erect, equalling or shorter than the culm; leaf-sheaths purplish, hyaline and red-dotted opposite leaf-insertion, the outermost becoming fibrous; ligule absent; leaf-blade 0.5-3 mm wide, flat to canaliculate, rigid, scabrid at the obtuse tip and midrib; inflorescence loosely capitate or compactly umbel-like; bracts 2-4, leaf-like, to 20 cm, unequal, the lowest much exceeding the rays; rays 0 or 1-3, to 3.5 cm, often curved, slender, smooth; spikes broadly ovoid to ± globose, with numerous shortly spicate spikelets; rhachis 2-6 mm; spikelets 0.5-3 cm x 2-3 mm, linear to oblong, acute, strongly compressed, pale or silvery brown, 8-66-flowered, rhachilla straight, persistent, wingless, red-spotted; glumes 2.1-2.2 x 1.25 mm, ovate-oblong, obtuse, keel 3-veined, green, sides veinless or 1-veined, straw-coloured or red streaked, margins broad, hyaline; stamens 2; anthers 0.3-0.5 mm; style 0.5-1 mm; stigmas 2, longer than style; nutlet 1-1.2 x 0.5-0.7 mm, obovoid-oblong, laterally compressed, apiculate, minutely and regularly puncticulate by rows of squarish surface cells, glossy, yellow to brown.

De (along Suez Canal); ditches, moist ground. Spain, France, Italy, Cyprus, Algeria, Egypt, Palestine, Lebanon, Syria, Turkey, Caucasus, Iran, Afghanistan, Pakistan, India, Nepal, Himalaya, Sri Lanka, Mayanmar, Bengal, Thailand, Vietnam, Borneo, New Guinea, China, Korea, Taiwan, Japan, eastern Australia, Madagascar, Mauritius, Seychelles.

10. **Schoenus** L.

Tufted perennials, with conspicuous basal sheaths; leaves shorter than the culms; inflorescence of 5-10 terminal spikelets; bracts longer or shorter than the inflorescence; glumes distichous, keeled, brown to blackish-brown, lowest 2 sterile; flowers bisexual; perianth of bristles, when present, shorter than the nutlet; stigmas 3. About 80 species, cosmopolitan.

1. **Schoenus nigricans** L., Sp. Pl., ed. 1, 43 (1753).

Caespitose perennial 25-40 cm; rhizome short, producing tillers; culms 1-1.5 mm diam., terete, deeply grooved; leaves *c.* 1/2 of culm length, basal; sheaths 2-10 cm, apparently all with blades, outer dark to blackish-brown, stiff, glossy, inner from pale brown to greenish, one side scarious, brown or yellowish, mouth oblique; ligule 0.3-0.5 mm; blades 0.5-1 mm diam., thick, crescentiform in cross-section with narrow adaxial surface, or channelled, greyish-green, margins smooth or slightly scabrous, apex channelled, obtuse, scabrous; inflorescence 0.8-1.5 x 0.5-1 cm, ellipsoid, later obconical or almost globose, composed of 5-10, tightly overlapping terminal spikelets; lowest bract or, occasionally, 2 lowest foliose, to 4.5 cm; spikelets 7-9 x 1.5-2.5 mm, fusiform, compressed, 1-3 in axil of each bract, sessile or peduncle *c.* 1.5 mm; glumes distichous, keeled, acute, with strong, scabrous mid-vein, lowest two sterile, 4-5.5 mm, following 2-3 fertile, *c.* 6 mm, and uppermost 2-3 smaller, sterile; perianth bristles 0-5, much shorter than the nutlet and not falling with it; stamens 2-3, anthers 3-4 mm; nutlet 1.4-1.6 x 1-1.1 mm, broadly ellipsoid to subglobose, trigonous, smooth, glossy, white.

S; damp slopes, springs, small streams and canals. Western, Central and southern Europe, Rhodes, Cyprus, North Africa, Sinai, Palestine, Turkey, Caucasus, Iran, Afghanistan, Pakistan, Uzbekistan, Tadjikistan; introduced to South Africa, North and South America.

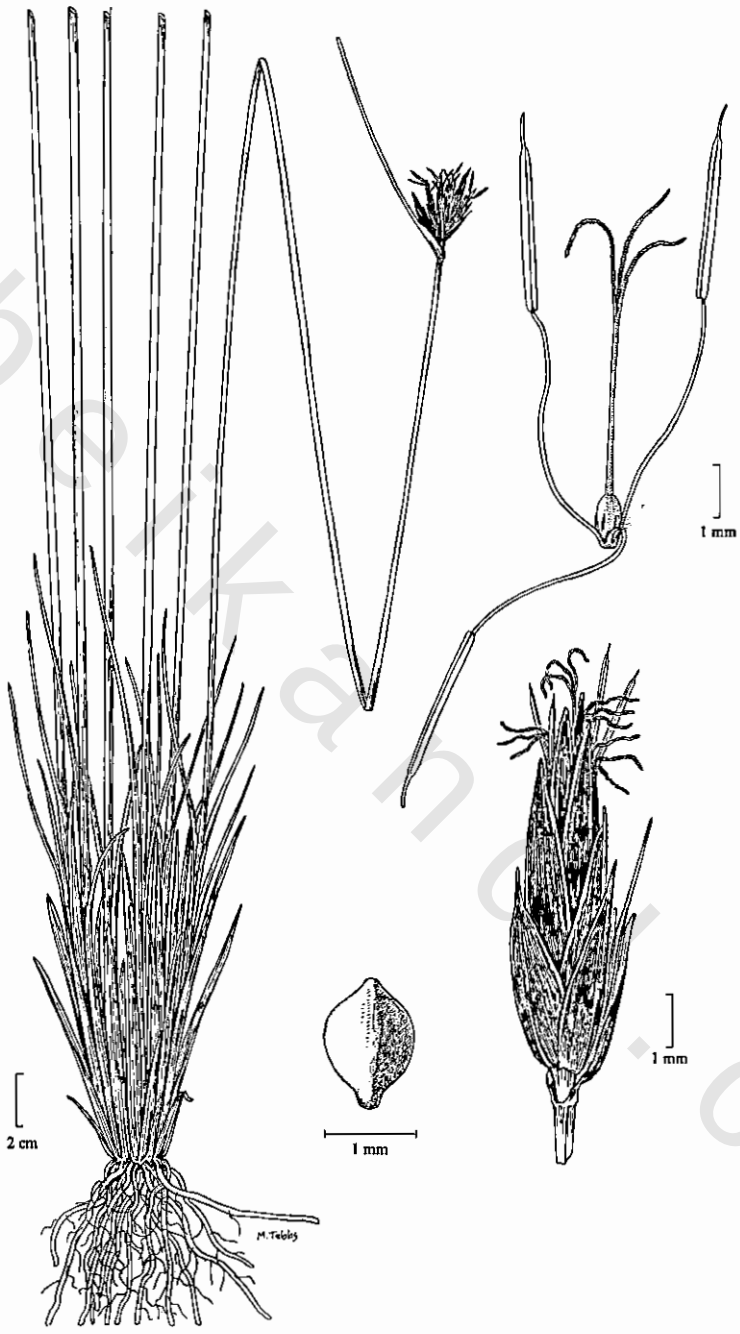


Plate 126. CYPERACEAE: *Schoenus nigricans*, habit; nutlet (down right); spikelet (further down right); flower (up right). Drawn by Margaret Tebbs.
Courtesy of BSBI.

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11. **Cladium** P. Browne

Stoloniferous perennials; culms noded, terete; cauline leaves several, pseudo-dorsiventral, glaucous, very scabrous; inflorescence of several axillary, branched partial inflorescences, mostly not overlapping; spikelets 3-15, in a cluster on tip of ultimate branches, sessile or with short peduncles, fusiform; lowest 2 or more glumes sterile, in axils of the next 2 glumes a unisexual or bisexual flower; nutlet fusiform, with ± differentiated disc at the base. 2 species, 1 North America, 1 cosmopolitan.

1. **Cladium mariscus** (L.) Pohl, Tent. Fl. Bohem. 32 (1809).
Syn. *Schoenus mariscus* L., Sp. Pl., ed. 1, 42 (1753).

Perennial reaching more than 1 m, in large pure stands; rhizome creeping or stoloniferous, sturdy; culms to *c.* 6 mm diam., internodes 10 or more, terete, hollow, smooth; leaves to ± equalling the culm, spirally arranged along the entire culm length; basal sheaths, *c.* 15 cm, rigid, persistent, greyish-brown ; ligule 0; blades often more than 50 cm, 5-9 mm broad, unifacial, flat or folded, mid-vein below and margins sharply scabrous, apex long-attenuate, trigonous; inflorescence of partial inflorescences in more than 6 leaf axils, the upper overlapping; bracts much longer than partial inflorescences, except at culm apex; partial inflorescence umbel-like, occasionally much elongate to 15 x 10 cm; peduncle to 25 cm; primary branches (0-)2.5-10 cm; secondary branches to 3.5 cm, ending in a cluster of rather compact or open spikelets or tertiary umbel-like partial inflorescence; tertiary branches to 1.5 cm, mostly ending in a cluster of spikelets; ultimate branches with bracts 3-5 mm, and tubular prophyll; spikelets *c.* 4 mm, mostly sessile, in clusters of 3-14, fusiform; glume-like bract *c.* 1 mm; glume-like prophyll *c.* 1 mm; lowest 2-3 glumes 1.2-3 mm, sterile, in axil of 4th glume a unisexual flower with 2 stamens (occasionally bisexual); in axil of 5th glume a bisexual flower with 2 stamens, a pistil and 3 stigmas; nutlet 2.9-3.3 x 1.4-1.6 mm, fusiform, base with ± differentiated disc, apex conical, smooth or regulose glossy, yellowish-brown.

One subspecies occurs in Egypt:

subsp. **mariscus**
Syns. *Cladium mariscus* (L.) Pohl subsp. *martii* (Roem. & Schult.) Egor., Fed. Fl. Partis Europ. URSS 2: 129 (1976).
Isolepis martii Roem. & Schult., Syst. Veg. 2: 117 (1817).
Cladium mariscus (L.) Pohl var. *martii* (Roem. & Schult.) Kük., Feddes Rep. 51: 187 (1942).
Cladium grossheimii Pobed , Not. Syst. Leningrad 12: 13 (1950).

Partial inflorescences with 3-10 rather compact spikelets; nutlet smooth.

O (Siwa), De (Suez Canal region); swamps, in shallow water. Europe, North Africa, southwest Asia, Caucasus.

12. **Carex** L.

Perennials of small to moderate size; rhizome short caespitose to long creeping; culms scapose or noded, usually arising in the centre of leaf rosette; leaves mostly basal, lowest often present but bladeless, one side of sheaths scarious, the other thicker and strongly-veined; sheaths and culm bases of previous seasons often forming conspicuous tussocks; ligule scarious, straight or arched; inflorescence a single spike, multiple spikes or paniculate comprising bisexual or unisexual spikes; branches with basal tubular



Plate 127. CYPERACEAE: *Cladium mariscus*, inflorescence and lower part, flower (middle within); spikelet (down within); nutlet (down left). Drawn by Margaret Tebbs.
Courtesy of BSBI.

prophylls absent in subg. *Vignea*; partial inflorescences subtended by sheathing or sheathless; bracts of variable sizes, from small glume-like to wide, foliose and overtopping the inflorescence; male flowers usually with 3 stamens, subtended by a glume, forming true spikes; female flowers subtended by a glume and surrounded by a bottle-shaped utricle (perigynium), beaked at apex, occasionally accompanied by reduced rhachilla; style-base occasionally expanded, rarely articulated; stigmas 2 or 3; fruit a biconvex or triangular nutlet, usually reticulate with a papilla in each areole. About 2200 species, cosmopolitan, but especially temperate and cold wet regions.

1. Spikes mostly similar in appearance; male and female flowers in the same spike (androgynous); a single partial inflorescence or spike in the lowest bract axil; female flowers with 2 stigmas 2
+ Spikes mostly dissimilar in appearance; male and female flowers in separate spikes; when no pure male spikes present, then either female flowers with 3 stigmas, or several peduncled spikes borne in the lowest bract axil 3

2. Culms 1-1.5 mm diam.; leaves 1-3 mm wide; utricle without conspicuous veins 1. **C. divisa**
+ Culms 0.5-1 mm diam.; leaves 0.5-2 mm wide; utricle veinless or obscurely veined 2. **C. pachystylis**

3. Plant 30-70 cm; culms 1-2 mm diam.; leaves 3-5 mm broad; female spikes 1.2-4 cm 4. **C. distans**
+ Plant 5-25 (-60) cm; culms 0.4-1 mm diam.; leaves 0.8-3.5 mm broad; female spikes 0.5-1.8 cm 3. **C. extensa**

1. **Carex divisa** Huds., Fl. Angl. 348 (1762).
Syns. *Carex coarcta* Boott, Trans Linn. Soc. 1: 133 (1846).
Carex austro-afghanica Raymond in Koeie & Rech.f., Dan. Biol. Skr. 14: 24 (1965).

Greyish-green perennial 10-50(-80) cm; rhizome long, 1.5-3 mm diam., creeping, sturdy, with rather short internodes and fibrous scales; culms trigonous to triquetrous, distally scabrous along the edges; leaves 1/3-2/3 of culm length; sheaths 2-5 cm, outermost pale brown, mouth almost straight; ligule *c.* 0.2 mm; blades 1-3 mm wide, conduplicate to involute, seldom flat, adaxial side papillose, margins and mid-vein scabrous towards the apex; inflorescence 1-4 cm, of (3-)5-7(-15) overlapping androgynous spikes; bracts sheathless, narrow, lowest sometimes equalling the inflorescence; spikes 0.5-1.3 cm, globular to ellipsoid, at first variegated green and brown, later brown; female glumes 3-5 x 1.6-2.8 mm, light brown with darker mid-vein and scarious margins, frequently with arista to 1.5 mm; utricles 3.2-4.7 x 1.5-2.1 mm, ellipsoid, plano-convex, conspicuously spongy, with or without pronounced veins, sometimes with a short stipe; beak 0.7-1.1 mm, smooth or slightly scabrous, basal part narrowly winged; apex 2-dentate or oblique; margins scarious; nutlet *c.* 2 x 1.5 mm, plano-convex, broadly obovoid, sometimes with short style-base, brown.

N, O, M; wet meadows, lake edges, streams, irrigation canals, gardens, rice fields. Western Europe, North Africa, Kashmir, eastern Tibet, introduced to North America, South Africa and New Zealand.

2. **Carex pachystylis** J. Gay, Ann. Sci. Nat. Paris, sér. 2, 10: 301 (1838).
Syns. *Carex stenophylla* Wahlenb , Kungl. Svenska Vetenskapsakad. Handl., n.s. 24: 142 (1803).

Carex stenophylla Wahlenb. var. *planifolia* Boiss., Fl. Orient. 5: 400 (1882).
Carex desertorum Litw., Trav. Mus. Bot. Acad. Sci. Imp. Petersb. 1: 19 (1902).

Stoloniferous perennial 8-25 cm; rhizome thin, dark, with fibrous scales, profusely branching; roots mat-forming, sand-binding; culms slender, terete or trigonous, smooth or slightly scabrous above; first leaves short, less than 1/4 of culm length, usually falcate, subsequent leaves to equalling the culm, erect or flexuous; sheaths 1.5-4 cm, greyish-brown, soon fibrous, margins of scarious side straight or tongue-shaped; ligule *c.* 0.2 mm; blades 0.5-1.7 mm broad, flat, smooth or scabrous towards apex; inflorescence 0.7-1.7 x 0.5-1 cm, globose, of 3-6 androgynous compact spikes; lowest bracts occasionally to 1/2 of inflorescence length, sheathless, acuminate; spikes *c.* 5 x 5 mm, sessile, globose, of 3-6(-8) pistillate flowers; glumes 2.8-4.2(5) x 1.4-2.6 mm, deltate, acute or with arista to 0.9 mm, dark brown, glossy, mostly with wide scarious margins; utricle 2.8-4.6 x 1.1-2 mm, ovoid, plano-convex, glossy, slightly inflated, veinless or obscurely veined, rather spongy, with a stipe to 0.7 mm; beak 0.6-1.7 mm, smooth or lateral veins barbed; apex mostly 2-dentate; nutlet 2-2.2 x 1.7-1.9 mm, obovoid, biconvex or plano-convex, finely reticulate, glossy, brown.

M; dry, but periodically moist soils, slightly saline, sandy and stony ground. Italy, Austria to Kazakhstan, northwest India, China.

3. **Carex distans** L., Syst. Nat., ed. 10, 2: 1263 (1759).
Syns. *Carex sinai* Boott, Trans. Linn. Soc. London 20: 146 (1851).
Carex sinaica Nees in Steud., Syn. Pl. Glumac. 2: 348 (1855).

Cespitose stoloniferous perennial, 30-70 cm; culms trigonous, smooth or slightly scabrous above; leaves to *c.* 1/2 of culm length; sheath 2-4 cm, margins of scarious side straight or ligulate, usually brown-punctate; ligule 0.2-0.3 mm, brown-punctate; blades (2-)3-5 mm wide, flat or slightly recurved, scabrous on both surfaces, margins and towards the apex; inflorescence of 1 male and 2-4 female spikes, the upper sometimes androgynous; lower bracts mostly longer than the spikes, lowest sheath 1.5-3 cm; male spikes 1.5-3.5 cm, 2-6 mm wide, cylindrical or club-shaped, brown; male glumes 4-5 x 1.6-2 mm, oblanceolate to obovate, scarious, brown; female spikes 1.2-4 cm, 3-6 mm wide, cylindrical to ellipsoid, mostly with peduncles to 5 cm, erect or slightly nodding, lowest often remote; female glumes 2-3 x *c.* 1.5 mm, deltate, mid-vein mostly with scabrous arista to 2 mm, margins scarious, brown; utricle 3-4 x *c.* 1.5 mm, green to yellowish or brownish-green, mostly brown-punctate, veins conspicuous, beak 0.8-1.3 mm, scabrous or smooth, apex deeply 2-dentate, margins mostly brown, ciliate; stigmas 3; nutlet 2.5-3 x 1.3-1.6 mm, including a persistent style-base *c.* 0.2 mm, and a stipe 0.2-0.3 mm, greenish-brown.

N, S; wadis, marshes, wet meadows, Nile banks and streams. Europe, except North and northeast, North Africa from Morocco to Egypt, Turkey, southwest Asia from Sinai to Iraq, Iran and Caucasus.

4. **Carex extensa** Good., Trans. Linn. Soc. 2: 175 (1794).

Caespitose perennial 20-50 cm; culms trigonous or terete, smooth; leaves shorter than to overtopping the inflorescence; sheaths 2-5 cm, brown, frequently red-punctate; blades 1.5-2.5 mm wide, folded or involute; inflorescence of 1-2 male spikes and 2-5 female



Plate 128. CYPERACEAE: *Carex divisa* 1, habit; utricle (down right). *Carex pachystylis* 2, habit; utricle (right). *Carex distans* 3, habit; utricle (down right). *Carex extensa* 4, inflorescence and lower part; utricle (up within). Drawn by Margaret Tebbs.

spikes, mostly overlappping or the lowest remote; peduncle to 3.5 cm; bracts mostly overtopping the inflorescence, the upper often patent, the lower with sheath to 1.8 cm; male spikes 0.9-2.5 x 0.2-0.3 cm, fusiform or club-shaped; male glumes 3.4-4.1 x 1-1.7 mm, obovate, apex rounded, usuallly ciliate, margins brown; female spikes 6-20 x 5-7 mm, globose to cylindrical; female glumes 1.8-3.7 x 1-1.6 mm, broadly ovate to obovate, cymbiform, acute or with barbed arista to 0.5 mm, apex often ciliate, margins scarious, often with reddish spots; utricle 2.8-3.7 x 1.4-1.7 mm, ovoid, trigonous, loosely surrounding the fruit, conspicuously veined, glossy, smooth, greenish and mostly with reddish spots; beak 0.5-0.8 mm, conical, conspicuously veined, smooth; apex shallowly 2-fid; nutlet 2.3-2.6 x 1.1-1.4 mm, including a style-base 0.1 mm and a stipe 0.2 mm, ovoid, trigonous, finely reticulate and papillose, greenish-yellow to brown.

M, S; salt marshes. Western and northwest Europe, Mediterranean region, Sinai, Black Sea coasts, Sara Island in the Caspian Sea.

ORCHIDACEAE

Phillip Cribb

Perennial, terrestrial, saprophytic, epiphytic or lithophytic herbs, rarely scrambling climbers, with rhizomes; root-stem tuberoids or rootstocks with mycorrhizal fungi in the roots and often elsewhere; growth sympodial or less commonly monopodial; stems usually leafy, but leaves often reduced to bract-like scales, one or more internodes at the base often swollen to form a pseudobulb; aerial, assimilating adventitious roots, often bearing one or more layers of dead cells called a velamen, borne in epiphytic species; leaves glabrous or occasionally hairy, entire except at the apex in some cases, alternate or occasionally opposite, often distichous, frequently fleshy and often terete or canaliculate, almost always with a basal sheath which frequently sheaths the stem; inflorescences erect to pendent, spicate, racemose, paniculate, 1 to many-flowered, basal, lateral or terminal; flowers small to large, often quite showy, bisexual, rarely monoecious and polymorphic outside Africa, sessile or variously pedicellate; ovary inferior, unilocular; placentation parietal, rarely trilocular and the placentation axile; perianth epigynous, of 2 whorls, of 3 segments; the outer whorl of sepals usually free but sometimes variously adnate, the median (dorsal) often dissimilar to the laterals, the laterals sometimes adnate to the column foot to form a saccate, conical or spur-like mentum; the inner whorl comprising 2 lateral petals and a median lip; petals free or rarely partly adnate to sepals, similar to sepals or not, often showy; lip entire, variously lobed or 2- or 3-partite, ornamented or not with calli, ridges, hair cushions or crests, with or without a basal spur or nectary, margins entire to laciniate; column short to long, formed from the stylar and filamentous tissue, with or without a basal foot, occasionally winged or with lobes or arms at apex or ventrally; anther 1, rarely 2 or 3, terminal or ventral on column, cap-like or opening by longitudinal slits; pollen in tetrads, agglutinated into discrete masses called pollinia; pollinia mealy, waxy or horny, sectile or not, 2,4, 6 or 8, sessile or attached by caudicles, stipes or stipites to 1 or 2 sticky viscidia; stigma 3-lobed, the midlobe often modified to form a rostellum, the other lobes either sunken on the ventral surface of the column behind the anther or with 2 lobes porrect; fruit a capsule, opening laterally by 3 or 6 slits; seeds numerous, dust-like, lacking endosperm, sometimes markedly winged. 800 genera, 25,000-30,000 species, distributed in all continents except Antarctica, but especially in the humid tropics and subtropics.



Plate 129. ORCHIDACEAE: *Epipactis veratrifolia* habit (a); inflorescence of larger plant (b); flower (c); column (d); fruit (e). Drawn by Emmanuel Papadopoulos, after Flora of Iraq 8: 278 (1985), with permission.

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NOTE: Orchids are extensively grown around the world as ornamentals but other economic uses are few. Two or possibly three species of *Vanilla* Mill. are grown commercially to produce the flavouring vanillin, the tubers of several species are used for food and as aphrodisiacs, and a number of species are used in folk medicine, particularly in India, Indo-China and China.

1. **Epipactis** Zinn, nom. conserv.

Terrestrial, rarely saprophytic herbs with horizontal or vertical, very short rhizomes, numerous fleshy roots and simple, erect, leafy stems; leaves ovate or lanceolate, plicate, occasionally very small; flowers in more or less secund racemes, rather inconspicuous, spreading or pendulous, shortly pedicelled; tepals spreading or remaining closed, dull reddish or greenish; sepals free, subequal; petals scarcely smaller than sepals; lip usually in 2 parts articulated by a narrow joint or fold (mesochile); the basal part (hypochile) forms a nectar-containing cup often with a pair of basal bosses; the apical part (epichile) forming a more or less cordate or triangular downwardly directed terminal lobe; spur absent; column short, flat or concave in front with a shallow cup at apex; anther free, hinged at the back of the summit of the column, behind the stigma and rostellum, ovate, slightly convex, 2-celled; pollinia 2, tapering towards their apices near which they are attached to the rostellum, each more or less divided longitudinally into halves; caudicles absent; pollen grains forming friable masses loosely bound by fine threads; stigma prominent, broad; rostellum placed centrally above the stigma, large, globular, persistent, evanescent or absent; capsule oblong, spreading or pendulous. About 25 species, mainly north temperate and montane subtropical regions.

1. **Epipactis veratrifolia** Boiss. & Hohen., Diagn. Pl. Orient., ser. 1, 13: 11 (1842).
Syns. *Epipactis somaliensis* Rolfe in Dyer, Fl. Trop. Afr. 7: 189 (1897).
Helleborine veratrifolia (Boiss. & Hohen.) Bornm., Beih. Bot. Centralbl. 33: 205 (1915).
Epipactis wallichii Schltr., Anz. Akad. Wiss. Wien, Math.-Nat. Kl. 62: 275 (1920).
Epipactis consimilis sensu Wall. ex Hook.f., non D.Don; Täckholm & Drar, Fl. Egypt 4: 219 (1969).

Erect to scrambling terrestrial herb, 0.2-1.5 m; stems with 8-20-leaves; leaves 10-28 x 3-6 cm, linear-lanceolate, plicate; inflorescence 9-24 cm, lax, many-flowered; rhachis pubescent; bracts 5-15 x 1-1.5 cm, lanceolate to narrowly elliptic, pubescent; flowers with green, buff or yellow tepals, with broad marginal purple bands; lip white or buff with a purplish hypochile and a purple band on the epichile; pedicel, ovary and outer surface of flower densely pubescent; dorsal sepal 1-1.9 x 0.4-0.7 cm, lanceolate, acute; lateral sepals 1-2 x 0.4-0.8 cm, obliquely ovate, acute; petals 0.8-1.8 x 0.4-0.8 cm, ovate, acute; lip 2-partite, 0.9-2.1 x 0.7-1.2 cm; hypochile to 1 cm, narrowly saccate, with erect sides and auriculate at base; epichile fleshy, obscurely 3-lobed, with a central, raised longitudinal ridge and suberect side-lobes; column 1 cm, fleshy; anther 4-5 mm.

S; moist areas on rocks and below cliffs. Algeria, Sinai, Cyprus, Turkey, eastwards to Nepal, Himalayas and southwards to Yemen, Oman, Ethiopia and Somalia.

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Colour Plates



Potamogeton nodosus



Colchicum ritchii



Androcymbium palaestinum





Asphodelus aestivus





Asphodelus tenuifolius

orkandcom



Asphodelus fistulosus



Gagea reticulata



Tulipa stylosa

obrazkarna.com



Tulipa biflora



Tulipa biflora



Urginea maritima



Scilla peruviana



Dipcadi erythraeum



Bellevalia trifoliata



Leopoldia comosa



Asparagus stipularis



Allium blomfeldianum



Allium neapolitanum



Allium roseum *var.* tourneauxii



Allium aschersonianum





Allium cepa



Dracaena ombet





Ixiolirion tataricum



Narcissus tazetta



Pancratium maritimum



Pancratium tortuosum



Pancratium sickenbergeri



Eichhornia crassipes





Moraea sisyrinchium



Gladiolus italicus





Juncus littoralis





Juncus rigidus



Juncus subulatus



Juncus bufonius









Phoenix dactylifera







Hyphaene thebaica





Hyphaene thebaica







Medemia argun



Medemia argun





Pistia stratiotes



Eminium spiculatum



Spirodela polyrhiza



Lemna gibba



Typha domingensis



Typha elephantina





Commelina forsskaolii



Oryza sativa



Leersia hexandra



Lygeum spartum



Stipa capensis



Stipa lagascae



Oryzopsis miliacea



Lolium perenne



Poa annua



Dactylis glomerata



Sphenopus divaricatus



Cutandia memphitica



Cutandia dichotoma



Parapholis marginata



Ammochloa palaestina



Brachypodium distachyum



Avena barbata



Avena fatua



Trisetaria linearis



Rostraria cristata



Phalaris paradoxa



Polypogon monspeliensis



Polypogon viridis



Bromus catharticus



Bromus scoparius



Bromus madritensis



Boissiera squarrosa



Elymus farctus



Hordeum marinum *subsp.* marinum



Hordeum murinum *subsp.* glaucum



Aegilops kotschyi



Aegilops bicornis



Schismus arabicus



Schismus barbatus



Arundo donax





Phragmites australis



Stipagrostis ciliata



Stipagrostis scoparia



Aristida adscensionis



Leptochloa fusca



Dinebra retroflexa



Dactyloctenium aegyptium



Desmostachya bipinnata



Cynodon dactylon



Leptothrium senegalense





Panicum turgidum



Panicum repens



Panicum coloratum

openrana





Echinochloa crusgalli





Echinochloa colona



Echinochloa stagnina



Echinochloa stagnina



Paspalum dilatatum



Brachiaria reptans



Paspalum distichum



Setaria verticillata



Setaria pumila



Paspalidium geminatum



Digitaria ciliaris



Pennisetum divisum



Cenchrus echinatus





Saccharum spontaneum *subsp.* aegyptiacum

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Saccharum officinarum



Imperata cylindrica



Sorghum x drummondii



Sorghum virgatum



Dichanthium annulatum





Cymbopogon schoenanthus





Lasiurus scindicus



(female inflorescence)



(male inflorescence)



Zea mays (male inflorescences)





Bolboschoenus glaucus



Schoenoplectus litoralis *subsp.* thermalis



Scirpoides holoschoenus



Cyperus alternifolius *subsp.* flabelliformis



Cyperus papyrus



Cyperus articulatus



Cyperus articulatus



Cyperus alopecuroides



Cyperus rotundus



Cyperus difformis



Cyperus laevigatus



Cyperus capitatus





Cyperus conglomeratus





Epipactis veratrifolia

Additions and Corrections

Volume 1

p. 1, line 5: trees or shrubs; read: herbs, trees or shrubs

p. 14, lines 11-12 from below (part of the key to *Ficus* species) to be replaced by the following:

1. Leaves lanceolate, to 4 cm wide — 1. **F. cordata** subsp. **salicifolia**
+ Leaves 3-5-lobed or undivided, to 20(-30) cm wide — 2

2. Leaves undivided — 4. **F. sycomorus**
+ Leaves 3-5-lobed, all lobed, or sometimes few undivided — 3

Replace couplet 2 in the key by 3, otherwise the rest of the key remains unchanged.

p. 16, before line 3 from below add the following:

4. **Ficus sycomorus** L., Sp. Pl., ed. 1, 1059 (1753).
Syns: *Sycomorus gnaphalocarpa* Miq., London J. Bot. 7: 113 (1848).
Ficus gnaphalocarpa (Miq.) A. Rich., Tent. Fl. Abyss. 2: 270 (1851).
Ficus sycomorus L. subsp. *gnaphalocarpa* (Miq.) C. C. Berg, Adansonia, sér. 2, 20: 272 (1980).

Tree to 20(-30) m; main branches ascending; leaves 5-12 x 3-8 cm, broadly ovate to suborbicular, leathery, scabrous, slightly pubescent on the lower surface, apex shortly acute, base cordate; petiole 1.5-3.5 cm; fruits 2.5-4.5 cm diam., depressed globose to obovoid, yellowish or reddish to orange-red, in crowded clusters or few to single fruits on older leafless branches, peduncle 0.3-1.5 cm; basal bracts 2-3 mm.

N, O, M, S; by canals or near moist ground. Cape Verde Islands, Egypt, Palestine, Syria, Arabia, tropical East Africa, Comoros Islands, Madagascar, South Africa, Namibia.



Ficus sycomorus

NOTE: According to Berg & Hijman, in Polhill (ed.), Fl. Trop. East Africa, Moraceae (1989), *Ficus sycomorus* is listed among the native species in Egypt. The sycomore fig is also widely cultivated in the rural regions and the oases. It has been recorded in ancient Egypt; its drawings and engravings ferquently appeared on the temples. The fruits were among the offerings which were found in the tombs. Young branches of *Ficus sycomorus* were also found among the garlands accompanying some royal mummies of Egyptian Pharaohs. A herbarium specimen from one of the garlands is now on display in the Agricultural Museum at Dokki, Cairo, probably the oldest herbarium specimen ever known.

p. 18, before line 3 from below add:

1. Perennial; leaves densely white-pubescent on the lower surface 1. **F. tenacissima**
\+ Annual; laeves green, with thin white tomentum on the lower surface 2. **F. viridis**

p. 20, after line 8 add:

2. **Forsskaolea viridis** Webb in Hook., Niger Fl. 179 (1849).

Annual 25-80 cm, branched from the base; stems erect or ascending, sparsely hairy; lamina 1.5-7 x 0.8-3.5 cm, ovate to ovate-lanceolate, green, with thin white tomentum on the lower surface, margins dentate-serrate, apex subacute; petiole 1-4 cm; stipules 1-2 x 0.5-1.5 mm, ovate-lanceolate, margins ciliate; inflorescence with 4-7-lobed involucre, involucral bracts 4-6 x 3-4 mm, broadly ovate, densely hairy at the base; male flowers pedicellate, perianth 3-lobed; stamen 1; female flowers few, at the centre of inflorescence; perianth 0; achene 2-3.5 x 1-1.75 mm, ovoid, brown.

GE; stony ground. Southeast Egypt, Sudan, Ethiopia, Somalia, Angola, Namibia, Cape Verde Islands, Saudi Arabia, Yemen.

p. 36, line 17 from below: S; read: GE, S;

p. 54, line 3 from below: exerted; read: exserted

p. 98, line 10: N, M; read: N, M, O;

p. 101, line 5 from below: Annual herb 40-80 cm; read: Perennial 40-80 cm;

p. 116, line 6: exerted, read: exserted

p. 129, line 18: Branches and leaves glabrous; upper part of leaves around glomerules terete, twice as long as wide; read: Branches and leaves not papillose-hispid.

p. 129, line 12 from below: Branches and leaves papillose-hispid; upper part of leaves around glomerules terete, twice as long as wide; read: Branches and leaves papillose-hispid.

p. 230, line 2 from below: M; read: M, S;

p. 251, key to genera: replace couplet 19 with the following 2 couplets:

19. Pod subterranean 9. **M. hypogaea**
\+ Pod aerial 20

20. Leaflets sinuate-plicate, pubescent and gland-dotted on both surfaces — 19. **Cullen**
\+ Leaves serrulate, denticulate or dentate, glabrous or sparsely hairy, not gland-dotted — 10. **Melilotus**

and add 1 to couplets 20 to 46 of the key to read: 21 to 47.

p. 267, line 3 from below: + Pod 1-1.2; read: 0.1-1.2

p. 267, last line + Pod 0.3-1.2 mm; read: + Pod 0.3-1.2 cm

p. 282, line 7 from below: occur the Egypt; read: occur in Egypt.

p. 286, last line: westwards to Iran; read: eastwards to Iran.

p. 297, line 24: Egypt, Eritrea; raed: Egypt, northeast Sudan.

p. 308, after line 2 add: S; calcareous soil. East Mediterranean region, Sinai.

p. 319, line 4 from below: Mediterranean to China; read: Mediterranean region to China.

p. 354, line 8 from below: 37. **Vigna** Savi; read: 37. **Vigna** Savi, nom. conserv.

p. 382, colour photo (up left): Silene arabica; read Silene villosa.

p. 409 (index): **Hypericum sinaicum** Hochst. & Steud., read: Hochst. & Steud. ex Boiss.

Volume 2

p. 7, line 3: M, De, R, GE; read: M, De, S, R, GE.

p. 43, line 2: pedicel 3-8, read: pedicel 3-8 mm

p. 61, line 15 from below: juillet 1882, read: juillet 1832

p. 75, below line 6, add: Syn. *Rhus vulgaris* Meikle, Kew Bull. 6: 290 (1951).

p. 76, after line 5, add: Area of the species: Egypt, Syria, Turkey, northern Iraq, Iran, Afghanistan, Pakistan.

p. 124, line 5: Mant. 2: 246; read: Mant. 246

p. 143, after line 24, add:

Syns. *Cucumis figarei* Naudin var. *dissectus* Naudin, Ann. Sci. Nat., sér. 4, 11: 17 (1859), and delete "Syns." from next line.

p. 230, line 11: Flowers in 3; read: Flowers in 3s

p. 238, line 19: ?De, ?S; read: ?De, S;

p. 255, line 2: leaves lobed or entire; read: leaves palmately compound, lobed or entire.

p. 255, add the following after line 6:

1. Leaf-lobes lanceolate, coarsely and sinuately toothed — 3. **M. dissecta**
\+ Leaf-lobes or leaflets entire — 2

Replace couplet 1 in the key by 2, otherwise the rest of the key remains unchanged.

p. 255, before line 3 from below add:

3. **Meremmia dissecta** (Jacq.) Hallier f., Bot. Jahrb. Syst. 16: 552 (1893).
Syn. *Convolculus dissectus* Jacq., Obs. Bot. 2: 4 (1767).

Herbaceous perennial, climber; stems hairy, later glabrous; leaves deeply pinnatiscect; lobes 3-5.5 x 1-1.5 cm, lanceolate, coarsely and sinuately toothed; flowers usually solitary or in few flowered cymes; peduncle 3-5 cm; pedicel 1.5-2.5 cm; corolla 3-4.5 cm, broadly funnel-shaped, white with purple centre; fruit 1.5-2 cm diam., a depressed-globose capsule, subtended by the persistent calyx; seeds *c.* 6 x 5 mm, subglobose, glabrous, black.

N; weed of cultivation, naturalized. Southern United States to tropical South America, naturalized in some tropical regions in Africa and Asia.

NOTE: *Merremia dissecta* has been collected in several localities during the last few years in Upper and Lower Egypt, growing as a weed in fields and waste ground within the Nile Valley, and seems to be completely naturalized.

p. 267, line 1: N, O; read: N, O, S;

p. 304, line 19: De, R, GE; read: De, R, GE, S;

Volume 3

p. 130, line 16 from below: *Campanula mutabunda,* read: *Campanula nutabunda*

p. 196, plate 48, line 4 from below: *Ifloga spicata;* read: *Ifloga labillardieri,* and the same correction in the index to line drawings p. 354

p. 260, plate 63, add scale 8 mm long corresponding to 2 mm original size of the branchlet with two capitula of *Artemisia judaica*

p. 264, plate 64, add scale 5 mm long corresponding to 2 mm original length of the capitulum of *Senecio aegyptius* var. *aegyptius*

p. 270, line 4 from below: M, O, M; read: N, O, M;

p. 278, line 7 from below: plate 214, p. 293; read: plate 214, p. 593

p. 331, lower 2 colour photos: *Verbascum sinaiticum,* read *Verbascum sinuatum,* and the same correction in the index to colour photographs p. 357

p. 340, colour photo (up right): *Centaurea sinaica*; read: *Centaurea aegyptiaca*, and the same correction in the index to colour photographs p. 357

p. 341, colour photo (down right): *Carthamus nitidus*; read: *Carthamus glaucus* subsp. *alexandrinus*, and the same correction in the index to colour photographs p. 357

p. 343, colour photo (down left): *Ifloga spicata,* read: *Ifloga labillardieri,* and the same correction in the index to colour photographs p. 357

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Keys to Major Divisions and to Families
(volumes 1-4)

Literature: Cook, C.D.K. 1996. Aquatic plant book. SPB Academic Publishing, Amsterdam, New York.
Cullen, J. 2000. The identification of flowering plant families, ed. 4. Cambridge University Press, Cambridge.

NOTE: The keys to families given here apply only to their representative taxa in the Flora of Egypt.

Key to Major Divisions

1. Plants reproducing by spores — I. **Pteridophyta**
+ Plants reproducing by seeds — 2

2. Ovules not enclosed in an ovary; perianth absent — II. **Gymnospermae**
+ Ovules enclosed in an ovary; perianth usually present — III. **Angiospermae**

I. Pteridophyta

1. Stems jointed, with longitudinal grooves; leaves reduced to a sheath of scales at the nodes — **Equisetaceae**
+ Stems not jointed; leaves (fronds) not reduced to a sheath — 2

2. Plants free-floating on water — **Azollaceae**
+ Plants rooted in the ground, aquatic or terrestrial — 3

3. Fronds (leaves) with 4 pinnae (leaflets) on long stipes (petioles) — **Marsileaceae**
+ Fronds not as above — 4

4. Fronds not circinnate in bud — **Ophioglossaceae**
+ Fronds circinnate in bud — 5

5. Fronds fan- or wedge-shaped, dichotomously branching — **Actiniopteridaceae**
+ Fronds not fan- or wedge-shaped, not dichotomously branching — 6

6. Sori marginal, covered by the deflexed margin of pinnules — **Adiantaceae**
+ Sori elongate, placed along the veins — 7

7. Perennials; fronds coriaceous — **Aspleniaceae**
+ Annuals; fronds membranous, thin — **Adiantaceae**

II. Gymnospermae

1. Monoecious (our species) shrubs or trees; juvenile leaves acicular; mature leaves ovate-rhomboid, densely imbricate; cones 3-9-seeded; seeds free — **Cupressaceae**
+ Usually dioecious shrubs or climbers; leaves scale-like; cones 1-3-seeded; seeds surrounded by fleshy or scarious bracts — **Ephedraceae**

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III. **Angiospermae**

1. Cotyledons 2; leaves usually net-veined; flowers with parts in 2s, 4s, or 5s, or parts numerous; primary root-system a taproot, usually persistent and branched; pollen with 3 or more germination apertures **Dicotyledoneae**
+ Cotyledon 1; leaves usually parallel-veined; flowers with parts in 3s; mature root-system entirely adventious; pollen with 1 germination aperture **Monocotyledoneae**

Dicotyledoneae

1. Petals present, free or rarely united above the base, or petals absent 2
+ Petals present, united into a tube 9

2. Flowers unisexual; petals absent; male flowers in catkins; plants woody **Group A**
+ Flowers unisexual or bisexual; petals present or absent, not in catkins; plants woody or not 3

3. Ovary of 2 or more free carpels; styles also free **Group B**
+ Ovary of 1, 2 or more carpels, united wholly or partly, rarely free then the styles united 4

4. Perianth of 2 or more whorls, usually differentiated into calyx and corolla 5
+ Perianth of 1 whorl, or perianth absent, or of 2 or more whorls but segments not or hardly differing from whorl to whorl 8

5. Stamens more than twice as many as the petals **Group C**
+ Stamens twice as many as the petals or fewer 6

6. Ovary partly or fully inferior **Group D**
+ Ovary completely superior 7

7. Placentation axile, apical, basal, marginal or free-central **Group E**
+ Placentation parietal **Group F**

8. Stamens borne on the perianth, or ovary inferior **Group G**
+ Stamens free from the perianth, ovary superior **Group H**

9. Ovary partly or fully inferior **Group I**
+ Ovary superior 10

10. Corolla actinomorphic **Group J**
+ Corolla zygomorphic **Group K**

Group A

1. Leaves pinnate **Leguminosae** (*Ceratonia*)
+ Leaves simple, entire, toothed or lobed 2

2. Ovules numerous; seeds many, each with a tuft of long silky hairs **Salicaceae**
+ Ovules solitary or few; seeds not with a tuft of long silky hairs 3

3. Fruit splitting into 3 mericarps; seeds with appendages **Euphorbiaceae**
+ Fruit a syconium (fig) with enlarged fleshy receptacle and numerous small 1-seeded druplets **Moraceae** (*Ficus*)

Group B

1. Aquatic plants; leaves peltate **Nymphaeaceae** (*Nymphaea*)
+ Terrestrial plants, or if aquatic, then leaves not peltate 2

2. Leaves succulent; stamens in 1 or 2 whorls **Crassulaceae**
+ Leaves not succulent; stamens spirally arranged, not obviously in whorls 3

3. Petals fringed; fruits formed from free carpels borne on a common stalk **Resedaceae**
+ Petals when present not fringed; fruits formed from free carpels, not borne on a common stalk 4

4. Woody climbers; flowers unisexual; seeds U-shaped **Menispermaceae** (*Cocculus*)
+ Herbaceous or woody (not climbers); flowers bisexual; seeds not U-shaped 5

5. Fruit dry, woody, orbicular, flattened, indehiscent, smooth on the lower surface, spiny on the upper, few-seeded **Neuradaceae** (*Neurada*)
+ Fruit not as above 6

6. Shrubs or small trees **Rosaceae**
+ Herbaceous annuals or perennials 7

7. Leaves simple, without stipules, often compound and deeply lobed or dissected **Ranunculaceae**
+ Leaves compound, pinnate, with stipules; leaflets serrate or dentate **Rosaceae**

Group C

1. Perianth and stamens hypogynous; ovary superior 2
+ Perianth and stamens perigynous, or epigynous; ovary partly or fully inferior 20

2. Placentation axile or free-central 3
+ Placentation marginal or parietal 13

3. Placentation free-central; sepals 2 **Portulacaceae** (*Portulaca*)
+ Placentation axile; sepals more than 2 4

4. Leaves alternate 5
+ Leaves opposite or rarely whorled 12

5. Perianth-segments of inner whorl nectar-secreting; fruit a group of partly or fully coalescent follicles **Ranunculaceae**
+ Perianth and fruits not as above 6

6. Leaves with translucent aromatic glands **Rutaceae** (*Haplophyllum*)
+ Leaves without translucent aromatic glands 7

7. Milky latex present; flowers unisexual **Euphorbiaceae**
+ Milky latex absent; flowers bisexual 8

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8. Stamens 15; filaments connate at the base in 5 bundles of 3s — **Geraniaceae** (*Monsonia*)
\+ Stamens and filaments not as above — 9

9. Filaments free; anthers 2-celled — 10
\+ Filaments united into a tube, at least around the ovary; anthers often 1-celled — 11

10. Nectar-secreting disc absent; stamens more than 15; leaves simple — **Tiliaceae**
\+ Nectar-secreting disc present, conspicuous; stamens 15; leaves dissected — **Peganaceae** (*Peganum*)

11. Styles several, divided above; stipules often persistent; carpels 5 or more — **Malvaceae**
\+ Style 1; stipules usually deciduous; carpels 2-5 — **Sterculiaceae**

12. Leaves simple, with translucent glands; stamens united in bundles — **Guttiferae** (*Hypericum*)
\+ Leaves pinnate, without translucent glands; stamens not united in bundles — **Zygophyllaceae**

13. Leaves 2-pinnate, with stipules — **Leguminosae**
\+ Leaves various, not 2-pinnate, without stipules — 14

14. Leaves opposite — 15
\+ Leaves alternate — 17

15. Floral parts in 3s — **Papaveraceae**
\+ Floral parts in 4s or 5s — 16

16. Style 1; stamens not united in bundles; leaves without translucent glands — **Cistaceae**
\+ Styles 3-5, free or variously united below; stamens united in bundles; leaves with translucent or black glands — **Guttiferae** (*Hypericum*)

17. Sepals 2 or 3, caducous — **Papaveraceae**
\+ Sepals 4-8, persistent in flower — 18

18. Leaves scale-like — **Tamaricaceae**
\+ Leaves various, not scale-like — 19

19. Ovary closed at the apex, borne on a stalk (gynophore); none of the petals fringed — **Capparaceae**
\+ Ovary open at the apex, not borne on a stalk; at least some of the petals fringed — **Resedaceae**

20. Placentation free-central; ovary partly inferior — **Portulacaceae** (*Portulaca*)
\+ Placentation not free-central; ovary either completely superior or completely inferior — 21

21. Aquatic plants with peltate leaves — **Nymphaeaceae** (*Nymphaea*)
\+ Terrestrial plants; leaves not peltate — 22

22. Sepals 4 or 5, persistent in flower; mostly shrubs — **Rosaceae**
\+ Sepals 2 or 3, caducous; herbaceous plants — 23

23. Stamens numerous — **Papaveraceae**
\+ Stamens 2 or 4 — **Fumariaceae**

Group D

1. Petals and stamens numerous; plants succulent — **Aizoaceae**
\+ Petals and stamens each 10 or fewer; plants usually not succulent — 2

2. Anthers opening by terminal pores (mangroves) — **Rhizophoraceae** (*Rhizophora*)
\+ Anthers opening by longitudinal slits or by valves — 3

3. Placentation parietal, placentas sometimes intrusive — 4
\+ Placentation axile, basal, apical or free-central — 5

4. Climbing herbs with tendrils; flowers unisexual — **Cucurbitaceae**
\+ Herbs, but not climbing and without tendrils; flowers bisexual — **Vahliaceae** (*Vahlia*)

5. Stamens as many as, and on the same radii as the petals; trees or shrubs; leaves simple — **Rhamnaceae**
\+ Stamens more numerous than petals, or, if as numerous, then not on the same radii; plants herbaceous or woody; leaves simple or compound — 6

6. Flowers borne in umbels, these sometimes condensed into heads; leaves usually compound — **Umbelliferae**
\+ Flowers not in umbels; leaves simple — 7

7. Ovary inferior, 4-5-locular; stamens 8-10 in 2 whorls — **Onagraceae**
\+ Ovary semi-inferior, 2-5-locular; stamens 3-5 in 1 whorl — 8

8. Ovary 2-locular; stigma 1, capitate; fruit a circumscissile capsule dehiscing by a lid — **Sphenocleaceae** (*Sphenoclea*)
\+ Ovary 2-5-locular; stigmas 2-5, not capitate; fruit a capsule, dehiscing by apical or lateral valves or pores — **Campanulaceae**

Group E

1. Perianth zygomorphic — 2
\+ Perianth actinomorphic — 7

2. Anthers opening by terminal pores — **Polygalaceae** (*Polygala*)
\+ Anthers opening by longitudinal slits or by valves — 3

3. Plants herbaceous — 4
\+ Plants woody: shrubs, trees or climbers — 6

4. Leaves without stipules — **Lythraceae**
\+ Leaves with stipules — 5

5. Carpel 1; fruit a legume, sometimes 1-seeded — **Leguminosae**
\+ Carpels 5; fruit a schizocarp splitting into mericarps — **Geraniaceae**

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6. Carpel 1 — **Leguminosae**
\+ Carpels 2 or more — **Sapindaceae**

7. Placentation free-central — 8
\+ Placentation axile, apical or basal — 11

8. Stamens more or fewer than petals, if as many then not on the same radii as petals — **Caryophyllaceae**
\+ Stamens as many as petals and on the same radii as petals — 9

9. Anthers opening by valves; stigma 1 — **Berberidaceae**
\+ Anthers opening by longitudinal slits; stigmas more than 1 — 10

10. Sepals 5; ovule 1, basal on a long curved stalk — **Plumbaginaceae**
\+ Sepals 2; ovules numerous, not on a long curved stalk — **Portulacaceae** (*Portulaca*)

11. Small glabrous annuals growing in water or on wet mud; seeds pitted — **Elatinaceae**
\+ Plants not as above — 12

12. Sepals, petals and stamens borne on a rim, cup or tube inserted below the ovary — 13
\+ Sepals, petals and stamens inserted individually below the ovary — 15

13. Stamens more or fewer than the petals — **Lythraceae**
\+ Stamens as many as the petals — 14

14. Fruit a capsule — **Celastraceae** (*Maytenus*)
\+ Fruit a drupe — 15

15. Flowers in conspicuous axillary and terminal panicles — **Salvadoraceae** (*Salvadora*)
\+ Flowers in small cymes, spikes, clusters or solitary — **Rhamnaceae**

16. Leaves with translucent aromatic glands — **Rutaceae** (*Haplophyllum*)
\+ Leaves without such glands — 17

17. Milky latex often present; flowers unisexual; styles 3, often further divided — **Euphorbiaceae**
\+ Plants not as above — 18

18. Flower with a well-developed disc, usually nectar-secreting, below and around the ovary — 19
\+ Flower without a disc, nectar secreted in other ways — 24

19. Stamens as many as and on the same radii as the petals; climbers with tendrils — **Vitaceae**
\+ Stamens more or fewer than the petals, or if of the same number, then not on the same radii as petals; erect plants, tendrils absent — 20

20. Resinous trees or shrubs — 21
\+ Herbs or shrubs, not resinous — 22

21. Ovules 2 per locule of the ovary — **Burseraceae** (*Commiphora*)
\+ Ovule per locule of the ovary — **Anacardiaceae**

22. Plants herbaceous — **Zygophyllaceae** (incl. **Peganaceae**)
\+ Plants woody trees or shrubs — 23

23. Flowers unisexual — **Celastraceae** (*Maytenus*)
\+ Flowers bisexual — **Zygophyllaceae** (incl. **Nitrariaceae**)

24. Herbs — 25
\+ Trees or shrubs — 28

25. Leaves simple, not lobed — 26
\+ Leaves lobed or compound — 27

26. Stamens 5-many, without nectaries; ovary of 2-5 carpels; fruit a capsule, schizocarp or nutlet — **Molluginaceae**
\+ Stamens 5, with nectaries adnate to the staminal tube; ovary 10-locular due to false septa; fruit a capsule — **Linaceae**

27. Leaves with stipules — **Geraniaceae**
\+ Leaves without stipules — **Oxalidaceae** (*Oxalis*)

28. Stamens 2 — **Oleaceae**
\+ Stamens 5 or more — **Sterculiaceae**

Group F

1. Trees; leaves 2- or 3-pinnate; stamens 5, of differing lengths — **Moringaceae**
\+ Plants not as above — 2

2. Perianth zygomorphic — 3
\+ Perianth actinomorphic — 6

3. Ovary open at the apex; some or all of the petals fringed — **Resedaceae**
\+ Ovary closed at the apex; petals not fringed — 4

4. Petals and stamens 5; carpels 3 — **Violaceae** (*Viola*)
\+ Petals and stamens 4 or 6; carpels 2 — 5

5. Ovary borne on a stalk; stamens projecting beyond petals — **Capparaceae**
\+ Ovary not borne on a stalk; stamens not projecting beyond petals — **Papaveraceae**

6. Petals and stamens numerous — **Aizoaceae**
\+ Petals and fertile stamens each fewer than 7 — 7

7. Sepals 2 — **Papaveraceae**
\+ Sepals 4-5 — 8

8. Stamens 6, 4 longer and 2 shorter; carpels 2; fruit usually with a secondary septum — **Cruciferae**
\+ Stamens 4-10, all ± equal; carpels 2-5; fruit without a secondary septum — 9

9. Petals with a scale-like appendage at the base; leaves opposite — **Frankeniaceae** (*Frankenia*)
\+ Petals without appendages; leaves alternate or all basal — 10

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10. Stipules present — **Violaceae** (*Viola*)
+ Stipules absent — **Tamaricaceae**

Group G

1. Aquatic plants — 2
+ Terrestrial plants — 3

2. Flowers unisexual; stamens 8 — **Haloragidaceae** (*Myriophyllum*)
+ Flowers bisexual; stamens 6 — **Cruciferae**

3. Trees or shrubs — 4
+ Herbs, climbers or parasites — 8

4. Stamens as many as, and on radii alternating with, the perianth-segments — **Rhamnaceae**
+ Stamens not arranged as above — 5

5. Stipules present, sometimes falling early — 6
+ Stipules absent — 7

6. Stamens numerous — **Rosaceae**
+ Stamens 10 — **Leguminosae**

7. Ovary superior — **Thymelaeaceae** (*Thymelaea*)
+ Ovary inferior — **Santalaceae**

8. Plants parasitic — 9
+ Plants not parasitic — 10

9. Stem-parasites; flowers conspicuous, in umbels; chlorophyll present — **Loranthaceae** (*Plicosepalus*)
+ Root-parasites; flowers minute, in fleshy spikes; chlorophyll absent — **Balanophoraceae** (*Cynomorium*)

10. Ovary superior — 11
+ Ovary inferior — 15

11. Fruit a many-seeded capsule — 12
+ Fruit 1-seeded nutlet or utricle — 13

12. Stems often with swollen nodes; flowers in dichasial cymes, sometimes clustered, umbellate or solitary; capsule with valves or apical teeth — **Caryophyllaceae**
+ Stems without swollen nodes; flowers axillary, in spikes or cymes, or solitary; capsule septicidally dehiscent, irregularly circumscissile or dehiscing on decay — **Lythraceae**

13. Leaves with stipules united into a sheath (ocrea); stamens 6-9 — **Polygonaceae**
+ Leaves without ocrea; stamens 5, rarely 1-4, or 8 in 2 rows — 14

14. Stamens 5, rarely 1-4; carpels 2-3 (-5); ovule basal — **Chenopodiaceae**
+ Stamens 8, in 2 rows; carpel 1; ovule apical — **Thymelaeaceae** (*Thymelaea*)

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15. Lower part of perianth-tube swollen around the style, the upper part cylindrical; ovary 6-celled **Aristolochiaceae** (*Aristolochia*)
\+ Perianth and ovary not as above 16

16. Leaves linear; fruit a nutlet; seed 1 **Santalaceae** (*Thesium*)
\+ Leaves elliptic-lanceolate; fruit a capsule; seeds numerous **Onagraceae**

Group H

1. Aquatic plants, submerged or partially covered by flowing water 2
\+ Terrestrial plants 3

2. Leaves whorled, much divided **Ceratophyllaceae** (*Ceratophyllum*)
\+ Leaves closely imbricate, sometimes distant, not divided **Podostemaceae** (*Tristicha*)

3. Stipules present, sometimes falling early 4
\+ Stipules entirely absent 9

4. Ovary 1- celled, containing 1 ovule 5
\+ Ovary 1- to serveral-celled, containing more than 1 ovule 7

5. Styles 2-4, usually 3, free **Polygonaceae**
\+ Style 1, sometimes divided above into 2 stigmas 6

6. Herbs **Urticaceae**
\+ Trees or shrubs **Moraceae**

7. Placentation free-central **Caryophyllaceae**
\+ Placentation axile 8

8. Milky latex present; stamen 1 **Euphorbiaceae**
\+ Milky latex absent; stamens 5-30, often connate into a tube **Sterculiaceae**

9. Ovary 1-celled, containing 1 ovule 10
\+ Ovary 1-several-celled, containing more than 1 ovule 13

10. Perianth dry and scarious **Amaranthaceae**
\+ Perianth neither dry nor scarious 11

11. Style 1 or 0 **Nyctaginaceae**
\+ Styles 2-5, free 12

12. Stamens 9; perianth petaloid, of 6 segments united below **Polygonaceae**
\+ Stamens 5, rarely 1-4; perianth not petaloid, generally of 2-5 free sepaloid segments **Chenopodiaceae**

13. Placentation parietal or free-central 14
\+ Placentation axile, apical or basal 15

14. Placentation parietal; perianth-segments free **Papaveraceae**
\+ Placentation free-central; perianth-segments united at least at the base **Primulaceae**

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15. Leaves opposite; stamens 2 **Oleaceae**
+ Leaves alternate; stamens 3 or more 16

16. Resinous trees or shrubs; fruit 1-seeded, drupe-like; ovule 1 per locule, apical or basal **Anacardiaceae**
+ Non-resinous shrubs or herbaceous climbers; fruit an inflated capsule with 3, 1-seeded locules **Sapindaceae**

Group I

1. Inflorescence a head (capitulum), surrounded by an involucre of bracts (phyllaries); ovule always 1 2
+ Inflorescence and ovules not as above 3

2. Each flower with a cup-like involucel; stamens 4, free; ovule apical **Dipsacaceae**
+ Involucel absent; stamens 5, anthers united into a tube; ovule basal **Compositae**

3. Leaves alternate or basal 4
+ Leaves opposite or whorled 5

4. Climbers with tendrils; flowers unisexual; stamens 1-5; placentation parietal; fruit berry-like pepo **Cucurbitaceae**
+ Plants not climbing; flowers bisexual; stamens 5; placentation free-central; fruit a capsule **Primulaceae**

5. Stamens 3, ovary with 1 ovule **Valerianaceae** (*Valerianella*)
+ Stamens 4-5; ovary with 2 or more ovules **Rubiaceae**

Group J

1. Stamens 2 **Oleaceae**
+ Stamens more than 2 2

2. Carpels several, free; leaves succulent **Crassulaceae**
+ Carpels united, if bodies of the carpels free, then the styles united; leaves usually not succulent 3

3. Corolla papery, translucent, 4-lobed; stamens 4, projecting from the corolla; leaves with parallel veins, often all basal **Plantaginaceae** (*Plantago*)
+ Plants not as above 4

4. Stamens more than twice as many as the petals 5
+ Stamens up to twice as many as the petals 7

5. Leaves with stipules; filaments of stamens united into a tube around the ovary and style **Malvaceae**
+ Leaves without stipules; filaments free 6

6. Leaves with translucent aromatic glands; flowers bisexual **Rutaceae** (*Haplophyllum*)
+ Leaves without translucent aromatic glands; flowers unisexual **Ebenaceae** (*Euclea*)

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7. Stamens as many as petals and on the same radii as them 8
+ Stamens more or fewer than petals, if as many then not on the same radii 11

8. Placentation axile; climbers with tendrils **Vitaceae**
+ Placentation basal or free-central; plants not climbers with tendrils 9

9. Sepals 2, free **Portulacaceae** (*Portulaca*)
+ Sepals 4 or more, united 10

10. Corolla persistent and papery in fruit; ovule 1, on a long stalk arising from the base of the ovary **Plumbaginaceae**
+ Corolla not persistent and papery in fruit; ovules many, on a free-central placenta **Primulaceae**

11. Sepals 2 or 3, caducous **Papaveraceae**
+ Sepals more than 3 12

12. Leaves bipinnate; carpel 1; fruit a legume **Leguminosae**
+ Plants not as above 13

13. Anthers opening by pores; pollen in monads **Solanaceae**
+ Anthers opening by longitudinal slits; pollen in monads, tetrads or in coherent masses (pollinia) 14

14. Leaves alternate or all basal; carpels never 2 15
+ Leaves opposite or whorled, alternate only when carpels 2 20

15. Herbs with milky latex; stamens free from the corolla-tube **Campanulaceae**
+ Plants not as above 16

16. Flowers in spirally coiled cymes; fruit of 1-4 nutlets or 1-4-seeded drupe **Boraginaceae**
+ Flowers and fruits not as above 17

17. Ovules 1-2 in each locule of the ovary 18
+ Ovules 3- to many in each locule of the ovary 19

18. Sepals free; corolla-lobes contorted and infolded in bud; twiners, herbs or dwarf shrubs **Convolvulaceae**
+ Sepals united; corolla-lobes not as above in bud; trees or shrubs **Boraginaceae**

19. Stamens 5; staminodes absent; septum of the ovary oblique, not in the horizontal plane **Solanaceae**
+ Stamens 4, 2 or 5; staminodes 1-3 or absent; septum of ovary in the horizontal plane **Scrophulariaceae**

20. Milky latex usually present; fruit of 2 almost free follicles united by a common style; seeds with silky appendages 21
+ Milky latex absent; fruit a capsule or fleshy; carpels united; seeds without silky appendages 22

21. Pollen granular; corona absent; corolla-lobes valvate in bud **Apocynaceae**
+ Pollen usually in coherent masses (pollinia); corona usually present; corolla-lobes valvate or contorted in bud **Asclepiadaceae**

22. Placentation parietal; epicalyx present **Gentianaceae**
+ Placentation axile or free-central; epicalyx absent 23

23. Placentation axile; fruit a drupe or of 2-4 nutlets or pyrenes **Verbenaceae**
+ Placentation free-central; fruit a 1-seeded capsule opening by 2(-4) valves (mangroves) **Avicenniaceae** (*Avicennia*)

Group K

1. Stamens more numerous than the corolla-lobes, or anthers opening by pores 2
+ Stamens as many as corolla-lobes or fewer, anthers not opening by pores 5

2. Leaves undivided; anthers opening by pores; ovary of 2 or more united carpels 3
+ Leaves dissected or compound; anthers opening by longitudinal slits; ovary of 1 carpel 4

3. The 2 lateral sepals petal-like; filaments united **Polygalaceae**
+ No sepals petal-like; filaments free **Gentianaceae**

4. Leaves pinnate or trifoliolate; perianth not spurred **Leguminosae**
+ Leaves laciniate; upper petals spurred; upper sepal helmet-like or spurred **Ranunculaceae**

5. Stamens as many as corolla-lobes; zygomorphy weak 6
+ Stamens fewer than corolla-lobes; zygomorphy pronounced 8

6. Stamens on the same radii as the corolla-lobes; placentation free-central **Primulaceae**
+ Stamens on different radii from the corolla-lobes; placentation axile 7

7. Flowers in coiled cymes; fruit of 1-4-seeded nutlets **Boraginaceae**
+ Flowers not in coiled cymes; fruit a many-seeded capsule **Scrophulariaceae**

8. Placentation axile; ovules 4 or many 9
+ Placentation parietal, free-central, apical or basal; ovules many or 1-2 14

9. Ovules numerous but not in vertical columns in each cell of the ovary 10
+ Ovules 4, or more numerous but then in vertical columns in each cell of the ovary 11

10. Corolla-lobes imbricate in bud; septum of ovary in the horizontal plane; leaves opposite or alternate **Scrophulariaceae**
+ Corolla-lobes usually folded, valvate or contorted in bud; septum of ovary oblique, not in the horizontal plane; leaves alternate **Solanaceae**

11. Fruit a capsule; ovules 4- to many, usually in vertical columns in each cell of the ovary 12
+ Fruit not a capsule; ovules 4, side by side 13

12. Leaves all opposite; flower-stalks without swollen glands at the base; capsule usually opening elastically; seeds usually on hooked stalks **Acanthaceae**
+ Upper leaves alternate; flower-stalks with swollen glands at the base; capsule not elastic; seeds not on hooked stalks **Pedaliaceae**

13. Style gynobasic, arising from the depression between the 4 lobes of the ovary, or if terminal then corolla with a reduced upper lip; fruit of 4, 1-seeded nutlets **Labiatae**
+ Style terminal; corolla with well-developed upper lip; fruit a drupe, or of 2-4 nutlets or pyrenes **Verbenaceae**

14. Ovules 4- to many; fruit a capsule, rarely a berry or drupe 15
+ Ovules 1-2; fruit indehisent, often dispersed with its persistent calyx 18

15. Ovary with 4 ovules, side by side **Verbenaceae**
+ Ovary with many ovules 16

16. Placentation free-central; corolla spurred; leaves modified for trapping and digesting insects **Lentibulariaceae** (*Utricularia*)
+ Placentation parietal or apical; corolla not spurred, rarely swollen at base; leaves scale-like, never green; root-parasites 17

17. Placentas 4; calyx laterally 2-lipped **Orobanchaceae**
+ Placentas 2; calyx 4-lobed **Scrophulariaceae**

18. Flowers in heads, surrounded by an involucre of bracts; ovule 1 **Globulariaceae** (*Globularia*)
+ Flowers not in heads, often in spikes; ovules 2 **Scrophulariaceae**

Monocotyledoneae

1. Ovary superior, or flowers completely without perianth; aquatics with totally submerged flowers **Group L**
+ Ovary partly or fully inferior; if aquatics then flowers borne well above water level **Group M**

Group L

1. Trees with large palmately or pinnately divided leaves; flowers ± sessile in fleshy spikes or panicles with large spathes **Palmae**
+ Plants not as above 2

2. Totally submerged aquatic plants of fresh, brackish or sea water 3
+ Terrestrial plants, if aquatic then not totally submerged, occasionally entirely floating 9

3. Plants marine, submerged in sea water 4
+ Plants in fresh or brackish water 6

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4. Rhizomes robust, with bundles of fibrous leaf-sheath remains persisting at the bases of the leaves; flowers bisexual **Posidoniaceae** (*Posidonia*)
\+ Rhizomes thin and elongate, without bundles of fibrous leaf-sheath remains; flowers unisexual 5

5. Leaves with numerous tannin dots and dashes between the nerves; plants dioecious; flowers solitary or in pairs, terminating short branches **Cymodoceaceae**
\+ Leaves without tannin dots; plants monoecious; flowers arranged on one side of a flattened spadix (leaf-base or -sheath) enclosed in a spathe **Zosteraceae** (*Zostera*)

6. Leaves toothed **Najadaceae** (*Najas*)
\+ Leaves entire, linear to filiform 7

7. Perianth-segments 4; flowers bisexual **Potamogetonaceae** (*Potamogeton*)
\+ Perianth absent; flowers unisexual, plants monoecious 8

8. Fruits ± sessile, in the leaf axils **Zannichelliaceae** (*Zannichellia*)
\+ Fruits in terminal few-rayed umbels **Ruppiaceae** (*Ruppia*)

9. Small, floating aquatic plants, not differentiated into stem and leaves **Lemnaceae**
\+ Plants various, rarely floating aquatics, the plant-body differentiated into stem and leaves 10

10. Perianth hyaline or papery or reduced to bristles, hairs or scales, or absent 11
\+ Perianth well-developed, sometimes small but never hyaline or papery 15

11. Flowers in small 2-sided spikelets with overlapping bracts, spikelets sometimes 1-flowered 12
\+ Flowers in heads, superposed spikes, racemes, panicles or cymes, never in spikes as above 13

12. Leaves alternate in 2 ranks on stems (culms), usually hollow with cylindric internodes; leaf-sheath usually with free margins, at least in the upper part; flowers arranged in 2-sided spikelets (sometimes 1-flowered) each usually subtended by 2 bracts (glumes); each flower usually enclosed by a lower lemma and an upper palea (sometimes absent); perianth of 2-3 concealed scales (lodicules); styles usually 2, feathery **Gramineae**
\+ Leaves usually arranged on 3 sides of the cylindric or more usually 3-angled stems; internodes solid; young leaf-sheaths closed, sometimes splitting later; flowers arranged in 2-sided or cylindric spikelets, often with a 2-keeled or 2-lobed glume at the base; each flower subtended by 1 glume only; perianth of serveral bristles, hairs or scales, or absent; style 1, with 2 or 3 papillose stigmas **Cyperaceae**

13. Inflorescence a simple fleshy spike (spadix); flowers inconspicuous, subtended by a large bract (spathe); leaves often net-veined, or lobed (plant rarely a small evergreen floating aquatic) **Araceae**
\+ Plants not as above 14

14. Flowers bisexual, in heads or cymes; perianth-segments 6, scarious or brownish; ovary with many ovules **Juncaceae** (*Juncus*)

+ Flowers unisexual, in elongate brownish spikes; perianth-segments a few threads or scales; ovary with 1 ovule **Typhaceae** (*Typha*)

15. Carpels free or slightly united at the base 16
+ Carpels united for most of their length, though styles may be free, or carpel solitary 17

16. Stamens 4; perianth-segments 4, not petaloid **Potamogetonaceae** (*Potamogeton*)
+ Stamens 6, perianth-segments 6, differentiated into 3 sepals and 3 petals **Alismataceae**

17. Perianth-segments conspicuously different, the outer sepal-like, the inner petal-like **Commelinaceae**
+ All perianth-segments similar 18

18. Inflorescence subtended by an entire, spathe-like sheath; plants aquatic **Pontederiaceae** (*Eichhornia*)
+ Inflorescence not as above; plants terrestrial 19

19. Leaves very small, scale-like or spiny; stems thread-like or flattened (cladodes) on which the inflorescences are often borne **Asparagaceae** (*Asparagus*)
+ Plant with expanded leaves; cladodes absent 20

20. Tree; trunk repeatedly forked; leaves in dense terminal rosettes; inflorescence a large panicle **Dracaenaceae** (*Dracaena*)
+ Plants herbaceous, not as above 21

21. Plants with corms covered with tunics, or with rhizomes, or roots fleshy or fibrous 22
+ Plants with bulbs 23

22. Plants with corms; flowers solitary or in short racemes, usually borne near the ground **Colchicaceae**
+ Plants with rhizomes or roots fleshy or fibrous; flowers in terminal elongate racemes or panicles **Asphodelaceae**

23. Flowers in a terminal umbel, enclosed within a spathe in bud **Alliaceae**
+ Flowers solitary or in racemes or corymbose racemes, spikes, or umbel-like but not enclosed within a spathe in bud 24

24. Flowers solitary or in umbel-like inflorescences **Liliaceae**
+ Flowers in racemes, corymbose racemes, or spikes **Hyacynthaceae**

Group M

1. Freshwater or marine aquatic plants **Hydrocharitaceae**
+ Terrestrial plants 2

2. Stamens 3 **Iridaceae**
+ Stamens 1, 2 or 6 3

3. Fertile stamens 1 or 2, united with the style to form a column **Orchidaceae** (*Epipactis*)
\+ Fertile stamens 6 4

4. Leaves in a basal rosette; perianth-segments fused into a tube; corona present **Amaryllidaceae**
\+ Leaves not in a basal rosette, stem leafy; perianth-segments free almost to base; corona absent **Ixiolirlaceae**

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Latin - Vernacular Names

Literature: Drar, M. 1936. Enumeration of the plants collected in Gebel Elba during two expeditions. Ministry of Agriculture, Cairo.
Shabetai, J. R. 1940. Contribution to the flora of Egypt, plants collected from southern Sinai in April 1937. Ministry of Agriculture, Cairo.
Täckholm, V. & Drar, M. 1941, 1950, 1954, 1969. Flora of Egypt, vols. 1-4 (vol. 1 with G. Täckholm). Bull. Fac. Sci. Cairo Univ. 17, 28, 30, 36.
Täckholm, V. 1974. Students' Flora of Egypt, ed. 2, Publ. Cairo Univ., Beirut.

The users of this annex will observe that the same species may receive more than one vernacular name. Two or more species may have the same name, while some other plants have no vernacular names. Most of the vernacular names listed here are of Arabic origin, applied to plants either by the Bedouin in the desert regions, or by the farmers and other inhabitants of the Nile Valley and Delta. However, some names are not of Arabic origin, e.g. Bishari, the language spoken by the tribes of Gebel Elba, or of Berber origin as in Siwa Oasis. For example *Portulaca oleracea* has three different names: Regla (Arabic), Makhmakh (Berber of Siwa Oasis) and Lul'aneeb (Bishari of Gebel Elba).

In order to get the nearest to correct phonetic pronunciation of vernacular names, some letters are preceded by an apostorophe (') such as 'a, 'e, 'o; these are pronounced عَ , عِ , عُ respectively. The underlined letters d, h, s, t are pronounced ض , ح , ص , ط . The letter (q) refers to ق to recognize it from (k) which is pronounced ك. The two combined letters (gh) are pronounced غ , (kh) خ , (sh) ش , while (th) either pronounced ث as in Thelatha, or ذ as in Thoweinat and Hawthan.

Vernacular names are meant to help collectors to communicate with local people during their field trips, and not necessarily to provide a correct identification of the plants.

Abutilon bidentatum	Amboaro	أَمْبُوارُو
Abutilon fruticosum	Qalieh, Amboaro	قَلِية، أَمْبُوارُو
Abutilon pannosum	Loaq, Amboaro	لُواق، أَمْبُوارُو
Acacia ehrenbergiana	Salam, Selem	سَلَمْ، سِلِمْ
Acacia etbaica	'Arad	عَرَض
Acacia laeta	Hashaab, Khashab	هَاشَابْ، خَشَبْ
Acacia mellifera	Hashaab, Khashab	هَاشَاب، خَشَبْ
Acacia nilotica	Sant, Sont (tree), Qarad (pod)	سَنط، سُنط (الشجرة)، قَرَضْ (الثمرة)
Acacia oerfota	'Orfot	عُرْفُط
Acacia seyal	Seyyal, Sayyal	سِيَّال، سَيَّال
Acacia tortilis subsp. *raddiana*	Sayyal, Talh	سَيَّال، طَلْحْ
Acacia tortilis subsp. *tortilis*	Sayyal, Samour	سَيَّال، سَمُور
Achillea fragrantissima	Qaysoum	قَيْصُومْ
Achillea santolina	Bu'aithran	بُعَيْثْرانْ
Achyranthes aspera	No'aiyem	نُعَيِّمْ
Actiniopteris semiflabellata	Awaay Wiheet	أَوَاى وِهِيتْ
Adiantum capillus-veneris	Kuzbarat El-Bir, Sha'ar El-Banat	كُزْبَرَة البِيرْ، شعر البنات
Adonis dentata	Nab El-Gamal	نَابْ الجَمَلْ
Aegilops bicornis	Sha'eer Eblies, Sha'eir El-Far	شَعير إبليس، شَعير الفَار
Aegilops kotschyi	Sha'eer El-Far	شَعير الفَار
Aegilops geniculata	Qamh El-Hagal, Sabal El-Far	قَمْح الحَجَل، سَبَلْ الفار
Aeluropus lagopoides	Negiel Shitani, Mulleih	نِجيل شِيطانى، مُلّيح
Aeluropus littoralis	Negeil	نِجِيلْ
Aerva javanica	'Aara, Shagaret El-Ghazal	عَارَة، شَجَرة الغَزَالْ
Aerva lanata	'Eigab	عِيْجَاب
Aetheorhiza bulbosa	Beid El-Ard	بِيض الأَرْض
Agathophora alopecuroides	Hamad, Sha'aran	حَمَض، شَعْران
Ageratum conyzoides	Borgoman	بُرْجُمان

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Agropyron spp.	Gazouf, Sayfoun	جَزُوف، سَيْفُون
Aizoon canariense	Hadaq, Samh	حَدَقْ، سَمْح
Ajuga iva	Shandaqora, Ja'ada	شَنْدَقُورَه، جَعْدَة
Alcea rosea	Khatmia	خَطْمِيَّة
Alcea striata	Khobbeiza	خُبَيزَة
Alhagi graecorum	'Aqoul	عَقُول
Alisma gramineum	Zommaret El-Ra'ie	زُمّارة الرَاعِي
Alkanna lehmanii	Hennat El-Ghoul	حِنَّة الغُولْ
Alkanna orientalis	Libbeid	لِبّيد
Allium ampeloprasum	Basal El-'Afrit	بَصَلْ العَفْريت
Allium aschersonianum	Qa'abar	قَعْبَرْ
Allium cepa	Basal	بَصَل
Allium desertorum	Z'eitman	زِعِيْطمَانْ
Allium kurrat	Kurrat	كُرّات
Allium modestum	Thoum El-Hanash, Thoum El-Hayya	ثُومْ الحَنَشْ، ثُومْ الحَيَّة
Allium myrianthum	Lawas	لَوَصْ
Allium porrum	Kurrat Abou Shousha	كُرّات أبو شوشَة
Allium sativum	Thoum	ثوم
Allium sinaicum	Botteit, Ze'eitman	بُطّيط، زِعيْطمان
Allium sphaerocephalon	Senn El-Ghazal	سِنْ الغَزَالْ
Alternanthera pungens	'Entab	عِنْتَاب
Alternanthera sessilis	Loqmet El-Hamal	لُقْمة الحَمَل
Althaea ludwigii	Khatma, Khatmia	خَطْمَة، خَطْمِيَّة
Amaranthus caudatus	'Orf El-Diek	عُرْف الدِّيك
Amaranthus graecizans	Fiss El-Kilab	فِسْ الكِلاب
Amaranthus hybridus	Ro'aaf	رُعَّاف
Ambrosia maritima	Damseisa	دَمْسِيسَة
Ammannia spp.	Rigl El-Hamama	رِجْل الحَمَامة
Ammi majus	Khilla, Khilla Sheitani	خِلَّة، خِلَّة شِيطانى

Ammi visnaga	Sewak En-Nabi, Khilla	سِوَاك النَبى، خِلَّة
Ammophila arenaria	Gazouf	جَزُوف
Anabasis articulata	'Agram, Rimth	عَجْرم، رِمْث
Anabasis setifera	'Agram, 'Asal, Gelw	عَجْرم، عَسَلْ، جـلْـو
Anacyclus monanthos	Sorret El-Kabsh	سُرَّة الكَبْشْ
Anagallis arvensis	'Ain El-Gamal, 'Ebeila	عِينْ الجَمَلْ، عِبيلَة
Anagyris foetida	Garood, Hab El-Melouk	جَرُود، حَبْ الملوك
Anarrhinum pubescens	Erfaija, Rofaia'a	إرْفَيْجَة، رُفَيْعَة
Anastatica hierochuntica	Kaff Mariam	كَفْ مَرْيَمْ
Anchusa aegyptiaca	Dahnoon	دَهْنُون
Anchusa humilis	Lisan El-Teir	لِسان الطّير
Anchusa milleri	Kahla	كَحْلَة
Anchusa undulata	Kahla	كَحْلَة
Andrachne aspera	'Ain Umm Solaiman, 'Oud El-'Aqrab	عين أم سُليمان، عُود العَـقْـرب
Andrachne telephioides	Kimmash	كِمّاشْ
Androcymbium palaestinum	Kershut	كِرْشُوط
Aneilema aequinoctiale	Holleib	حُلّيب
Anemone coronaria	Zaghleel, No'omaan	زَغْلِيل، نُعْمَانْ
Anthemis melampodina	Erbeiyan	إرْبيّان
Anthemis pseudocotula	Basoum, Erbeiyan	بَسوم، إرْبـيّـان
Anthemis retusa	'Ain El-Qott, Erbeiyan	عِينْ القط، إرْبـيّـان
Anticharis glandulosa	Semoum	سِمُوم
Apium graveolens	Karafs	كَرَفْسْ
Arabidopsis kneuckeri	Sleih	سِلِيح
Arabidopsis pumila	Sleih	سِلِيح
Arenaria deflexa	Labakh	لَبَخْ
Argyrolobium arabicum	Koud	كُودْ
Arisarum vulgare	Louf	لُوفْ
Aristida adscensionis	Sabal Abu El-Hosein	سَبَلْ أبو الحُصين

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Aristida mutabilis	'Adar Hamoreit	عَدَار هَموريت
Arnebia decumbens	Kahla	كَحْلَة
Arnebia hispidissima	'Attan	عَطَّان
Arnebia linearifolia	Kahla	كَحْلَة
Arnebia tinctoria	Shagaret El-Arnab	شَجَرة الأرْنَب
Artemisia judaica	Bo'aitheran, Sheih	بُـعَـيْـثِـران، شِيحْ
Artemisia monosperma	'Aader	عَادِرْ
Arthrocnemum macrostachyum	Shenan	شِنَانْ
Arundo donax	Ghaab	غَابْ
Asclepias sinaica	Hargal Barri	حَرْجَلْ بَرِّى
Asparagus aphyllus	Shawk	شَـوك
Asparagus stipularis	'Aqoul Gabal, Shawk, Halaioun	عَقُول جَبَلْ، شَـوك، هَلَيُون
Asperugo procumbens	Sleisla	سِليسْلَة
Asphodelus aestivus	Boaraq, Basal El-'Onsol	بُورَق، بَصَل العُـنْـصُـل
Asphodelus tenuifolius	Basal Eblees	بَصَل إبْـليس
Asphodelus visidulus	Zahlag	زَحـلَـجْ
Astracantha echinus	Qadass	قَدَسْ
Astragalus annularis	Mohallaq	مُحَلَّقْ
Astragalus asterias	Abu 'Ekeifa, 'Adras	أبوعِـكيفَـة، عَـدْرَس
Astragalus bombycinus	Dorreis	ضُرَّيس
Astragalus eremophilus	Maqd, Umm El-Qorein	مَقْد، أم القُرين
Astragalus fresenii	'Aqfa	عَقْفَة
Astragalus fruticosus	Teiz El-Kalba	طِيظ الكَلْبة
Astragalus hamosus	Qorein	قُرين
Astragalus hauarensis	Dan El-Farah	دَانْ الفَارَة
Astragalus kahiricus	Zabb El-Qott	زَبْ القُط
Astragalus macrocarpus	Beid El-Homaar	بـيض الحُمار
Astragalus peregrinus	Kreisha	كِريشة
Astragalus schimperi	Qoraidoum Aswad	قُـرَيضوم أسْـوَد

Astragalus sieberi	Asaabe'e El-'Arous	أَصَابِعُ العَرُوس
Astragalus tribuloides	Beid El-Gamal, 'Adras	بـيض الجَمَل، عَدْرَس
Astragalus vogelii	Qarn	قَرْنْ
Atractylis carduus	Shawk El-Gamal	شَوْك الجَمَل
Atraphaxis spinosa var. *sinaica*	Serra, Saras	سِـرًّا، سَرَاسْ
Atriplex dimorphostegia	Roghl	رُغْـل
Atriplex farinosa	Hawwa	حَوَّا
Atriplex halimus	Qataf	قَطَفْ
Atriplex leucoclada	Roghl	رُغْـل
Atriplex portulacoides	Hatab Abiad	حَطَب أَبْـيَـض
Avena barbata	Zommeir, Bahma	زُمِّير، بَهْمَى
Avena fatua	Khafour, Zommeir	خافُور، زُمِّير
Avena sterilis	Khafour, Zommeir	خافُور، زُمِّير
Avicennia marina	Shoura	شُورَى
Balanites aegyptiaca	Heglig	هِجْلِيجْ
Ballota damascena	Asaghan	أَسَغَان
Ballota kaiseri	Sharma, Ghassa	شَرْمَه، غَصَّة
Ballota saxatilis	Messeisa	مِصّيصة
Ballota undulata	Ghassa, Zafra	غَصَّة، زَفْـرَة
Barleria acanthoides	Kwataag	كَوَاتَاجْ
Barleria hochstetteri	Alimaseib	اليَماسِيبْ
Bassia arabica	Thelatha	ثِلاثَة
Bassia eriophora	Umm Haas, Umm Haasa	أُم حَاصْ، أُم حَاصَة
Bassia muricata	Ghobbeira	غُبِّيرة
Bellevalia flexuosa	'Aisalaan	عَيْصَلاَن
Bellevalia macrobotrys	Athan Hamir	آذان حَـمِـير
Bellevalia sessiliflora	Belboush	بِـلْبُوش
Beta vulgaris subsp. *maritima*	Dirs El-Kalb, Salq	ضِرس الكَلْـب، سَلْق
Bituminaria bituminosa	Thoweinat El-Far	ثُوَيْنَات الفار

Bituminaria flaccida	Thoweinat El-Far	ثُوَيْنَات الفار
Blepharis edulis	Shawk El-Dabb	شَـوك الضَّبْ
Boerhavia repens	Moddeid	مُدَّيد
Boissiera squarrosa	El-Ehaim	الإحَـيْم
Bolboschoenus glaucus	Debsha, Dees, Heesh	دِبْشه، دِيسْ، هِيشْ
Brachiaria deflexa	Belleib, Yadaab	بِـلَّـيبْ ، ياداب
Brachiaria mutica	Moddeid, Rokeib	مُدَّيد، رُكِيب
Brachiaria reptans	Nisseila	نِسَّيلة
Brachypodium distachyum	Sha'ir Barri, Lesseiq	شعيرَ بَرِّى، لِصَّيق
Brassica nigra	Kabar, Khardal	كَبَرْ، خَرْدَل
Brassica tournefortii	Shiltam	شِلْطَام
Bromus fasciculatus	Sabal Abu El-Hosein	سَبَلْ أبو الحُصين
Bromus japonicus	Safsouf, Fakhour	سَفْسُوفْ، فاخـُور
Bromus madritensis	Deil El-Ta'alab	دِيل الثَّعْلَب
Bromus pectinatus	Safsouf, Yadaab	سَفْسُوفْ، ياداب
Bromus tectorum	Sabal Abu El-Hosein, Safsouf	سَبَلْ أبو الحُصين، سَفْسُوفْ
Bryonia cretica	Le'eba Murra, 'Enab El-Hayya	لِعْبة مُرَّة، عِنَب الحيَّة
Bufonia multiceps	'Adama	عَدَمَة
Bupleurum falcatum	Abu Za'arir	أبو زَعْرير
Bupleurum lancifolium	Halawan	حَلْوَان
Cadaba farinosa	Qadab	قَضَب
Cadaba glandulosa	Qormot	قُرْمُت
Cadaba rotundifolia	Qormot	قُرْمُت
Cakile maritima	Figl El-Gamal, Rashad El-Bahr	فِجْل الجَمل، رَشاد البَحر
Calendula arvensis	'Ain Essafra, 'Ain El-Qott	عِين الصَـفْـرا، عين القُط
Calligonum polygonoides	Arta	أَرْطَه
Callipeltis cucullaris	Bseisa	بِـسيسَـة
Calotropis procera	'Oshar, 'Oshaar	عُـشَـر، عُشار
Capparis decidua	Tondob	تُنْدُبْ

Capparis sinaica	Lasaf	لَصَفْ
Capparis spinosa	Kabbar, Lasaf, Laisouf	كَبَّار، لَصَف، لَيْصُوف
Capsella bursa-pastoris	Kies El-Ra'aie	كِيسْ الرَّاعِي
Caralluma acutangula	Kareeb	كَرِيبْ
Caralluma edulis	Sho'ob	شُعُبْ
Caralluma sinaica	Sabra Barri	صَبْرة بَرّى
Cardiospermum halicacabum	Bakeff	بَكِفْ
Carduncellus eriocephalus	Kharshouf	خَرْشوف
Carduus getulus	Hoshrouf	حُشْرُوف
Carduus pycnocephalus	Lisan El-Kalb	لِسان الكَلْبْ
Carex distans	Halfa	حَلْفَا
Carex divisa	Sard	صَرْدْ
Carlina involucrata	Morrar	مُرَّار
Carrichtera annua	Qleiqlah	قِلِيقْلَه
Carthamus lanatus	Shawk 'Antar	شَـوك عَـنْـتَـر
Carthamus tenuis	Qous	قُوص
Caylusea hexagyna	Danaban	دَنَبان
Cayratia ibuensis	Leef	لِيف
Cenchrus ciliaris	Hemri, Rigl El-Ghorab	حِمْرى، رِجْل الغُراب
Cenchrus pennisetiformis	Za'abal	زَعْبَل
Cenchrus setiger	Yadaab	ياداب
Centaurea spp.	Morrar	مُرَّار
Centaurea aegialophila	'Akaash	عَكَاشْ
Centaurea aegyptiaca	Yamrar	يَـمْـرار
Centaurea calcitrapa	Morrar	مُرَّار
Centaurea eryngioides	Lehiet El-Badan	لِحْية البَـدَن
Centaurea glomerata	Sorret El-Na'aga	سُرَّة النَّعْجة
Centaurea pallescens	Harrar, Morrar	حَرَّار، مُرَّار
Centaurea scoparia	Barqaan	بَرْقَانْ

Centaurea sinaica	Barqaan, Morrar	بَرْقَان، مُرَّار
Centaurium pulchellum	Qantarion	قَـنْطَرْيون
Centaurium spicatum	Nashash Ed-Dibbaan	نَشَّاش الدِّبان
Centropodia forskaolii	Negeil El-Na'aga, 'Ekresh, Shagaret El-Gamal	نِجيل النَعْجَة، عِكْرِش، شَجَرة الجَـمَـل
Cephalaria syriaca	Sewan	سِوان
Ceratophyllum demersum	Horreish, Nakhshoush El-Hoot	حُرَّيش، نَـخْـشُوش الحُوت
Ceruana pratensis	Garawan	جَرَوان
Cheilanthes vellea	Awaay weheit	أَوَاى وَهِيت
Chenopodium album	Fiss El-Kalb	فِسْ الكَلْبْ
Chenopodium ambrosioides	Nitna, Mintena, Zorbeih	نِتْنَة، مِنْتِنَة، زُرْبِيح
Chenopodium botrys	Fiss El-Kalb, Mintena	فِسْ الكَلْبْ، مِنْتِنَة
Chenopodium murale	Lesan El-Teir, Abu 'Effein	لِسَانْ الطَّير، أبُو عِفِّينْ
Chenopodium vulvaria	Qihania	قِيحَانْيَة
Chiliadenus montanus	Heneida, Neheida	هِنِيدَة، نِهِيدَة
Chlamidophora tridentata	Babounig	بابُونِـج
Chrozophora plicata	Nili	نِيلِى
Chrozophora tinctoria	Ghobbeira, Sabbagh, Labed	غـُبَّـيرة، صَبَّاغ، لابـِدْ
Cichorium endivia	Shikoria	شِيكُورْيَا
Cistanche phelypaea	Danoun	دَانُونْ
Citrullus colocynthis	Handal, Hanthal	حَنْضَلْ، حَنْظَلْ
Cladium mariscus	Shorreikh	شُرَّيخْ
Cleome amblyocarpa	Megneina, 'Atna, Shidq El-Kalb	مِجْنِينَة،عطنة، شَدْق الكَـلْـب
Cleome arabica	Zeita	زِيتَة
Cleome chrysantha	Soffeira, Samwa□	صُـفَّـيرة، سَمْوَة
Cleome droserifolia	Samwa	سَمْوَة
Cleome paradoxa	Hindeib	هِنْدِيبْ
Cleome viscosa	Abu Tarboush	أبو طَرْبُوشْ
Clitoria ternata	'Erq El-'Aqrab	عِرْق العَقْرَبْ

Coccinia abyssinica	Hameis	حَميص
Cocculus pendulus	'Olleiq, Labakh El-Gabal	عُلَّيق، لَبَخ الجَبَل
Coelachyrum brevifolium	Mantieb	مَنْتيب
Colchicum guessfeldtianum	Qattan	قَطَّان
Colchicum ritchii	Khamira, 'Okna	خَميرَة، عُكْنَة
Colutea istria	Yusr, Yasar, Shohat	يُسْر، يَسَرْ، شُوحَطْ
Cometes abyssinica	Daqn El-Sheikh, Komeisha	دَقْن الشَّيخ، كُميشه
Commelina benghalensis	Had-eeb	هَادِ إيبْ
Commelina forsskaolii	Hal-eeb	هَال إيبْ
Commicarpus boissieri	Doweinat El-Faar, Hamad El-Gabal	دُوَيْنَات الفَارْ، حَماضْ الجَبَلْ
Commicarpus helenae	Sikomteit, Hamad El-Gabal	سِيكومْتِيتْ، حَمَاضْ الجَبَلْ
Commiphora gileadensis	Gafal, Mayowak	جَفَلْ، مَايَواكْ
Convolvulus althaeoides	Moddad	مُدَّاد
Convolvulus arvensis	'Olleiq	عُلَّيق
Convolvulus glomeratus	Laseit Gabal	لاسِيتْ جَبَلْ
Convolvulus hystrix	Shobroq	شُبْرُق
Convolvulus lanatus	Bayad, Rokham	بَيَاضْ، رُخَامْ
Convolvulus prostratus	Shagaret El-Ghazal	شَجَرة الغَزَالْ
Conyza aegyptiaca	Nashash Ed-Debban	نَشَّاشْ الدِّبَانْ
Conyza bonariensis	Hashish El-Gabal	حَشيش الجَبَل
Conyza stricta	Sleisla	سِلِيسْلَه
Corchorus olitorius	Meloukhia	مِلُوخِيَّة
Corchorus trilocularis	Meloukhia Shitani	مِلُوخِيَّة شِيطَانى
Cordia sinensis	Mokhheit, Gharaf	مُخَّيط، غَرَافْ
Coriandrum sativum	Kozbara	كُزْبَرَة
Cornulaca ehrenbergii	Haad	حَادْ
Cornulaca monacantha	Haad, Shawk El-Deeb	حَادْ، شَوك الدِّيبْ
Coronilla scorpioides	Khweitma	خويتْمَة
Coronopus niloticus	Rashad	رَشَادْ

Cotoneaster orbicularis	Shawhatt	شُوحَطْ
Cotula cinerea	Rebyan, Arbeyyan	رِبْيَان، أَربّيان
Crataegus azarolus	Za'arour	زَعْرُورْ
Crataegus x *sinaica*	Za'arour	زَعْرُورْ
Crepis sancta	Hawthaan, Hawdaan	حَوْذَان، حَوْدان
Cressa cretica	Molleih, Nadwa	مُلَّيح، نَدْوَة
Crotalaria aegyptiaca	Natash	نَتَشْ
Crotalaria microphylla	Gleiglan, Kwoog, Bahal-qard	جْليجَلان، كُووج، بَحَلْقَرْض
Crotalaria senegalensis	Sagilweib, Bahal-qard	ساجيلويب، بَحَلْقَرْضْ
Crotalaria thebaica	Natash	نَتَشْ
Crucianella ciliata	'Eshb	عِشْب
Crucianella membranacea	'Adras	عَدْرَسْ
Crypsis schoenoides	Babaaq, Hosaad	بَاباق، حُصاد
Cucumis prophetarum	Heneidlan	حِنَيْضِلاَنْ
Cullen plicata	Marmeid	مَرْمِيدْ
Cuscuta spp.	Hamoul, Haamoul	حَمُول، حَامُول
Cuscuta pedicellata	Geed El-Arnab	جِـيد الأرنَـبْ
Cutandia memphitica	Samma	صَمَّة
Cymbopogon schoenanthus	Half-Barr	حَلْفْ بَرْ
Cymodosea nodosa	Hamoul, Haamoul	حَـمُـول، حَامُولْ
Cynanchum acutum	'Olleiq, Libbein	عُلِّيق، لِبِّين
Cynara cornigera	Khashrouf, Shouk El-Hanash	خَشْرُوفْ، شُوكْ الحَنَشْ
Cynodon dactylon	Negeil	نِجِيلْ
Cynomorium coccineum	Zabb El-Ard, Mazrour	زَبْ الأَرْضْ، مَزْرُورْ
Cyperus spp.	Se'ed	سِعْد
Cyperus alopecuroides	Samaar Helw	سَمَار حِلو
Cyperus articulatus	Khobb, Dees Medawwar	خُب، دِيس مِدَوَّر
Cyperus capitatus	Se'ed	سِعْد
Cyperus conglomeratus	Se'ed, 'Eshb	سِعْد، عِشب

Cyperus difformis	'Agira	عَجيرَة
Cyperus digitatus	Qorreish, Samaar Bahr	قُرَّيش، سَمَار بَحْر
Cyperus esculentus	Habb El-'Aziz	حَبْ العزيز
Cyperus fuscus	Se'ed	سِعْد
Cyperus laevigatus	Borbeit	بُربيط
Cyperus maculatus	Se'ed	سِعْد
Cyperus papyrus	Bardi	بَرْدى
Cyperus rotundus	Se'ed	سِعْد
Cyperus schimperianus	Se'ed	سِعْد
Dactyloctenium aegyptium	Na'eem El-Saleeb, Rigl El-Herbaya	نِعيمْ الصَلِيبْ، رِجْل الحِرْبَايَة
Datura innoxia	Tatura	طَاطُورا
Datura stramonium	Tatura, Nefir	طَاطُورا، نِفير
Daucus littoralis	Gezzeira	جِزَّيرة
Delonix elata	Oogoay	أوجُوى
Desmostachya bipinnata	Halfa	حَلْفا
Deverra tortuosa	Shabat El-Gabal, Qazzah	شَبَتْ الجَبَلْ، قَزَّاحْ
Deverra triradiata	Zagouh, 'Eleigan, Qasoukh	زَجُوحْ، عِليجان، قَصُوخ
Dianthus sinaicus	Samma	صَمَّة
Diceratella elliptica	Hamboak	هَمْبواك
Dichanthium annulatum	Abu Qseiba, Hmeira, Sayfoun	أبو قصيبه، حِميرة، سيفون
Dicoma tomentosa	Hassingof	هَسَيْنْجُوفْ
Digitaria ciliaris	Dafra	ضَفْرَة
Digitaria nodosa	Dafra	ضَفْرَة
Digitaria sanguinalis	Abu Rokba, Abu Qusseyba	أبورُكْبَة، أبو قُصَّيبَة
Digitaria velutina	'Eilab	إيلاَبْ
Dinebra retroflexa	Dineib, Negeil El-Nimr	ضِنيب، نِجِيل النِّمرْ
Dipcadi erythraeum	Breida	بِريَدة

Diplotaxis acris	Yahag	يَـهَـجْ
Diplotaxis erucoides	Yahaaq	يَاحَاق
Diplotaxis harra	Harra	حَارَّة
Dipterygium glaucum	Soffeira	صُفَّيرة
Dittrichia viscosa	'Erq El-Tayyoun	عِرْق الطَّيون
Dodonaea viscosa	Neeh	نِيحْ
Doellia bovei	Howeimda, Belleikh	هُوَيْمدَة، بِـلَّـيخ
Dracaena ombet	Ombeit	أُمْبيت
Echinochloa colona	Abu Rokba, Zafra	أبو رُكْبَة، زَفْرة
Echinochloa crusgalli	Deneiba	دِنِيَبة
Echinochloa stagninum	Amshout, Moddeid	أمْشُوط، مُدَّيد
Echinops glaberrimus	Khashir	خَشير
Echinops hussonii	Agdeem	أجْديمْ
Echinops spinosus	Qatad, Gorreih	قَتَّاد، جُـرَّيح
Echiochilon fruticosum	Kahla, Garsha	كَحْلَة، جَـرْشَـة
Echium angustifolium subsp. *sericeum*	Hinnat El-Ghoul, Lisan El-'Asal	حِنَّة الغُول، لِسَانْ العَسَل
Echium longifolium	Hinnat El-Daba'a	حِنَّة الضَبْعَة
Echium rauwolfii	Hinnet El-Ghoul, Lisan El-Thor	حِنَّة الغُول، لِـسان الثور
Eclipta prostrata	Sowweid, Hashish El-Faras	سُوَّيد، حَشِيشْ الفَرَسْ
Eichhornia crassipes	Ward El-Nil, Yasent El-Mayya	وَرْدْ النِيل، يَاسِنْتْ المِيَّه
Eleocharis geniculata	Qarn El-Khouli, Sha'ar El-Qird	قَرْن الخُـولى، شَعْرْ القِرْدْ
Eleocharis palustris	Borbeit	بُرْبِيطْ
Eleocharis parvula	Sha'ar El-Qird	شَعْرْ القِرْدْ
Eleusine indica	Nageil, Negeil	نَـجِـيل، نِـجِـيل
Emex spinosa	Dirs El-'Agouz	ضِرِسْ العَجُوزْ
Eminium spiculatum	Erqeita, Louf	إرقِيطَة، لَوف
Enarthrocarpus lyratus	Sheltam, Rashad El-Barr	شِلْطَام، رَشَاد البَّر
Ephedra alata	'Alda	عَلْدة
Ephedra aphylla	'Algam	عَلْجَمْ

Epilobium hirsutum	Seekh, Weyket Eblees	سيخ، ويكة إبْليس
Equisetum ramosissimum	Namass, Hagina	نَمَص، حَجِينة
Eragrostis aspera	'Eilab Gabal	عِيلاب جَبَل
Eragrostis cilianensis	Tirab	تِيرَابْ
Eragrostis ciliaris	Dabouk, Khafour	دَابُوك، خَافُور
Eragrostis pilosa	Heilagoug	هِيلاجُوجْ
Eremobium aegyptiacum	Erbeiyan, Sleisla	إرْبيَّان، سِلِيسْلَة
Erodium arborescens	Dahma	دَهْمة
Erodium chium	Ghazlan	غَزْلان
Erodium ciconium	Abu Mosfaah	أبو مُصْفاح
Erodium cicutarium	Dahmiyet El-Ghazal	دَهْمِيَّة الغـزال
Erodium crassifolium	Timmeir, Merghaat	تِمـّير، مِرْغات
Erodium glaucophyllum	Timmeir, Kabshia	تِمـّير، كَبْشيـّة
Erodium gruinum	Abu Mosfaah	أبو مُصْفاح
Erodium laciniatum	Dahmiya, Dahmiyet Ghozlan	دَهْمِيَّة، دَهْمِيَّة غُزْلان
Erodium malacoides	'Oqeil	عُـقِيل
Erodium moschatum	Meseika	مِسيكة
Eruca sativa	Gargeer	جَرْجِير
Erucaria crassifolia	Kronb El-Sahraa	كُرُنْب الصَحْراء
Erucaria hispanica	Rawq	رَوْق
Erucaria pinnata	Saleekh	سَلِيخ
Eryngium campestre	Foqqa'a, Shaqaqeil	فُقَّاعْ، شَقَاقِيل
Ethulia conyzoides	Hashish El-Faras	حَشِيشْ الفَرَسْ
Euclea racemosa subsp. *schimperi*	Ogoum	أجُومْ
Euphorbia spp.	Libbein	لِبَّين
Euphorbia chamaepeplus	Elbeina	إلبَيِنَـة
Euphorbia consobrina	Yoab	يوآب
Euphorbia cuneata	Ayoab	أيُوآبْ
Euphorbia forsskaolii	Sha'ar El-'Agouz	شَعْرْ العَجُوزْ

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Euphorbia helioscopia	Sa'ada	سَعْدَة
Euphorbia heterophylla	Laban El-Homara, Hashishet El-Qalb	لَبَن الحُمارة، حشيشة القلب
Euphorbia obovata	Melbeina	ملبينة
Euphorbia paralias	Shagaret El-Hanash	شَجَرة الحَنَش
Euphorbia peplus	Wedeina, Zaghlanta	وِدِّينة، زَغْلَنتة
Euphorbia polyacantha	Sheet	شِيت
Euphorbia retusa	N'omaniya, Umm Lebbeina	نُعْمانية، أُم لِبِّينَة
Euphorbia scordifolia	Libbein El-Gabal	لِبِّين الجَبَل
Evolvulus alsinoides	Hashanit El-Gabal	حَشَنيت الجَبَل
Evolvulus nummularius	'Eifal	عِيْفَال
Fagonia spp.	Shawka, Halawi	شَوْكَة، حلاوى
Fagonia arabica	Waraqa, Shobroq, Helwat El-Gamal	وَرَقَة، شُبْرُق، حِلْوَة الجَمَل
Fagonia bruguieri	'Attan, 'Aqoul	عَطَّانْ، عَقُولْ
Fagonia glutinosa	Medeihna	مِديهنَة
Fagonia mollis var. *hispida*	Shaka'ah, Waraqa	شَكاعَة، وَرَقَة
Faidherbia albida	Kharaaz, Haraaz	خَرَازْ، حَرَازْ
Farsetia aegyptia	Goreibi	جُرِيبى
Farsetia longisiliqua	Garbaa	جَرْبَاء
Farsetia stylosa	Mahad	مَهَدْ
Ferula sinaica	Shamar El-Gabal, Kalkh	شَمَر الجَبَل،كَلْخ
Ficus carica	Teen	تِين
Ficus cordata subsp. *salicifolia*	Saymouk	سَيْموك
Ficus palmata	Hamat, Teen El-Barr	حَمَاط، تِين البَر
Ficus sycomorus	Gemmeiz	جِمِّيز
Fimbristylis bisumbellata	Forreish, Farish, Sha'ara	فُرِّيش، فِارِشْ، شَعْرَة
Flueggia virosa	Na'ayiet Hindeib	نَعَاية هِنْدِيبْ
Forsskaolea tenacissima	Losseiq	لُصَّيق
Forsskaolea viridis	Tombaleek	طُمْباليك

Frankenia hirsuta	Hemeisha	حِمِيشَة
Frankenia pulverulenta	Molleih	مُلَّيح
Fumaria densiflora	Zeita	زِيتَة
Fumaria parviflora	Shatrag	شَتْرَجْ
Gagea reticulata	Botteit El-Hagal	بُطَيطْ الحَجَلْ
Galium setaceum	Bseisa	بِسِيسَة
Galium sinaicum	'Athma	عَثْمَة
Geigera alata	Hashak	حَشَاك
Geranium spp.	Sheibat	شِيبات
Geropogon hybridus	Thanab El-Faras	ذَنَب الفَرَس
Gisekia pharnaceoides	Samaleika	سَمَلِيكَة
Gladiolus italicus	Seif El-Ghorab	سِيفْ الغُرابْ
Glaucium arabicum	No'omaan	نُعْمَانْ
Glebionis coronaria	Oqhowan, Qohwan	أقحُوَانْ، قُحْوَانْ
Glinus lotoides	Ghobbeira, Damsees	غُبَّيرة، دَمْسِيسْ
Globularia arabica	Handaqouq, Zorreiqa	حَنْدَقوق، زُرِّيقَة
Glossonema boveanum	'Etr	عِطْرْ
Gnaphalium polycaulon	Hashish El-Bahr	حَشِيش البَحْر
Grewia tenax	Keisa, Tamoaat	كِيسَة، تاموآت
Grewia villosa	Diwal, Kataat	دِيوال، كَاتَات
Gundelia tournefortii	Ku'eib	كُعِيب
Gymnarrhena micrantha	Khirsheif	خِرْشِيفْ
Gymnocarpos decandrus	Gurd	جُرْدْ
Gynandropsis gynandra	Abu Qarn	أبُو قَرْنْ
Gypsophila capillaris	Roqaieqa, Rafi'aa	رُقَيِّقة، رَفيعَة
Halocnemum strobilaceum	Hatab Ahmar, Sabad	حَطَبْ أحمَر، سَبَدْ
Halodule uninervis	Gizawi	جِيزاوى
Haloxylon salicornicum	Rimth	رِمْثْ
Haloxylon scoparium	Tafwa	طَفْوَه

Haplophyllum tuberculatum	Shagaret El-Reeḥ, Megeinina	شَجَرة الرِّيح، مِجَيْنينة
Helianthemum kahiricum	Gathum	جَـثـومْ
Helianthemum lippii	Ra'al, Ra'ala	رَعَلْ، رَعْلة
Helianthemum sancti-antonii	Gathum, Egdeem	جَـثـومْ، إجْدِيمْ
Helianthemum ventosum	Qaḍib	قَضِيبْ
Helichrysum glumaceum	Hambokeet	هَمْبُوكيت
Heliotropium arbainense	'Aṭna	عَـطْـنَـة
Heliotropium bacciferum	Libbeid	لِبَيد
Heliotropium digynum	Roghl, Kary	رُغْل، كَـرِى
Heliotropium lasiocarpum	'Aqrabana	عَـقْـرَبانة
Heliotropium pterocarpum	Gheraireh	غِرَيْرة
Heliotropium strigosum	Mokor, Drobakeeb	مُكُرْ، دروباكيب
Heliotropium supinum	Qoddeiḥ, Zorreiqa	قُدَّيح، زُرَّيقة
Heliotropium zeylanicum	Tolai	تُولاَىْ
Hemarthria altissima	Roqeiba, Ḥashish Dakar	رُقَـيبَة،حَـشِـيش دَكَـر
Hermannia modesta	Tingadi	تِنجادى
Herniaria hemistemon	Umm Lebbeid	أُم لِبَّـيد
Hibiscus micranthus	Khaṣiet Rashed	خَصْية راشِد
Hibiscus sabdariffa	Karkadeih	كَرْكَدِيه
Hibiscus trionum	Teel Sheiṭani	تِيلْ شِيَطانى
Hibiscus vitifolius	Riba Hamboak	رِيـبا هـامْبُواكْ
Hippocrepis areolata	Doreis	ضُرِيسْ
Hippocrepis constricta	Qeleiqlan	قِليقْلاَنْ
Hippocrepis multisiliquosa	Umm Dawara	أُم دَوارَة
Homognaphalium pulvinatum	Ra'ara'a	رَعْرَاعْ
Hordeum marinum	Sha'iriya, Bohma	شَـعِيرية، بُـهْـمَة
Hordeum murinum subsp. *glaucum*	Sha'eer El-Deeb	شَـعير الديب
Hordeum murinum subsp. *leporinum*	Sha'eer Barri, Sha'eera	شَـعير بَرّى، شَـعيرة

Hordeum vulgare	Sha'eer	شـعـير
Hyoscyamus albus	Beng	بِـنْـجْ
Hyoscyamus desertorum	Sakaran	سَكَرَانْ
Hyoscyamus muticus	Sakaran	سَكَرَانْ
Hyoscyamus pusillus	Soffeira	صُفَّيرة
Hyoscyamus reticulatus	'Awarwar	عَوَرْوَرَ
Hyparrhenia hirta	Hmeira, Safsouf	حِمِيرة، سَفسوف
Hypecoum aegyptiacum	Moddeida	مُدَّيدة
Hypecoum littorale	Qorein	قُرين
Hypecoum pendulum	Sleikh	سـلـيخ
Hypericum sinaicum	Labakh	لَبَخْ
Hypericum triquetrifolium	Dernaah	دِرْناح
Hyphaene thebaica	Doum	دُوم
Ifloga spicata	Kreishet El-Gadiye, Shagaret El-Ma'eez	كِريشة الجَدى، شَجَرِة المَعِيز
Imperata cylindrica	Halfa, Deil El-Qott	حَلْفا، دِيلْ القُطْ
Indigofera articulata	Neela	نِيَلة
Indigofera colutea	Damra	ضَمْرَه
Indigofera hochstetteri	Tokaieet	تُـوكاييت
Indigofera oblongifolia	Dahseer	دَحْسِير
Indigofera spinosa	Singeit	سِنجيت
Iphiona mucronata	Dafeera	دَفيرة
Iphiona scabra	Dafret El-Homar	دَفْرة الحُمار
Ipomoea cairica	Sitt El-Hosn	سِتْ الحُسْن
Ipomoea pes-caprae	Leblaba	لِبْـلابَـة
Ipomoea purpurea	'Olleiq Kebeer	عُـلَّيق كِـبير
Ipomoea sinensis	Hantout	هَـنْـتـوُت
Iris mariae	Ka'akaban	كَعْكَبَان
Isatis lusitanica	Soffeira	صُفَّيرة
Isatis microcarpa	Soffeira	صُفَّيرة

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Jacquemontia tamnifolia	Yasamoab	ياسَامُوآب
Jasminum grandiflorum subsp. *floribundum*	Hindamalawe	هِنْدامالاو
Juncus acutus	Samaar Morr	سَمَارْ مُر
Juncus bufonius	Sha'ar El-Qird	شَعْرْ القِرْد
Juncus inflexus	Samaar	سَمَارْ
Juncus punctorius	Dees	دِيسْ
Juncus rigidus	Samaar, Samaar Hosr, Samaar Morr	سَمَار، سَمَار حُصْر، سَمَارْ مُرْ
Juncus subulatus	Heesh	هِيشْ
Juniperus phoenicea	'Ar'ar	عَرْعَرْ
Justicia heterocarpa	Heitaar, Goraar	هِيتار، جُرار
Kickxia acerbiana	Widein El-Faar	وِدِين الفَار
Kickxia aegyptiaca	'Eshb El-Deeb, Megeinina	عِشب الدِّيب، مِجَينِينَة
Kickxia macilenta	Halawa	حَلاَوَة
Kickxia spuria	Mizzeiz	مِزِّيزْ
Koelpinia linearis	Lehiet El-Teiys	لِحْية التَّيسْ
Kohautia caespitosa	Refaiy'aa, Qermel, Umm Sweih	رِفَيَّعَة، قِرْمِل، أُم سِـويح
Kraschenninnikovia ceratoides	Gheil	غِيل
Lactuca saligna	Hawwa	حَوَّا
Lactuca serriola	Khass El-Homar, Khass El-Baqar	خَسْ الحُمَارْ، خَسْ البَقَرْ
Lamium amplexicaule	Fomm El-Samaka	فُمْ السَمَكة
Lantana camara	Lantana	لانْتَانَا
Lantana viburnoides	Hormaaseib	هُورْمَاسِيب
Lappula spinocarpos	Qaliet El-Ra'eie, Sleisla	قِلْية الرّاعى، سِلِيسْلَة
Lasiopogon muscoides	Kreishet El-Gadiye	كِريشة الجَـدْى
Lasiurus scindicus	Sammat	صَمَّـاط
Lathyrus aphaca	Borg El-Hamam	بُـرْج الحَـمام
Lathyrus sativus	Gelban	جِلْبَـان

Launaea angustifolia	Noqod	نُقُدْ
Launaea capitata	Hawthaan	حَوْذانْ
Launaea fragilis	Sleih	سِلِيح
Launaea massauensis	Meswaak	مِسْوَاكْ
Launaea mucronata	'Amrour, 'Adeid	عَمْرور، عَضِيض
Launaea nudicaulis	Howthaan	حُوْذانْ
Launaea procumbens	Hawwa	حَـوَّا
Launaea spinosa	Kabath	كَبَاثْ
Lavandula coronopifolia	Zeita	زِيْتَة
Lavandula pubescens	'Atan	عَطَنْ
Leersia hexandra	Shillakh, Shulleikh	شِلاَّخْ، شُلِّيخْ
Lemna gibba	'Ads El-Mayya	عَدْس المَيَّة
Leontice leontopetalum	Rakaf	رَكَف
Leontodon hispidulus	Howthaan	حُوْذانْ
Leontodon tuberosus	Howthaan	حُوْذانْ
Leopoldia comosa	Boseil	بُصِيل
Lepidium draba	Lesleis, Tefla	لِسلِيس، تِـفْلة
Lepidium sativum	Rashad	رَشَـادْ
Leptadenia arborea	Loweith	لِويثْ
Leptadenia pyrotechnica	Markh	مَرْخْ
Leptaleum filifolium	Qseiysa	قِصِيصَة
Leptochloa fusca	Heesh, Qasaba, Sayfoun	هِيشْ، قَصَبَة، سَيفُونْ
Leptothrium senegalense	Teiraab	تِيْرَاب
Leysera leyseroides	Losseiq	لُصَّيق
Limbarda crithmoides	Hatab Zeiti	حَطَبْ زِيتى
Limoniastrum monopetalum	Zeita	زِيتَه
Limonium axillare	Sheleel	شِلِيلْ
Limonium narbonense	'Orq-Angebar	عُرْقْ انْجِـبَارْ
Limonium pruinosum	Molleih	مُلِّيح

Limonium tubiflorum	Bahman Ahmar	بَهْمَان أحْمَرْ
Linaria haelava	Halawa	حَلاوَة
Lindenbergia indica	Messelsa	مِصِّيصَة
Linum humile	Kettan	كِتَّانْ
Linum usitatissimum	Kettan	كِتَّانْ
Lobularia arabica	Dahyaan	دَحْيَان
Lobularia libyca	Khorm El-Ebra	خُرْمْ الإبْرَة
Lolium multiflorum	Sammah	صَامَّة
Lolium perenne	Nuseil, Hashish El-Faras	نُصِيلْ، حَشِيشْ الفَرَسْ
Lolium rigidum	Sammah	صَامَّة
Lolium temulentum	Zawaan	زَوَانْ
Lotononis platycarpa	'Eshb, 'Oshoob, 'Adras	عِشْب، عُشوب، عَدْرس
Lotus arabicus	Qadaab	قَضَابْ
Lotus creticus	'Eshb, 'Oshb	عِشْب، عُشْب
Lotus glaber	Qarn El-Ghazal, Rigl El-'Asfour	قَرْنْ الغَزَالْ، رِجْلْ العَصْفُور
Lotus glinoides	Qabd	قَبْضْ
Lotus halophilus	Qarn El-Ghazal	قَرْنْ الغَزَال
Lotus lalambensis	Qasaba	قَصَبة
Lotus ornithopodioides	Umm El-Qereisaat	أم القِرَيْصات
Lotus tetragonolobus	Assabe'e El-'Arous	أصَابِع العَرُوسْ
Ludwigia stolonifera	Moddeid, Forqa'a	مُدِّيد، فُرْقَاعْ
Lupinus albus	Termis	تِرْمِسْ
Lupinus digitatus	Termis Shitaani	تِرْمِسْ شِيطَانى
Lycium europaeum	'Awsag	عَوْسَجْ
Lycium shawii	'Awsag	عَوْسَجْ
Lygeum spartum	Halfa	حَلْفَا
Lythrum hyssopifolia	Rigl El-Hamama	رِجْلْ الحَمَامَة
Maerua crassifolia	Kamoaab	كَامُوآبْ
Maerua oblongifolia	Morgaan	مُرْجَانْ

Malabaila suaveolens	Telghoodi, Ammeeshi	تِلْغُودى، أَمِّيشى
Malcolmia pygmaea	Shigara	شِيجَارَة
Malva parviflora	Khobbeiza	خُبَّيزَة
Marrubium alysson	Frasiyoun	فَراسْيُون
Marrubium vulgare	Roubiya	رُوبْيَة
Marsilea aegyptiaca	Qoreiyta	قُرِيطَة
Matricaria aurea	Qamdila	قَمْدِيلَة
Matricaria recutita	Babounig	بابُونِجْ
Matthiola arabica	Khomkhom	خُمْخُمْ
Matthiola longipetala	Shaqaara	شَقَارَة
Maytenus senegalensis	Daballat	دَابَالأَبْ
Medemia argun	'Argoun	عَرْجون
Medicago intertexta var. *ciliaris*	Khaasag	خَاصَج
Medicago laciniata	Dreis	دِرِيس
Medicago polymorpha	Nafal	نَفَلْ
Medicago sativa	Barseem Hegazi	بَرْسِيم حِجَازى
Melhania denhamii	Dabbagh, Riba Hamboak	دَبَّاغ، رِيبا هَامْبُواك
Melhania phillipsiae	Hamboak El-Ard	هَامبُواك الأَرْض
Melilotus spp.	Handaqcuq	حَنْدَقُوقْ
Melilotus indicus	Handaqcuq Morr	حَنْدَقُوقْ مُرْ
Mentha longifolia subsp. *schimperi*	Habaq	حَبَقْ
Mentha longifolia subsp. *typhoides*	Habaq El-Maiyya, Habaq El-Barr, Felaiyya	فِلَيَّـة، حَبَق المَيّة، حَبَق البَر
Mentha pulegium	Filaiyya	فِلَيَّـة
Mercurialis annua	Halboub	حَلْبُوبْ
Merremia aegyptia	Amionaib	أَمْيونِيب
Mesembryanthemum forsskaolii	Hamad	حَمْضْ
Mesembryanthemum nodiflorum	Ghasoul	غَسُولْ
Microcharis tritoides	Tokaylet	تُوَكايتْ

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Micromeria sinaica	Erfaija, Sleisla	إِرْفَيَّجَة، سِلِيسْلة
Mimosa pigra	Habbaas	حَبَّاسْ
Minuartia picta	Abu Hreiba	أبوحِرِيبة
Misopates orontium	Saysam	سَيْسَمْ
Moltkiopsis ciliata	Halama, Ghabsha	حَلَمَة، غَبْشَة
Monsonia nivea	Qarn, Dahmi, Dahmiyya	قَرْنْ، دَهْمِى، دَهْمِيَّة
Monsonia senegalensis	Koriaat	كُرْيَاتْ
Moraea sisyrinchium	Kheita	خِيْطَة
Morettia canescens	Rakhami, Ghereira	رَخَامِى، غِرِيرَة
Morettia phileana	Taghar, Taghagha	تَاغَرْ، تَغَاغَة
Moricandia nitens	Fojeila	فُجِيلَة
Moricandia sinaica	Khaswet El-Gamal	خَصْوِة الجَمَل
Moringa peregrina	Yasaar, El-Baan, Habb El-Yasaar, (seeds)	يَسَارْ، البَان، حَبْ اليَسَارْ، (البذور)
Muscari neglectum	Boseil	بُصِيل
Najas armata	Horreish	حُرِّيش
Narcissus tazetta	Nargis	نَرْجِسْ
Nauplius graveolens	Rabl	رَبْلْ
Nepeta septemcrenata	Zeiteiya, Messeisa	زِيْتية ، مِسَيسَة
Neurada procumbens	Losseiq, Sa'adan	لُصَّيق، سَعْدَان
Nicotiana glauca	Massasa	مَصَّاصَة
Nigella deserti	Zorbeih	زُرْبِيح
Nitraria retusa	Ghardaq, Gharqad	غَرْدق، غَرْقَد
Noaea mucronata	Shoak El-Hanash	شُوك الحَنَشْ
Notoceras bicorne	Hamma	حَمَّة
Nymphaea caerulea	Bashneen Azraq	بَشْنِينْ أَزْرَقْ
Nymphaea lotus	Bashneen Abiad	بَشْنِينْ أَبْيَضْ
Ochradenus baccatus	Qordi	قُرْضِى
Ocimum forsskaolii	Rihan	رِيحان

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Olea europaea subsp. *cuspidata*	Dada'a	دَدَعْ
Olea europaea subsp. *europaea* var. *europaea*	Zaitoun	زَيْتُون
Oligomeris linifolia	Danaban, Khozama	دَنْبَانْ، خُزَامَة
Onobrychis crista-galli	Sleisla	سِلِيْسلَة
Onobrychis ptolemaica	Widaan El-Hardeeb	وِدَان الحَرْدِيبْ
Ononis natrix	Littein	لِطِّين
Ononis reclinata	Hoteiba	حُطِيْبَة
Ononis serrata	Zeiti	زِيتى
Onopordum alexandrinum	Kharshouf, Shawk El-Gamal	خَرْشُوفْ، شَـوك الجَمَلْ
Onychium divaricatum	Qira'ai	قِرَاعِى
Origanum syriacum subsp. *sinaicum*	Bardaqoush, Za'atar	بَرْدقوش، زَعْتَر
Ornithogalum trichophyllum	Basal El-Hanash	بَصل الحَـنَـش
Orobanche spp.	Halouk	هَـالُـوك
Orobanche aegyptiaca	Halouk Reihi	هَالُوك رِيحِى
Orobanche cernua	Danoun	دَانُون
Orobanche crenata	Dakar El-Foul, Halouk	دَكَرْ الفُولْ، هَالُوكْ
Oryza sativa	Rozz	رُزْ
Oryzopsis miliacea	Hemri, Hommar	حِمرى، حُـمَّـار
Osteospermum vaillantii	Hama-Shbat	حَمَا شْبَاطْ
Otostegia fruticosa	Sharma	شَرْمَة
Ottelia alsimoides	Widnet El-Maiya, Widnet El-Sheitan	وِدْنِة المَّية، وِدْنِة الشَيْطَانْ
Oxalis corniculata	Hommeid	حُمَّيضْ
Oxalis pes-caprae	'Erq El-Laimoun	عِرْقْ اللَيْمُون
Oxygonum atriplicifolium	'Addar-Engomeel	عَدَّار إِنْجُومِيل
Oxystelma esculentum	'Olleiq, Moddad	عُلَّيقْ، مُدَّاد
Pancratium arabicum	Sawsan, Bosseil	سَوْسَنْ، بُصَّيلْ
Pancratium maritimum	Sawsan, Zambaq	سَوْسَنْ، زَمْبَقْ
Pancratium sickenbergeri	Bosseil, 'Aisalaan,	بُصَّيلْ، عَيْصَلَانْ، بَطْنْ الحَيَّة

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Panicum coloratum	Showash	شُوَاشْ
Panicum repens	Nseila, Qseiba	نِسيلة، قِصِيبَة
Panicum turgidum	Thammam, Thommam	ثَـمَّامْ، ثُـمَّام
Papaver decaisnei	Qerei'iya	قِرِيعِيَّة
Papaver rhoeas	Deydahaan, Zaghleel	دِيْدَهَانْ، زَغْلِيلْ
Paracaryum intermedium	Umm Lebbeid, Ghobbeisha	أُمْ لِبِّيْد، غُبَّيشَة
Parapholis incurva	Timzein	تِمزِينْ
Parietaria alsinifolia	Lisan El-Teir, Weddein	لِسَانْ الطِّير، وِدِّين
Parietaria judaica	Hashish El-Reeh	حَشِيْش الريح
Paronychia arabica	Bseisa	بِـسِـيسَة
Paronychia argentea	Besat El-Ard, Kreisha	بِـسَاط الأَرْضْ، كِرِيشَة
Paronychia sinaica	Rkheima	رِخِـيمَة
Paspalidium geminatum	Nseila, Qasaba	نِسيلَة، قَصَبَة
Paspalum distichum	Moddeid	مُدِّيدْ
Pavonia kotschyi	Ikfaleet	إيكفَالِيت
Pavonia triloba	Abot-Klaay	أَبْتْكلاَى
Peganum harmala	Harmal	حَرْمَلْ
Pegolettia senegalensis	Mikbanon	مِكْبَانُونْ
Pennisetum spp.	Sabat (wild); Dakhn (cultivated)	سَبَطْ (بَرّى)، دَخْنْ (مزروع)
Pennisetum divisum	Daah, Murrat Ghazal	دَاحْ، مُرَّات غَزَال
Pennisetum orientale	Sabat, Safsouf, Nassie	سَبَطْ، سَفْسُوفْ، نَصِى
Pennisetum setaceum	Sabat, Hadaa	سَبَطْ، حَدَاة
Pergularia daemia	Ghalaqa	غَلَقَة
Pergularia tomentosa	Ghalaqa, Umm El-Laban, Laban El-Homara	غَلَقَة، أُم اللَّبَنْ، لَبَنْ الحُمَارَة
Periploca angustifolia	Halaab	حَلاَبْ
Periploca aphylla subsp. *laxiflora*	Mayouk	مَايُوك
Peristrophe paniculata	Balatay	بالاتَايْ
Persicaria limbata	Zilf	زِلْفْ

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Persicaria salicifolia	Zilf, Forga'aa	زِلْفْ، فُرْجاعة
Persicaria senegalensis	Habaq El-Bahr, Abu Zilf	حَبَقْ البَحْرْ، أبو زِلْفْ
Phagnalon barbeyanum	Gera'eet	جِرَاعِيطْ
Phagnalon nitidum	Khananet Na'aga	خَنانِة نَـعْجَة
Phagnalon rupestre	Ta'am El-Arnab	طَعْمْ الأَرْنَبْ
Phagnalon sinaicum	Lahiet El-Badan, Eqrei'ie	لَحْية البَدَنْ، إقريعى
Phalaris minor	Sha'eer El-Faar	شَعِير الفَارْ
Phalaris paradoxa	Sha'eer El-Faar	شَعِير الفَارْ
Phleum subulatum	Deil El-Qott	دِيلْ القُطْ
Phlomis aurea	'Awarwar, Zeheira	عَوَرْوَرْ، زِهِيرة
Phlomis floccosa	Dirs El-Shayeb, Zeheira	ضِرْسْ الشَايب، زِهِيرة
Phoenix dactylifera	Nakhl El-Balah, Nakhla	نَخْلْ البَلَحْ، نَخْلَة
Phragmites australis	Hagna, Bous, Ghaab	حَجْنَة، بُوصْ، غَابْ
Phyla nodiflora	Libbia	لِيبْيَة
Phyllanthus maderaspatensis	Ayoheit	أيوهِيتْ
Phyllanthus rotundifolius	Hashab Saghir	هَشَبْ صَغِير
Picris altissima	Morrar	مُرَّارْ
Picris asplenioides	Howthaan	حُوذَانْ
Pimpinella schweinfurthii	Yansoun	يَانْسُون
Pistacia khinjuk var. *glabra*	Botom	بُطُمْ
Pistia stratiotes	Zoqqeim	زُقِّيمْ
Pisum sativum	Gilbaan	جِلْبَان
Plantago afra	Qotouna	قُطُونَة
Plantago albicans	Yanam	يَنَمْ
Plantago amplexicaulis	Doweinat El-Gadye	دُوَيْنات الجَدْيْ
Plantago arenaria	Habb El-Baragheet	حَبْ البراغيتْ
Plantago ciliata	Halawet El-Badan	حَلاَوِة البَدَنْ
Plantago coronopus	Wideina	وِدِينَة
Plantago cylindrica	Yanam	يَنَمْ

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Plantago exigua	Kammoun Aswad	كَمُّون أسود
Plantago lagopus	Widna	وِدْنَة
Plantago major	Mesaasa	مِصَاصَة
Plantago notata	Yanam	يَنَمْ
Plantago ovata	Loqmet El-Na'aga, Gneima	لُقْمَة النَّعْجَة، جِنِيمَة
Plantago sinaica	Medeihna, Re'eiet El-Badan	رِعْيَة البَدَن، مِدِيهْنَة
Plicosepalus acaciae	Seher, 'Anab El-Talh	سِحِرْ، عَنَبْ الطَلْحْ
Plicosepalus curviflorus	Seher, 'Anab El- Talh, Goola	سِحِرْ، عَنَبْ الطَلْحْ، جُوْلَه
Pluchea dioscoridis	Barnouf	بَرْنُوفْ
Poa sinaica	'Anzia, Sabal Abu El-Hossein	عَنْزِيَّة، سَبَلْ أبو الحُصِينْ
Polycarpaea repens	Kreishet Gadie	كِرِيشة جَدْى
Polycarpaea robbairea	Rihay, Reekha	ريحاى، ريخة
Polycarpon prostratum	Rihay	رِيحَاىْ
Polygala erioptera	Heikaal	هِيكال
Polygala sinaica	Sarr	صَرْ
Polygonum spp.	Qordaab	قُرْضَابْ
Polygonum aviculare	Qordaab	قُرْضَابْ
Polygonum bellardii	Qordaab	قُرْضَابْ
Polygonum equisetiforme	Qordaab, 'Okreish	قُرْضاب، عُكْرِيشْ
Polygonum maritimum	Qordaab	قُرْضَابْ
Polygonum plebejum	Shedeed, Qoteiyh	شِدِيدْ، قُطِيحْ
Polypogon monspeliensis	Deil El-Qott	دِيلْ القُطْ
Polypogon viridis	Deil El-Faar, No'eima	دِيلْ الفَارْ، نُعَيْمَة
Populus euphratica	Reqeiqab	رِقِيقَابْ
Portulaca oleracea	Regla, Makhmakh, Lul'aneeb	رِجْلَة، مَخْمَخْ، لولعانيب
Posidonia oceanica	Shetenaara, Galamish	شِتِنَارة، جَلاَمِيش
Potamogeton crispus	Horreisha, Zilf	حُرِّيشَة، زِلْفْ
Potamogeton nodosus	Waraqa, Zafoun, Abu Zilf	وَرَقَة، زَفُونْ، أبو زِلْـفْ
Potamogeton pectinatus	Deil El-Faras, Sha'ar El-Hosaan	دِيلْ الفَرَسْ، شَعْرْ الحُصَانْ

Potentilla supina	Hashishet El-Wezz	حَشِيشِة الوِزّ
Prasium majus	Shofal	شوفَلْ
Primula boveana	Khass El-Gabal, Sahseeh	خَسّ الجَبَل، سَحْسيح
Prosopis farcta	Sheshlaan	شِشْلاَنْ
Pseudognaphalium luteoalbum	Sabounet El-'Afreet, Ghobbeira	صَابُونِة العَفْرِيت، غُبَّيرة
Pseudorlaya pumila	Shamar El-Gabal	شَمَرْ الجَبَلْ
Pterocephalus plumosus	Soffeiratan, Soffeira, Losseiq	صُفَّيْرَتَانْ، صُفَّيرة، لُصَّيقْ
Pterocephalus sanctus	Megeinina, 'Esseil	مِجَيْنِينَة، عِسِّيلْ
Pulicaria arabica	Abu-'Ain-Safra, Deithouth	أبو عينْ صَفْرَة، دِيْثُوثْ
Pulicaria incisa	Shaay Gabal, Shaay El-Gabal, Rabol	شَايْ جَبَلْ، شَايْ الجَبَلْ، رَبُلْ
Pulicaria inuloides	Damsees	دَمْسِيسْ
Pulicaria undulata	Githgath, Dithdath, Sabad	جِثْجَاثْ، دِثْدَاثْ، سَبَدْ
Pupalia lappacea	Sebeb Ombeik	سِبِبْ أُمْبِيكْ
Pycnocycla tomentosa	Saisaban	سَيْسَبَانْ
Ranunculus arvensis	Zaghalanta	زَغَلَنْتَة
Ranunculus asiaticus	Shaqeeq, Shaqeeq El-No'oman	شَقِيقْ، شَقِيقْ النُّعْمَانْ
Ranunculus scleratus	Zaghleel	زَغْلِيلْ
Raphanus raphanistrum	Figgeil	فِجِّيلْ
Reaumuria hirtella	Molleih	مُلِّيح
Reaumuria vermiculata	Molleih	مُلِّيحْ
Reichardia tingitana	Morrar, Hawwa	مُرَّار، حَوَّا
Reseda arabica	Theil El-Kharouf	ذِيلْ الخَرُوفْ
Reseda decursiva	Rigl El-Ghorab	رِجْلْ الغُرَاب
Reseda lutea	Weiba	وِيْبَة
Reseda luteola	Baqam	بَقَمْ
Reseda muricata	Khozama	خُزَامَة
Reseda orientalis	Theil El-Kharouf	ذِيلْ الخَرُوفْ
Reseda pruinosa	Danban, Khozama	دَنْبَان، خُزَامَة
Retama raetam	Ratam	رَتَمْ

Rhamnus dispermus	'Areen, Za'arour, 'Orontol	عَرِينْ، زَعْرُورْ، عُـرُنـتُـل
Ricinus communis	Kherwa'a, Kharwa'a	خِرْوَع، خَرْوَعْ
Roemeria hybrida	Rigl El-Ghorab	رِجْلْ الغُرَاب
Rosa arabica	Ward Barri	وَرْدْ بَرِّى
Rubus sanctus	Tout Shouki, 'Olleiqa	تُوتْ شُوكى، عُلَّيقَة
Ruellia patula	Foul	فُـول
Rumex spp.	Hommad	حُـمَّـاض
Rumex dentatus	Khillala	خِلاَّله
Rumex pictus	Hamasees	حَمَاصِيص
Rumex pulcher	Lesan El-Kalb	لِسَانْ الكَلْبْ
Rumex vesicarius	Hommad	حُـمَّـاض
Ruppia maritima	Reem, Hamoul	رِيمْ، حَمُولْ
Saccharum officinarum	Qasab El-Sokkar	قَـصَبْ السُـكَّـر
Saccharum spontaneum	Bous, Bous El-Gazaier, Heesh	بُوصْ، بُوصْ الجَزاير، هِيشْ
Sageretia thea	'Oronteel	عُرُنْتِيلْ
Salicornia europaea	Khreiza	خِرِيزة
Salix mucronata	Safsaaf	صَفْصَافْ
Salix tetrasperma	Safsaaf 'Arid	صَفْصَافْ عَرِيضْ
Salsola imbricata	Khariet	خَرِيطْ
Salsola inermis	Qomeyla, Nadwa	قُمَيْلة، نَدْوة
Salsola kali	Qaliye, Eshnaan	قَلِى، إشْنَانْ
Salsola longifolia	Hedeid	حِدِيدْ
Salsola tetrandra	Damraan	ضَمْرَانْ
Salsola villosa	Sha'aran	شَعْرَانْ
Salsola volkensii	Areineba	أَرِيْنَبَة
Salvadora persica	Araak, Siwaak, Miswaak	أَرَاكْ، سِوَاكْ، مِسْوَاكْ
Salvia aegyptiaca	Ra'alah	رَعْلَة
Salvia deserti	Shoheibi, Ghobbeisha	شُهيبى، غُبَّيشَة
Salvia dominica	Simsim	سِمْسِم

Salvia lanigera	Shagaret El-Gamal	شَجَرة الجَمَلْ
Salvia multicaulis	Mardaqoush	مَرْدَقُوشْ
Salvia palaestina	Kharna	خَرْنَة
Salvia sclarea	Dannoun, Widan El-Homaar	دَانُونْ، وِدَان الحُمار
Salvia spinosa	Than El-Homaar, Shagaret El-Ghazal	ذانْ الحُمَارْ، شَجَرِة الغَزَالْ
Salvia verbenaca	Tha'alaba	ثَعْلَبَة
Samolus valerandi	'Oreida	عُرَيْضة
Sanguisorba minor subsp. *verrucosa*	Abu Greisaaf, Doweinat El-Faar	أبوجِرِيصافْ، دُوَيْنَاتْ الفَارْ
Sarcocornia fruticosa	Abu Saaq, Hatab	أبو سَاقْ، حَطَبْ
Savignya parviflora	Rashad Gabali, Halawa	رَشَادْ جَبَلى، حَلاَوَة
Scabiosa arenaria	Ka'ab El-Ghazaal	كَعْبْ الغَزَالْ
Scandix pecten-veneris	Msheita	مِشيَطة
Scandix stellata	Abu Hreiba, Shabat Barri	أبُو حِرِيبَة، شَبَتْ بَرِّى
Scariola orientalis	Gekheis	جِخِيصْ
Schenoplectus spp.	Khabb, Dees, Samaar	خَبْ، دِيسْ، سَمَارْ
Schenoplectus prelongatus	Khabb, Dees	خَبْ، دِيسْ
Schimpera arabica	Umm Rous, Ethhian	أمْ رُوس، إثْحِيان
Schismus barbatus	Bohma, Zaghab El-Faar	بُهْمَة، زَغَبْ الفَارْ
Schouwia purpurea	Mahad, Namnaam	مَهَدْ، نَمْنام
Scirpoides holoschoenus	Dees	دِيسْ
Sclerocephalus arabicus	Dahian	دَحْيَانْ
Scolymus maculatus	Lekhlakh	لِخْلاَخْ
Scorpiurus muricatus	Thanab El-'Aqrab	ذَنَبْ العَقْرَبْ
Scorzonera mollis	Dabahleel, Thanhaleel	دَبَحْلِيلْ، ثَنْحَلِيلْ
Scorzonera schweinfurthii	Dabahleel	دَبَحْلِيلْ
Scorzonera undulata	Dabbah, Dibbeih	دَبَّاحْ، دِبِّيح
Scrophularia deserti	Qarsa, Abu 'Effein, Sreeda	قَرْصَة، أبو عِفِّينْ، سِرِيدَة
Scrophularia xanthoglossa	Qartam, Berwek	قَرْطَمْ، بِرْوِك

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Seddera latifolia	Ahterg	أَهْتِرْجْ
Seetzenia lanata	Habbein	حَبِّـينْ
Senecio aegyptius	Baysoum	بَيْسُومْ
Senecio flavus	Howwaiya, Abu Rmeiha	حُوَّيْة، أبو رميحَة
Senecio glaucus subsp. *coronopifolius*	Qorreis, Umm Lonein	قُرَّيص، أُمْ لُونِينْ
Senecio vulgaris	Morrar	مُرَّار
Senna alexandrina	Senna Mekki, Salamekki	سِنَّامِكِّى، سَلَامِكِّى
Senna italica	Senna, Senna Mekki	سِنَّا، سِنَّامِكِّى
Seriphidium herba-album	Sheeh	شِيحْ
Sesbania sesban	Saisaban	سَيْسَبَانْ
Setaria pumila	Deil El- Faar, Deil El-Qott, Safwa	دِيلْ الفَارْ، دِيلْ القَطْ، صَفْوَة
Setaria verticillata	Qamh El-Faar, Shobbeit, No'eima	قَمْحْ الفَار، شُبِّيطْ، نُعِيمَة
Setaria viridis	Deil El-Faar, Yadaab	دِيلْ الفَارْ، يَادَابْ
Sida alba	Meloukhiet Eblees	مِلُوخِيَّة إبْلِيسْ
Silene arabica	Abu Dheina	أَبُو دِهِينَة
Silene biappendiculata	Medheina	مِدْهِينَة
Silene colorata	'Ein El-Bint	عِينْ البِنْتْ
Silene conoidea	Za'afar	زَعْفَرْ
Silene linearis	'Abbeish, Wasbeiya	عَبِيشْ، وَصْبِيَّة
Silene palaestina	Dheina	دِهِينَـة
Silene rubella	Nashash Ed-Debban, Abu El-Nagaf	نَشَّاش الدِبَّان، أبو النَجَف
Silene schimperiana	Losseiq	لُصَّيقْ
Silene succulenta	Roghl, Khobbeizet El-Barr	رُغْلْ، خُبِّيزة البَرْ
Silene villosa	Hemmeiem, 'Attani	حِمِّيم، عَطَّانى
Silybum marianum	Shawk Sennari, Shawk El-Gamal	شَوكْ سِنَّارِى، شَـوكْ الجَمَلْ
Sinapis alba	Khardal	خَرْدَلْ
Sinapis arvensis	Khardal, Qrilla	خَرْدَلْ، قِرِلَّة

Sisymbrium erysimoides	Saleekh	سَلِيخْ
Sisymbrium irio	Figl El-Gamal	فِجْلْ الجَمَلْ
Sisymbrium orientale	Saleekh	سَلِيخ
Solanum coagulans	Oleileet	أُلِيلِيتْ
Solanum forsskaolii	Abu Shouka	أَبُو شُوكَة
Solanum incanum	Gebbein	جِبِّينْ
Solanum nigrum	'Enab El-Deeb	عِنَبْ الدِّيبْ
Solenostemma arghel	Hargal, Hargal Bahari	حَرْجَلْ ، حَرْجَلْ بَحرى
Sonchus maritimus	Saiyfoun	سَيْفُونْ
Sonchus oleraceus	Go'edeid, Galawein	جُعْضيض، جلاوين
Sorghum bicolor	Dura Seifi, Dura 'Eweiga, Dura Hamra, Dura Rafi'aa	دُرَة صيفى، دُرَة عويجة دُرَة حَمْرة، حَمْرَة رفيعة
Sorghum x *drummondii*	Hashish El-Sudan, Garawa	حَشِيشْ السُّودانْ، جَرَاوَة
Sorghum halepense	Hashish El-Faras, Garawa	حَشِيشْ الفَرَسْ، جَرَاوَة
Sorghum virgatum	Hashish El-Faras, Garawa	حَشِيشْ الفَرَسْ، جَرَاوَة
Spergularia diandra	Abu Gholam	أبُو غُلَامْ
Spergularia marina	Abu Gholam	أبُو غُلَامْ
Sphaeranthus suaveolens	Qateef, Zirr El-Ward	قَطِيفْ، زِرْ الوَرْدْ
Sphaerocoma hookeri	Hanboak	هَـنْـبواك
Sphenopus divaricatus	Indinqirni	ايِنْدِنْقِرْنى
Spirodela polyrhiza	'Adas El-Mayia	عَدَسْ المَيَّة
Sporobolus spicatus	Silla, Sabat Gabali, Negeil Shawki	سِلَّة، سَبَطْ جَبَلى، نِجِيل شَـوكى
Stachys aegyptiaca	Roghl, Roghat, Gortom	رُغْلْ، رُغَاتْ، جُرْطُم
Stellaria media	Qizaaza	قِزَازَة
Stellaria pallida	Hashishet El-Qizaaz	حَشِيشَة القِزَازْ
Stenotaphrum secundatum	Negeil Faransawi	نِجِيل فَـرَنْـساوى
Sterculia africana	Barout	بَرُوطْ
Stipa arabica	Hamara	حَمَارَة
Stipa capensis	Abu Nakhur, Teira, Safsouf	أبو نَـخور، طِيَرة، سَفْسُوفْ

Stipa lagascae	Gawthar	جَوْثَرْ
Stipa parviflora	Safsouf, Sabal Abu El-Hosein	سَفْسُوفْ، سَبَلْ أبو الحُصِينْ
Stipagrostis acutiflora	Sakham	سَخَمْ
Stipagrostis ciliata	Hemeira, Nessiye	حِمِيرَة، نِصِي
Stipagrostis lanata	Shafshouf, 'Ainseila	شَفْشُوفْ، عِينْصِيلَة
Stipagrostis obtusa	Safsouf, Dreira	سَفْسُوفْ، ضِرِيرَة
Stipagrostis plumosa	Nessiye, Qaba, Dreira	نِصِي، قَبَا، ضِرِيرَة
Stipagrostis pungens	Shawk El-Ghazal	شَوكْ الغَزَالْ
Stipagrostis scoparia	Sabt	سَبْطْ
Stipagrostis vulnerans	Shush, Shawk El-Ghazal	شُوشْ، شَوكْ الغَزَال
Striga hermonthica	'Odaar	عُدَارْ
Suaeda aegyptiaca	Tarteer, Molleih, Khreiza	طَرْطِيرْ، مُلِّيحْ، خريزة
Suaeda monoica	'Asal, Sowweid	عَسَلْ، سُوِّيدْ
Suaeda vera	Sabta, Hemmam	سَبْطَة، حِمَّامْ
Suaeda vermiculata	Tarteer, Sowweid	طَرْطِيرْ، سُوِّيدْ
Taeniatherum caput-medusae	Safsouf, Abu Hreiba	سَفْسُوفْ، أَبُو حِرِيبَة
Tamarix aphylla	Atl, Athel	أَثْلْ، أثِلْ
Tamarix nilotica	'Abal, Tarfa	عَبَلْ، طَرْفَةَ
Tamarix tetragona	Tarfa	طَرْفَة
Tanacetum sinaicum	Mirr, Morr	مِرْ، مُرْ
Taverniera aegyptiaca	Dehseer	دِحْسِيرْ
Tephrosia nubica	Shama Haneit, Haneit	شَمَا هَانِيتْ، هَانِيتْ
Tephrosia purpurea	'Omayeen, Nafal, Daan El-Faar	عُمَيِينْ، نَفَلْ، دَانْ الفَارْ
Tephrosia quartiniana	'Omayeen	عُمَيِينْ
Teucrium polium	Ga'ada	جَعْدة
Thalassodendron ciliatum	Qoshr, Qoshar, Kanaf	قُشْرْ، قُشَارْ، كَنَفْ
Thesium humile	Habb El-Kreish	حَبْ الكِرِيشْ
Thymelaea hirsuta	Mitnaan, Mithnaan	مِتْنَانْ، مِثْنَانْ
Thymus bovei	Za'ataran	زَعْتَرَانْ

Thymus capitatus	Za'atar	زَعْتَرْ
Thymus decussatus	Z'eitar, Z'eitran	زِعَيْتَرْ، زِعَيتران
Torilis arvensis	Gazar Shitani	جَزَر شِيطانى
Traganum nudatum	Damraan, Hamd	ضَمْرَانْ، حَمْضْ
Tragopogon collinus	Thanab E-Faras	ذَنَبْ الفَرَسْ
Tragopogon sinuatus	Rakha	رَخَا
Tragus berteronianus	Harrouy	هارّوى
Tragus racemosus	'Areibi	عَرِيبى
Trianthema triquetra	Arareeb	أراريبْ
Tribulus macropterus	Qotba	قُطْبة
Tribulus pentandrus	Qatoub	قَطُوبْ
Tribulus terrestris	Dreiss, Glaya	ضِريسْ، جِـلايَـة
Trichodesma africanum	Himmim, Losseiq, Tada'at	حِمِّيمْ، لُصَّيقْ، تَدَعْتْ
Trichodesma ehrenbergii	Himhim, Shana	حِمْحِمْ، شَانَة
Tricholaena teneriffae	Sabat, Yaraab	سَبَطْ، يَارَابْ
Trifolium alexandrinum	Barseem, Barseem Mesqawi	بَرْسِيمْ، بَرْسِيمْ مِسْقَاوِى
Trifolium glanduliferum var. *nervulosum*	Bezz El-Baqara	بِـزْ البَقَرَة
Trifolium resupinatum	Qort	قُرْطْ
Trifolium tomentosum	Kreishet El-Ra'aie	كِرِيشِة الرَاعِى
Trigonella arabica	Wedeina	وِدِينَة
Trigonella hamosa	'Eshb El-Malik, Deraaq	عِشْبْ المَـلِكْ، دِرَاقْ
Trigonella stellata	Gargas, Drahmiya	جَرْجَسْ، دراهْمِيَّـة
Tripleurospermum auriculatum	Babounig	بَابُونِجْ
Triraphis pumilio	Za'abal	زَعْبَلْ
Triticum durum	Qamh Dakar	قَمْحْ دَكَرْ
Triticum pyramidale	Qamh Baladi	قمح بَلَدِى
Triticum vulgare	Qamh Hindi	قَمْحْ هِنْدِى
Triumfetta flavescens	Tekayet Gebel	تِكايتْ جِـبِلْ
Tulipa biflora	Freywa	فِرِيّوة

Tulipa stylosa	Rakha	رَخَا
Typha domingensis	Dees, Burdi, Bout	دِيسْ، بُرْدِى، بُوطْ
Typha elephantina	Dees	دِيسْ
Umbilicus botryoides	Widna	وِدْنَة
Urginea maritima	Basal Far'aon, 'Onsol	بَصَلْ فَرْعُونْ، عُنْصُلْ
Urospermum picroides	Beseekh, Seleis	بِسِيخْ، سِلِيسْ
Urtica pilulifera	Qorreis, Horreiq	قُرَّيصْ، حُرَّيقْ
Urtica urens	Qorreis, Horreiq	قُرَّيصْ، حُرَّيقْ
Utricularia inflexa	Hamoul	حَمُولْ
Vaccaria hispanica	Foul El-'Arab	فُولْ العَرَبْ
Vahlia digyna	Sofra, Soffeira	صُفْرَة، صُفِيرَة
Verbascum schimperianum	'Awarwar	عَوَرْوَرْ
Verbascum sinaiticum	Kherma'a	خِرْمَاع
Verbascum sinuatum	Kherma, Kherma'a	خِرْمَة، خِرْمَاع
Verbena officinalis	Rigl El-Hamaam	رِجْلْ الحَمَامْ
Verbena supina	Morreikh, Morreiq	مُرَّيخ، مُرَّيق
Veronica anagallis-aquatica	Habaq	حَبَقْ
Veronica kaiseri	'Eshb El-Mayya	عِشْبْ المَيَّة
Vicia lutea	Bakhran	بَخْرَانْ
Vicia monantha	Qireinet Ghazal, Kharieg	قَرِينِة غَزَالْ، خَرِيجْ
Vicia narbonensis	Fool Eblees	فُول إِبْلِيسْ
Vicia sativa	Dohreig, Gilbaan	دُحْرِيجْ، جِلْبَان
Vigna unguiculata subsp. *sesquipedalis*	Lobiya	لُوبْيَا
Volutaria crupinoides	Morrar	مُرَّار
Volutaria lippii	Roumeyia, Ahna	رُومِيَّة، أحْنَة
Vulpia pectinella	Sobbeila	سُبَّيلة
Wahlenbergia lobelioides subsp. *nutabunda*	Kishay-Qalamt	كِيشَايْ قَلَمْتْ
Waltheria indica	Birkeeb	بِيرْكِيبْ

Withania obtusifolia	Artwaateib	أرتواتيب
Withania somnifera	Semm Fraakh, Morgaan	سِمْ فَراخْ، مُرْجَانْ
Wolffiella hyalina	Reem, 'Ads El-Mayya	رِيمْ، عَدْسْ المَيَّة
Xanthium spinosum	Shubbeit	شُبَّيطْ
Xanthium strumarium	Shabka	شُبْكَة
Zaleya decandra	Laanɛy	لاَنَايْ
Zannichellia palustris	Hamoul El-Bahr, Lamaq	حَمُولْ البَحْرْ، لَمَقْ
Zea mays	Dura Shami	دُرَة شَامِى
Zilla spinosa	Silla, Sseilla	سِلَّة، سِيلَّة
Ziziphora tenuior	Habaq 'Atshaan	حَبَقْ عَطْشَانْ
Ziziphus spina-christi	Nabq, Sidr	نَبْقْ، سِدْرْ
Zogea purpurea	Dgeiga	دِجِيجَة
Zosima absinthifolia	'Amiyya	عَمِيَّ
Zostera noltii	Hamcul	حَمُولْ
Zygophyllum album	Rotreit, Bawwal	رُطْرِيط، بَوَّالْ
Zygophyllum coccineum	Rotreit, Balbal, Qalam	رُطْرِيط، بَلْبَالْ، قَلَمْ
Zygophyllum simplex	Qarmal, Gormal	قَرْمَلْ، جُرْمَلْ

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Vernacular - Latin Names

'Aader	*Artemisia monosperma*	عَادِرْ
'Aara	*Aerva javanica*	عَارَة
'Abal	*Tamarix nilotica*	عَبَلْ
'Abbeish	*Silene linearis*	عَبِيشْ
Abot-Klaay	*Pavonia triloba*	أَبُتْكلاَى
Abu Dheina	*Silene arabica*	أَبُو دِهِينَة
Abu 'Effein	*Chenopodium murale, Scrophularia deserti*	أَبُو عِفِّينْ
Abu 'Ekeifa	*Astragalus asterias*	أبوعِـكيفَـة
Abu El-Nagaf	*Silene rubella*	أبو النَجَـف
Abu Gholam	*Spergularia diandra, S. marina*	أَبُو غُلاَمْ
Abu Greisaaf	*Sanguisorba minor* subsp. *verrucosa*	أبوجرِيَصافْ
Abu Hreiba	*Scandix stellata*	أَبُو حِرِيَبة
Abu Hreiba	*Minuartia picta, Taeniatherum caput-medusae*	أبوحِرِيبة
Abu Mosfaah	*Erodium ciconium, Erodium gruinum*	أبو مُصْفاح
Abu Nakhur	*Stipa capensis*	أبو نَـخور
Abu Qarn	*Gynandropsis gynandra*	أَبُو قَرْنْ
Abu Qseiba	*Dichanthium annulatum*	أبو قصيبه
Abu Qusseyba	*Digitaria sanguinalis*	أبو قُصَّيبَة
Abu Rmeiha	*Senecio flavus*	أبو رِمِيحَة
Abu Rokba	*Echinochloa colona, Digitaria sanguinalis*	أبو رُكْبَة
Abu Saaq	*Sarcocornia fruticosa*	أبو سَاقْ
Abu Shouka	*Solanum forsskaolii*	أَبُو شُوكَة
Abu Tarboush	*Cleome viscosa*	أبو طَرْبُوشْ
Abu Za'arir	*Bupleurum falcatum*	أبو زَعْرِير
Abu Zilf	*Persicaria senegalensis, Potamogeton nodosus*	أبو زِلْـفْ
Abu-'Ain-Safra	*Pulicaria arabica*	أبو عينْ صَفْرَة
'Adama	*Bufonia multiceps*	عَدَمَة

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'Adar Hamoreit	*Aristida mutabilis*	عَدّار هَموريت
'Adas El-Mayia	*Spirodela polyrhiza*	عَدَسْ المَيَّة
'Addar-Engomeel	*Oxygonum atriplicifolium*	عَدَّار إنْجُوميل
'Adeid	*Launaea mucronata*	عَضِيض
'Adras	*Astragalus asterias, A. tribuloides, Crucianella membranacea, Lotoroonis platycarpa*	عَـدْرَس
'Ads El-Mayya	*Lemna gibba, Wolffiella hyalina*	عَدْس المَيَّة
Agdeem	*Echinops hussonii*	أجْديمْ
'Agira	*Cyperus difformis*	عَجيَرة
'Agram	*Anabasis articulata, A. setifera*	عَجْرم
Ahna	*Volutaria lippii*	أحْنَة
Ahterg	*Seddera latifolia*	أهْتِرْجْ
'Ain El-Gamal	*Anagallis arvensis*	عِينْ الجَمَلْ
'Ain El-Qott	*Anthemis retusa, Calendula arvensis*	عِينْ القُطْ
'Ain Essafra	*Calendula arvensis*	عين الصَفْرا
'Ain Umm Solaiman	*Andrachne aspera*	عين أم سُليمان
'Ainseila	*Stipagrostis lanata*	عِينْصِيلَة
'Aisalaan	*Pancratium sickenbergeri, Bellevalia flexuosa*	عَيْصَلانْ
'Akaash	*Centaurea aegialophila*	عَكَاشْ
'Alda	*Ephedra alata*	عَلْدة
'Algam	*Ephedra aphylla*	عَلْجَمْ
Alimaseib	*Barleria hochstetteri*	اليَمابيبْ
Amboaro	*Abutilon bidentatum, A. fruticosum, A. pannosum*	أمْبُوارُو
Amionaib	*Merremia aegyptia*	أمْيونيب
'Amiyya	*Zosima absinthifolia*	عَمِيَّ
Ammeeshi	*Malabaila suaveolens*	أمّيشى
'Amrour	*Launaea mucronata*	عَمْرور
Amshout	*Echinochloa stagninum*	أمْشُوط

'Anab El- Talh	*Plicosepalus curviflorus, P. acaciae*	عَنَبْ الطَلْحْ
'Anzia	*Poa sinaica*	عَنْزِيَّة
'Aqfa	*Astragalus fresenii*	عَقْفَة
'Aqoul	*Alhagi graecorum, Fagonia bruguieri*	عَقُول
'Aqoul Gabal	*Asparagus stipularis*	عَقُول جَبَلْ
'Aqrabana	*Heliotropium lasiocarpum*	عَقْرَبانة
Araak	*Salvadora persica*	أرَاكْ
'Arad	*Acacia etbaica*	عَرَض
'Ar'ar	*Juniperus phoenicea*	عَرْعَرْ
Arareeb	*Trianthema triquetra*	أراريبْ
Arbeyyan	*Cotula cinerea*	أربّيان
'Areen	*Rhamnus dispermus*	عَرِينْ
'Areibi	*Tragus racemosus*	عَرِيبى
Areineba	*Salsola volkensii*	أرِيْنبَة
'Argoun	*Medemia argun*	عَرْجون
Arta	*Calligonum polygonoides*	أرْطَه
Artwaateib	*Withania obtusifolia*	أرتواتيب
Asaabe'e El-'Arous	*Astragalus sieberi*	أصَابعْ العَرُوس
Asaghan	*Ballota damascena*	أسَغَان
'Asal	*Anabasis setifera, Suaeda monoica*	عَسَلْ
Assabe'e El-'Arous	*Lotus tetragonolobus*	أصَابع العَرُوسْ
'Atan	*Lavandula pubescens*	عَطَنْ
Athan Hamir	*Bellevalia macrobotrys*	آذان حَمِير
Athel	*Tamarix aphylla*	أثِلْ
'Athma	*Galium sinaicum*	عَثْمة
Atl	*Tamarix aphylla*	أثْلْ
'Atna	*Cleome amblyocarpa, Heliotropium arbainense*	عَطْنَة
'Attan	*Arnebia hispidissima, Fagonia bruguieri*	عَطَّان

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'Attani	*Silene villosa*	عَطَّانى
Awaay Wiheet	*Cheilanthes vellea, Actiniopteris semiflabellata*	أوَاى وَهِيت
'Awarwar	*Hyoscyamus reticulatus, Phlomis aurea, Verbascum schimperianum*	عَوَرْوَرَ
'Awsag	*Lycium europaeum, Lycium shawii*	عَوْسَجْ
Ayoab	*Euphorbia cuneata*	أيُوآبْ
Ayoheit	*Phyllanthus maderaspatensis*	أيوهِيتْ
Babaaq	*Crypsis schoenoides*	بَاباق
Babounig	*Chlamidophora tridentata, Matricaria recutita, Tripleurospermum auriculatum*	بابُونِج
Bahal-qard	*Crotalaria microphylla, C. senegalensis*	بَحَلْقَرْض
Bahma	*Avena barbata*	بَهْمَى
Bahman Ahmar	*Limonium tubiflorum*	بَهْمَان أحْمَرْ
Bakeff	*Cardiospermum halicacabum*	بَكِفْ
Bakhran	*Vicia lutea*	بَخْرَانْ
Balatay	*Peristrophe paniculata*	بالاتَايْ
Balbal	*Zygophylum coccineum*	بَلْبَالْ
Baqam	*Reseda luteola*	بَقَمْ
Bardaqoush	*Origanum syriacum* subsp. *sinaicum*	بَرْدقوش
Bardi	*Cyperus papyrus*	بَرْدى
Barnouf	*Pluchea dioscoridis*	بَرْنُوفْ
Barout	*Sterculia africana*	بَرُوطْ
Barqaan	*Centaurea scoparia, C. sinaica*	بَرْقَانْ
Barseem	*Trifolium alexandrinum*	بَرْسِيمْ
Barseem Hegazi	*Medicago sativa*	بَرْسِيم حِجَازى
Barseem Mesqawi	*Trifolium alexandrinum*	بَرْسِيمْ مِسْقَاوِى
Basal	*Allium cepa*	بَصَل
Basal Eblees	*Asphodelus tenuifolius*	بَصَل إبْلِيس

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Basal El-'Afrit	*Allium ampeloprasum*	بَصَلْ العَفْريت
Basal El-Hanash	*Ornithogalum trichophyllum*	بَصل الحَنَش
Basal El-'Onsol	*Asphodelus aestivus*	بَصَل العُنْصَل
Basal Far'aon	*Urginea maritima*	بَصَلْ فَرْعُونْ
Bashneen Abiad	*Nymphaea lotus*	بَشْنِينْ أبْيَضْ
Bashneen Azraq	*Nymphaea caerulea*	بَشْنِينْ أزْرَقْ
Basoum	*Anthemis pseudocotula*	بَسوم
Batn El-Hayya	*Pancratium sickenbergeri*	بَطْنْ الحَيَّة
Bawwal	*Zygophyllum album*	بَوَّالْ
Bayad	*Convolvulus lanatus*	بَيَاضْ
Baysoum	*Senecio aegyptius*	بَيْسُومْ
Beid El-Ard	*Aetheorhiza bulbosa*	بِيض الأَرْض
Beid El-Gamal	*Astragalus tribuloides*	بِيض الجَمَل
Beid El-Homaar	*Astragalus macrocarpus*	بِيض الحُمار
Belboush	*Bellevalia sessiliflora*	بِلْبُوش
Belleib	*Brachiaria deflexa*	بِلَّيبْ
Belleikh	*Doellia bovei*	بِلَّيخ
Beng	*Hyoscyamus albus*	بِنَجْ
Berwek	*Scrophularia xanthoglossa*	بِرْوِك
Besat El-Ard	*Paronychia argentea*	بِسَاط الأَرْضْ
Beseekh	*Urospermum picroides*	بِسِيخ
Bezz El-Baqara	*Trifolium glanduliferum* var. *nervulosum*	بِزْ البَقَرَة
Birkeeb	*Waltheria indica*	بِيرْكِيبْ
Bo'aitheran	*Artemisia judaica*	بُعَيْثِران
Boaraq	*Asphodelus aestivus*	بُورَق
Bohma	*Hordeum marinum*, *Schismus barbatus*	بُهْمَه
Borbeit	*Eleocharis palustris*, *Cyperus laevigatus*	بُرْبِيطْ
Borg El-Hamam	*Lathyrus aphaca*	بُرْج الحَمام

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Borgoman	*Ageratum conyzoides*	بُرْجُمان
Boseil	*Leopoldia comosa*, *Muscari neglectum*	بُصِيلْ
Bosseil	*Pancratium arabicum*, *P. sickenbergeri*	بُصَّيلْ
Botom	*Pistacia khinjuk* var. *glabra*	بُطُمْ
Botteit	*Allium sinaicum*	بُطَّيط
Botteit El-Hagal	*Gagea reticulata*	بُطّيطُ الحَجَلْ
Bous	*Phragmites australis*, *Saccharum spontaneum*	بُوصْ
Bous El-Gazaier	*Saccharum spontaneum*	بُوصْ الجَزاير
Bout	*Typha domingensis*	بُوطْ
Breida	*Dipcadi erythraeum*	بِبرِيَدة
Bseilla	*Zilla spinosa*	بِسِلَّة
Bseisa	*Callipeltis cucullaris*, *Galium setaceum*, *Paronychia arabica*	بِسِيسَة
Bu'aithran	*Achillea santolina*	بُعَيْثَرانْ
Burdi	*Typha domingensis*	بُرْدِى
Daah	*Pennisetum divisum*	دَاحْ
Daan El-Faar	*Tephrosia purpurea*	دَانْ الفَارْ
Dabahleel	*Scorzonera mollis*, *S. schweinfurthii*	دَبَحْلِيلْ
Daballab	*Maytenus senegalensis*	دَابَالاَبْ
Dabbagh	*Melhania denhamii*	دَبَّاغ
Dabbah	*Scorzonera undulata*	دَبَّاحْ
Dabouk	*Eragrostis ciliaris*	دَابُوك
Dada'a	*Olea europaea* subsp. *cuspidata*	دَدَعْ
Dafeera	*Iphiona mucronata*	دَفِيرة
Dafra	*Digitaria ciliaris*, *Digitaria nodosa*	ضَفْرَة
Dafret El-Homar	*Iphiona scabra*	دَفْرة الحُمار
Dahian	*Sclerocephalus arabicus*	دَحْيَانْ
Dahma	*Erodium arborescens*	دَحْمة

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Dahmi	*Monsonia nivea*	دَهْمِى
Dahmiya	*Erodium laciniatum*	دَهْمِيَّة
Dahmiyet El-Ghazal	*Erodium cicutarium*	دَهْمِيَّة الغـزال
Dahmiyet Ghozlan	*Erodium laciniatum*	دَهْمِيَّة غُزْلان
Dahmiyya	*Monsonia nivea*	دَهْمِيَة
Dahnoon	*Anchusa aegyptiaca*	دَهْنُون
Dahseer	*Indigofera oblongifolia*	دَحْسِير
Dahyaan	*Lobularia arabica*	دَحْيَان
Dakar El-Foul	*Orobanche crenata*	دَكَرْ الفُولْ
Dakhn (cultivated)	*Pennisetum* spp.	دَخْنْ (مزروع)
Damra	*Indigofera colutea*	ضَمْرَه
Damraan	*Salsola tetrandra, Traganum nudatum*	ضَمْرَانْ
Damsees	*Glinus lotoides, Pulicaria inuloides*	دَمْسِيسْ
Damseisa	*Ambrosia maritima*	دَمْسِيسَة
Dan El-Farah	*Astragalus hauarensis*	دَانْ الفَارَة
Danaban	*Caylusea hexagyna, Oligomeris linifolia*	دَنَبان
Danban	*Reseda pruinosa*	دَنْبَان
Dannoun	*Salvia sclarea*	دَانُونْ
Danoun	*Cistanche phelypaea, Orobanche cernua*	دَانُونْ
Daqn El-Sheikh	*Cometes abyssinica*	دَقْن الشَّيخ
Debsha	*Bolboschoenus glaucus*	دِبْشه
Dees	*Bolboschoenus glaucus, Juncus punctorius, Schenoplectus spp., S. prelongatus, Scirpoides holoschoenus, Typha domingensis, T. elephantina*	دِيسْ
Dees Medawwar	*Cyperus articulatus*	دِيس مِدَوَّر
Dehseer	*Taverniera aegyptiaca*	دِحْسِيرْ
Deil El-Faar	*Setaria pumila, S. viridis, Polypogon viridis*	دِيلْ الفَارْ

Deil El-Faras	*Potamogeton pectinatus*	دِيلْ الفَرَسْ
Deil El-Qott	*Imperata cylindrica, Phleum subulatum, Polypogon monspeliensis, Setaria pumila*	دِيلْ القُطْ
Deil El-Ta'alab	*Bromus madritensis*	دِيل الثَّعْلَب
Deithouth	*Pulicaria arabica*	دِيْثُـوثْ
Deneiba	*Echinochloa crusgalli*	دِنِيَبة
Deraaq	*Trigonella hamosa*	دِرَاقْ
Dernaah	*Hypericum triquetrifolium*	دِرْناح
Deydahaan	*Papaver rhoeas*	دِيْدَهَانْ
Dgeiga	*Zogea purpurea*	دِجِـيـجَـة
Dheina	*Silene palaestina*	دِهينَـة
Dibbeih	*Scorzonera undulata*	دِبَّيح
Dineib	*Dinebra retroflexa*	ضِنيب
Dirs El-'Agouz	*Emex spinosa*	ضِرِسْ العَجُوزْ
Dirs El-Kalb	*Beta vulgaris* subsp. *maritima*	ضِرِس الكَلْب
Dirs El-Shayeb	*Phlomis floccosa*	ضِرْسْ الشَايب
Dithdath	*Pulicaria undulata*	دِثْـدَاثْ
Diwal	*Grewia villosa*	دِيوال
Dohreig	*Vicia sativa*	دُحْرِيجْ
Doreis	*Hippocrepis areolata*	ضُرِيسْ
Dorreis	*Astragalus bombycinus*	ضُرَّيس
Doum	*Hyphaene thebaica*	دُوم
Doweinat El-Faar	*Sanguisorba minor* subsp. *verrucosa*, *Commicarpus boissieri*	دُوَيْنَاتْ الفَارْ
Doweinat El-Gadye	*Plantago amplexicaulis*	دُوَيْنات الجَدْىْ
Drahmiya	*Trigonella stellata*	دراهْمـيَّـة
Dreira	*Stipagrostis obtusa, S. plumosa*	ضِرِيَرة
Dreis	*Medicago laciniata*	دِرِيس
Dreiss	*Tribulus terrestris*	ضِرِيسْ

Drobakeeb	*Heliotropium strigosum*	دروباكيب
Dura 'Eweiga	*Sorghum bicolor*	دُرَة عُويجَة
Dura Ḥamra	*Sorghum bicolor*	دُرَة حَمْرَة
Dura Rafi'aa	*Sorghum bicolor*	دُرَة رَفيعَة
Dura Seifi	*Sorghum bicolor*	دُرَة صيفى
Dura Shami	*Zea mays*	دُرَة شَامِى
'Ebeila	*Anagallis arvensis*	عِبيلَة
Egdeem	*Helianthemum sancti-antonii*	إجْدِيمْ
'Eifal	*Evolvulus nummularius*	عِيْفَال
'Eigab	*Aerva lanata*	عِيْجَاب
'Eilab	*Digitaria velutina*	إيلَابْ
'Eilab Gabal	*Eragrostis aspera*	عِيلاب جَبَل
'Ein El-Bint	*Silene colorata*	عِينْ البِنْتْ
'Ekresh	*Centropodia forskaolii*	عِكْرِش
El-Baan	*Moringa peregrina*	البَان
Elbeina	*Euphorbia chamaepeplus*	إلبَيِنَـة
El-Ehaim	*Boissiera squarrosa*	الإحَـيْم
'Eleigan	*Deverra triradiata*	عِـليجان
'Enab El-Deeb	*Solanum nigrum*	عِنَبْ الدِّيبْ
'Enab El-Hayya	*Bryonia cretica*	عِنَب الحيَّة
'Entab	*Alternanthera pungens*	عِنْتَاب
Eqrei'ie	*Phagnalon sinaicum*	إقريعى
Erbeiyan	*Anthemis melampodina, A. pseudocotula, A. retusa, Eremobium aegyptiacum*	إرْبـيَّـان
Erfaija	*Anarrhinum pubescens*	إرْفَيْجَة
Erfaija	*Micromeria sinaica*	إرْفَيَّجَة
'Erq El-'Aqrab	*Clitoria ternata*	عِرْق العَقْرَبْ
'Erq El-Laimoun	*Oxalis pes-caprae*	عِرْقْ اللَيْمُون
'Erq El-Ṭayyoun	*Dittrichia viscosa*	عِرْق الطَّيون

Erqeiṭa	*Eminium spiculatum*	إرقيَطة
'Eshb	*Cruciaṇella ciliata, Cyperus conglomeratus, Lotononis platycarpa, Lotus creticus*	عِشْب
'Eshb El-Deeb	*Kickxia aegyptiaca*	عِشب الدِّيب
'Eshb El-Malik	*Trigonella hamosa*	عِشْبْ المَـلِكْ
'Eshb El-Mayya	*Veronica kaiseri*	عِشْبْ المَيَّة
Eshnaan	*Salsola kali*	إشْنَانْ
'Esseil	*Pterocephalus sanctus*	عِسِّيلْ
Ethhian	*Schimpera arabica*	إذْحِيان
'Eṭr	*Glossonema boveanum*	عِطْرْ
Fakhour	*Bromus japonicus*	فاخُـور
Farish	*Fimbristylis bisumbellata*	فِارِشْ
Felaiyya	*Mentha longifolia* subsp. *typhoides*	فِلَيَّـة
Figgeil	*Raphanus raphanistrum*	فِجِّيلْ
Figl El-Gamal	*Cakile maritima, Sisymbrium irio*	فِجْل الجَمَلْ
Filaiyya	*Mentha pulegium*	فِلَيَّـة
Fiss El-Kalb	*Chenopodium album, C. botrys*	فِسْ الكَلْبْ
Fiss El-Kilab	*Amaranthus graecizans*	فِسْ الكِـلاب
Fojeila	*Moricandia nitens*	فُجِيلَة
Fomm El-Samaka	*Lamium amplexicaule*	فُمْ السَمَكة
Fool Eblees	*Vicia narbonensis*	فُول إبْلِيسْ
Foqqa'a	*Eryngium campestre*	فُقَّاعْ
Forga'aa	*Persicaria salicifolia*	فُرْجاعة
Forqa'a	*Ludwigia stolonifera*	فُرْقَاعْ
Forreish	*Fimbristylis bisumbellata*	فُرِّيش
Foul	*Ruellia patula*	فُـول
Foul El-'Arab	*Vaccaria hispanica*	فُولْ العَرَبْ
Frasiyoun	*Marrubium alysson*	فَراسْيُون
Freywa	*Tulipa biflora*	فِرِيَوة

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Ga'ada	*Teucrium polium*	جَعْدة
Gafal	*Commiphora gileadensis*	جَفَلْ
Galamish	*Posidonia oceanica*	جَلاَمِيش
Galawein	*Sonchus oleraceus*	جلاوين
Garawa	*Sorghum* x *drummondii*, *S. halepense*, *S. virgatum*	جَرَاوَة
Garawan	*Ceruana pratensis*	جَرَوان
Garbaa	*Farsetia longisiliqua*	جَرْبَاء
Gargas	*Trigonella stellata*	جَرْجَسْ
Gargeer	*Eruca sativa*	جَرْجِير
Garood	*Anagyris foetida*	جَرُود
Garsha	*Echiochilon fruticosum*	جَرْشَة
Gathum	*Helianthemum kahiricum*, *H. sancti-antonii*	جَثُومْ
Gawthar	*Stipa lagascae*	جَوْثَرْ
Gazar Shitani	*Torilis arvensis*	جَزَر شِيطانى
Gazouf	*Agropyron* spp., *Ammophila arenaria*	جَزُوف
Gebbein	*Solanum incanum*	جِبِّينْ
Geed El-Arnab	*Cuscuta pedicellata*	جِيد الأرنَبْ
Gekheis	*Scariola orientalis*	جِخِيصْ
Gelban	*Lathyrus sativus*	جِلْبَان
Gelw	*Anabasis setifera*	جِلْو
Gemmeiz	*Ficus sycomorus*	جِمِّيز
Gera'eet	*Phagnalon barbeyanum*	جِرَاعِيطْ
Gezzeira	*Daucus littoralis*	جِزِّيرة
Ghaab	*Arundo donax*, *Phragmites australis*	غَابْ
Ghabsha	*Moltkiopsis ciliata*	غَبْشَة
Ghalaqa	*Pergularia daemia*, *P. tomentosa*	غَلَقَة
Gharaf	*Cordia sinensis*	غَرَافْ
Ghardaq	*Nitraria retusa*	غَرْدق

Gharqad	*Nitraria retusa*	غَرْقَد
Ghasoul	*Mesembryanthemum nodiflorum*	غَسُولْ
Ghassa	*Ballota kaiseri, Ballota undulata*	غَصَّة
Ghazlan	*Erodium chium*	غَزْلان
Gheil	*Kraschenninnikovia ceratoides*	غِيل
Gheraireh	*Heliotropium pterocarpum*	غِرَيرَة
Ghereira	*Morettia canescens*	غِريرَة
Ghobbeira	*Bassia muricata, Chrozophora tinctoria, Glinus lotoides, Pseudognaphalium luteoalbum*	غُبَّيرة
Ghobbeisha	*Salvia deserti, Paracaryum intermedium*	غُبَّيشَة
Gilbaan	*Pisum sativum, Vicia sativa*	جِلْبَان
Githgath	*Pulicaria undulata*	جِثْجَاثْ
Gizawi	*Halodule uninervis*	جِيزاوى
Glaya	*Tribulus terrestris*	جِلايَة
Gleiglan	*Crotalaria microphylla*	جْليجَلان
Gneima	*Plantago ovata*	جِنِيَمة
Go'edeid	*Sonchus oleraceus*	جُعْضيض
Goola	*Plicosepalus curviflorus*	جُوُلَه
Goraar	*Justicia heterocarpa*	جُرار
Goreibi	*Farsetia aegyptia*	جُرِيبى
Gormal	*Zygophyllum simplex*	جُرْمَلْ
Gorreih	*Echinops spinosus*	جُرِّيح
Gortom	*Stachys aegyptiaca*	جُرْطُم
Gurd	*Gymnocarpos decandrus*	جُرْدْ
Haad	*Cornulaca ehrenbergii*	حَادْ
Haad	*Cornulaca monacantha*	حَادْ
Haamoul	*Cuscuta* spp., *Cymodosea nodosa*	حَامُول
Hab El-Melouk	*Anagyris foetida*	حَبْ الملوك

Habaq	*Mentha longifolia* subsp. *schimperi*, *Veronica anagallis-aquatica*	حَبَقْ
Habaq 'Atshaan	*Ziziphora tenuior*	حَبَقْ عَطْشَانْ
Habaq El-Bahr	*Persicaria senegalensis*	حَبَقْ البَحْرْ
Habaq El-Barr	*Mentha longifolia* subsp. *typhoides*	حَبَق البَر
Habaq El-Maiyya	*Mentha longifolia* subsp. *typhoides*	حَبَق الميّة
Habb El-'Aziz	*Cyperus esculentus*	حَبْ العزيز
Habb El-Baragheet	*Plantago arenaria*	حَبْ البراغيتْ
Habb El-Kreish	*Thesium humile*	حَبْ الكِريشْ
Habb El-Yasaar (seeds)	*Moringa peregrina*	حَبْ اليَسَارْ (البذور)
Habbaas	*Mimosa pigra*	حَبَّاسْ
Habbein	*Seetzenia lanata*	حَبِّينْ
Hadaa	*Pennisetum setaceum*	حَدَاة
Hadaq	*Aizoon canariense*	حَدَقْ
Had-eeb	*Commelina benghalensis*	هَادِ إِيبْ
Hagina	*Equisetum ramosissimum*	حَجِينة
Hagna	*Phragmites australis*	حَجْنَة
Halaab	*Periploca angustifolia*	حَلاَبْ
Halaioun	*Asparagus stipularis*	هَلَيُون
Halama	*Moltkiopsis ciliata*	حَلَمَة
Halawa	*Kickxia macilenta*, *Linaria haelava*, *Savignya parviflora*	حَلاَوَة
Halawan	*Bupleurum lancifolium*	حَلَوَان
Halawet El-Badan	*Plantago ciliata*	حَلاَوِة البَدَنْ
Halawi	*Fagonia* spp.	حلاوى
Halboub	*Mercurialis annua*	حَلْبُوبْ
Hal-eeb	*Commelina forsskaolii*	هَال إِيبْ
Halfa	*Carex distans*, *Imperata cylindrica*, *Desmostachya bipinnata*, *Lygeum spartum*	حَلْفا

Half-Barr	*Cymbopogon schoenanthus*	حَلْفْ بَرْ
Halouk	*Orobanche* spp., *Orobanche crenata*	هَالُوك
Halouk Reihi	*Orobanche aegyptiaca*	هَالُوك رِيحِى
Hamad	*Agathophora alopecuroides*, *Mesembryanthemum forsskaolii*	حَمَض
Hamad El-Gabal	*Commicarpus boissieri*, *C. helenae*	حَماضْ الجَبَلْ
Hamara	*Stipa arabica*	حَمَارَة
Hamasees	*Rumex pictus*	حَمَاصِيص
Hama-Shbat	*Osteospermum vaillantii*	حَمَا شْبَاطْ
Hamat	*Ficus palmata*	حَمَاط
Hamboak	*Diceratella elliptica*	هَمْبواك
Hamboak El-Ard	*Melhania phillipsiae*	هَامبُواك الأَرْض
Hambokeet	*Helichrysum glumaceum*	هَمْبُوكيت
Hamd	*Traganum nudatum*	حَمْضْ
Hameis	*Coccinia abyssinica*	حَميص
Hamma	*Notoceras bicorne*	حَمَّة
Hamoul	*Cuscuta* spp., *Cymodosea nodosa*, *Ruppia maritima*, *Utricularia inflexa*, *Zostera noltii*	حَمُول
Hamoul El-Bahr	*Zannichellia palustris*	حَمُولْ البَحْرْ
Hanboak	*Sphaerocoma hookeri*	هَنْبواك
Handal	*Citrullus colocynthis*	حَنْضَلْ
Handaqouq	*Globularia arabica*, *Melilotus* spp.	حَنْدَقوق
Handaqouq Morr	*Melilotus indicus*	حَنْدَقُوقْ مُرْ
Haneit	*Tephrosia nubica*	هَانِيتْ
Hanthal	*Citrullus colocynthis*	حَنْظَلْ
Hantout	*Ipomoea sinensis*	هَنْتوُت
Haraaz	*Faidherbia albida*	حَرَازْ
Hargal	*Solenostemma arghel*	حَرْجَلْ
Hargal Bahari	*Solenostemma arghel*	حَرْجَلْ بَحرى
Hargal Barri	*Asclepias sinaica*	حَرْجَلْ بَرِّى

Harmal	*Peganum harmala*	حَرْمَلْ
Harra	*Diplotaxis harra*	حَارَّة
Harrar	*Centaurea pallescens*	حَرَّار
Harrouy	*Tragus berteronianus*	هارّوى
Hashaab	*Acacia laeta, Acacia mellifera*	هَاشَابْ
Hashab Saghir	*Phyllanthus rotundifolius*	هَشَبْ صَغِير
Hashak	*Geigera alata*	حَشَاك
Hashanit El-Gabal	*Evolvulus alsinoides*	حَشَنيت الجَبَل
Hashish Dakar	*Hemarthria altissima*	حَشِيش دكَر
Hashish El-Bahr	*Gnaphalium polycaulon*	حَشيش البَحْر
Hashish El-Faras	*Eclipta prostrata, Ethulia conyzoides, Lolium perenne, Sorghum halepense, S. virgatum*	حَشِيشْ الفَرَسْ
Hashish El-Gabal	*Conyza bonariensis*	حَشيش الجَبَل
Hashish El-Reeh	*Parietaria judaica*	حَشِيْش الريح
Hashish El-Sudan	*Sorghum* x *drummondii*	حَشِيشْ السُوَدانْ
Hashishet El-Qalb	*Euphorbia heterophylla*	حشيشة القلب
Hashishet El-Qizaaz	*Stellaria pallida*	حَشِيشَة القِزَازْ
Hashishet El-Wezz	*Potentilla supina*	حَشِيشِة الوزْ
Hassingof	*Dicoma tomentosa*	هَسَينْجُوفْ
Hatab	*Sarcocornia fruticosa*	حَطَبْ
Hatab Abiad	*Atriplex portulacoides*	حَطَب أبْيَض
Hatab Ahmar	*Halocnemum strobilaceum*	حَطَبْ أَحمَر
Hatab Zeiti	*Limbarda crithmoides*	حَطَبْ زِيتى
Hawdaan	*Crepis sancta*	حَوْدان
Hawthaan	*Crepis sancta*	حَوْذان
Hawthaan	*Launaea capitata*	حَوْذانْ
Hawwa	*Atriplex farinosa, Lactuca saligna, Launaea procumbens, Reichardia tingitana*	حَوَّا
Hedeid	*Salsola longifolia*	حِدِيدْ

Heesh	*Bolboschoenus glaucus, Leptochloa fusca, Saccharum spontaneum, Juncus subulatus*	هِيشْ
Heglig	*Balanites aegyptiaca*	هِجْلِيجْ
Heikaal	*Polygala erioptera*	هِيكال
Heilagoug	*Eragrostis pilosa*	هِيلاجُوجْ
Heitaar	*Justicia heterocarpa*	هِيتار
Helwat El-Gamal	*Fagonia arabica*	حِلْوَة الجَمَل
Hemeira	*Stipagrostis ciliata*	حِمِيرَة
Hemeisha	*Frankenia hirsuta*	حِمِيشَة
Hemmam	*Suaeda vera*	حِمَّامْ
Hemmeiem	*Silene villosa*	حِمَّيِّم
Hemri	*Cenchrus ciliaris*	حِمْرى
Hemri	*Oryzopsis miliacea*	حِمرى
Heneida	*Chiliadenus montanus*	هِنِيدَة
Heneidlan	*Cucumis prophetarum*	حِنَيْضِلاَنْ
Hennat El-Ghoul	*Alkanna lehmanii*	حِنَّة الغُولْ
Himhim	*Trichodesma ehrenbergii*	حِمْحِمْ
Himmim	*Trichodesma africanum*	حِمِّيمْ
Hindamalawe	*Jasminum grandiflorum* subsp. *floribundum*	هِنْدامالاو
Hindeib	*Cleome paradoxa*	هِنْدِيبْ
Hinnat El-Daba'a	*Echium longifolium*	حِنَّة الضَّبْعَة
Hinnat El-Ghoul	*Echium angustifolium* subsp. *sericeum*	حِنَّة الغُول
Hinnet El-Ghoul	*Echium rauwolfii*	حِنَّة الغُول
Hmeira	*Dichanthium annulatum*	حِمِيرة
Hmeira	*Hyparrhenia hirta*	حِمِيرة
Holleib	*Aneilema aequinoctiale*	حُلَّيب
Hommad	*Rumex* spp., *Rumex vesicarius*	حُمَّاض
Hommar	*Oryzopsis miliacea*	حُمَّار

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Hommeid	*Oxalis corniculata*	حُمَّيضْ
Hormaaseib	*Lantana viburnoides*	هُورْمَاسِيب
Horreiq	*Urtica pilulifera, Urtica urens*	حُرِّيقْ
Horreish	*Ceratophyllum demersum, Najas armata*	حُرِّيش
Horreisha	*Potamogeton crispus*	حُرِّيشَة
Hosaad	*Crypsis schoenoides*	حُصاد
Hoshrouf	*Carduus getulus*	حُشْرُوف
Hoteiba	*Ononis reclinata*	حُطِيبَة
Howeimda	*Doellia bovei*	هُوَيْمدَة
Howthaan	*Launaea nudicaulis, Leontodon hispidulus, L. tuberosus, Picris asplenioides*	حُوذَانْ
Howwaiya	*Senecio flavus*	حُوَّيَة
Ikfaleet	*Pavonia kotschyi*	إيكفَالِيت
Indinqirni	*Sphenopus divaricatus*	ايندْنْقِرْنى
Ja'ada	*Ajuga iva*	جَعْدَة
Ka'ab El-Ghazaal	*Scabiosa arenaria*	كَعْبْ الغَزَالْ
Ka'akaban	*Iris mariae*	كَعْكَبَان
Kabar	*Brassica nigra*	كَبَرْ
Kabath	*Launaea spinosa*	كَبَاثْ
Kabbar	*Capparis spinosa*	كَبَّار
Kabshia	*Erodium glaucophyllum*	كَبْشِيَّة
Kaff Mariam	*Anastatica hierochuntica*	كَفْ مَرْيَمْ
Kahla	*Anchusa milleri, A. undulata, Arnebia decumbens, A. linearifolia, Echiochilon fruticosum*	كَحْلَة
Kaikh	*Ferula sinaica*	كَلْخْ
Kammoun Aswad	*Plantago exigua*	كَمُّون أسود
Kamoaab	*Maerua crassifolia*	كَامُوآبْ
Kanaf	*Thalassodendron ciliatum*	كَنَفْ
Karafs	*Apium graveolens*	كَرَفْسْ

Kareeb	*Caralluma acutangula*	كَرِيبْ
Karkadeih	*Hibiscus sabdariffa*	كَرْكَدِيه
Kary	*Heliotropium digynum*	كَرِى
Kataat	*Grewia villosa*	كَاتَات
Keisa	*Grewia tenax*	كِيسَة
Kershut	*Androcymbium palaestinum*	كِرْشُوط
Kettan	*Linum humile, L. usitatissimum*	كِتَّانْ
Khaasag	*Medicago intertexta* var. *ciliaris*	خَاصَج
Khabb	*Schenoplectus* spp., *S. prelongatus*	خَبْ
Khafour	*Eragrostis ciliaris, Avena fatua, A. sterilis*	خَافُور
Khamira	*Colchicum ritchii*	خَمِيرَة
Khananet Na'aga	*Phagnalon nitidum*	خَنَانِة نَعْجَة
Kharaaz	*Faidherbia albida*	خَرَازْ
Khardal	*Brassica nigra, Sinapis alba, S. arvensis*	خَرْدَل
Kharieg	*Vicia monantha*	خَرِيجْ
Khariet	*Salsola imbricata*	خَرِيط
Kharna	*Salvia palaestina*	خَرْنَة
Kharshouf	*Carduncellus eriocephalus, Onopordum alexandrinum*	خَرْشوف
Kharwa'a	*Ricinus communis*	خَرْوَعْ
Khashab	*Acacia laeta, A. mellifera*	خَشَبْ
Khashir	*Echinops glaberrimus*	خَشير
Khashrouf	*Cynara cornigera*	خَشْرُوفْ
Khasiet Rashed	*Hibiscus micranthus*	خَصْية راشِد
Khass El-Baqar	*Lactuca serriola*	خَسْ البَقَرْ
Khass El-Gabal	*Primula boveana*	خَسْ الجَبَل
Khass El-Homar	*Lactuca serriola*	خَسْ الحُمَارْ
Khaswet El-Gamal	*Moricandia sinaica*	خَصْوِة الجَمَل
Khatma	*Althaea ludwigii*	خَطْمَة

Khatmia	*Alcea rosea, Althaea ludwigii*	خَطْمِيَّة
Kheiṭa	*Moraea sisyrinchium*	خِيْطَة
Kherma	*Verbascum sinuatum*	خِـرْمَة
Kherma'a	*Verbascum sinaiticum, V. sinuatum*	خِـرْمَاع
Kherwa'a	*Ricinus communis*	خِرْوَع
Khilla	*Ammi majus, A. visnaga*	خِلَّة
Khilla Sheiṭani	*Ammi majus*	خِلَّة شِيطانى
Khillala	*Rumex dentatus*	خِلاَّله
Khirsheif	*Gymnarrhena micrantha*	خِرْشِيفْ
Khobb	*Cyperus articulatus*	خُب
Khobbeiza	*Alcea striata, Malva parviflora*	خُبَيْزَة
Khobbeizet El-Barr	*Silene succulenta*	خُبَّيزة البَرْ
Khomkhom	*Matthiola arabica*	خُـمْخُـمْ
Khorm El-Ebra	*Lobularia libyca*	خُرْمْ الإبْرَة
Khozama	*Oligomeris linifolia, Reseda muricata, R. pruinosa*	خُـزَامَة
Khreiza	*Salicornia europaea, Suaeda aegyptiaca*	خِرِيزة
Khweitma	*Coronilla scorpioides*	خِويتْمَة
Kies El-Ra'aie	*Capsella bursa-pastoris*	كِيسْ الرَّاعِى
Kimmash	*Andrachne telephioides*	كِمَّاشْ
Kishay-Qalamt	*Wahlenbergia lobelioides* subsp. *nutabunda*	كيشَايْ قَلَمْتْ
Komeisha	*Cometes abyssinica*	كُميشه
Koriaat	*Monsonia senegalensis*	كُرْيَاتْ
Koud	*Argyrolobium arabicum*	كُودْ
Kozbara	*Coriandrum sativum*	كُزْبَرَة
Kreisha	*Astragalus peregrinus, Paronychia argentea*	كِريشة
Kreishet El-Gadiye	*Ifloga spicata, Lasiopogon muscoides*	كِريشة الجَـدْى
Kreishet El-Ra'aie	*Trifolium tomentosum*	كِريشة الرَّاعِى

Krelshet Gadie	*Polycarpaea repens*	كِـريشة جَـدْى
Kronb El-Sahraa	*Erucaria crassifolia*	كُرُنْب الصَحْراء
Ku'eib	*Gundelia tournefortii*	كُعيب
Kurrat	*Allium kurrat*	كُرّات
Kurrat Abou Shousha	*Allium porrum*	كُرّات أبو شوشَة
Kuzbarat El-Bir	*Adiantum capillus-veneris*	كُزْبَرَة البيرْ
Kwataag	*Barleria acanthoides*	كَوَاتَاجْ
Kwoog	*Crotalaria microphylla*	كُووج
Laanay	*Zaleya decandra*	لاَنَايْ
Labakh	*Arenaria deflexa, Hypericum sinaicum*	لَبَخْ
Labakh El-Gabal	*Cocculus pendulus*	لَبَـخْ الجَبَل
Laban El-Homara	*Euphorbia heterophylla, Pergularia tomentosa*	لَبَنْ الحُمَارَة
Labed	*Chrozophora tinctoria*	لابِـدْ
Lahiet El-Badan	*Phagnalon sinaicum*	لَحْية البَدَنْ
Laisouf	*Capparis spinosa*	لَيْـصُوف
Lamaq	*Zannichellia palustris*	لَمَقْ
Lantana	*Lantana camara*	لانْتَانَا
Lasaf	*Capparis sinaica, C. spinosa*	لَصَفْ
Laseit Gabal	*Convolvulus glomeratus*	لاسِيتْ جَبَلْ
Lawas	*Allium myrianthum*	لَوَصْ
Leblaba	*Ipomoea pes-caprae*	لِبْـلابَـة
Le'eba Murra	*Bryonia cretica*	لِعْبة مُرَّة
Leef	*Cayratia ibuensis*	لِيف
Lehiet El-Badan	*Centaurea eryngioides*	لِحْية البَـدَن
Lehiet El-Teiys	*Koelpinia linearis*	لِحْية التَّيس
Lekhlakh	*Scolymus maculatus*	لِخْلاَخْ
Lesan El-Kalb	*Rumex pulcher*	لِسَانْ الكَلْبْ
Lesan El-Teir	*Chenopodium murale*	لِسَانْ الطِّير
Lesleis	*Lepidium draba*	لِسْلِيس

Lesseiq	*Brachypodium distachyum*	لِصّيق
Libbeid	*Alkanna orientalis*, *Heliotropium bacciferum*	لِبّيد
Libbein	*Cynanchum acutum*, *Euphorbia* spp.	لِبّين
Libbein El-Gabal	*Euphorbia scordifolia*	لِبّين الجبَل
Libbia	*Phyla nodiflora*	ليبْيَة
Lisan El-'Asal	*Echium angustifolium* subsp. *sericeum*	لِسَانْ العَسَل
Lisan El-Kalb	*Carduus pycnocephalus*	لِسان الكَلْبْ
Lisan El-Teir	*Anchusa humilis*, *Parietaria alsinifolia*	لِسَانْ الطِّير
Lisan El-Thor	*Echium rauwolfii*	لِسان الثور
Littein	*Ononis natrix*	لِطّين
Loaq	*Abutilon pannosum*	لُواق
Lobiya	*Vigna unguiculata* subsp. *sesquipedalis*	لُوبْيَا
Loqmet El-Hamal	*Alternanthera sessilis*	لُقْمة الحَمَل
Loqmet El-Na'aga	*Plantago ovata*	لُقْمَة النَّعْجَة
Losseiq	*Forsskaolea tenacissima*, *Leysera leyseroides*, *Neurada procumbens*, *Pterocephalus plumosus*, *Silene schimperiana*, *Trichodesma africanum*	لُصّيق
Louf	*Arisarum vulgare*, *Eminium spiculatum*	لُوفْ
Loweith	*Leptadenia arborea*	لِويثْ
Lul'aneeb	*Portulaca oleracea*	لولعانيب
Mahad	*Farsetia stylosa*, *Schouwia purpurea*	مَهَدْ
Makhmakh	*Portulaca oleracea*	مَخْمَخْ
Mantieb	*Coelachyrum brevifolium*	مَنْتيب
Maqd	*Astragalus eremophilus*	مَقْدْ
Mardaqoush	*Salvia multicaulis*	مَرْدَقُوشْ

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Markh	*Leptaderia pyrotechnica*	مَرْخ
Marmeid	*Cullen plicata*	مَرْمِيدْ
Massasa	*Nicotiana glauca*	مَصَّاصَة
Mayowak	*Commiphora gileadensis*	مَايَواكْ
Mayouk	*Periploca aphylla* subsp. *laxiflora*	مَايُوك
Mazrour	*Cynomorium coccineum*	مَزْرُورْ
Medeihna	*Fagonia glutinosa, Plantago sinaica*	مِدِيهنَة
Medheina	*Silene brappendiculata*	مِدْهِينَة
Megeinina	*Haplophyllum tuberculatum, Kickxia aegyptiaca, Pterocephalus sanctus*	مِجَيْنينة
Megneina	*Cleome amblyocarpa*	مِجْنينَة
Melbeina	*Euphorbia obovata*	مِلبينة
Meloukhia	*Corchorus olitorius*	مِلُوخِيَّة
Meloukhia Shitani	*Corchorus trilocularis*	مِلُوخِيَّة شِيطانى
Meloukhiet Eblees	*Sida alba*	مِلُوخِيَّة إبْلِيسْ
Merghaat	*Erodium crassifolium*	مِرْغات
Mesaasa	*Plantago major*	مِصَاصَة
Meseika	*Erodium moschatum*	مِسِيكة
Messeisa	*Ballota saxatilis, Lindenbergia indica, Nepeta septemcrenata*	مِصَّيصَة
Meswaak	*Launaea massauensis*	مِسْوَاكْ
Mikbanon	*Pegolettia senegalensis*	مِكْبَانُونْ
Mintena	*Chenopodium ambrosioides, C. botrys*	مِنْتِنَة
Mirr	*Tanacetum sinaicum*	مِرّ
Miswaak	*Salvadora persica*	مِسْوَاكْ
Mithnaan	*Thymelaea hirsuta*	مِتْنَانْ
Mitnaan	*Thymelaea hirsuta*	مِتْنَانْ
Mizzeiz	*Kickxia spuria*	مِزَّيزْ
Moddad	*Convolvulus althaeoides, Oxystelma esculentum*	مُدَّاد

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Moddeid	*Boerhavia repens, Brachiaria mutica, Echinochloa stagninum, Ludwigia stolonifera, Paspalum distichum*	مُدّيد
Moddeida	*Hypecoum aegyptiacum*	مُدّيدة
Mohallaq	*Astragalus annularis*	مُحَلَّقْ
Mokhheit	*Cordia sinensis*	مُخّيط
Mokor	*Heliotropium strigosum*	مُكُرْ
Molleih	*Cressa cretica, Frankenia pulverulenta, Limonium pruinosum, Reaumuria hirtella, R. vermiculata, Suaeda aegyptiaca*	مُلّيحْ
Morgaan	*Maerua oblongifolia, Withania somnifera*	مُرْجَانْ
Morr	*Tanacetum sinaicum*	مُرْ
Morrar	*Carlina involucrata, Centaurea* spp., *C. calcitrapa, C. pallescens, C. sinaica, Picris altissima, Reichardia tingitana, Senecio vulgaris, Volutaria crupinoides*	مُرّار
Morreikh	*Verbena supina*	مُرّيخ
Morreiq	*Verbena supina*	مُرّيق
Msheita	*Scandix pecten-veneris*	مِشَيْطة
Mulleih	*Aeluropus lagopoides*	مُلّيح
Murrat Ghazal	*Pennisetum divisum*	مُرّات غَزّال
Na'aylet Hindeib	*Flueggia virosa*	نَعّاية هِنْدِيبْ
Nab El-Gamal	*Adonis dentata*	نَابْ الجَمَلْ
Nabq	*Ziziphus spina-christi*	نَبْقْ
Nadwa	*Cressa cretica, Salsola inermis*	نَدْوَة
Na'eem El-Saleeb	*Dactyloctenium aegyptium*	نِعيمْ الصَلِيبْ
Nafal	*Medicago polymorpha, Tephrosia purpurea*	نَفَلْ
Nageil	*Eleusine indica*	نَجيل

Nakhl El-Balah	*Phoenix dactylifera*	نَخْلْ البَلَحْ
Nakhla	*Phoenix dactylifera*	نَخْلَة
Nakhshoush El-Hoot	*Ceratophyllum demersum*	نَخْشُوش الحُوت
Namass	*Equisetum ramosissimum*	نَمَص
Namnaam	*Schouwia purpurea*	نَمْنام
Nargis	*Narcissus tazetta*	نَرْجِسْ
Nashash Ed-Debban	*Silene rubella, Centaurium spicatum, Conyza aegyptiaca*	نَشَّاشْ الدِّبَّان
Nassie	*Pennisetum orientale*	نَصِي
Natash	*Crotalaria aegyptiaca, Crotalaria thebaica*	نَتَشْ
Neeh	*Dodonaea viscosa*	نِيحْ
Neela	*Indigofera articulata*	نِيلَة
Nefir	*Datura stramonium*	نِفير
Negeil	*Aeluropus littoralis, Cynodon dactylon*	نِجِيلْ
Negeil El-Na'aga	*Centropodia forskaolii*	نِجيل النَّعْجَة
Negeil El-Nimr	*Dinebra retroflexa*	نِجيل النِّمرْ
Negeil Faransawi	*Stenotaphrum secundatum*	نِجِيل فَرَنْساوى
Negeil Shawki	*Sporobolus spicatus*	نِجيل شَوكى
Negeil Shitani	*Aeluropus lagopoides*	نِجيل شِيطانى
Neheida	*Chilliadenus montanus*	نِهيدَة
Nessiye	*Stipagrostis ciliata, S. plumosa*	نِصِي
Nili	*Chrozophora plicata*	نِيلى
Nisseila	*Brachiaria reptans*	نِسِّيلة
Nitna	*Chenopodium ambrosioides*	نِتْنَة
No'aiyem	*Achyranthes aspera*	نُعَيِّمْ
No'eima	*Polypogon viridis*	نُعَيْمَة
No'eima	*Setaria verticillata*	نُعِيمَة
N'omaniya	*Euphorbia retusa*	نُعْمانية

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No'omaan	*Anemone coronaria, Glaucium arabicum*	نُعْمَانْ
Noqod	*Launaea angustifolia*	نُقُدْ
Nseila	*Panicum repens, Paspalidium geminatum*	نِسيلَة
Nuseil	*Lolium perenne*	نُسِيلْ
'Odaar	*Striga hermonthica*	عُدَارْ
Ogoum	*Euclea racemosa* subsp. *schimperi*	أُجُومْ
'Okna	*Colchicum ritchii*	عُكْنَة
'Okreish	*Polygonum equisetiforme*	عُكْرِيشْ
Oleileet	*Solanum coagulans*	أُلِيلِيتْ
'Olleiq	*Cocculus pendulus, Convolvulus arvensis, Cynanchum acutum, Oxystelma esculentum*	عُلِّيقْ
'Olleiq Kebeer	*Ipomoea purpurea*	عُلِّيق كِبير
'Olleiqa	*Rubus sanctus*	عُلِّيقَة
'Omayeen	*Tephrosia purpurea, T. quartiniana*	عُمَيِينْ
Ombeit	*Dracaena ombet*	أُمْبِيت
'Onsol	*Urginea maritima*	عُنْصُلْ
Oogoay	*Delonix elata*	أوجُوى
'Oqeil	*Erodium malacoides*	عُقِيل
Oqhowan	*Glebionis coronaria*	أقحُوَانْ
'Oreida	*Samolus valerandi*	عُرَيْضَة
'Orf El-Diek	*Amaranthus caudatus*	عُرْف الدِّيك
'Orfot	*Acacia oerfota*	عُرْفُط
'Oronteel	*Sageretia thea*	عُرُنْتِيلْ
'Orontol	*Rhamnus dispermus*	عُرُنْتُل
'Orq-Angebar	*Limonium narbonense*	عُرْقْ انْجِبَارْ
'Oshaar	*Calotropis procera*	عُشار
'Oshar	*Calotropis procera*	عُشَر
'Oshb	*Lotus creticus*	عُشْب

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'Oshoob	*Lotononis platycarpa*	عُشوب
'Oud El-'Aqrab	*Andrachne aspera*	عُود العَقْرب
Qa'abar	*Allium aschersonianum*	قَعْبَرْ
Qaba	*Stipagrostis plumosa*	قَبَا
Qabd	*Lotus glinoides*	قَبْضْ
Qadaab	*Lotus arabicus*	قَضَابْ
Qadab	*Cadaba farinosa*	قَضَب
Qadass	*Astracantha echinus*	قَدَسْ
Qadib	*Heliantnemum ventosum*	قَضِيبْ
Qalam	*Zygophyllum coccineum*	قَلَمْ
Qalieh	*Abutilon fruticosum*	قَلِية
Qaliet El-Ra'eie	*Lappula spinocarpos*	قِلْية الرّاعى
Qaliye	*Salsola kali*	قَلِى
Qamdila	*Matricaria aurea*	قَمْدِيلَة
Qamh Baladi	*Triticum pyramidale*	قمح بَلَدِى
Qamh Dakar	*Triticum durum*	قَمْحْ دَكَرْ
Qamh El-Faar	*Setaria verticillata*	قَمْحْ الفَار
Qamh El-Hagal	*Aegilops geniculata*	قَمْح الحَجَل
Qamh Hindi	*Triticum vulgare*	قَمْحْ هِنْدِى
Qantarion	*Centaurium pulchellum*	قَنْطَرْيون
Qarad (pod)	*Acacia nilotica*	قَرَضْ (الثمرة)
Qarmal	*Zygophyllum simplex*	قَرْمَلْ
Qarn	*Astragalus vogelii, Monsonia nivea*	قَرْنْ
Qarn El-Ghazal	*Lotus glaber, L. halophilus*	قَرْنْ الغَزَالْ
Qarn El-Khouli	*Eleocharis geniculata*	قَرْن الخُولى
Qarsa	*Scrophularia deserti*	قَرْصَة
Qartam	*Scrophularia xanthoglossa*	قَرْطَمْ
Qasab El-Sokkar	*Saccharum officinarum*	قَصَبْ السُكَّر
Qasaba	*Leptochloa fusca, Lotus lalambensis, Paspalidium geminatum*	قَصَبَة

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Qasoukh	*Deverra triradiata*	قَصُوخ
Qatad	*Echinops spinosus*	قَتَاد
Qataf	*Atriplex halimus*	قَطَفْ
Qateef	*Sphaeranthus suaveolens*	قَطِيفْ
Qatoub	*Tribulus pentandrus*	قَطُوبْ
Qattan	*Colchicum guessfeldtianum*	قَطَّان
Qaysoum	*Achillea fragrantissima*	قَيْصُومْ
Qazzah	*Deverra tortuosa*	قَزَّاحْ
Qeleiqlan	*Hippocrepis constricta*	قِلِيقْلَانْ
Qerei'iya	*Papaver decaisnei*	قِرِيعِيَّة
Qermel	*Kohautia caespitosa*	قِرْمِل
Qihania	*Chenopodium vulvaria*	قِيحَانْيَة
Qira'ai	*Onychium divaricatum*	قِرَاعِي
Qireinet Ghazal	*Vicia monantha*	قَرِينِة غَزَالْ
Qizaaza	*Stellaria media*	قِزَازَة
Qleiqlah	*Carrichtera annua*	قِلِيقْلَه
Qoddeih	*Heliotropium supinum*	قُدَّيح
Qohwan	*Glebionis coronaria*	قُحْوَانْ
Qomeyla	*Salsola inermis*	قُمَيْلة
Qoraidoum Aswad	*Astragalus schimperi*	قُـرَيضوم أسْـوَد
Qordaab	*Polygonum* spp., *P. aviculare*, *P. bellardii*, *P. equisetiforme*, *P. maritimum*	قُرْضَابْ
Qordi	*Ochradenus baccatus*	قُرْضِي
Qorein	*Astragalus hamosus*, *Hypecoum littorale*	قُرين
Qoreiyta	*Marsilea aegyptiaca*	قُرِيطَة
Qormot	*Cadaba glandulosa*, *C. rotundifolia*	قُرْمُت
Qorreis	*Senecio glaucus* subsp. *coronopifolius*, *Urtica pilulifera*, *U. urens*	قُرَّيصْ
Qorreish	*Cyperus digitatus*	قُرَّيش

Qort	*Trifolium resupinatum*	قُرْط
Qoshar	*Thalassodendron ciliatum*	قُشَارْ
Qoshr	*Thalassodendron ciliatum*	قُشْرْ
Qotba	*Tribulus macropterus*	قُطْبة
Qoteiyh	*Polygonum plebejum*	قُطَيح
Qotouna	*Plantago afra*	قُطُونَة
Qous	*Carthamus tenuis*	قُوص
Qrilla	*Sinapis arvensis*	قِرِلَّة
Qseiba	*Panicum repens*	قِصَيبَة
Qseiysa	*Leptaleum filifolium*	قِصَيصَة
Ra'al	*Helianthemum lippii*	رَعَلْ
Ra'ala	*Helianthemum lippii*	رَعْلة
Ra'alah	*Salvia aegyptiaca*	رَعْلَة
Ra'ara'a	*Homognaphalium pulvinatum*	رَعْرَاعْ
Rabl	*Nauplius graveolens*	رَبْلْ
Rabol	*Pulicaria incisa*	رَبُلْ
Rafi'aa	*Gypsophila capillaris*	رَفيعَة
Rakaf	*Leontice leontopetalum*	رَكَف
Rakha	*Tragopogon sinuatus, Tulipa stylosa*	رَخَا
Rakhami	*Moretia canescens*	رَخَامِى
Rashad	*Cororopus niloticus, Lepidium sativum*	رَشَادْ
Rashad El-Bahr	*Cakile maritima*	رَشاد البَحر
Rashad El-Barr	*Enarthrocarpus lyratus*	رَشَاد البَّر
Rashad Gabali	*Savignya parviflora*	رَشَادْ جَبَلى
Ratam	*Retama raetam*	رَتَمْ
Rawq	*Erucaria hispanica*	رَوْق
Re'eiet El-Badan	*Plantago sinaica*	رِعْية البَدَن
Rebyan	*Cotula cinerea*	رِبْيَان
Reekha	*Polycarpaea robbairea*	ريخة

Reem	*Ruppia maritima, Wolffiella hyalina*	رِيمْ
Refaiy'aa	*Kohautia caespitosa*	رِفَيْعَة
Regla	*Portulaca oleracea*	رِجْلَة
Reqeiqab	*Populus euphratica*	رِقِيقَابْ
Riba Hamboak	*Hibiscus vitifolius, Melhania denhamii*	رِيبا هامْبُواكْ
Rigl El-'Asfour	*Lotus glaber*	رِجْلْ العَصْفُور
Rigl El-Ghorab	*Cenchrus ciliaris, Reseda decursiva, Roemeria hybrida*	رِجْل الغُراب
Rigl El-Hamaam	*Verbena officinalis*	رِجْلْ الحمَامْ
Rigl El-Hamama	*Ammannia* spp., *Lythrum hyssopifolia*	رِجْل الحمَامة
Rigl El-Herbaya	*Dactyloctenium aegyptium*	رِجْل الحِرْبَايَة
Rihan	*Ocimum forsskaolii*	رِيحان
Rihay	*Polycarpaea robbairea, Polycarpon prostratum*	رِيحَايْ
Rimth	*Anabasis articulata, Haloxylon salicornicum*	رِمْثْ
Rkheima	*Paronychia sinaica*	رِخِيمَة
Ro'aaf	*Amaranthus hybridus*	رُعَّاف
Rofaia'a	*Anarrhinum pubescens*	رُفَيْعَة
Roghat	*Stachys aegyptiaca*	رُغَاتْ
Roghl	*Atriplex dimorphostegia, A. leucoclada, Heliotropium digynum, Silene succulenta, Stachys aegyptiaca*	رُغْـل
Rokeib	*Brachiaria mutica*	رُكِيب
Rokham	*Convolvulus lanatus*	رُخَامْ
Roqaieqa	*Gypsophila capillaris*	رُقَـيِّـقة
Roqeiba	*Hemarthria altissima*	رُقَـيبَة
Rotreit	*Zygophyllum album, Z. coccineum*	رُطْرِيط
Roubiya	*Marrubium vulgare*	رُوبْـيَة
Roumeyia	*Volutaria lippii*	رُومِيَّة

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Rozz	*Oryza sativa*	رُزْ
Sa'ada	*Euphorbia helioscopia*	سَعْدَة
Sa'adan	*Neurada procumbens*	سَعْدَان
Sabad	*Halocnemum strobilaceum*, *Pulicaria undulata*	سَبَدْ
Sabal Abu El-Hosein	*Aristida adscensionis*, *Bromus fasciculatus*, *B. tectorum*, *Stipa parviflora*, *Poa sinaica*	سَبَلْ أبو الحُصين
Sabal El-Far	*Aegilops geniculata*	سَبَلْ الفار
Sabat	*Pennisetum orientale*, *P. setaceum*, *Trichclaena teneriffae*	سَبَطْ
Sabat (wild)	*Pennisetum* spp.	سَبَطْ (بَرّى)
Sabat Gabali	*Sporobolus spicatus*	سَبَطْ جَبَلى
Sabbagh	*Chrozophora tinctoria*	صَبّاغ
Sabounet El-'Afreet	*Pseudognaphalium luteoalbum*	صَابُونة العَفْرِيت
Sabra Barri	*Carallurna sinaica*	صَبْرة بَرّى
Sabt	*Stipagrostis scoparia*	سَبْطْ
Sabta	*Suaeda vera*	سَبْطَة
Safsaaf	*Salix mucronata*	صَفْصَافْ
Safsaaf 'Arid	*Salix tetrasperma*	صَفْصَافْ عَرِيضْ
Safsouf	*Bromus japonicus*, *B. pectinatus*, *B. tectorum*, *Hyparrhenia hirta*, *Pennisetum orientale*, *Stipa capensis*, *S. parviflora*, *Stipagrostis obtusa*, *Taeniatherum caput-medusae*	سَفْسُوفْ
Safwa	*Setaria pumila*	صَفْوَة
Sagilweib	*Crotalaria senegalensis*	ساجيلويب
Sahseeh	*Primula boveana*	سَحْسيح
Saisaban	*Pycnocycla tomentosa*, *Sesbania sesban*	سَيْسَبَانْ
Saiyfoon	*Sonchus maritimus*	سَيْفُونْ
Sakaran	*Hyoscyamus desertorum*, *H. muticus*	سَكْرَانْ
Sakham	*Stipagrostis acutiflora*	سَخَمْ

Salam	*Acacia ehrenbergiana*	سَلَمْ
Salamekki	*Senna alexandrina*	سَلَامِكِّى
Saleekh	*Erucaria pinnata*, *Sisymbrium erysimoides*, *S. orientale*	سَلِيخ
Salq	*Beta vulgaris* subsp. *maritima*	سَلْق
Samaar	*Juncus inflexus*, *J. rigidus*, *Schenoplectus* spp.	سَمَارْ
Samaar Bahr	*Cyperus digitatus*	سَمَار بَحْر
Samaar Helw	*Cyperus alopecuroides*	سَمَار حِلو
Samaar Hosr	*Juncus rigidus*	سَمَار حُصْر
Samaar Morr	*Juncus acutus*, *J. rigidus*	سَمَارْ مُر
Samaleika	*Gisekia pharnaceoides*	سَمَلِيكَة
Samh	*Aizoon canariense*	سَمْح
Samma	*Cutandia memphitica*, *Dianthus sinaicus*	صَمَّة
Sammah	*Lolium multiflorum*, *L. rigidum*	صَامَّة
Sammat	*Lasiurus scindicus*	صَمَّاط
Samour	*Acacia tortilis* subsp. *tortilis*	سَمُور
Samwa	*Cleome chrysantha*, *C. droserifolia*	سَمْوَة
Sant (tree)	*Acacia nilotica*	سَنط
Saras	*Atraphaxis spinosa* var. *sinaica*	سَرَاسْ
Sard	*Carex divisa*	صَرْدْ
Sarr	*Polygala sinaica*	صَرّ
Sawsan	*Pancratium arabicum*, *P. maritimum*	سَوْسَنْ
Sayfoun	*Agropyron* spp., *Dichanthium annulatum*, *Leptochloa fusca*	سَيْفُون
Saymouk	*Ficus cordata* subsp. *salicifolia*	سَيْموك
Saysam	*Misopates orontium*	سَيْسَمْ
Sayyal	*Acacia seyal*, *A. tortilis* subsp. *raddiana*, *A. tortilis* subsp. *tortilis*	سَيَّال

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Sebeb Ombeik	*Pupalia lappacea*	سِبِبْ أُمْبِيكْ
Se'ed	*Cyperus* spp., *C. capitatus*, *C. conglomeratus*, *C. fuscus*, *C. maculatus*, *C. rotundus*, *C. schimperianus*	سِعْد
Seekh	*Epilobium hirsutum*	سِيخْ
Seher	*Plicosepalus acaciae*, *P. curviflorus*	سِحِرْ
Seif El-Ghorab	*Gladiolus italicus*	سِيفْ الغُرابْ
Seleis	*Urospermum picroides*	سِلِيسْ
Selem	*Acacia ehrenbergiana*	سِلِمْ
Semm Fraakh	*Withania somnifera*	سِمْ فَراخْ
Semoum	*Anticharis glandulosa*	سِمُوم
Senn El-Ghazal	*Allium sphaerocephalon*	سِنْ الغَزَالْ
Senna	*Senna italica*	سِنَّا
Senna Mekki	*Senna alexandrina*, *S. italica*	سِنَّامِكِّى
Serra	*Atraphaxis spinosa* var. *sinaica*	سِرَّ
Sewak En-Nabi	*Ammi visnaga*	سِوَاك النَبى
Sewan	*Cephalaria syriaca*	سِوان
Seyyal	*Acacia seyal*	سِيَّال
Sha'ar El-Banat	*Adiantum capillus-veneris*	شَعْر البَنات
Sha'ar El-'Agouz	*Euphorbia forsskaolii*	شَعْرْ العَجُوزْ
Sha'ar El-Hosaan	*Potamogeton pectinatus*	شَعْرْ الحُصَانْ
Sha'ar El-Qird	*Eleocharis geniculata*, *E. parvula*, *Juncus bufonius*	شَعْرْ القِرْدْ
Sha'ara	*Fimbristylis bisumbellata*	شَعْرَة
Sha'aran	*Agathophora alopecuroides*, *Salsola villosa*	شَعْرَانْ
Shaay El-Gabal	*Pulicaria incisa*	شَايْ الجَبَلْ
Shaay Gabal	*Pulicaria incisa*	شَايْ جَبَلْ
Shabat Barri	*Scandix stellata*	شَبَتْ بَرِّى
Shabat El-Gabal	*Deverra tortuosa*	شَبَتْ الجَبَلْ

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Shabka	*Xanthium strumarium*	شُبْكَة
Sha'eer	*Hordeum vulgare*	شَعير
Sha'eer Barri	*Hordeum murinum* subsp. *leporinum*	شَعير بَرّى
Sha'eer El-Deeb	*Hordeum murinum* subsp. *glaucum*	شَعير الديب
Sha'eer El-Faar	*Phalaris minor, P. paradoxa, Aegilops bicornis, A. kotschyi*	شَعِير الفَارْ
Sha'eera	*Hordeum murinum* subsp. *leporinum*	شَعيرة
Sha'eir Eblies	*Aegilops bicornis*	شَعير إبليس
Shafshouf	*Stipagrostis lanata*	شَفْشُوفْ
Shagaret El-Arnab	*Arnebia tinctoria*	شَجَرة الأَرْنَب
Shagaret El-Gamal	*Centropodia forskaolii, Salvia lanigera*	شَجَرة الجَمَل
Shagaret El-Ghazal	*Aerva javanica, Convolvulus prostratus, Salvia spinosa*	شَجَرة الغَزَالْ
Shagaret El-Hanash	*Euphorbia paralias*	شَجَرة الحَنَش
Shagaret El-Ma'eez	*Ifloga spicata*	شَجَرة المَعيز
Shagaret El-Reeh	*Haplophyllum tuberculatum*	شَجَرة الرِّيح
Sha'ir Barri	*Brachypodium distachyum*	شعيرَ بَرى
Sha'iriya	*Hordeum marinum*	شَعِيرِيّة
Shaka'ah	*Fagonia mollis* var. *hispida*	شَكاعَة
Shama Haneit	*Tephrosia nubica*	شَمَا هَانِيتْ
Shamar El-Gabal	*Ferula sinaica, Pseudorlaya pumila*	شَمَرْ الجَبَلْ
Shana	*Trichodesma ehrenbergii*	شَانَة
Shandaqora	*Ajuga iva*	شَنْدَقُورَه
Shaqaara	*Matthiola longipetala*	شَقَارة
Shaqaqeil	*Eryngium campestre*	شَقَاقِيل
Shaqeeq	*Ranunculus asiaticus*	شَقِيقْ
Shaqeeq El-No'oman	*Ranunculus asiaticus*	شَقِيقْ النُعْمَانْ
Sharma	*Ballota kaiseri, Otostegia fruticosa*	شَرْمَه
Shatrag	*Fumaria parviflora*	شَتْرَجْ

Shawhatt	*Cotoneaster orbicularis*	شُوحَطْ
Shawk	*Asparagus aphyllus, A. stipularis*	شَـوك
Shawk 'Antar	*Carthamus lanatus*	شَـوك عَـنْـتَـر
Shawk El-Dabb	*Blepharis edulis*	شَـوك الضَّبْ
Shawk El-Deeb	*Cornulaca monacantha*	شَـوك الدِّيبْ
Shawk El-Gamal	*Atractylis carduus, Onopordum alexandrinum, Silybum marianum*	شَوْك الجَمَل
Shawk El-Ghazal	*Stipagrostis pungens, S. vulnerans*	شَـوكْ الغَزَالْ
Shawk Sennari	*Silybum marianum*	شَـوكْ سِنَّارِى
Shawka	*Fagonia* spp.	شَوْكَـة
Shedeed	*Polygonum plebejum*	شِدِيدْ
Sheeh	*Seriphidium herba-album*	شِيحْ
Sheet	*Euphorbia polyacantha*	شِـيت
Sheibat	*Geranium* spp.	شِـيبات
Sheih	*Artemisia judaica*	شِيحْ
Sheleel	*Limonium axillare*	شِلِيلْ
Sheltam	*Enarthrocarpus lyratus*	شِلْطَام
Shenan	*Arthrocnemum macrostachyum*	شِنَانْ
Sheshlaan	*Prosopis farcta*	شِشْلَانْ
Shetenaara	*Posidonia oceanica*	شِتِنَارة
Shidq El-Kalb	*Cleome amblyocarpa*	شَدْق الكَـلْـب
Shigara	*Malcolmia pygmaea*	شِيجَارَة
Shikoria	*Cichorium endivia*	شِيكُورْيَا
Shillakh	*Leersia hexandra*	شِلَّاخْ
Shiltam	*Brassica tournefortii*	شِلْطَام
Shoak El-Hanash	*Noaea mucronata*	شُوك الحَنَشْ
Shobbeit	*Setaria verticillata*	شُبِّيطْ
Shobroq	*Convolvulus hystrix, Fagonia arabica*	شُبْرُق
Shofal	*Prasium majus*	شوفَلْ

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Shohat	*Colutea istria*	شُوحَطْ
Shoheibi	*Salvia deserti*	شُهيبى
Sho'ob	*Caralluma edulis*	شُعُبْ
Shorreikh	*Cladium mariscus*	شُرّيخْ
Shouk El-Hanash	*Cynara cornigera*	شُوكْ الحنَشْ
Shoura	*Avicennia marina*	شُورَى
Showash	*Panicum coloratum*	شُوَاشْ
Shubbeit	*Xanthium spinosum*	شُبّيطْ
Shulleikh	*Leersia hexandra*	شُلّيخْ
Shush	*Stipagrostis vulnerans*	شُوشْ
Sidr	*Ziziphus spina-christi*	سِدْرْ
Sikomteit	*Commicarpus helenae*	سِيكومْتِيتْ
Silla	*Sporobolus spicatus, Zilla spinosa*	سِلَّة
Simsim	*Salvia dominica*	سِمْسِم
Singeit	*Indigofera spinosa*	سِنجيت
Sitt El-Hosn	*Ipomoea cairica*	سِتْ الحُسْن
Siwaak	*Salvadora persica*	سِوَاكْ
Sleih	*Arabidopsis kneuckeri, A. pumila, Launaea fragilis*	سِليح
Sleikh	*Hypecoum pendulum*	سِليخ
Sleisla	*Asperugo procumbens, Conyza stricta, Eremobium aegyptiacum, Lappula spinocarpos, Micromeria sinaica, Onobrychis crista-galli*	سِلِيسْلة
Sobbeila	*Vulpia pectinella*	سُبّيلة
Soffeira	*Vahlia digyna, Cleome chrysantha, Dipterygium glaucum, Hyoscyamus pusillus, Isatis lusitanica, I. microcarpa, Pterocephalus plumosus*	صُفّيرة
Soffeiratan	*Pterocephalus plumosus*	صُفّيرَتَانْ

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Sofra	*Vahlia digyna*	صُفْرَة
Sont (tree)	*Acacia nilotica*	سُنط (الشجرة)
Sorret El-Kabsh	*Anacyclus monanthos*	سُرَّة الكَبْش
Sorret El-Na'aga	*Centaurea glomerata*	سُرَّة النَعْجة
Sowweid	*Eclipta prostrata, Suaeda monoica, S. vermiculata*	سُوَّيد
Sreeda	*Scrophularia deserti*	سِرِيدَة
Ta'am El-Arnab	*Phagnalon rupestre*	طَعْم الأَرْنَب
Tada'at	*Trichodesma africanum*	تَدَعْتْ
Tafwa	*Haloxylon scoparium*	طَفْوَه
Taghagha	*Morettia phileana*	تَغَاغَة
Taghar	*Morettia phileana*	تَاغَرْ
Talh	*Acacia tortilis* subsp. *raddiana*	طَلْح
Tamoaat	*Grewia tenax*	تاموآت
Tarfa	*Tamarix nilotica, T. tetragona*	طَرْفَة
Tarteer	*Suaeda aegyptiaca, S. vermiculata*	طَرْطِير
Tatura	*Datura innoxia, D. stramonium*	طَاطُورا
Teel Sheitani	*Hibiscus trionum*	تِيلْ شِيَطانى
Teen	*Ficus carica*	تِين
Teen El-Barr	*Ficus palmata*	تِين البَر
Tefla	*Lepidium draba*	تِفْلة
Teira	*Stipa capensis*	طِيَرة
Teiraab	*Leptothrium senegalense*	تِيْرَاب
Teiz El-Kalba	*Astragalus fruticosus*	طِيظ الكَلْبَة
Tekayet Gebel	*Triumfetta flavescens*	تِكايتْ جِبِيلْ
Telghoodi	*Malabaila suaveolens*	تِلْغُودى
Termis	*Lupinus albus*	تِرْمِسْ
Termis Shitaani	*Lupinus digitatus*	تِرْمِسْ شِيَطانى
Tha'alaba	*Salvia verbenaca*	ثَعْلَبَة
Thammam	*Panicum turgidum*	ثَمَّامْ

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Than El-Homaar	*Salvia spinosa*	ذانْ الحُمَارْ
Thanab E-Faras	*Tragopogon collinus*	ذَنَبْ الفَرَسْ
Thanab El-'Aqrab	*Scorpiurus muricatus*	ذَنَبْ العَقْرَبْ
Thanab El-Faras	*Geropogon hybridus*	ذَنَب الفَرَس
Thanhaleel	*Scorzonera mollis*	ثَـنْحَـلِيلْ
Theil El-Kharouf	*Reseda arabica, R. orientalis*	ذِيلْ الخَرُوفْ
Thelatha	*Bassia arabica*	ثِلاَثَة
Thommam	*Panicum turgidum*	ثُـمَّام
Thoum	*Allium sativum*	ثوم
Thoum El-Hanash	*Allium modestum*	ثُومْ الحَنَشْ
Thoum El-Hayya	*Allium modestum*	ثُومْ الحَيَّة
Thoweinat El-Far	*Bituminaria bituminosa, B. flaccida*	ذُوِيْنَات الفار
Timmeir	*Erodium crassifolium, E. glaucophyllum*	تِـمِّـير
Timzein	*Parapholis incurva*	تِمزِينْ
Tingadi	*Hermannia modesta*	تِنجادى
Tirab	*Eragrostis cilianensis*	تِـيرَابْ
Tokaieet	*Indigofera hochstetteri*	ثُـوكاييت
Tokayiet	*Microcharis tritoides*	ثُوَكايتْ
Tolai	*Heliotropium zeylanicum*	ثُولاَىْ
Tombaleek	*Forsskaolea viridis*	طُمْـباليك
Tondob	*Capparis decidua*	ثُنْدُبْ
Tout Shouki	*Rubus sanctus*	ثُوتْ شُوكى
Umm Dawara	*Hippocrepis multisiliquosa*	أُم دَوارَة
Umm El-Laban	*Pergularia tomentosa*	أُم اللَّبَنْ
Umm El-Qereisaat	*Lotus ornithopodioides*	أُم القِـرَيْصات
Umm El-Qorein	*Astragalus eremophilus*	أم القُرين
Umm Haas	*Bassia eriophora*	أُم حَاصْ
Umm Haasa	*Bassia eriophora*	أُم حَاصَة
Umm Lebbeid	*Herniaria hemistemon,*	أُم لِبِّـيد

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	Paracaryum intermedium	
Umm Lebbeina	*Euphorbia retusa*	أم لِبِّـيـنَـة
Umm Lonein	*Senecio glaucus* subsp. *coronopifolius*	أمْ لُونِينْ
Umm Rous	*Schimpera arabica*	أمْ رُوس
Umm Sweih	*Kohautia caespitosa*	أم سـويح
Waraqa	*Fagonia arabica*, *F. mollis* var. *hispida*, *Potamogeton nodosus*	وَرَقَة
Ward Barri	*Rosa arabica*	وَرْدْ بَرِّى
Ward El-Nil	*Eichhornia crassipes*	وَرْدْ النيِّل
Wasbeiya	*Silene linearis*	وَصْبيَّة
Weddein	*Parietaria alsinifolia*	وِدِّين
Wedeina	*Euphorbia peplus*, *Trigonella arabica*	وِدِينَة
Weiba	*Reseda lutea*	وِيْبَة
Weyket Eblees	*Epilobium hirsutum*	وِيكَة إبْلِيس
Widaan El-Hardeeb	*Onobrychis ptolemaica*	وِدَان الحَرْدِيبْ
Widan El-Homaar	*Salvia sclarea*	وِدَان الحُمار
Widein El-Faar	*Kickxia acerbiana*	وِدِين الفَار
Wideina	*Plantago coronopus*	وِدِينَة
Widna	*Plantago lagopus*, *Umbilicus botryoides*	وِدْنَـة
Widnet El-Maiya	*Ottelia alsimoides*	وِدْنِة المَّية
Widnet El-Sheitan	*Ottelia alsimoides*	وِدْنِة الشَيْطَانْ
Yadaab	*Setaria viridis*, *Brachiaria deflexa*, *Bromus pectinatus*, *Cenchrus setiger*	يَادَابْ
Yahaaq	*Diplotaxis erucoides*	يَاحَاق
Yahag	*Diplotaxis acris*	يَـهَـجْ
Yamrar	*Centaurea aegyptiaca*	يَـمْـرار
Yanam	*Plantago albicans*, *P. cylindrica*, *P. notata*	يَنَمْ
Yansoun	*Pimpinella schweinfurthii*	يَانْسُون

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Yaraab	*Tricholaena teneriffae*	يَارَابْ
Yasaar	*Moringa peregrina*	يَسَارْ
Yasamoab	*Jacquemontia tamnifolia*	ياسَامُوآب
Yasar	*Colutea istria*	يَسَرْ
Yasent El-Mayya	*Eichhornia crassipes*	يَاسِنْتْ المَيَّه
Yoab	*Euphorbia consobrina*	يوآب
Yusr	*Colutea istria*	يُسْر
Z'eitran	*Thymus decussatus*	زِعَيتران
Za'abal	*Cenchrus pennisetiformis, Triraphis pumilio*	زَعْبَلْ
Za'afar	*Silene conoidea*	زَعْفَرْ
Za'arour	*Crataegus azarolus, C.* x *sinaica, Rhamnus dispermus*	زَعْرُورْ
Za'atar	*Origanum syriacum* subsp. *sinaicum, Thymus capitatus*	زَعْتَرْ
Za'ataran	*Thymus bovei*	زَعْتَرَانْ
Zabb El-Ard	*Cynomorium coccineum*	زَبْ الأَرْضْ
Zabb El-Qott	*Astragalus kahiricus*	زَبْ القُطْ
Zafoun	*Potamogeton nodosus*	زَفُونْ
Zafra	*Ballota undulata, Echinochloa colona*	زَفْرَة
Zaghab El-Faar	*Schismus barbatus*	زَغَبْ الفَارْ
Zaghlanta	*Ranunculus arvensis, Euphorbia peplus*	زَغَلَنْتَة
Zaghleel	*Anemone coronaria, Papaver rhoeas, Ranunculus scleratus*	زَغْلِيلْ
Zagouh	*Deverra triradiata*	زَجُوحْ
Zahlag	*Asphodelus visidulus*	زَحْلَجْ
Zaitoun	*Olea europaea* subsp. *europaea* var. *europaea*	زَيْتُون
Zambaq	*Pancratium maritimum*	زَمْبَقْ
Zawaan	*Lolium temulentum*	زَوَانْ
Ze'eitman	*Allium sinaicum*	زِعَيْطمان

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Zeheira	*Phlomis aurea, P. floccosa*	زِهيرة
Zeita	*Cleome arabica, Fumaria densiflora, Lavandula coronopifolia, Limoniastrum monopetalum*	زِيتَة
Z'eitar	*Thymus decussatus*	زِعَيْتَرْ
Zeiteiya	*Nepeta septemcrenata*	زِيْتية
Zeiti	*Ononis serrata*	زِيتى
Z'eitman	*Allium desertorum*	زِعِيْطمَانْ
Zilf	*Persicaria limbata, P. salicifolia, Potamogeton crispus*	زِلْفْ
Zirr El-Ward	*Sphaeranthus suaveolens*	زِرْ الوَرْدْ
Zommaret El-Ra'ie	*Alisma gramineum*	زُمّارة الرَاعى
Zommeir	*Avena barbata, A. fatua, A. sterilis*	زُمِّير
Zoqqeim	*Pistia stratiotes*	زُقَّيمْ
Zorbeih	*Chenopodium ambrosioides, Nigella deserti*	زُرْبيح
Zorreiqa	*Globularia arabica, Heliotropium supinum*	زُرِّيقَة

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Glossary

Literature: Jackson, B. D. 1960. A glossary of botanic terms, ed. 4. Gerald Duckworth & Co. London.
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abaxial side of an organ away from the axis, e.g. lower surface of a leaf; opposite: adaxial
abortion suppression of parts which are usually present
acanthophyll leaflet of a pinnate leaf modified into a spine as in Palmae
accrescent increasing in length or thickness with age
achene dry small thin-walled fruit with a single seed as in Compositae
acicular needle-shaped very narrow, stiff and pointed
actinomorphic regular (flowers), radially symmetric, opposite zygomorphic
aculeate armed with prickles
acuminate tapering to a long tip
acute sharp, sharply pointed, opposite: obtuse
adaxial side of an organ towards the axis, e.g. upper surface of a leaf; opposite: abaxial
adherent attached, but not fused
adnate attached to, surface to surface
adventive not native, a species in a new habitat but not completely established
adventitous produced elsewhere than normal
alluvial composed of sand and clay deposited by running water
alternate inserted at different levels of the axis
amphibious adapted to both land and water
amphitropous with ovule apex and stalk base next to each other
amplexicaul leaves embracing the stem
anastomosing forming a network
anatropous ovule reversed, bent parallel to its stalk
androecium male sexual organs, the stamens
androgynophore a stalk carring both stamens and carpels
androphore a stack carrying the stamens
annual completing life cycle within one year
annular shape of a ring, organs arranged in a circle
annulus ring, the ring of thick-walled cells opening the sporangium in ferns
anthela the cymose inflorescence of Juncaceae
anther part of the stamen carrying the pollen
anthesis time of flower pollination when flower is expanded
anthocarp collective composite or aggregated fruit formed from an entire inflorescence as in *Ficus*
antrorse pointing upwards towards the distal end; opposite: retrorse
apetalous without petals
apex tip, distal end; opposite: base
apiculate ending in an abrupt short point
apomictic reproducing asexually
appendage attached secondary part, as a projection or supplement
appendiculate with appendage or appendages
appressed lying close and flat, e.g. hairs on a leaf or a stem
aquatic living in fresh water
arachnoid cobweb-like, tangled cottony, with hairs in different directions and tangling, a type of indumentum
arcuate curved like a bow
areole areas on a surface divided by a division line, e.g. a vein

aril appendage enveloping a seed, partially or completely
arillate with an aril
arista long bristle-like pointed axis
aristulate bearing a small sharp bristle
armed with sharp defensive structures
aromatic producing volatile oils with odours
ascending curved upwards, growing upwards
asperulous slightly rough
asymmetrical with both sides of organ not equal; opposite: symmetric
attenuate gradually tapering
auricle ear-like lobe
auriculate with ear-like structures
awn a fine bristle ending an organ, e.g. in grass flowers
awnless without awns
awnlet small awn
axil angle between stem and leaf
axile belonging to the axis, e.g. ovule placentation
axillary arising in the axil
back-crossing hybrids crossing with one of the parents
barbed with rigid points or bristles pointing backwards
barbellate shortly barbed, as in pappus of Compositae, with spreading or pointing upwards hairs
bark rough outer layer of stem or trunk of woody plants, tissue outside the cambium
barren sterile, not producing seed
basifixed attached to the base
beak a long projection
beaked with a beak, also rostrate
berry juicy indehiscent fruit with one or several seeds immersed in the pulp
biconvex domed on both sides, also lenticular
bidentate with two teeth
biennial taking two years from seedling to maturity
bifid divided in two at the tip
bilabiate two-lipped, with two clearly separated projections, as in Labiatae
bipartite divided in two parts at the apex
bipinnate doubly pinnate, when the primary divisions of a pinnate leaf are pinnately compound
bisexual having both sexes in the same flower or same inflorescence
biternate compound ternate, the ternate divisions divided in three parts
blade expanded part of leaf
blotch irregular coloured spot
borne carried
bract modified leaf subtending pedicels or flowers
bracteate subtended by a bract
bracteole secondary bract, usually smaller than the bracts and borne above them
bractiform bract-shaped
branch lateral growth from the axis
branchlet a small branch, the final division of the branching system
bristle strong and stiff cylindrical structure emerging from an organ
bristly bearing stiff strong hairs or bristles
bud a meristem in its early stage
bulb underground storage organ, with bud or buds enclosed by fleshy scale leaves
bulbiliferous producing bulbils
bulbil a small, usually axillary bulb, capable of developing into a new plant
bulbet a small bulb
bumpy with sudden rise on the surface
caducous falling off soon after formation, not persistent
caespitose growing in tight groups, tufted or clumped
calcarate with a spur
calcareous of siols, containing calcium carbonate
callus hard protruberance, thickening, in Gramineae, a horny prolongation at the base of floret or spikelet

calyculate having bracts around the calyx, or with involucre resembling an outer calyx
calyx the outermost organ or whorl of floral parts, usually divided into sepals
campanulate bell-shaped
canaliculate with a longitudinal channel or groove, also channelled
canescent grey or hoary, of indument
capitate head-like
capitulum compact cluster of sessile flowers; plural: capitula
caranculate with a carancule
carpophore a prolongation of the receptacle or floral axis bearing the carpels or ovary, e.g. in Ranunculaceae
carpopodium basal callus to the achene, in Compositae
cartilagineous hard or tough but slightly bending, also cartilaginous
caruncle an outgrowth of the outer seed integument, e.g. *Euphorbia* seeds
caryopsis the fruit in Gramineae, with the seed attached to pericarp, a type of achene
castaneous chestnut-coloured, dark glossy brown or reddish-brown
cataphyll scale-like leaf
catkin a slender, often pendulous cylindrical inflorescence, with ± sessile unisexual apetelous flowers
caudate ending in a long tail-like appendage
caudicle a stalk connecting pollen-masses as in Asclepiadaceae and Orchidaceae
cauline arising from or inserted on the stem
cereals grasses which yield grains used as human food
channelled with a groove running along its length
chartaceous thin and stiff, like paper
ciliate bearing a fringe of hairs along the margin
ciliolate fringed with very small hairs
cincinnate in the shape of a cincinnus
cincinnus inflorescence with flowers appearing alternately on the right and left of one side of the sympodial axis, scorpioid cyme
circinnate coiled inwards upon itself, e.g. young fronds (leaves) of ferns
circumscissile opening as if cut off at the equator, the upper part coming off like a lid
clasping leaf base almost surrounding, touching the stem closely on two sides, see amplexicaul
clathrate pierced with holes
clavate club-shaped, thickened towards the upper end
claw narrow proximal part of a flat round organ, e.g. a petal, as in Cruciferae
clawed with a claw
cleistogamous when self-fertilization occurs within unopened flowers, e.g. in *Viola*
climber a plant growing upwards by attaching itself to other structures which it uses as supports
clumped growing in tight groups, or caespitose
cluster a tight group
coherent attached to each other
cohering attached to each other
coma a tuft of long hairs at one end of a seed
comose bearing a coma or a tuft of hairs
compact pressed together
compressed flattened, especially laterally
concave hollow, as the inside of a bowl; opposite: convex
concealed hidden or included within
concrescent growing together
conduplicate folded together lengthwise, opposite reduplicate
cone fruit of a gymnosperm, or a shape with the base a circle, the sides narrowing towards the apex
congested crowded
conical cone-shaped

conjugate coupled or connected
connate joined margin to margin, e.g. petals, or leaves when a pair are united at base
connivent two or more parts separated at the base but coming together distally, but not fused
conspecific the same species
conspicuous clear, standing out
constricted abrubtly narrowed
contiguous without an interruption
contorted sepals or petals in bud, when each overlaps its neighbour on one side and is overlapped by its neighbour on the other side
convolute rolled
copious abundant, much, a lot
cordate heart-shaped, or base of leaf deeply notched
cordiform shaped like a heart
coriaceous leathery
corm short underground swollen storage stem
corolla floral whorl inside the calyx, consisting of petals, free or united into a tube
corona appendages on the corolla or on the back of stamens, often united into a ring
corrugated wrinkled regularly and longitudinally
corymb flat-topped raceme
corymbose corymb-like, also corymboid
costapalmate palmate leaf in which the petiole extends into the lamina, in palm leaves
cotyledon seed-leaf
crateriform cup-shaped
creeper plant with stems running along the ground and rooting at intervals
creeping growing along the ground and rooting at intervals
crenate margins notched with regular rounded symmetrical teeth
crenulate with small crenate teeth
crescentiform or **crescentric**, curved and thinner at either end than the middle, like a young moon
crest elevated irregular ridge
crevices narrow fissures or splits in rock or bark
crispate curled
crown of trees, the cluster of branches and leaves at the top of the trunk
cruciform shaped like a cross
crustaceous of brittle texture
culm stem of a grass (Gramineae) or a sedge (Cyperaceae)
cultivar a cultivated variety of a species
cuneate tapering (base of leaf) gradually, wedge-shaped
cucullate hooded, used especially for small parts of the plant
cupular cup-shaped
cupule cup-like structure at the base of fruits
cusp sharp, rigid point
cuspidate abruptly tipped with a sharp rigid point
cyathia plural of cyathium
cyathiform shaped like a drinking cup
cyathium the cup-shaped involucre with the flowers inserted in it, in *Euphorbia*
cylindric or **cylindrical**, like a cylinder
cymbiform boat-shaped
cyme a sympodial inflorescence in which the axis terminates in a flower
cymose like a cyme
deciduous losing all its leaves for a part of the year, not evergreen
declinate bent or curved downwards or forwards
decumbent lying on the ground, but distal part upright
decurrent extending downwards, as in leaves when they continue down the stem as wings or raised lines
decussate when alternate pairs, e.g. of leaves are at right angles to each other
deflexed bent abruptly downwards

dehiscent splitting, or opening spontaneously when ripe, e.g. capsules
deltoid shaped like an equal-sided triangle, (for 3-dimensions) also deltate (2-dimensions)
dendroid shaped like a tree
dentate toothed, usually for margins
denticulate finely-toothed
depauperate impoverished, of much less stature than normal
diadelphous in two bundles, usually in stamens, as in Leguminosae
dichasial a dichasium cyme
dichasium a peduncle bearing a terminal flower and two bracts, which subtend lateral staked flowers
dichotomous forked, dividing into two equal branches
didymous in pairs, divided into two lobes, e.g. anthers
didynamous of stamens, in two pairs of unequal length
digitate of a compound leaf, like fingers, when leaflets diverge from the same point, also palmate
dilated expanded, widened
dimorphic with two different shapes or forms
dioecious with unisexual flowers, male and female flowers on different plants
diploid somatic, or 2n, with twice the haploid number of chromosomes
disarticulating falling apart into its constituent parts, e.g. a lomentum
disciform a capitulum with outer filiform florets and inner disc florets
discoid like a disc or plate, in Compositae applied to a head without ray florets, only with disc florets
dissected divided into segments
disseminule any part of the plant being dispersed and able to produce a new generation
distribution the occurrence of a plant group (species or other taxon) in a geographical sense
divaricate spreading wide
dormant not active, awaiting stimulus to function
dorsal adaxial; opposite: ventral
dorsifixed of anthers, when the connective is attached between the base and apex to the filament
drupaceous like a drupe
drupe a stone fruit, a fleshy 1-seeded indehiscent fruit, with seed enclosed in a stony endocarp
drupelet in aggregate fruits, a single drupe, together from the fruit
dwarf of small size compared to other related individuals
ecaranculate without a caruncle
echinate spinose, with projections tapering from a broad base, densely covered with spines
ecotype locally adapted population of a widespread species, usually with small but recognizable differences from the main population
eglandular without glands
eliaosome oily appendage on seeds, serving as food-body for ants or other insects which then disperse the seeds
ellipsoid of 3-dimensional shape, broadest at middle and two equal rounded ends
elliptic of 2-dimensional shape broadest at middle, also elliptical
elongate or **elongated** stretched, long
emarginate with a sharp notch
embryo the rudimentary plant contained in the seed, consisting of cotyledons, root apex and shoot apex
endemic restricted to a certain geographic region, e.g. endemic to Egypt or to Sinai
endosperm food-storage tissue of a seed, usually surrounding the embryo
ensiform sword-shaped, long and narrow and ending in a sharp point
entire not divided, of margins

epaleate without paleae, lacking receptacle scales
epappose without pappus
epicalyx a group or whorl of bracts below the calyx, e.g. in some Malvaceae
epicarp the outermost layer of the fruit wall
epichile of orchid flowers, the terminal part of a lip which is divided into 2 or 3 distinct parts
epigynous, of flowers when sepals, petals and stamens are inserted on top of the ovary
epipetalous usually of stamens, united with the petals
epiphytic plant growing on, and attached to another plant without being parasitic
equitant base of one leaf clasping the base of the next leaf up and opposite
erect upright
erecto-patent between spreading and erect
erostrate without a beak, usually in achenes of Compositae, also beakless
evergreen retaining its leaves throughout the year; opposite: deciduous
excentric off-centre
excurrent running through the apex and beyond
exocarp outer layer of the fruit, also epicarp
exserted projecting beyond, e.g. stamens projecting beyond the corolla
exstipulate without stipules
extrastaminal beyond or outside the stamens
extrorse of anthers opening away from the centre of the flower
extruded pushed out
exudate liquid substance produced by the plant when wounded, deposited on its surface and then hardening
falcate curved on distal end
fallow of cultivated land, resting, without crops for one or more seasons
family taxonomic unit of one or more related genera
farinose like flour, mealy, the surface covered with small white particles
fascicle a cluster of similar organs arising from ± the same point, e.g. flowers or leaves
fasciculate erect branches in close bundles
fastigiate of branches, erect and parallel, bundled
female flower a flower with functional female parts and without (or with rudimentary) male parts
ferruginous rust-coloured
fertile capable of giving rise to the next generation, or bearing flowers and/ or fruits
fetid of offensive or stinking smell, also foetid
fibrous composed of, or including fibers
filament the stack which bears the anthers
filiform slender, thread-like
fimbriate of the margin, bordered by rather broad hair-like processes, fringed
fimbriolate bordered by very fine and very slender hairs
fissured cracked with deep splits, usually in bark
fistulose of stems, cylindrical and hollow, also fistular
flabellate fan-shaped
flexuose or **flexuous** sinuous, bent alternately in different directions
floccose covered with woolly hairs, rubbing off easily
flocculose like wool, with dense soft interwoven hairs
flexuous sinuous, bent alternately in different directions
flora plants occurring in a certain area
Flora a book listing and describing plants of a certain region
floral bract in Cyperaceae, membranous scale-like structure in the

inflorescence unit subtending a male flower of a single stamen only
floret small flower, a single flower in Compositae; the flower and its bracts (lemma and palea) in Gramineae
foetid stinking, of offensive smell, also fetid
foliaceous leaf-like
foliolate with leaflets
foliose leafy
follicle a pod arising from a single carpel, opening along the inner suture
follicular shaped like a long thin fruit opening by a single suture
forked branched
form shape, slightly variable
forma form, a group of plants within a species slightly different from the main population, not sufficiently classified as variety or subspecies
foveolate minutely pitted, with small depressions
free neither adhering, nor united, usually attributed to flower parts
frond leaf, the lamina of a fern
fruit the ripened ovary, the seed bearing organ
frutescent like a shrub, becoming shrubby
functionally male when male and female parts are present in a flower but only the male parts are functional
funicle the stalk of the ovule and seed, attaching it to the placenta
funnel-form, funnel-shaped like a funnel, proximally tubular and abruptly widening at the distal part
furcate forked, with sharp terminal lobes
furrowed with longitudinal grooves or channels
fuscous dusky brown
fused completely united organs
fusiform thick but tapering at both ends, also spindle-shaped
gametophyte haploid generation that bears the sexual organs
gamopetalous with jointed petals
geminate in pairs
geniculate bent like a knee
genus group of plants containing species of similar appearance or closely related to each other, plural: genera
gibbous more convex on one side than on the other, such as not quite full moon
glabrescent becoming ± glabrous
glabrous smooth, without hairs, scales or other indumentum
gland a secretory area on the surface or the tip of a hair
glandular covered with glands
glaucous covered with a waxy bluish-grey or sea-green bloom
globose spherical
glochid barbed bristle
glochidiate beset with barbed bristles
glomerule a dense cluster of ± sessile flowers
glossy lustrous
glume the bract, usually occurring in pairs, at the base of a grass spikelet
granulate granular, surface covered with small grains
granules small amorphous grain-like particles
grooved with long narrow indentations, also sulcate
gum hardened exudates from wounded stem or leaves, water soluble
gymnosperm seed plants in which ovules and seeds are not enclosed in an ovary
gynobasic when the style rises from the base of the ovary, as in Labiatae
gynodioecious of a species with some plants bearing bisexual flowers only, and other plants female flowers
gynophore a stalk carrying the ovary, formed by the elongation of the receptacle
gynostegium unspecified covering of the gynoecium
halophyte plant adapted to saline soils,

with seeds that can greminate in saline soils

hastate leaf-base with 2 triangular lobes diverging from the petiole apex

haustoria suckers of parasitic plants, single: haustorium

hemiparasitic partly parasitic

hemispherical in the shape of half a sphere

herb plant without persistent woody stem above the ground

herbaceous annual herb, or plant with annual stems from a perennial root

hermaphrodite bisexual, with stamens and pistil in the same flower

heterogamous with 2 kinds of flowers, as in Compositae

heteromorphic with variation in normal structure, also heteromorphous

heterostylous a species with flowers of 2 or more types, having styles of different lenghths; opposite: homostylous

heterotrichous with hairs of different types

hexagonal 6-angled

hexalobate with 6 lobes

hilum the scar left on the seed from its point of attachment

hirsute with rather coarse stiff hairs

hirtellous softly or minutely hirsute or hairy

hispid with stiff hairs or bristles, more sharply bristly than hirsute

hispidulous minutely hispid

holotype a single specimen representing the nomenclatural type of the name of a species

homogamous with all flowers of the same kind; opposite: heterogamous

homomorphic of uniform type, of one kind; opposite: heteromorphic

homonym one of two or more identical names, of which only one can be correct

homotrichous with hairs of the same type

homostylous a species with flowers with uniform styles; opposite heterostylous

hood 3-dimensional shape with the sides and apex curved inwards

hooded forming a hood

hook a process with a curved or bent part at the tip

horned with a horn, a tapering structure resembling an elongated cone, usually curved

horseshoe-shaped shaped like a shoe of a horse, like the letter U

host a plant on which a parasite grows, and from which the parasite derives its food

hyaline transparent, or nearly so

hybrid a cross between two parent species

hybridization crossing between different plants

hydrogamous flowers pollinated in water

hygrophyllous moisture-loving plants growing in damp sites

hygroscopic hairs hairs that react to the presence or absence of moisture

hypanthium cup-shaped extension of the receptacle

hypochile of orchid flowers, the basal part of a lip, divided into 2 or 3 distinct parts

hypocotyl of a seed or seedling, part of the main axis below the junction of the cotolydons, but above the radicle

hypocrateriform bowl-shaped

hypogynous of flowers, with superior ovary, where sepals, petals and stamens are inserted on the receptacle below and free from the ovary

hysteranthous produced after the flowers

imbricate of aestivation, when floral parts overlap like tiles

immersed sunk completely into

imparipinnate unevenly or odd-pinnate, pinnate with a single terminal leaflet

incised deeply cut, intermediate between toothed and lobed
included not protruding from surrounding organ; opposite: exserted
inconspicuous not showy
incumbent lying on, e.g. the cotyledons with the radicle against the surface, as in some Cruciferae
indehiscent of fruits, not splitting
indumentum a cover of hairs, scales or bristles
induplicate in palms, V-shaped in cross section; margins folded inwards, but not overlapping in sepals or petals
indurate hardened, or indurated
indusia in ferns, thin flaps of tissue covering the sorus when young
indusium single of indusia
inferior of the ovary, where the calyx is above it
inflated blown up
inflorescence part of the plant bearing the flowers
infraspecific of taxa, subspecies, variety, forma and race
infrastaminal below the level of stamens
infundibular funnel-shaped
infundibuliform funnel-shaped
inrolled of leaves or petals, with margins rolled inwards, or involute
inserted placed in
integument the covering of an organ, the outer envelope of an ovule
intergrade specimens which occur on the boundary of one taxon, with characters intermediate with another taxon
internode part of the stem between 2 nodes
interpetular placed between the petioles of opposite leaves
interstaminal between the stamens
intrapetular between the petiole and the stem
intricate tangled, dense branching
introduced not native, brought by man; opposite: native
invagination enclosing in a sheath
involucel secondary involucre around the parts of the inflorescence
involucre a series of bracts usually close together, below or around a head of flowers, e.g. in Compositae
isotype duplicates of a holotype, parts of a single gathering
jointed with nodes of apparent articulation
juvenile young, early form
keel the two often partly united petals in a papilionaceous flower
keeled with a ridge along the middle
lacerate torn at the margin, irregularly lobed, as if torn
laciniate cut into narrow lobes or teeth
lamellate with thin membranous plates on top of the organ
lamina expanded blade of leaves or petals
lanceolate narrowly ovate and tapering at the apex
lateral on or at the side or margin
latex milky juice
lax loose, opposite: congested
leafless without leaves
leaflet expanded part of a compound leaf
lectotype the type chosen by a later author when the original diagnosis indicates no holotype
legume dry fruit, pod of Leguminosae, usually opening along 1 or 2 sutures
lemma the outermost of 2 bracts enclosing the grass flower
lenticular 3-dimensional body, circular and convex on both sides
lentiform lenticular
liane woody climber
ligulate strap shaped, or with a ligule
ligule a projection of the leaf sheath, e.g. in Gramineae
limb the upper expanded flat part of the calyx or corolla, especially if united into a tube below
linear narrow and much longer than wide, with parallel margins

lithophytic growing on rock
lobed divided into lobes, a flat split in 2 or more sub-divisions
locular with cavities or compartments, usually of ovaries and fruits
loculicidal when a ripe capsule splits into the cells, not at the lines of junction between the locules
lodicules minute scales in the florets of Gramineae representing the perianth
lomentum a flat legume fruit constricted between each seed and falling off at the constrictions into 1-seeded units
lorate strap-shaped
lunate half-moon shaped
lustrous shining
lyrate lyre-shaped, pinnately lobed, with a large rounded terminal lobe
male staminate, opposite: female, pistillate
mamillate with nipple-like processes
marcescent of leaves, corolla, remaining attached to the plant after withering
marginal at or near the edge
maritime associated with the sea or coastal regions
marsh areas with high water table, wet at all times
mature of a fruit, fully grown and ripe, opposite: unripe
mealy farinose, like flour
median situated in the middle
medifixed attached near the middle, of anthers or hairs
megasporangia the sporangia where megaspores develop; single: megasporangium
megaspore large-sized spore, opposite microspore
membranous like a membrane, thin flexible and translucent
mericarp seed-containing part of a fruit, usually derived from a carpel
mesocarp middle layer of the fruit wall in fleshy or succulent fruits
mesochile, of orchid flower, the mid-portion of a lip that is divided into 3 distinct portions
mesophyte plant adapted to normal conditions, avoiding very wet or arid conditions
mesophytic vegetation of mesophytes
micorrhiza see mycorrhiza
microspore small-sized spore
midrib major vascular supply and support structure in the leaf-blade
mitriform cup-shaped and ending in a point
monadelphous, of stamens, in one bundle and connate by the filaments, e.g. in Malvaceae and Leguminosae
monochasial of a monochasium
monochasium a cyme with one main axis
monoecious with separate male and female flowers or inflorescences on the same plant
monopodial branching system with the main axis growing indefinitely at the apex
morphological based on shape
morphology external form and appearance of organs and organisms
mottled with spots or blotches of a different colour
mucilaginous slimy, with mucilage or jelly-like exudate
mucronate ending abruptly in a short stiff point, with a mucro
multiseriate arranged in many rows
muricate rough, with short hard pointed protuberances
muticous blunt, without a point
mycorrhizal with symbiotic fungi in the roots or clothing the roots
naked of stems, without leaves; of flowers, without calyx and corolla
naturalized not native, introduced and established and reproduces freely
nectar sweet fluid extruded by glands; in flowers this is collected or eaten by insects

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nectaries organs in which nectar is formed; single: nectary
nectariferous with nectar
nitrogen-fixing bacteria converting atmospheric nitrogen into organic compounds which can be taken up by plants
node area of stem where a leaf is attached, or where a leaf used to be attached
notched cut from an entire edge
nut one-seeded indehiscent dry fruit, with a hard pericarp
nutlet a small nut, e.g. in Cyperaceae
obconical conical, with the narrow part at the base and the wide part near the apex
obcordate heart-shaped, with the narrow end near the base and the wider notched end near the apex
oblanceolate narrowly obovate and tapering towards the base
oblique of leaves, when the two sides of the leaf are unequal near the base
oblong longer than broad, with parallel margins
obovate 2-dimensional, egg-shaped with the broadest part near the apex
obovoid 3-dimensional, egg-shaped with the broadest part near the apex
obpyramidal pyramid-shaped, with the broad part near the apex
obtrigonous 3-dimensional, like an inverted triangular
obtuse blunt, not pointed, for leaf-apex
ocrea a leaf sheath, an extension beyond the petiole insersion (palms); a tubular membranous stipule sheathing the stem, e.g. in Polygonaceae
offset a lateral shoot, bulbil or bulblet for propagation
opaque not transluscent
opposite of leaves and branches, when 2 are borne on the same node on opposed sides of the stem
orbicular 2-dimensional, with a circular outline
ostiole mouth, as in the aperture at the apex of a fig fruit
ovary ovule-bearing part of the gynoecium
ovate 2-dimensional, egg-shaped, with the wider part below the middle or near the base
ovoid 3-dimensional, egg-shaped, with the wider part near the base
ovule immature seed in the ovary before fertilization
palaeotropical tropics of the Old World
palate projection on lower corolla lip near the throat
palea of Compositae, one of the chaffy scales of thin colourless bracts on receptacle; of Gramineae, the inner of the 2 bracts enclosing the floret
paleaceous chaffy, with paleae
pallid pale
palmate of lobed or compound leaves, when all lobes or leaflets originate from one central point
palmatifid cut to a palmate form, the lobes or divisions reaching about middle of the leaf
palmatipartite cut to a palmate form, the lobes or divisions reaching more than half of the leaf
palmatisect cut to a palmate form, the lobes or divisions extending almost to base
palmi-nerved with palmate venation
panicle inflorescence in which the main axis has several lateral branches, each of which has several flowers arranged as in racemes
pantropical occurring in all tropical regions of the world
papillose with many small nipple-like projections
pappus a series of hairs, bristles or scales around the apex of the fruit, as in Compositae

papyraceous papery, with the thickness of paper
parasite plant living on and driving its nourishment from another organism, the host
parasitic adjective of parasite
parietal placentation in which the ovules are attached to the inner surface of the outer wall
paripinnate evenly pinnate, terminated by 2 opposite leaflets
pectinate like a comb, with close, narrow and parallel divisions
pedate resembling palmate, but side divisions further divided, e.g. some Araceae leaves
pedicel the stalk of an individual flower in an inflorescence
pedicelled or **pedicellate** stalked
peduncle of an inflorescence, the lower unbranched part or stalk, as distinct from the rachis; or a flower stalk of a solitary flower or cluster
peltate of a leaf round and the petiole attached in or near the centre of the blade
pendulous hanging
penninerved with the nerves or veins in a pinnate pattern, i.e. branching off from the midrib
pentagonal 5-angled
pepo berry-like fruit often with a hard, and parietal placentation, e.g. Cucurbitaceae
perennial living for several to many years
perfoliate when the stem passes through the blade of the leaf or through a connate pair of leaves
perforate of pollen exine, punctured by numerous holes
perianth collective term for the sepals and petas, or for the tepals
pericarp the wall of the ripened ovary
perigonium perianth, term used in Typhaceae, e.g. perigonal hairs
perigynous when the sepals, petals and stamens are carried up around the ovary on a hypanthium
persistent remaining on the organ, not falling off; opposite: caducous or deciduous
petal a single free unit of the corolla
petaloid like a petal
petiolate with a leaf-stalk, not sessile
petiole leaf stalk, the basal usually narrow cylindrical part of the leaf
petioliolate with a petioliole
petioliole stalk of an individual leaflet
phyllaries in Compositae, bracts surrounding the capitulum, often referred to as bracts of the involucre
phyllary singular of phyllaries
phyllode a laterally flattened photosynthetic blade derived from the petiole
pigmented coloured
pilose hairy, with rather long, patent simple hairs
pinnae leaflets of a pinnate leaf; single: pinna
pinnate divided into a central axis and lateral ribs or leaflets, like a feather
pinnatifid pinnately lobed, with shallow lobes
pinnatilobed pinnately divided
pinnatipartite pinnately divided to about halfway
pinnatisect pinnately divided almost to the midrib
pinnule the leaflet of a bipinnate leaf, a second order pinna, the first order segment of a pinna
pistil the unit of a separate carpel, consisting when complete of ovary, style and stigma
pistillate female, or flower with only female organs
pistillode a rudimentary gynoecium, sterile
pitted with small depressions
placenta the part of the ovary to which the ovules or seeds are attached

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planoconvex flat on one side, convex on the other
plumose softly feathered
pollen powder-like fertilizing agent carried in the anthers
pollinia plural of pollinium, pollen grains cohering into a single group and distributed as such, e.g. in Asclepiadaceae and Orchidaceae
pollinium single of pollinia
polychasial like a polychasium
polychasium cymose inflorescence with oldest flower in the centre
polygamous with male, female and bisexual flowers on the same plant
polygonal or **polygonate** 2-dimensional shape with many corners
polymorphic variable taxon or organ with several forms
polyploid with double or more than the normal set of chromosomes
polystichous leaves borne in many series
pome a multiloculate fruit formed by the fusion of the inferior ovary and the hypanthium
population a group of plants of the same species living in a certain defined area
prickle sharp outgrowth from the epidermis, detachable without tearing the organ, e.g. in roses
procumbent lying on the surface of the ground or over other vegetation, but not rooting at nodes
prominent conspicuous, projecting out beyond another organ
prophyll in grasses and sedges: the 2-keeled hyaline leaflet at the base of, and on the upper side of side branches; in palms: the bract at the base of the inflorescence enveloping the inflorescence in bud
prostrate lying flat on the ground
prothallus of pteridophytes, the haploid generation, with or without chlorophyll, bearing the sexual organs
protuberance a bulging out structure
protuberant bulging out
proximal basal, nearest to the point of attachment, opposite: distal
pruinose covered with a waxy, frost-like powder
pseudobulb resembling a bulb, a storage organ of a swollen internode or two internodes, e.g. in Orchidaceae
pseudostaminode appendage between the filaments, not a modified stamen, as in Amaranthaceae
puberulent minutely pubescent, the hairs hardly visible without magnification
pubescent covered with fine short, soft hairs
pulp fleshy or juicy tissue of a fruit
pulvinus swollen part of the leaf petiole
punctate small dots, glands, or depressions
punctiform shaped like a point or dot
pungent ending in a rigid sharp point
pyramidal 3-dimensional, shaped like a pyramid
pyrene the seed and a hard layer of endocarp surrounding the seed
pyriform pear-shaped
quadrangular with four angles
quadrate a figure almost square in form
race a strain of a species with fixed genetic characters
raceme inflorescence in which the flowers are borne along a central axis, with terminal flowers being the youngest
racemelet a small raceme
racemose like a raceme
rachilla or **rhachilla** axis of a spikelet in Gramineae and Cyperaceae; ultimate flower-bearing axis of an inflorescence in Palmae
rachis or **rhachis** the part of main axis distal to the petiole in compound leaves; in inflorescences the part of main axis distal to the peduncle
radial going from the centre to the margin in a straight line

radiant a disciform capitulum in Compositae, where the outer florets become much enlarged with zygomorphic corollas, usually sterile, the capitulum therefore heterogamous
radiate in flower-heads of Compositae with ray-flowers on the outside and disc-flowers on the inside
radical of leaves, arising close to the base of the stem
radicle the first root from a germinating seed
raphe a ridge of tissue connecting the base nucellus with the placenta
raphides bundles of needle-like crystals of calcium oxalate in plant cells
ray one of the radiating branches of an umbel
ray floret marginal zygomorphic florets of the capitulum in Compositae
receptacle expanded part at the end of the flower stalk
recurved bent or curved downwards or backwards
reduplicate leaflets of palms, Λ-shaped in cross section
reflexed curved backwards or downwards at a sharp angle
regular radially symmetrical, actinomorphic
reniform kindney-shaped
replum partition between the locules of fruits in Cruciferae
resiniferous with the scent of resin
resupinate of flowers, upside down or seemingly so
reticulate net-veined, with the smallest veins of a leaf interconnected like the meshes of a net
reticulation network
retrorse marginal spines or barbs bent abruptly backwards or downwards
retrorsely turned backwards or downwards
retuse notched, usually of the apex of a leaf or other organ
revolute rolled or curled towards the abaxial (lower) surface, opposite: involute
rhizoid a hair serving as a root
rhizome underground stem, with nodes and scale-like leaves
rhombic 2-dimensional, of the shape of an equilateral parallelogram, lozenge-shaped
rhomboid rhombic-like
rigid stiff
robust strong, vigorous, thick
rootstock underground stems and/or roots, often perennating
rosette a group of tightly packed leaves, basal rosette: at ground level
rostrate beaked
rotate wheel-shaped, with a corolla with a short tube and spreading lobes
rotund 2-dimensional shape between oblong and rounded
rounded smoothly curved without abrupt angles, of base or apex
ruderal growing in disturbed habitats
rudimentary small and non-functional
rufous of colour, reddish, of various shades
rugose wrinkled
runcinate pinnatifid with the lobes pointing downwards
runner a creeping or prostrate lateral shoot, rooting at the nodes and giving rise to new individuals, also stolon
saccate pouch-shaped
sagittate triangular at the base, with 2 acute lobes, like an arrow-head
salver-shaped with a slender tube and an abruptly widening limb of free petal or sepal lobes spread flat, or salver-form
scaberulous slightly rough
scabrid rough to touch, usually from the presence of minute stiff hairs
scabridulous minutely scabrid
scalariform like a ladder

scale small peltate scarious discs, a kind of indumentum
scape a leafless flower- or inflorescence-stalk arising from groundlevel, naked peduncle
scapose with a scape, usually of herbs with a basal rosette and a flower or inflorescence rising from the centre of rosette on a leafless stalk
scarious thin and dry, not green
scented smelling sweetly
schizocarp fruit splitting into 1-seeded portions, the mericarps
sclerenchymatous composed of thick-walled cells, of endocarp of fruits
sclerified of organs, becoming fibrous, developing sclereids
scorpioid cyme 1-sided cymose inflorescence, coiled so as to resemble a scorpion's tail
scrambling growing upwards through other vegetation or objects, but not twining
scrub bushland, with shrubs
scurf small scales on the epidermis
scurfy covered with small scales
sectile of orchid flower, soft granular pollinia subdivided into small packets
seed the organ by which seed plants reproduce
seedling juvenile plant arisen recently from seed
sepal a single part of the calyx, the outermost whorl of floral organs
sepaloid resembling a sepal
septa partitions, single: septum
septate divided by 1 or more partitions
septicidal ripe capsule splits along the lines of junction of the carpels, i.e. along the septa, the valves remaining attached and not falling off
septifragal dehiscent along the septa and the valves falling off
serrate toothed like a saw, with teeth regular and angled
serrulate minutely serrate
sessile without stalk, directly attached
seta a bristle or stiff hair, plural: setae
setaceous bristle-like, narrow and stiff
setose beset with bristles
setulose beset with minute bristles
sheath a tubular organ, enveloping another organ, e.g. in Gramineae leaves enveloping the culm
shoot an elongating stem
shrub woody plant, self-supporting, branching at or near the ground, or with short stem less than 2 metres
silicula a short siliqua, less than 3 times as long as wide
siliqua a fruit divided into 2 cells by a thin partition, e.g. in Cruciferae
sinuate when the margin is uneven, with rounded undulations
sinuous wavy
sinus angle formed by lobes of a leaf
slender slim, thin
slit cut lengthwise, slash
solitary single, not in clusters
sori groups or clusters of sporangia, of pteridophytes
sorus single of sori
spadix unbranched fleshy inflorescence, e.g. in Araceae
spathaceous resembling, or with the function of a spathe, e.g. large bracts enclosing the flower
spathe a large sheathing bract, surrounding the inflorescence or spadix, e.g. in Palmae, Araceae
spathulate or **spatulate** like a small spoon or spatula
spicate spike-like
spike racemose inflorescence, with sessile flowers along a common unbranched axis
spikelet elongated or reduced axis with 1-many glumes, each glume subtending a flower, e.g. in Gramineae, Cyperaceae
spinescent ± spiny, ending in a sharp point
spine-shield horny pad from which the

spines stick out, e.g. in Euphorbiaceae

spinose with spine, term mostly used for leaf margin

spinulose with small spines

spiny armed with spines

spirally arranged arranged in a spiral or ascending coil along the axis, e.g. leaves on a stem

sporangium a sac or capsule containing spores, in pteridophytes

spore a haploid cell that germinates to form a gametophyte

sporophyte diploid plant producing haploid spores by meiosis

sprawling plant spreading loosely, not erect

spur a slender hollow extension usually of the perianth of the flower, often containing nectar

squarrose rough with tips of scales or bracts projecting outwards

stamen the male organ of a flower, consisting of a filament bearing the anthers which bear the pollen

staminate of flowers, bearing stamens, male

staminode a sterile or abortive stamen, usually not bearing pollen

standard the large, upper (posterior) petal of a papilionaceous flower, also vexillum

stellate star-shaped

stellulate diminutive of stellate

steppe plains of grassland, usually without trees

stereome in Compositae, a part of the phyllary which is (semi-) transparent

sterile barren, not functional, used for sexual parts, e.g. anthers

stigma the pollen receptor on the gynoecium, on the top of the style or sessile

stigmatic relating to the stigma

stinging hair tubular hairs filled with irritant liquid which upon breaking, eject the liquid causing itching or blistering of skin, e.g. in *Urtica*

stipe the leaf stalk of a frond, of ferns; the stalk inside a flower or fruit which supports the carpels; short or narrow extension to the base of the nutlet, e.g. Cyperaceae

stipitate supported on a special stalk

stipite of orchid flowers, stipe

stipitiform shaped like a long narrow cylinder

stipular, stipulate with stipules

stipule leaf-like, spine-like or scale-like appendage of the leaf

stolon vegetative shoot spreading along the surface of the ground; a runner which roots; in Cyperaceae, a thin underground branch arising from the rhizome or base of the culm; each stolon terminates in an aerial shoot

stoloniferous bearing stolons

stramineous straw-coloured, straw-like

strand beach

strap-shaped narrow, with straight margins; also ligulate, lorate

striate with parallel longitudinal grooves

striation a fine groove

strobilus plural strobili, an inflorescence largely made up of overlapping scales, as in pteridophytes and gymnosperms

style the part of the gynoecium or carpel between the ovary and the stigma, usually slender

style arms branches of the style

stylopodium a structure just above the ovary composed of the connate proximal parts of the styles, e.g. in Umbelliferae

subacute slightly acute

suberized corky

subglobose more or less globose

submarginal near the margin

submerged under water

subopposite almost opposite

suborbicular more or less orbicular or circular

subquadrate more or less square
subrotund more or less round
subsessile more or less sessile
subshrub small shrub, undershrub
subterranean underground
subulate awl-shaped, like a stout needle, linear-lanceolate
subumbellate almost umbellate
succulent juicy, pulpy; a plant with thick fleshy and swollen stems and/ or leaves
sucker a shoot arising from the roots below the ground
sulcate grooved, furrowed
superior of an ovary, when sepals, petals and stamens are inserted below the ovary
suture the line of junction, usually used for the line of opening of a carpel
swamp permanently wet terrestrial area
symmetrical with both sides of organ equal
sympatric of 2 or more taxa, living in the same area, opposite: allopatric
sympetalous of a flower, having the petals united
sympodial of a sympodium, without a single main stem
synandria single: synandrium, the cohesion of the anthers of a male flower
synanthous when flowers and leaves appear simultaneously
syncarpous of a flower, with united carpels
synflorescence in Compositae, a compact arrangement of capitula within a common or secondary involucre
syntype one of several collections mentioned in a protologue, where no holotype has been indicated
tapering gradually narrowing
tendril terminal coiling structure derived from stem or leaf, used for climbing
tepal a division of the perianth, used when the distinction between petals and sepals is not obvious
terete 3-dimensional, a cylindrical structure lacking grooves or ridged, circular in cross-section
terminal at apex, not axillary
ternate arranged in a whorl or cluster of 3
terrestrial on land, not in water
tetrad a group of 4 pollen grains, formed from one pollen mother cell, released from the anther as one unit
tetradynamous with 4 long and 2 short stamens, e.g. in Cruciferae
tetragonal with 4 angles in cross-section
tetragonous 4-angled
tetrahedral shaped like a tetrahedron, with 4 faces, pyramidal
tetraploid with 4 complete sets of chromosomes
theca, plural: thecae, the locule (s), usually 2, of an anther
thorn short pointed woody structure, derived from a reduced branch
thorny with a thorn
thyrse a mixed inflorescence, with the main axis a raceme and secondary axes in the form of cymes
thyrsoid like a thyrse
timber wood used in construction and carpentry
tomentellous shortly tomentose
tomentose densely covered in short soft hairs, these somewhat curly and matted
torulose cylindrical with constrictions or swellings at intervals
trabeculate having the appearance of minute girders
trailing prostrate on the ground, without rooting
translator the connecting structure between pollinia in Asclepiadaceae
trapeziform with four sides, two of which are parallel

tree perennial woody plant with secondary thickening and a clear main trunk of at least 2 metres
triad in Gramineae, used for groups of 3 spikelets; in palms for a group of 3 florets, the central female, fertile and 2 sterile ones
trichome hair, bristle or scale
trichotomous 3-forked, branched into three
trifid split in 3
trigonous obtusely 3-angled
triquetrous with 3 sharp angles
truncate ending abruptly in a ± straight line, as if cut off
trunk main axis of a tree
tuber a thickened branch of an underground stem, serving as a storage organ, root tuber is a swollen root to store reserve nourishment or water
tubercle a little tuber, or a little protuberance
tuberculate covered with water-like protuberances or knobs
tuberous fleshy, swollen, of roots or stems
tubular cylindrical and hollow
tufted growing in tight groups, also caespitose, clumped, tussocky
tunic coat of a bulb, consisting of dead leaf bases
tunicated of a bulb covered with complete enveloping coats, e.g. onion
turbinate top-shaped, obconical and narrowed towards the point, 3-dimensional
turgid swolen
turion detachable vegetative buds
tussock compact clump of grasses or grass-like plants
twig a small branch or shoot, of the current year
twining coiling around a structure of another plant
umbel a racemose inflorescence with branches arising from ± the same point on a common peduncle; simple umbel, where each ray bears a flower; a compound umbel, where each ray bears an umbel
umbellate with umbels
unarmed without spines or prickles
uncinate hooked
undulate wavy, of a margin
unguiculate of a sepal or a petal, clawed, narrowed into a petiole-like base
uniform of one shape or form, all ± similar
unilateral 1-sided, all organs borne on one side, or turned to one side
uniovulate with a single ovule, of carpels and ovaries
unisexual of flowers, having only male parts, or only female parts
urceolate urn-shaped, with a short swollen tube near the top and then slightly expanded in a narrow rim
utricle the trap of *Utricularia;* in Cyperaceae, a prophyll developing into a bottle-like structure surrounding the nutlet, e.g. in *Carex*
valvate of sepals and petals in bud, meeting exactly at the margin without orerlapping
valve one of the parts of a capsule or a pod splitting at maturity
variable not constant in appearance
variant one aspect of variation of a taxon which lacks a formal nomenclatural status
variation minor difference
variegated irregularly coloured with 2 or more colours
variety infraspecific taxon below the rank of subspecies and above that of the form, with one or more distinguishing characters, not geographically disjunct from other conspecific taxa
varnished shiny, of surface
vascular referring to the xylem or phloem or both

vascular system the network of specialized cells that conduct nutrients (xylem) and assimilated products (phloem)
vein strand of vascular tissue in flat organ, usually visible on the surface
velamen of orchid trees, the one or more layers of spongy cells on the outside
velutinous velvety, resembling relvet, i.e. with a soft, close-cut pile
venation the arrangement of the veins of a leaf
ventral or abaxial, or lower surface of lamina, opposite dorsal or adaxial
ventricose flat, swollen, or bulging on one side near the middle
vernation folding of leaves in bud
verrucose warty
verruculose warty with very small bumps
versatile of anthers, as if hinged on the filament
verticillaster of an inflorescence, a false whorl of 2 opposite cymes, e.g. in Labiatae
verticillate of leaves, in a whorl, i.e. 3 or more at the same node
vestigial as a remnant, an organ or part of organ not serving its original function
vexillary stamen upper stamen in diadelphous papilionaceous flower, free or partially attached, adaxial stamen
villous with long soft hairs, also villose
viscid sticky
viscous very sticky
vittae aromatic oil tubes in the fruit, e.g. in Umbelliferae
volatile of secreted oils, quickly evaporating
water-catchment areas draining into a basin
weed, weedy plant thriving in disturbed habitat and growing where it is not wanted
whippy long, thin and bendy
whorl a set of similar organs arranged in a circle around a central axil, or verticil
whorled arranged in a circle around a central axis, e.g. leaves around a node on a stem
wing lateral petals of a papilionaceous flower
winged with flattened to blade-like ridges on either side
wiry like a wire, thin and cylindrical
withering dried out, diminishing in volume and becoming brown and wrinkled while drying
wood lignified xylar tissue of shrubs and trees, secondary xylem tissue
woody made of wood, or wood-like tissue
xeromorphic structurally modified to withstand drought
xerophyte plant adapted to arid conditions
xerophytic dry-loving, plants adapted to arid conditions
zygomorphic with bilateral symmetry

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Near-endemic taxa
(vol. 1)

Petrorhagia arabica (Boiss.) P.W. Ball & Heywood (Sinai, Palestine).
Silene biappendiculata Rohrb. (Egypt, Libya).
Minuartia picta (Sibth. & Sm.) Bornm. (Sinai, southern Palestine).
Herniaria cyrenaica F. Herm. (Egypt, Libya).
Salsola longifolia Forssk. (Egypt, Libya).
Haloxylon negevensis (Iljin & Zohary) Boulos (Sinai, southern Palestine).
Nigella deserti Boiss. (Sinai, Palestine).
Delphinium bovei Decne. (Sinai, Palestine).
Hypericum sinaicum Hochst. & Steud. ex Boiss. (Sinai, northwest Saudi Arabia).
Hypecoum aequilobum Viv. (Egypt, Libya).
Hypecoum aegyptiacum (Forssk.) Asch. & Schweinf. (Egypt, Palestine).
Nasturtiopsis coronopinfolia (Desf.) Boiss. (Egypt, Palestine).
Isatis microcarpa J. Gay ex Boiss. (Egypt, Palestine).
Lobularia arabica (Boiss.) Muschl. (Egypt, Palestine).
Enarthrocarpus pterocarpus (Pers.) DC. (Egypt, Libya).
Reseda stenostachya Boiss. (Sinai, Palestine).
Lupinus palaestinus Boiss. (Sinai, Palestine).
Trifolium philistaeum Zohary (Sinai, Palestine).
Lotus hebranicus Hochst. ex Brand (Egypt, northeast Sudan).
Lotus nubicus Baker (Egypt, Sudan).
Tephrosia purpurea (L.) Pers. subsp. *apollinea* (Delile) Hosni & El-Karmy (Southern Egypt, Sudan).
Astragalus trimestris L. (Egypt, Palestine).
Astragalus caprinus L. (Egypt, Palestine).
Astragalus fruticosus Forssk. (Egypt, Palestine).
Astragalus amalecitanus Boiss. (Sinai, Palestine).
Taverniera aegyptiaca Boiss. (Egypt, Saudi Arabia).
Ebenus armitagei Schweinf. & Taub. (Egypt, Libya).

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Cultivated species of Gramineae

Oryza sativa
Avena sativa
Phalaris arundinacea
Phleum pratense
Bromus lepidus
Elymus repens
Hordeum vulgare
Triticum dicoccum
Triticum turgidum
Triticum durum
Triticum pyramidale
Triticum aestivum
Cortaderia selloana
Eragrostis tenuifolia
Eragrostis tremula
Eleusine coracana
Eleusine floccifolia
Sporobolus natalensis
Sporobolus wrightii
Cynodon transvaalensis
Panicum maximum
Paspalum racemosum
Setaria italica
Setaria megaphylla
Stenotaphrum secundatum
Melinis repens
Melinis minutiflora
Pennisetum clandestinum
Pennisetum glaucum
Pennisetum villosum
Saccharum officinarum
Miscanthus sinensis
Pogonatherum paniceum
Sorghum bicolor
Sorghum x *drummondii*
Chrysopogon zizanioides
Cymbopogon jwarancusa
Cymbopogon martinii
Cymbopogon nardus
Cymbopogon citratus
Cymbopogon flexuosus
Zea mexicana
Zea mays
Coix lacryma-jobi

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