

قاموس مصطلحات التقنية الحيوية

***Aerobe;*** A microorganism that grows in the presence of oxygen.

***Agarose gel electrophoresis;*** A matrix composed of a highly purified form of agar that is used to separate larger DNA and RNA molecules ranging 20,000 nucleotides

***Alleles;*** Alternate forms of a gene or DNA sequence, which occur on either of two homologous chromosomes in a diploid organism.

***Ampicillin; ( beta-lactamase );*** An antibiotic derived from penicillin that prevents bacterial growth by interfering with cell wall synthesis

***Amplify;*** To increase the number of copies of a DNA sequence, in vivo by inserting into a cloning vector that replicates within a host cell, or in vitro by polymerase chain reaction ( PCR )

***Anaerobe;*** An organism that grows in the absence of oxygen

***Anneal;*** The pairing of complementary DNA or RNA sequences, via hydrogen bonding, to form a double-stranded polynucleotide Most often used to describe the binding of a short primer or probe

***Antibiotic;*** A class of natural and synthetic compounds that inhibit the growth of or kill other microorganisms

**Antibiotic resistance;** The ability of a microorganism to produce a protein that disables an antibiotic or prevents transport of the antibiotic into the cell

**Antibody;** An immunoglobulin protein produced by B-lymphocytes of the immune system that binds to a specific antigen molecule

**Anticodon;** A nucleotide base triplet in a transfer RNA molecule that pairs with a complementary base triplet, or codon, in a messenger RNA molecule

**Antigen;** Any foreign substance, such as a virus, bacterium, or protein that elicits an immune response by stimulating the production of antibodies

**Antigenic determinant;** A surface feature of a microorganism or macromolecule, such as a glycoprotein, that elicits an immune response

**Antigenic switching;** The altering of a microorganism's surface antigens through genetic rearrangement, to elude detection by the host's immune system

**Antimicrobial agent;** Any chemical or biological agent that harms the growth of microorganisms

**Autosome;** A chromosome that is not involved in sex determination

**beta-DNA;** The normal form of DNA found in biological systems, which exists as a right-handed helix

**Bacillus;** A rod-shaped bacterium

***Bacillus thuringiensis ( Bt )***; A bacterium that kills insects; a major component of the microbial pesticide industry

***Backcross*** Crossing an organism with one of its parent organisms

***Bacteriophage ( phage or phage particle )***; A virus that infects bacteria Altered forms are used as vectors for cloning DNA

***Bacterium***; A single-celled, microscopic prokaryotic organism: a single cell organism without a distinct nucleus

***Base pair ( bp )***; A pair of complementary nitrogenous bases in a DNA molecule--adenine-thymine and guanine-cytosine Also, the unit of measurement for DNA sequences

***Bioenrichment***; Adding nutrients or oxygen to increase microbial breakdown of pollutants

***Biologics***; Agents, such as vaccines, that gives immunity to diseases or harmful biotic stresses

***Biomass***; The total dry weight of all organisms in a particular sample, population, or area

***Bioremediation***; The use of microorganisms to remedy environmental problems

***Biotechnology***; The scientific manipulation of living organisms, especially at the molecular genetic level, to

produce useful products Gene splicing and use of recombinant DNA ( rDNA ) are major techniques used

**Biotic stress;** Living organisms which can harm plants , such as viruses, fungi, and bacteria, and harmful insects

**Carcinogen;** A substance that induces cancer

**Catalyst;** A substance that promotes a chemical reaction by lowering the activation energy of a chemical reaction, but which itself remains unaltered at the end of the reaction

**Cation;** A positively charged ion

**cDNA;** DNA synthesized from an RNA template using reverse transcriptase

**cDNA library;** A library composed of complementary copies of cellular mRNAs

**Cellular oncogene ( proto-oncogene );** A normal gene that when mutated or improperly expressed contributes to the development of cancer

**Centers of origin;** Usually the location in the world where the oldest cultivation of a particular crop has been identified

**Central dogma;** Francis Crick's seminal concept that in nature genetic information generally flows from DNA to RNA to protein

**Centrifugation;** Separating molecules by size or density using centrifugal forces generated by a spinning rotor G forces of several hundred thousand times gravity are generated in ultracentrifugation

**Centromere;** The central portion of the chromosome to which the spindle fibers attach during mitotic and meiotic division

**Chromatid;** Each of the two daughter strands of a duplicated chromosome joined at the centromere during mitosis and meiosis

**Chromosome;** A single DNA molecule, a tightly coiled strand of DNA, condensed into a compact structure in vivo by complexing with accessory histones or histone-like proteins Chromosomes exist in pairs in higher eukaryotes

**Chromosome walking;** Working from a flanking DNA marker, overlapping clones are successively identified that span a chromosomal region of interest

**Clone;** An exact genetic replica of a specific gene or an entire organism

**Cloning;** The mitotic division of a progenitor cell to give rise to a population of identical daughter cells or clones

**Coat protein ( capsid );** The coating of a protein that enclosed the nucleic acid core of a virus

**Codon;** A group of three nucleotides that specifies addition of one of the 20 amino acids during translation of an mRNA into a polypeptide. Strings of codons form genes and strings of genes form chromosomes.

**Coenzyme ( cofactor );** An organic molecule, such as a vitamin, that binds to an enzyme and is required for its catalytic activity.

**Colony** A group of identical cells ( clones ); derived from a single progenitor cell.

**Competency;** An ephemeral state, induced by treatment with cold cations, during which bacterial cells are capable of uptaking foreign DNA.

**Complementary DNA or RNA;** The matching strand of a DNA or RNA molecule to which its bases pair.

**Complementary nucleotides;** Members of the pairs adenine-thymine, adenine-uracil, and guanine-cytosine that have the ability to hydrogen bond to one another.

**Conjugation;** The joining of two bacteria cells when genetic material is transferred from one bacterium to another.

**Constitutive promoter;** An unregulated promoter that allows for continual transcription of its associated gene.

**Cross-hybridization** The hydrogen bonding of a single-stranded DNA sequence that is partially but not entirely complementary to a singlestranded substrate. Often, this involves hybridizing a DNA probe for a specific DNA

sequence to the homologous sequences of different species

**Crossing-over;** The exchange of DNA sequences between chromatids of homologous chromosomes during meiosis

**Culture;** A particular kind of organism growing in a laboratory medium

**Cytogenetics;** Study that relates the appearance and behavior of chromosomes to genetic phenomenon

**Dalton;** A unit of measurement equal to the mass of a hydrogen atom,  $167 \times 10E-24$  gram/L ( Avogadro's number )

**Death phase;** The final growth phase, during which nutrients have been depleted and cell number decreases

**Denature;** To induce structural alterations that disrupt the biological activity of a molecule Often refers to breaking hydrogen bonds between base pairs in double-stranded nucleic acid molecules to produce in single-stranded polynucleotides or altering the secondary and tertiary structure of a protein, destroying its activity

**Diabetes;** A disease associated with the absence or reduced levels of insulin, a hormone essential for the transport of glucose to cells

**Dideoxynucleotide ( didN );** A deoxynucleotide that lacks a 3' hydroxyl group, and is thus unable to form a 3'-5' phosphodiester bond necessary for chain elongation



Dideoxynucleotides are used in DNA sequencing and the treatment of viral diseases

***Digest;*** To cut DNA molecules with one or more restriction endonucleases

***Diploid cell;*** A cell which contains two copies of each chromosome

***Directional cloning;*** DNA insert and vector molecules are digested with two different restriction enzymes to create noncomplementary sticky ends at either end of each restriction fragment This allows the insert to be ligated to the vector in a specific orientation and prevents the vector from recircularizing

***DNA ( Deoxyribonucleic acid );*** An organic acid and polymer composed of four nitrogenous bases--adenine, thymine, cytosine, and guanine linked via intervening units of phosphate and the pentose sugar deoxyribose DNA is the genetic material of most organisms and usually exists as a double-stranded molecule in which two antiparallel strands are held together by hydrogen bonds between adenine-thymine and cytosine-guanine

***DNA diagnosis;*** The use of DNA polymorphisms to detect the presence of a disease gene

***DNA fingerprint;*** The unique pattern of DNA fragments identified by Southern hybridization ( using a probe that binds to a polymorphic region of DNA ) or by

polymerase chain reaction ( using primers flanking the polymorphic region )

**DNA polymorphism;** One of two or more alternate forms ( alleles ) of a chromosomal locus that differ in nucleotide sequence or have variable numbers of repeated nucleotide units

**DNA sequencing;** Procedures for determining the nucleotide sequence of a DNA fragment

**Dominant gene;** A gene whose phenotype is when it is present in a single copy

**Double helix;** Describes the coiling of the antiparallel strands of the DNA molecule, resembling a spiral staircase in which the paired bases form the steps and the sugar-phosphate backbones form the rails

**Double-stranded complementary DNA ( dsDNA );** A duplex DNA molecule copied from a cDNA template

**Downstream;** The region extending in a 3' direction from a gene

**dsDNA;** double-stranded complementary DNA

**Duplex DNA;** Double-stranded DNA

**Electrophoresis;** The technique of separating charged molecules in a matrix to which is applied an electrical field

**Electroporation;** A method for transforming DNA, especially useful for plant cells, in which high voltage

pulses of electricity are used to open pores in cell membranes, through which foreign DNA can pass

***Environmental Protection Agency ( EPA );*** The US regulatory agency for Biotechnology of microbes The major laws under which the agency has regulatory powers are the Federal Insecticide, Fungicide, and Rodenticide Act ( FIFRA ); and the Toxic Substances Control Act ( TSCA )

***Enzymes;*** Proteins that control the various steps in all chemical reactions

***Escherichia coli;*** A commensal bacterium inhabiting the human colon that is widely used in biology, both as a simple model of cell biochemical function and as a host for molecular cloning experiments

***Ethidium bromide;*** A fluorescent dye used to stain DNA and RNA The dye fluoresces when exposed to UV light

***Eukaryote;*** An organism whose cells possess a nucleus and other membrane-bound vesicles, including all members of the protist, fungi, plant and animal kingdoms; and excluding viruses, bacteria, and blue-green algae

***Evolution;*** The long-term process through which a population of organisms accumulates genetic changes that enable its members to successfully adapt to environmental conditions and to better exploit food resources

**Exon;** A DNA sequence that is ultimately translated into protein

**Express;** To translate a gene's message into a molecular product

**Flanking region;** The DNA sequences extending on either side of a specific locus or gene

**Food and Drug Administration ( FDA );** The US agency responsible for regulation of Biotechnology food products The major laws under which the agency has regulatory powers include the Food, Drug, and Cosmetic Act; and the Public Health Service Act

**Fusion gene;** A hybrid gene created by joining portions of two different genes (to produce a new protein) or by joining a gene to a different promoter ( to alter or regulate gene transcription )

**Gene;** A locus on a chromosome that encodes a specific protein or several related proteins it is considered the functional unit of heredity

**Gene amplification;** The presence of multiple genes Amplification is one mechanism through which proto-oncogenes are activated in malignant cells

**Gene cloning;** The process of synthesizing multiple copies of a particular DNA sequence using a bacteria cell or another organism as a host

**Gene expression;** The process of producing a protein from its DNA- and mRNA-coding sequences

**Gene flow;** The exchange of genes between different but ( usually ) related populations

**Gene frequency;** The percentage of a given allele in a population of organisms

**Gene insertion;** The addition of one or more copies of a normal gene into a defective chromosome

**Gene linkage;** The hereditary association of genes located on the same chromosome

**Gene modification;** The chemical repair of a gene's defective DNA sequence

**Gene pool;** The totality of all alleles of all genes of all individuals in a particular population

**Gene splicing;** Combining genes from different organisms into one organism

**Gene translocation;** The movement of a gene fragment from one chromosomal location to another, which often alters or abolishes expression

**Genetic code;** The three-letter code that translates nucleic acid sequence into protein sequence The relationships between the nucleotide base-pair triplets of a messenger RNA molecule and the 20 amino acids that are the building blocks of proteins

**Genetic disease;** A disease that has its origin in changes to the genetic material, DNA Usually refers to diseases that are inherited in a Mendelian fashion, although noninherited forms of cancer also result from DNA mutation

**Genetic drift;** Random variation in gene frequency from one generation to another

**Genetic engineering;** The manipulation of an organism's genetic endowment by introducing or eliminating specific genes through modern molecular biology techniques A broad definition of genetic engineering also includes selective breeding and other means of artificial selection

**Genetic linkage map;** A linear map of the relative positions of genes along a chromosome Distances are established by linkage analysis, which determines the frequency at which two gene loci become separated during chromosomal recombination

**Genetic marker;** A gene or group of genes used to "mark" or track the action of microbes

**Genome;** The genetic complement contained in the chromosomes of a given organism, usually the haploid chromosome state

**Genomic library;** A library composed of fragments of genomic DNA

**Genotype;** The structure of DNA that determines the expression of a trait

**Genus;** A category including closely related species interbreeding between organisms within the same category can occur

**GEO;** Genetically engineered organism

**Germ cell;** Reproductive cell

**GMO** Genetically modified organism

**Growth factor;** A serum protein that stimulates cell division when it binds to its cell-surface receptor

**Growth phase ( curve );** The characteristic periods in the growth of a bacterial culture, as indicated by the shape of a graph of viable cell number versus time

**Haploid cell;** A cell containing only one set, or half the usual ( diploid ) number, of chromosomes

**Herbicide;** Any substance that is toxic to plants; usually used to kill specific unwanted plants

**Heterochromatin;** Dark-stained regions of chromosomes thought to be for the most part genetically inactive

**Heteroduplex;** A double-stranded DNA molecule or DNA-RNA hybrid, where each strand is of a different origin

**Heterogeneous nuclear RNA ( hnRNA );** The name originally given to large RNA molecules found in the

nucleus, which are now known to be unedited mRNA transcripts, or pre-mRNAs

***Homologous chromosomes;*** Chromosomes that have the same linear arrangement of genes a pair of matching chromosomes in a diploid organism

***Homologous recombination;*** The exchange of DNA fragments between two DNA molecules or chromatids of paired chromosomes ( during crossing over ) at the site of identical nucleotide sequences

***Host*** An organism that contains another organism

***Human Genome Project;*** A project coordinated by the National Institutes of Health ( NIH ) and the Department of Energy ( DOE ) to determine the entire nucleotide sequence of the human chromosomes

***Hybrid;*** The offspring of two parents differing in at least one genetic characteristic ( trait ) Also, a heteroduplex DNA or DNA-RNA molecule

***Hybridization;*** The hydrogen bonding of complementary DNA and/or RNA sequences to form a duplex molecule

***Hydrogen bond;*** A relatively weak bond formed between a hydrogen atom (which is covalently bound to a nitrogen or oxygen atom) and a nitrogen or oxygen with an unshared electron pair

***In situ;*** Refers to performing assays or manipulations with intact tissues



***Intergenic regions;*** DNA sequences located between genes that comprise a large percentage of the human genome with no known function

***Intron;*** A noncoding DNA sequence within a gene that is initially transcribed into messenger RNA but is later snipped out

***In vivo;*** Refers to biological processes that take place within a living organism or cell

***Ion;*** A charged particle

***Kanamycin;*** An antibiotic of the aminoglycoside family that poisons translation by binding to the ribosomes

***Lag phase;*** The initial growth phase, during which cell number remains relatively constant prior to rapid growth

***Library;*** A collection of cells, usually bacteria or yeast, that have been transformed with recombinant vectors carrying DNA inserts from a single species

***Ligase ( DNA ligase );*** An enzyme that catalyzes a condensation reaction that links two DNA molecules via the formation of a phosphodiester bond between the 3' hydroxyl and 5' phosphate of adjacent nucleotides

***Ligate;*** The process of joining two or more DNA fragments on a chromosome

***Liposomes*** Membrane-bound vesicles constructed in the laboratory to transport biological molecules

**Locus ( plural = loci );** A specific location or site on a chromosome

**Lysis** The destruction of the cell membrane

**Mapping;** Determining the physical location of a gene or genetic marker on a chromosome

**Megabase cloning;** The cloning of very large DNA fragments

**Messenger RNA ( mRNA );** The class of RNA molecules that copies the genetic information from DNA, in the nucleus, and carries it to ribosomes, in the cytoplasm, where it is translated into protein

**Metabolism;** The biochemical processes that sustain a living cell or organism

**Microbial mats ( biofilms );** Layered groups or communities of microbial populations

**Microinjection;** A means to introduce a solution of DNA, protein, or other soluble material into a cell using a fine microcapillary pipet

**Molecular biology;** The study of the biochemical and molecular interactions within living cells

**Molecular cloning;** The biological amplification of a specific DNA sequence through mitotic division of a host cell into which it has been transformed or transfected

**Molecular genetics;** The study of the flow and regulation of genetic information between DNA, RNA, and protein molecules

**Monoclonal antibodies;** Immunoglobulin molecules of single- epitope specificity that are secreted by a clone of B cells

**Monoculture;** The agricultural practice of cultivating crops consisting of genetically similar organisms

**Mutagen;** Any agent or process that can cause mutations

**Mutation;** An alteration in DNA structure or sequence of a gene

**Nitrocellulose;** A membrane used to immobilize DNA, RNA, or protein, which can then be probed with a labeled sequence or antibody

**Nitrogenous bases;** The purines ( adenine and guanine ) and pyrimidines ( thymine, cytosine, and uracil ) that comprise DNA and RNA molecules

**Nuclease;** A class of enzymes that degrades DNA and/or RNA molecules by cleaving the phosphodiester bonds that link adjacent nucleotides In deoxyribonuclease ( DNase ), the substrate is DNA In endonuclease, it cleaves at RNA sites in the substrate molecule Exonuclease progressively cleaves from the end of the substrate molecule In ribonuclease ( RNase ), the

substrate is RNA In the S1 nuclease, the substrate is single-stranded DNA or RNA

**Nucleic acids;** The two nucleic acids, deoxyribonucleic acid ( DNA ) and ribonucleic acid ( RNA ), are made up of long chains of molecules called nucleotides

**Nucleoside;** A building block of DNA and RNA, consisting of a nitrogenous base linked to a five carbon sugar

**Nucleoside analog;** A synthetic molecule that resembles a naturally occurring nucleoside, but that lacks a bond site needed to link it to an adjacent nucleotide

**Nucleotide;** A building block of DNA and RNA, consisting of a nitrogenous base, a five-carbon sugar, and a phosphate group Together, the nucleotides form codons, which when strung together form genes, which in turn link to form chromosomes **Nucleus** The membrane-bound region of a eukaryotic cell that contains the chromosomes

**Oligonucleotide;** A DNA polymer composed of only a few nucleotides

**Open reading frame;** A long DNA sequence that is uninterrupted by a stop codon and encodes part or all of a protein

**Operator;** A prokaryotic regulatory element that interacts with a repressor to control the transcription of adjacent structural genes

**Origin of replication;** The nucleotide sequence at which DNA synthesis is initiated

**Overlapping reading frames;** Start codons in different reading frames generate different polypeptides from the same DNA sequence

**Pathogen;** Organism which can cause disease in another organism

**Persistence;** Ability of an organism to remain in a particular setting for a period of time after it is introduced

**Phenotype;** The observable characteristics of an organism, the expression of gene alleles ( genotype ) as an observable physical or biochemical trait

**Phosphatase;** An enzyme that hydrolyzes esters of phosphoric acid, removing a phosphate group

**Phosphodiester bond;** A bond in which a phosphate group joins adjacent carbons through ester linkages a condensation reaction between adjacent nucleotides results in a phosphodiester bond between 3' and 5' carbons in DNA and RNA

**Phospholipid;** A class of lipid molecules in which a phosphate group is linked to glycerol and two fatty acyl groups A chief component of biological membranes

**Phosphorylation;** The addition of a phosphate group to a compound

**Physical map** A map showing physical locations on a DNA molecule, such as restriction sites, and sequence-tagged sites

**Plasmid;** A circular DNA molecule, capable of autonomous replication, which typically carries one or more genes encoding antibiotic resistance proteins Plasmids can transfer genes between bacteria and are important tools of transformation for genetic engineers

**Point mutation;** A change in a single base pair of a DNA sequence in a gene

**Poly( A ) polymerase;** Catalyzes the addition of adenine residues to the 3' end of pre-mRNAs to form the poly ( A ) tail

**Polyacrylamide gel electrophoresis** Electrophoresis through a matrix composed of a synthetic polymer, used to separate proteins, small DNA, or RNA molecules of up to 1000 nucleotides Used in DNA sequencing

**Polyclonal antibodies;** A mixture of immunoglobulin molecules secreted against a specific antigen, each recognizing a different epitope

**Polymer;** A molecule composed of repeated subunits

**Polymerase ( DNA );** Synthesizes a double-stranded DNA molecule using a primer and DNA as a template

**Polymorphisms;** Variant forms of a particular gene that occur simultaneously in a population

**Polynucleotide;** A DNA polymer composed of multiple nucleotides

**Polymerase chain reaction ( PCR );** A procedure that enzymatically amplifies a DNA polymerase

**Polypeptide ( protein );** A polymer composed of multiple amino acid units linked by peptide bonds

**Polyploid;** A multiple of the haploid chromosome number that results from chromosome replication without nuclear division

**Population;** A local group of organisms belonging to the same species and capable of interbreeding

**Probe;** A sequence of DNA or RNA, labeled or marked with a radioactive isotope, used to detect the presence of complementary nucleotide sequences

**Prokaryote;** A bacterial cell lacking a true nucleus; its DNA is usually in one long strand

**Primer;** A short DNA or RNA fragment annealed to single-stranded DNA, from which DNA polymerase extends a new DNA strand to produce a duplex molecule

**Probe;** A single-stranded DNA that has been radioactively labeled and is used to identify complementary sequences in genes or DNA fragments of interest

**Promoter;** A region of DNA extending 150-300 bp upstream from the transcription start site that contains binding sites for RNA polymerase and a number of

proteins that regulate the rate of transcription of the adjacent gene

**Protease;** An enzyme that cleaves peptide bonds that link amino acids in protein molecules

**Protein;** A polymer of amino acids linked via peptide bonds and which may be composed of two or more polypeptide chains

**Reading frame;** A series of triplet codons beginning from a specific nucleotide Depending on where one begins; each DNA strand contains three different reading frames

**Recessive gene;** Characterized as having a phenotype expressed only when both copies of the gene are mutated or missing

**Recognition sequence ( site );** A nucleotide sequence--composed typically of 4, 6, or 8 nucleotides that is recognized by a restriction endonuclease Type II enzymes cut ( and their corresponding modification enzymes methylate ) within or very near the recognition sequence

**Recombinant;** A cell that results from recombination of genes

**Recombinant DNA;** The process of cutting and recombining DNA fragments from different sources as a means to isolate genes or to alter their structure and function



**Recombination frequency;** The frequency at which crossing over occurs between two chromosomal loci--the probability that two loci will become unlinked during meiosis

**Regulatory gene;** A gene whose protein controls the activity of other genes or metabolic pathways

**Renature;** The reannealing ( hydrogen bonding ) of single-stranded DNA and/or RNA to form a duplex molecule

**Replicon;** A chromosomal region containing the DNA sequences necessary to initiate DNA replication processes

**Repressor;** A DNA-binding protein in prokaryotes that blocks gene transcription by binding to the operator

**Restriction endonuclease ( enzyme );** A class of endonucleases that cleaves DNA after recognizing a specific sequence, such as BamH1 ( GGATCC ), EcoRI ( GAATTC ), and HindIII ( AAGCTT ) Type I Cuts nonspecifically a distance greater than 1000 bp from its recognition sequence and contains both restriction and methylation activities Type II Cuts at or near a short, and often symmetrical, recognition sequence A separate enzyme methylates the same recognition sequence Type III Cuts 24-26 bp downstream from a short, asymmetrical recognition sequence Requires ATP and contains both restriction and methylation activities

***Restriction-fragment-length polymorphism ( RFLP );***

Differences in nucleotide sequence between alleles at a chromosomal locus result in restriction fragments of varying lengths detected by Southern analysis

***RFLP*** Restriction-fragment-length polymorphism

***Ribosomal RNA ( rRNA );*** The RNA component of the ribosome

***Ribosome;*** Cellular organelle that is the site of protein synthesis during translation

***Ribosome-binding site;*** The region of an mRNA molecule that binds the ribosome to initiate translation

***RNA ( ribonucleic acid );*** An organic acid composed of repeating nucleotide units of adenine, guanine, cytosine, and uracil, whose ribose components are linked by phosphodiester bonds

***RNA polymerase;*** Transcribes RNA from a DNA template

***Satellite RNA ( viroids );*** A small, self-splicing RNA molecule that accompanies several plant viruses, including tobacco ringspot virus

***Selectable marker;*** A gene whose expression allows one to identify cells that have been transformed or transfected with a vector containing the marker gene

***Semiconservative replication;*** During DNA duplication, each strand of a parent DNA molecule is a template for the synthesis of its new complementary strand Thus, one

half of a preexisting DNA molecule is conserved during each round of replication

**Sequence hypothesis;** Francis Crick's seminal concept that genetic information exists as a linear DNA code; DNA and protein sequence are colinear

**Small nuclear RNA ( snRNA );** Short RNA transcripts of 100-300 bp that associate with proteins to form small nuclear ribonucleoprotein particles ( snRNPs ), which participate in RNA processing

**Somatic cell;** Any nongerm cell that composes the body of an organism and which possesses a set of multiploid chromosomes ( diploid in most organisms )

**Somatic cell gene therapy;** The repair or replacement of a defective gene within somatic tissue

**Southern hybridization ( Southern blotting );** A procedure in which DNA restriction fragments are transferred from an agarose gel to a nitrocellulose filter, where the denatured DNA is then hybridized to a radioactive probe ( blotting )

**Species;** A classification of related organisms that can freely interbreed

**Spore;** A form taken by certain microbes that enables them to exist in a dormant stage It is an asexual reproductive cell

**Stationary phase;** The plateau of the growth curve after log growth, during which cell number remains constant new cells are produced at the same rate as older cells die

**Sticky end;** A protruding, single-stranded nucleotide sequence produced when a restriction endonuclease cleaves off center in its recognition sequence

**Stringency;** Reaction conditions notably temperature, salt, and pH that dictate the annealing of single-stranded DNA/DNA, DNA/RNA, and RNA/RNA hybrids At high stringency, duplexes form only between strands with perfect one-to-one complementarity; lower stringency allows annealing between strands with some degree of mismatch between bases

**Subcloning;** The process of transferring a cloned DNA fragment from one vector to another

**Supergene;** A group of neighboring genes on a chromosome that tends to be inherited together and sometimes are functionally related

**Taq polymerase;** A heat-stable DNA polymerase isolated from the bacterium *Thermus aquaticus*, used in PCR

**TATA box;** An adenine- and thymine-rich promoter sequence located 25-30 bp upstream of a gene, which is the binding site of RNA polymerase

**T-DNA ( transfer DNA, tumor-DNA );** The transforming region of DNA in the Ti plasmid of *Agrobacterium tumefaciens*

**Telomere;** The end of a chromosome

**Template;** An RNA or single-stranded DNA molecule upon which a complementary nucleotide strand is synthesized

**Termination codon;** Any of three mRNA sequences ( UGA, UAG, UAA ) that do not code for an amino acid and thus signal the end of protein synthesis Also known as stop codon

**Terminator region;** A DNA sequence that signals the end of transcription

**Tetracycline;** An antibiotic that interferes with protein synthesis in prokaryotes

**Thymidine kinase ( tk );** An enzyme that allows a cell to utilize an alternate metabolic pathway for incorporating thymidine into DNA Used as a selectable marker to identify transfected eukaryotic cells

**Transcription;** The process of creating a complementary RNA copy of DNA

**Transduction;** The transfer of DNA sequences from one bacterium to another via lysogenic infection by a bacteriophage ( transducing phage )

**Transformant;** In prokaryotes, a cell that has been genetically altered through the uptake of foreign DNA In

higher eukaryotes, a cultured cell that has acquired a malignant phenotype

**Transformation;** In prokaryotes, the natural or induced uptake and expression of a foreign DNA sequence--typically a recombinant plasmid in experimental systems In higher eukaryotes, the conversion of cultured cells to a malignant phenotype--typically through infection by a tumor virus or transfection with an oncogene

**Transformation efficiency;** The number of bacterial cells that uptake and express plasmid DNA divided by the mass of plasmid used ( in transformants/microgram )

**Transforming oncogene;** A gene that upon transfection converts a previously immortalized cell to the malignant phenotype

**Transgenic** An organism in which a foreign DNA gene ( a transgene ) is incorporated into its genome early in development The transgene is present in both somatic and germ cells, is expressed in one or more tissues, and is inherited by offspring in a Mendelian fashion

**Transgenic animal;** Genetically engineered animal or offspring of genetically engineered animals The transgenic animal usually contains material from at least one unrelated organism, such as from a virus, plant, or other animal

**Transgenic plant;** Genetically engineered plant or offspring of genetically engineered plants The transgenic plant

usually contains material from at least one unrelated organisms, such as from a virus, animal, or other plant

**Translation;** The process of converting the genetic information of an mRNA on ribosomes into a polypeptide  
Transfer RNA molecules carry the appropriate amino acids to the ribosome, where they are joined by peptide bonds

**Translocation;** The movement or reciprocal exchange of large-chromosomal segments, typically between two different chromosomes

**Transposition;** The movement of a DNA segment within the genome of an organism

**Transposon; ( transposable, or movable genetic element )**  
A relatively small DNA segment that has the ability to move from one chromosomal position to another

**tRNA ( transfer RNA );** The class of small RNA molecules that transfer amino acids to the ribosome during protein synthesis

**Trypsin;** A proteolytic enzyme that hydrolyzes peptide bonds on the carboxyl side of the amino acids arginine and lysine

**Upstream;** The region extending in a 5' direction from a gene

**Variation;** Differences in the frequency of genes and traits among individual organisms within a population

**Vector;** An autonomously replicating DNA molecule into which foreign DNA fragments are inserted and then propagated in a host cell Also living carriers of genetic material ( such as pollen ) from plant to plant, such as insects

**Viral oncogene;** A viral gene that contributes to malignancies in vertebrate hosts

**Viroid;** A plant pathogen that consists of a naked RNA molecule of approximately 250-350 nucleotides, whose extensive base pairing results in a nearly correct double helix

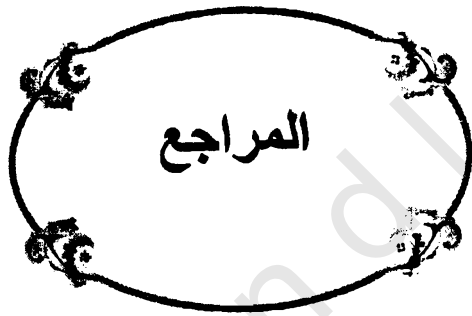
**Virulence;** The degree of ability of an organism to cause disease

**Virus;** An infectious particle composed of a protein capsule and a nucleic acid core, which is dependent on a host organism for replication A double-stranded DNA copy of an RNA virus genome that is integrated into the host chromosome during lysogenic infection

**X-ray crystallography;** The diffraction pattern of X-rays passing through a pure crystal of a substance

**Z-DNA;** A region of DNA that is "flipped" into a lefthanded helix, characterized by alternating purines and pyrimidines, and which may be the target of a DNA-binding protein





المراجع

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## المراجع

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