

Glossary Genetics

Active Site: The part of a protein that must be maintained in a specific shape if the protein is to be functional - e.g. in an enzyme, the part to which the substrate binds.

Allele: The different, alternative forms of a gene that can exist at a single locus (see dominance).

Dominant: An allele that expresses its phenotypic effect even when heterozygous with a recessive allele; if *A* is dominant over *a*, then *AA* (homo-) and *Aa* (heterozygot) have the same pheno(wild)type.

Recessive: An allele whose phenotypic effect is not expressed, a mutant (e.g.: *aa*).

Amino Acid: A peptide; the basic building block of proteins (polypeptides + a C₂O₂H+H₂N tail); see biochemistry;

Aromatic: Amino acids containing a benzene ring (but no O, or N and are hydrophobic).

Aliphatic: Do not contain benzene rings; are hydrophobic and do not contain N or O).

Ala (alanine):	GCU GCC GCA GCG	nonpolar (aliphatic)
Arg (arginine):	CGU CGC CGA CGG AGA AGG	basic (charged-ionizable)
Asn (asparagine):	AAU AAC	polar (nonionizable)
Asp (aspartic acid):	GAU GAC	acid (charged-ionizable)
Cys (cysteine):	UGU UGC	polar (nonionizable) + SH-tail
Gln (glutamine):	CAA CAG	polar (nonionizable)
Glu (glutamic acid):	GAA GAG	acid (charged-ionizable)
Gly (glycine):	GGU GGC GGA GGG	nonpolar
His (histidine):	CAU CAC	basic (charged-ionizable)
Ile (isoleucine):	AUU AUC AUA	nonpolar (aliphatic)
Leu (leucine):	UUA UUG CUU CUC CUA CUG	nonpolar (aliphatic)
Lys (lysine):	AAA AAG	basic (charged-ionizable)
Met (methionine):	AUG	Start + SCH ₃ -tail
	UAA UAG UGA	Stop
Phe (phenylalanine):	UUU UUC	nonpolar (aromatic)
Pro (proline):	CCU CCC CCA CCG	nonpolar
Ser (serine):	UCU UCC UCA UCG AGU AGC	polar (nonionizable) + OH-tail
Thr (threonine):	ACU ACC ACA ACG	polar (nonionizable) + OH-tail
Trp (tryptophan):	UGG	nonpolar (aromatic)
Tyr (tyrosine):	UAU UAC	polar (nonionizable) + OH-tail
Val (valine):	GUU GUC GUA GUG	nonpolar (aliphatic)

Autosome: A Look-alike chromosome other than a sex chromosome.

Auxotroph: (Gr. auxo, ???; trophos, feeder) A strain of microorganism that will proliferate only when the medium is supplemented with some specific substance (growth factor) not required by the wild type; humans are auxotroph for certain amino acids (see mutation, compare prototroph).

Backbone: In DNA/RNA: A sugar molecule connected to a P-acid; 5'-C from one sugar connects to the 3'-C of the following sugar (P-diester-bond). In Protein: The linear sequence of N-C-C, with up to 20 different side-chains corresponding to the specific amino acids.

Backcross: A testcross between F₂ generations of the recessive (*aa*-homo-) with the dominant (*Aa*-heterozygot) resulting in an equal display of recessive and dominant phenotypes.

Carcinogen: A substance that causes cancer.

Cell Cycle: Set of events that occur during the division of mitotic cells - periodically cycling between mitosis (M phase) and interphase. **Interphase** can be subdivided in order into G₁, S, and G₂ phase. DNA synthesis occurs during S-Phase. The length of the cell cycle is regulated through a special option

G₁-phase: in which G₁ cells can enter a resting phase also called G₀; preceding S-phase (haploid).

S-phase: the phase in which DNA synthesis occurs (doubling of DNA).

G₂-phase: preceding M-phase (diploid).

M-phase: the mitotic phase of the cell (see there).

Central Dogma: The hypothesis that information flows only from DNA to RNA to PROTEIN; although some exceptions are now known (retrovirus), the rule is generally valid.

Centriole: Pair of barrel-shaped dark-stained organelles, that form the spindle fibers during mitosis / meiosis.

Centromere: A kinetochore; the constricted region (CEN) of a nuclear chromosome, to which the spindle fibers (microtubuli) attach during division (see also mitosis and meiosis)

Chargaff's Law: States that A pairs with T/U in a double bond and G with C in a triple hydrogen bond.

Chiasma: (Gk. chiasma, cross) A cross-shaped structure commonly observed between nonsister chromatids during meiosis; the site of crossing over.

- Chromatin:** (Gk. chrom, color) Fibrous material of aggregated nucleosomes forming ; now known to include 50% DNA, and 50% (per weight) chromosomal proteins histones, chromosomal RNA.
- Chromatid:** One of the two side-by-side replicas produced by chromosome division.
- Sisterchromatid:** Each of the identical twin strands of a chromosome connected via the centromere, also called haploid chromosome.
- Chromosome:** (G. chroma, color; soma, body) A linear end to end arrangement of genes and other DNA, sometimes with associated protein and RNA, found in Eukaryota.
- Harlequin C.:** Sister chromatids that stain differently (one stains light the other dark).
- Homologous C.:** (Gk. homologia, agreement) A member of a pair of homologous chromosomes; similar in size, shape and genetic content (except sex chromosomes) usually indicating some original ancestral homology - in a diploid organism (eukaryota) there are homologous chromosomes each one deriving from the mother and the father, containing the same genes with different alleles.
- Sister C.:** The two homologous chromosomes, in a synaptonemal complex (tetrad; see meiosis)
- Ciston:** Originally defined as a functional genetic unit (gene) which two mutations cant complement (e.g. in diploids = homozygote recessive, *aa*).
- Clone:** (Gk. klon, twig) A population of cells or individuals derived by asexual division from a single cell or individual; one of the members of such a population, which are genetically identical to a parent.
- Coding Strand:** One of the two DNA strands carries the information necessary to direct synthesis of a protein (+ / upper strand) whereas the complimentary strand is needed in semiconservative replication only.
- Codon:** A section of DNA (three nucleotide pairs in length) - a section of mRNA consisting of 3 purine or 3 pyrimidine bases that encodes a specific amino acid (see reading frame).
- Anticod.:** A nucleotide triplet in a tRNA molecule that aligns with a particular codon in mRNA under the influence of ribosome, so that the amino acid carried by the tRNA is inserted in a growing poly-peptide chain (see protein, codon, triplet and tRNA).
- Start C.:** Signals where the translation of a protein (on mRNA) has to start - AUG (MET).
- Stop C.:** Signals where the translation of a protein (on mRNA) has to end - UAA, UAG, UGA.
- Coenzyme:** A low molecular weight molecule that participates in an enzymatic reaction by accepting and donating electrons or functional groups (NAD^+ , FAD^+).
- Complimentary DNA:** Synthetic DNA transcribed from a specific RNA through the action of the enzyme reverse transcriptase (see retrovirus, phage).
- Complementation:** The production of a wildtype-phenotype when two different mutations are combined, mixed in a diploid or heterokaryon (compare recombination).
- Crossing Over:** The exchange of corresponding chromosome parts between homologs (synapsis) by breakage and reunion (see also chiasma and meiosis).
- Cytoskeleton:** (Gk. cyto, cell) The protein cable system and associated proteins that together form the architecture of a eukaryotic cell.
- Cytokinesis:** (Gk. kytos, hollow vessel; kinesis, motion) Division of the cytoplasm at telophase giving rise to two daughter cells (see mitosis. meiosis).
- Darwinian fitness:** The relative probability of survival and reproduction for a genotype.
- Degenerate Code:** A genetic code in which some amino acids may be encoded by more than one codon each; thesaurus (see also wobble).
- Denaturation:** The separation of the two strands of a DNA double-helix, or the severe disruption of the structure of any complex molecule without breaking the major bonds of its chain - denaturation of proteins, where hydrophobic parts are exposed (see also renaturation).
- Diploid:** A cell that contains two copies of each type of chromosome (except sex chrom. compare haploid).
- DNA** (deoxyribonucleic acid): A double chain of linked nucleotides (having deoxyribose as their sugars); the fundamental substance of which genes are composed (see scan at end);
 in **eukaryota:** DNA wrapped around histones, forming nucleosomes on solenoids; i.e. chromosomes.
 in **prokaryota:** DNA is circular and supercoiled, do not have chromatin (histones etc.).
- DNA Double Helix:** Two interlocking helices joined by hydrogen bonds between the pairs purine-pyrimidine bases (see Chargaff's Law).
- DNA Sequence:** The linear assembly of purine / pyrimidine nucleotides along a DNA strand.
- DNA Topoisomerase:** Enzyme unwinding the tightly coiled DNA arrangement, for DNA-replication.
- DNA Replication:** Semiconservative replication, where one strand determines the sequence of the complimentary strand (DNA synthesis).

- Dominance:** An allele or corresponding phenotypic trait that is expressed in heterozygotes (see allele).
- Codominance:** The genetic situation in which both alleles in a heterozygote individual are fully equally expressed in the phenotype; no dominance of one allele over the other (bloodtype A x B = AB).
- Incomplete D.:** The genetic situation in which the phenotype of the heterozygote is intermediate between two homozygotes (red flowering plant x white f. p. = pink flowering plant).
- Double Helix:** The structure of DNA with two interlocking helices joined together by H-bonds between paired bases running in opposite direction - antiparallel.
- Enzyme:** A protein that functions as a bio-catalyst.
- Restriction E.:** Enzymes that cleave the DNA double helix at specific nucleotide sequences.
- Exon:** Any non-intron section of the coding sequence of a gene (in eukaryota only); exons spliced together constitute the mRNA and are translated into proteins (compare intron).
- Filial Generation:** F1, F2, etc. In mendelian genetics the 1st, 2nd, etc. Generation in the line at descent.
- Fitness:** The genetic constitution of an organism to future generations, relative to the contributions of organisms living in the same environment that have different genotypes.
- Gene:** The fundamental physical and functional unit of heredity, which carries information from one generation to the next; a segment of DNA, composed of a transcribed region and a regulatory sequence that makes possible transcription.
- G. **Conversion:** A mitotic process of directed change in which one allele directs the conversion of a partner allele to its own form - altering the predicted outcome of Mendel's 1st law from 2:2 to 3:1.
- G. **Expression:** Synthesis of a polypeptide chain transcribed via the mRNA, tRNA, and rRNA using DNA as a template (see transcription).
- G. **Locus:** The specific place on a chromosome where a gene is located.
- G. **Dose:** The number of copies of a particular gene present in the genome (their number is directly proportional to the amount of proteins synthesized).
- Genetic Code:** The system of nucleotide triplets (codons) in DNA and RNA that dictates the amino acid sequence in polypeptide chains (proteins) except for the start (AUG) and stop (UAA, UGA, UAG) signals
- Genetic Diversity:** Many allelic variations ensure a rich genetic pool; in heterozygous orgs (di-, polyploidy).
- Genetic Mapping:** The process of locating the position of genes on chromosomes (see locus).
- Genome:** The entire complement of genetic material in a chromosome set (see gene dose, mutation).
- Genotype:** The specific allelic composition of a cell - either of the entire or, more commonly, for a certain gene or set of genes; genetic characteristics (makeup) that determine the structure and function of an organism (see also phenotype).
- Hairpin Loop:** A required to recognize certain transcription termination signals (in prokaryota).
- Haplod:** Having only one copy of a chromosome (genome) set (compare diploid, polyploid).
- Helicase:** An enzyme actively involved in the separation of the complementary nucleotides of DNA.
- Heterozygot:** (Gk. heteros, different) Has two different alleles of a gene; one trait can be visible (dominant) while the other can be hidden (recessive), or visible both (codominant or incomplete dominant).
- Histone:** A type of basic protein that forms the unit around which DNA is coiled in the nucleosomes of eukaryotic chromosomes, allowing extreme long DNA molecules to be packed into a cell nucleus (see also solenoid).
- h1:** stabilizing solenoid, located in-between every nucleosome.
- h2, h2a, h2b, h3, h4:** form the octameric histone core (see also nucleosome).
- Homozygot:** (Gk. homo, same) Has two identical alleles of a gene either AA (dominant) or aa (recessive).
- Hybrid:** An offspring resulting from mating between individuals of different genetic constitution.
- Monohyb.** cross: A cross between 2 individuals identically heterozygous at 2 loci (i.e.: AaBb x AaBb).
- Dihyb.** cross: A cross between 2 individuals identically heterozygous at one gene pair (i.e.: Aa x Aa).
- Inbreeding:** The breeding of closely related plants or animals; in plants, it is usually brought about by repeated self-pollination - as Mendel did.
- Independent Assortment Structure:** Mendel's 2nd Law.
- Interphase:** The cell cycle stage between nuclear divisions, when chromosomes are extended and functionally active. Interphase can be subdivided into G1, S, and G2 phase (see cell cycle).
- Intron** (Gk. intervening sequence): An segment of largely unknown function within a gene of eukaryota which is initially transcribed but is not found in the functional mRNA - cut out (compare exon).
- Lagging Strand:** In DNA replication, the strand that is synthesized apparently in the 3' to 5' direction, by ligating short fragments synthesized individually in the 5' to 3' direction (see okazaki fragments).
- Leading Strand:** In DNA replication, the strand that is made in the 5' to 3' direction by continuous polymerization at the 3' growing tip (see also lagging strand).
- Ligase:** An enzyme that can rejoin a broken phosphodiester bond in a nucleic acid, used in the lagging strand.
- Linkage Group:** Closely located genes on the same chromosome that tend to be transmitted as a single unit.
- Locus:** The particular physical location on the chromosome of which the gene for a given trait occurs.

Meiosis: (Gk. replication) Two successive nuclear divisions (with corresponding cell division) that produce gametes (in animals) or sexual spores (in plants or fungi) have one-half of the genetic material of the original cell (1n).

Prior to **meiosis-I**, each chromosome is duplicated in the pre-meiotic S-phase to form a tetrad (synaptonemal complex) resulting in tetraploidy (4n); During prophase-I (synapsis) chiasma/ta are formed between non-sisterchromosomes resulting in crossing over; meiotic prophase is split into:

Leptotene: Condensed chromosomes become visible; chromomeres develop along each chromosome.

Zygotene: Formation of synaptonemal complexes due to pairing of the chromosomal threads.

Pachytene: Thick, fully synapsed threads w/ nuclei still present; chiasmata start to develop (invisible).

Diplotene: Longitudinal doubleness of each paired homolog (chromatids); chiasmata become visible.

Diakinesis: Further chromosome contraction.

In metaphase-I the sister chromosomes gather at the equatorial plane; During anaphase-I the chromosomes become separated (2n - centromer still in tact); telophase-I marks interkinesis; there is no DNA synthesis in this stage! **Meiosis-II** follows (no interphase in-between) producing haploid cells (see mitosis (1n)).

Mitotic Spindle: Weblike structure of microtubuli formed by centriols, on which chromosomes can align.

Mendels laws: 1st: Law of equal segregation; The two members of a genome-pair segregate from each other during anaphase of meiosis-I and -II; each gamete has an equal probability of obtaining either member of the gene pair (2:2). **2nd:** Law of independent assortment; unlinked or distantly linked segregating gene-pairs assort independently at prophase of meiosis-I (recombination).

Mitosis: (Gk. mitos, thread) A type of nuclear division (occurring at cell division) that produces two daughter nuclei identical to the parent nucleus; (di-, polyploid).

Prophase: (Gk. Pro, early; phasis, form) Early stage of nuclear division; nucleus disappears, mitotic spindle forms, chromosome condense and become visible.

Metaphase: (L. meta, half) Intermediate stage o.n.d.; chromosomes align along the equatorial plane.

Anaphase: (Gk. ana, away) Spindle separates centromere, pulling chromatids apart to the opposed poles of the cell.

Telophase: (Gk., Telo, late) Late stage o.n.d.; spindle dissolves, nuclear envelope reappears daughter nuclei re-form (segregation and cytokinesis).

Mutagen: (Gk.)An agent that is capable of increasing the mutation rate (see also wild type).

Mutant: An organism or cell carrying a mutation.

Mutation: (L. mutare, to change) A permanent change in chemical structure, organization, or amount of DNA; produces a gene or a chromosome set differing from the wild type, resulting in a faulty protein (loss or gain of function; gains and selection are the tools of evolution).

Germ-Line: Mutations in egg/sperm which can be potentially transmitted to offspring.

Induced: An organism is exposed to an environmental, mutagenic agent or mutagen, which may trigger transcription from an operon.

Reversion: The production of a wild type gene from a mutant gene.

Somatic: Non-inheritable mutations; caused due to the presence of onkogenes.

Spontane: Are naturally occurring and can arise in all cells; occurs in the absence of mutagens, usually due to errors in the normal functioning of cellular enzymes.

Supressor: Secondary mutation that cancels the effect of a primary mutation, resulting in a wild type.

M. at DNA-level (DNA-sequence): Sequence of bases altered (non-detectable with microscopic analysis).

Breakage: Occurring in the middle of the gene, disrupting the gene function.

Gene: A point mutation that results from changes within the structure of a gene.

Point: Involves one /few basepairs, resulting in basepair-substitution, -deletion, -insertion of a gene.

Transition: A nucleotide pair substitution where a purine is replaced with another purine or pyrimidine with a pyrimidine; e.g.: GC to AT.

Transversion: A nucleotide pair substitution where a purine is replaced with pyrimidine or purine with a pyrimidine; e.g.: GC to TA.

M. at Protein level: particular aminoacids are altered resulting in different aminoacids or termination (non-detectible with microscopic analysis).

Missense: A mutation that alters a codon so that it encodes a different / nonfunctional amino acid.

Neutral: A codon specifies a different but functionally equivalent aminoacid.

Nonsense: A codon signaling chain termination; end of translation.

Frameshift: Dele-/ insertion of a basepairs that are not multiples of three; disruption of reading frame.

Silent: The function of the protein product is unaltered.

M. at Chromosome-level: Affect large / entire regions of chromosomes, hence location of genes (detectible with microscopic analysis).

Dele-/ Insertion: Lost / gain of genetic information during crossover in meiosis.

Duplication: A segment of a chromosome is duplicated twice.

Inversion: Large segments of a chromosome are flipped around (inverted); could lead to breakage.

- Recombinant:** Novel DNA formed by the combination of two non-homolog DNA molecules (meiosis).
- Transposon:** Relocation of a gene within a chromosome (jumping gene, transfer of plasmids).
- Translocation:** Breakage of a chromosomal segment which allocates to a different (non-homolog) one.
- M. at Genome level:** Altering the chromosomal number (detectable with microscopic analysis).
- Dis / Appearance:** Paired chromosomes fail to segregate properly in meiosis; number of chromosomal sets altered - monosomy ($2n-1$); disomy ($n+1$); trisomy-21/18/13-, XXX, XXY. ($2n+1$); tetraploidy.
- Nucleolus:** An organelle in the nucleus of eukaryota, where rRNA is formed.
- Nucleoside:** (Gk.) A N-base bound to a sugar molecule (see also nucleotide).
- Nucleosome:** The basic unit of eukaryotic chromosome structure; a ball of eight histone molecules wrapped about by two coils of DNA responsible for packaging (see also chromatin, solenoid).
- Nucleotide:** (Gk.) The basic single unit of nucleic acid composed of a P- and a 5-C sugar (either deoxy / ribose)-group and a purine / pyrimidine attached to it.
- Okazaki Fragments:** Each of the short discontinued segments in the 3'-5'-direction of the lagging strand made by DNA polymerase-III - about 1500 bases in eu-, 150 bases in prokaryota.
- Oligonucleide:** (Gk.) A short segment of synthetic DNA.
- One gene one enzyme:** Each gene regulates the production of only one enzyme /
- One gene one polypeptide chain:** Synthesis of each polypeptide chain is regulated by a different gene.
- Operon:** A regulatory protein and a group of genes whose transcription it controls in bacterial cells.
- ORF (open reading frame):** A section of a sequenced piece of DNA that begins with a start codon and ends with a stop codon; it is presumed to be the coding sequence of a gene.
- Parental Generation:** In mendelian genetics the individuals that give rise to the 1st filial generation F1.
- Parental Type:** In mendelian genetics, an offspring having the characteristics of one of the parents.
- Pedigree:** An ordered diagram of a family's relevant genetic features (□ male; ○ female; ◇ no sex given; * abortion, stillbirth; ⊙ female carrier; □-○ mating; □=○ consanguineous mating; ■ ♂ propositus; ■ affected male; 1,2,3,4... person in a generation; I,II,III....generation.
- Phage:** (Gr. phagos, case) Bacteriophage - a virus that infects bacteria.
Steps of replication: Attachment (infection by injection; viral DNA enters bacterium); nucleic acid replication (viral DNA is produced by the host along with synthetisation of viral proteincases); assembly and packaging (viral RNA is packed into the cases); lysis (bacterium dies, releasing viral offspring).
- Phenotype:** The physical appearance (makeup) of an organism controlled by its genes interacting with the environment; product of genotype (see dominant / recessive allele).
- Plasmid:** An autonomously replicating circular, extrachromosomal DNA molecule in prokaryota, bearing often genes of antibiotic resistance.
- Polygenetic Trait:** Characteristics of a trait that varies in the quantity depending on the interaction of many genes; phenotypic traits controlled by more genetic loci (height: variations from short to tall).
- Polymerase:** Various enzymes involved in the polymerization (formation) of large molecules out of monomeric units (building blocks).
- P.-I:** Catalyzes chain growth in the 5'-3' direction, removes mismatched bases, degrades double stranded DNA.
- P.-II:** Structural genes for proteins are transcribed by polymerase II.
- P.-III:** Holoenzyme consisting of various subunits (Sigma-factor); cut out introns and splice exons.
- DNA P.:** Various enzymes that synthesize new DNA strands (from 5' to 3') using a DNA template.
- RNA P.:** Enzyme that catalyzes the synthesis of an RNA strand from a DNA template i.e. a core enzyme and the sigma factor (together form the holoenzyme).
- Primer:** A short RNA nucleic chain (polynucleotide) required to recognize the origin in DNA replication for DNA polymerase, where the 1st nucleotide is attached.
- Promoter:** The site on DNA where RNA polymerase binds and begins transcription, i.e.: a regulator region just shortly off the 5' end of a gene.
- Propositus:** The individual who first came to the attention of the geneticist (see pedigree).
- Protein:** (Gk. Proteios, primary) A complex organic compound composed of many (about 100) amino acids joined together by peptide bonds. (see polypeptide chain).
- Primary Structure:** The sequence of amino acids, forming a polypeptide chain (determines folding).
- Secondary S.:** Spiral (alpha-helix) or zigzag (beta-sheet) arrangement of a polypeptide chain.
- Tertiary S.:** The folding or coiling of the secondary structure to form a globular molecule.
- Quartary S.:** A protein constructed of more than one globular molecules.
- P. Synthesis:** The flow of genetic information from DNA to a protein - tRNA and mRNA synthesized from DNA; splicing of exons, capping and tailing; transportation into cytoplasm; translation from mRNA into polypeptide chain (see Shine del Garro.).
- Prototroph:** A strain of organism that will proliferate on minimal medium (compare auxotroph).
- Punnet Square:** A diagrammatic way of presenting the results of random fertilization from mating.
- Purine:** A type of double CN-ring base. **Adenine:** Pairs with thymine. **Guanine:** Pairs with cytosine.

- Pyrimidine:** A type of single CN-ring base. **Cytosine:** Pairs with guanine. **Thymine:** Pairs with adenine in the DNA and uracil in RNA. **Uracil:** In place of thymine (found in RNA) that pairs with Adenine.
- Reading Frame:** The codon sequence that is determined by the reading nucleotides in groups of three from some specific start codon, read consecutively in one direction; the grammar of DNA.
- Recombination:** The formation of offspring by combination of genes that are present in either chromatid, resulting from the assortment of chromosomes and their genes during the production of gametes (meiosis) and their subsequent fertilization (ovum and testis) from different individuals. (the reshuffling of maternal and paternal chromosomes during meiosis, resulting in new genetic recombinations (compare complementation).
- Recombinant Type:** In mendelian genetics an offspring with characteristics different from that of the parents.
- Renaturation:** The inverse process if denaturation.
- Replication:** DNA synthesis is semiconservative, not dispersive or conservative (see ligase.).
Helicase, Primer, Pol-I-III, form the looping of the DNA-template for the lagging strand, allowing synthetisation of both strands; Ligase joins the synthesized fragments of the lagging strand.
DNA-R. in prokaryota: Starts at a special site named oriC and ending at the opposed terminus of the circular DNA.
DNA-R. in eukaryota: Occurs in the S-phase of the cell-cycle - part of interphase.
- Replication Fork:** The point at which the two strands of DNA are separated to allow replication of each strand moving from the 3' to the 5' end of the parental sense (coding, upper or +)strand (see polymerase).
- Retrovirus:** (Gk.) An RNA virus that replicates by being converted into double stranded DNA within the host.
- Rho-Factor:** A protein factor required to recognize certain transcription termination signals (in prokaryota).
- Ribosome:** A complex organelle that catalyzes translation of mRNA into an amino acid sequence. Composed of proteins and rRNA.
- RNA** (ribonucleic acid): A single stranded nucleic acid similar to DNA but having ribose as its sugar and uracil rather than thymine as one of the bases (see scan at end);
mRNA (messenger RNA): An RNA molecule transcribed from the DNA of a gene, and from which a protein is translated by the action of ribosomes (constituting for 5% of total RNA).
rRNA (ribosomal RNA) A class of small and large subunit-RNA molecules, coded in the nuclear organizer, that have an integral role in ribosome structure and function (80% of total RNA).
tRNA: (transfer RNA): Small cloverleaf RNA molecules that bear specific amino acids (at the 3'-end =CCA) to the ribosome during translation; the amino acid is inserted into the growing polypeptide chain when the anticodon of the tRNA pairs with a codon on the mRNA being translated (15%).
- Scaffold:** The central framework of a chromosome to which the DNA solenoid is attached as loops; composed largely of topoisomerase.
- Segregation:** 1) Cytologically, the separation of homologous structures; 2) genetically, the production of two separate phenotypes, corresponding to two alleles of a gene, either in different individuals (meiotic segregation) or in different tissues (mitotic segregation).
- Semiconservative Replication:** The established model of DNA replication in which each double-stranded molecule is composed of on parental strand and one newly polymerized strand.
- Sex-Chromosome:** Pairs of chromosomes when the member of the pairs are dissimilar and involved in sex determination, such as the X and Y chromosomes.
- Sex-Linked:** Characteristics of genes that are carried on these sex-chromosomes and therefore show different patterns of inheritance between male and female (colorblindness in humans is located on the X).
- Shine-Del-Garno Sequence:** A 3-9 nucleotide long sequence preceding the start-region (AUG) of mRNA (see protein synthesis, transcription)
- Sigma-Factor:** One of the 5 subunits of the holoenzyme; it aids initiation in transcription by recognizing the promoter site.
- Solenoid Structure:** The packed arrangement of DNA in eukaryotic nuclear chromosomes produced by coiling the continuous string of nucleosomes (see also histone).
- Somatic Cell:** A cell that is not destined to become a gamete; a body cell, whose genes will not be passed on to future generations (see germ cell).
- Spindle:** The set of microtubular fibers that appear to move eukaryotic chromosomes during division.
- Splicing:** The reaction that removes introns and joins together exons in eukaryotic RNA.
- Supercoil:** A closed double stranded DNA molecule that is twisted on itself, in prokaryota.
- Synapsis:** Close pairing of homologs (side by side) at meiosis (see also crossing over).
- Synaptonemal Complex:** A complex structure that unites homologs during the prophase of meiosis.
- Tautomer:** Each of the bases of DNA can appear in one or several forms (isomers that differ in the position of atoms and atomic bonds - see wobble).
- Telomer:** The tip or end of a chromosome. Telomerase makes sure that the lagging strand will always be completed correctly even though located at terminal ends.

Template: A molecular “mold“ that shapes the structure or sequence of another molecule; e.g. the nucleotide sequence of DNA acts as a template to control the nucleotide sequence of RNA during transcription.

Tetrad: (Gk. Tetra , four) Products of a single meiosis remain together as a group of four.

Transcription: (L. trans, across; scribere, to write) The synthesis of complementary mRNA using portions of the sense-DNA template (ORF) with the help of RNA-polymerase;

Initiation: RNA polymerase docks on the promoter sequence of DNA aided by the sigma factor.

Elongation: Sigma factor dissociates, RNA is synthesized in the 5' to 3' direction.

Termination: End of transcription signaled by either a hairpin-loop or the rho factor in prokaryota.

Transforming Principle: RNA from a virus (retrovirus) is transferred to the DNA of its host (bacteriophage) to make the host reproduce the viral DNA.

Translation: The ribosome mediated production of a polypeptide chain (protein) whose amino acid sequence is derived from the codon sequence of a mRNA molecule (AUG=start, UAA, UAG, UGA=stop).

Triplet: The three nucleotide pairs that compose a codon.

Wild Type: The genotype or phenotype that is found in nature or in the standard laboratory stock for a given organism (see also mutant).

Wobble-effect: The synonymous codons that differ only in the 3rd position; the third position of an anticodon in tRNA forms H-bonds in various ways causing alignment with several possible codons (tautomers).

X-Chromosome: The sex chromosome found in two doses in female mammals and many other species.

Y-Chromosome: The sex chromosome found in a single dose in male mammals and many other species.

Zygote: (Gr. zygotos, paired together) the diploid cell that results from the fusion of an egg and a sperm cell.

Hemizyg: A male organism in which a mutant trait is present at the X chromosome (i.e. *Drosophila sp.*).

Heterozyg: An individual having heterozygous gene pair (a gene pair having different alleles in the two chromosome sets of the diploid individual).

Homozyg: An organism carrying identical alleles at the corresponding sites and homologous chromosomes.

