Appendix

Genomic glossary

ADENINE (A)
A purine base that is found paired with thymine (T) in DNA and with uracil (U) in RNA. Adenine is one of the bases that makes up the nucleotide, which are the subunits present in DNA chains.

AMINO ACIDS
Fundamental protein elements that are encoded by a codon and linked together through peptide bonds. The molecule is composed of an amine (NH2), carboxylic acid (-COOH) functional groups, a hydrogen atom (-H), as well as a side-chain of organic (R) elements linked to the carbon atom that varies with each amino acid.

ANTICODÓN
A sequence of three adjacent nucleotides, found at the end of transfer RNA, that binds to a corresponding triplet sequence of nucleotides in messenger RNA during the translation phase of protein synthesis.

APOPTOSIS
The process of programmed cell death, which is normally signaled by the nuclei of functional human and animal cells and is dictated by the age or health of a cell as well as other biological conditions.

AUTOSOMES
Any chromosome not considered a sex chromosome or not involved in the determination of sex. They are produced in pairs within somatic cells and separately within sex cells (gametes).

BIOCHIPS
Systems - minicomputers - that report gene sequencing.

BIOETHICS
The science that studies the ethics of biological science and medicine. It deals with ethical issues that arise regarding life sciences, biotechnology, medicine, politics, the law, philosophy and theology.

BIOINFORMATICS
The science of information technology applied to biological research.

BIOLOGICAL EVOLUTION
A change in a population's genetic composition over successive generations, which can be caused by natural selection, inbreeding, hybridization or mutation.

BIOTECHNOLOGY
The use of biological organisms, systems or processes for the purpose of learning about the science of life and improving the value of materials and organisms, such as pharmaceutical products, crops and livestock. It is a relatively new science that is quickly developing while integrating the knowledge of diverse traditional sciences: biochemistry, chemistry, microbiology and chemical engineering.

CELL
It is the structural, functional and biological unit of all organisms. Cells are an autonomous, self-replicating unit that can exist as an independent functional unit of life (as in the case of unicellular organisms) or as a subunit of multicellular organisms (such as plants and animals or pluricellular organisms) and which specialize in performing particular functions in favor of the organism as a whole.

CELL NUCLEUS
A cellular organelle containing genetic material and organized as multiple long, linear DNA molecules in structures called chromosomes.

CHROMATID
Two strands of nucleic acid bound together by a single centromere. They are formed through chromosome duplication during the early stages of cell division and are separated to become individual chromosomes during the late stages of cell division.

CHROMOSOME
A structure found within cells that carry genetic material. It comes in the form of a linear threadlike DNA strand bound to diverse proteins in the nucleus of eukaryotic cells, or a circular DNA strand (or RNA strand in the case of some viruses) found in the cytoplasm of prokaryotic cells and in the mitochondria and chloroplasts of certain eukaryotic cells.

CLONE
A group of propagating organisms, either single cell or multicellular, derived from a single progenitor cell. Such organisms should be genetically identical, although this can be invalidated due to mutation events.

CODOMINANCE
Two dominant alleles within a single gene that equally affect the phenotype of heterozygous individuals. For example, Blood Type AB.

CODON
A set of three adjacent nucleotides (also called a triplet) found in RNA that is paired with the corresponding anticodon bases of the tRNA molecule carried by a particular amino acid and which, therefore, specifies the type and amino acids sequence for the synthesis of proteins.

CROSSING OVER
A process that occurs during meiosis in which two chromosomes are paired up, and a portion of their genetic material is exchanged.

CYTOSINE (C)
In DNA and RNA, it is a pyrimidine base that is paired with guanine. It is one of the four nitrogenous bases found in DNA and RNA.

DIPLOID
A cell or organism composed of two sets of chromosomes: usually, one set is from the mother and the other from the father. In the diploid state the haploid number is duplicated, and, therefore, this condition is also known as (2n).

DNA
Deoxyribonucleic acid is a double helix shaped molecule that contains genetic information pertaining to the development, division and function of cells.

EPIGENETICS
The science that studies stable hereditary phenotypes that are produced as a result of changes in a chromosome without alterations in the DNA sequence.

EXON
The protein-coding region in DNA.

GENE
A fundamental, physical and functional unit of heredity.

GENETIC CODE
The relationship between the nucleic acid's base sequence and the amino acid sequence of the polypeptide synthesized from it. A sequence of three nucleic acids (a triplet) acts as a code word (codon) for a single amino acid.

GENETIC DIAGNOSIS
A screening process to discover if persons are gene carriers for specific known genetic illnesses, such as sickle cell anemia.

GENETIC ENGINEERING
Genetic engineering is the deliberate and controlled manipulation of genes in an organism with the intention of improving some aspect of the organism.

GENETIC FOOTPRINT
An individual's unique sequence of DNA base pairs.

GENETIC MARKERS
A DNA sequence or gene fragment having a known location on a chromosome with an easily identifiable phenotype and whose hereditary pattern can be followed.

GENETICS
The science that studies the hereditary patterns of specific traits.

GENOME
The entire set of genes within an organism.

GENOTYPE
The genetic composition of an individual or taxon.

GUANINE (G)
Purine base that is paired with cytosine in both DNA and RNA. One of the four constituent bases of nucleic acids, nucleosides and nucleotides.

HAPLOID
Characteristic or trait that is passed from generation to generation.

HEREDITARY
Of or pertaining to a trait that can be genetically passed from parents to children.

HETEROZYGOUS
A nucleus, cell or organism that has two different alleles from a particular gene.

HOMOZYGOTE
A nucleus, cell or organism in which the alleles of a particular gene in each chromosome are identical.

HUMAN GENOME
The genome for the Homo sapiens species that is comprised of 24 different chromosomes (22 paired autosomal chromosomes and 2 sex chromosomes), with a total of approximately 3 billion DNA base pairs that contain an estimated 20,000-25,000 genes.

HUMAN GENOME PROJECT (HGP)
The Human Genome Project (HGP) is a project developed to determine the sequence of the 3 billion nucleotides contained in the human genome as well as to map and identify all of the genes present within it. Finished in April of 2003, the HGP gave the possibility for the first time to read the complete genetic map that nature uses to build a human being.

INTRON
A non-coding DNA sequence within a gene that is transcribed but not translated.

MEIOSIS
A type of cellular division that takes place in sexually reproducing organisms. Two consecutive nuclear divisions occur (meiosis I and meiosis II) producing four haploid gametes (sex cells), each containing a pair of homologous chromosomes (In other words, the maternal and paternal chromosomes are randomly distributed among the cells, giving way to genetic variability).

MICROARRAY
A small solid surface, generally a membrane, in which an organized array of DNA sequences are attached. The DNA microarrays are used to measure the expression levels and/or sequence of large numbers of genes simultaneously.

MITOSIS
The process in which a single cell is divided generally resulting in two identical cells, each containing the same number of chromosomes and identical genetic content.

MOLECULAR BIOLOGY
A branch of biology that studies the structure and activity of life essential macromolecules (and especially their genetic function).

MUTAGEN
A chemical agent that increases the rate of genetic mutation when it interferes with the function of nucleic acids.

MUTATION
A heritable permanent change in the nucleotide sequence of a gene or chromosome.

NUCLEIC ACID
Complex compounds that are made up of linear chains of monomeric nucleotides. Each monomer is comprised of phosphoric acid, sugar and a nitrogenous base and participates in preservation, replication and expression of the hereditary information stored in every living cell.

NUCLEÓTIDE
The basic unit of nucleic acids, such as DNA and RNA. It is an organic compound consisting of a nitrogenous base, a sugar and a phosphate group.

PHENOTYPE
The physical or biological traits that are characteristic of an organism as a result of the interaction between the genotype and its environment.

PROTEIN
A molecule comprised of amino acid polymers linked by peptide bonds. It can be distinguished from fats and carbohydrates by its nitrogen.
Other components include carbon, hydrogen, oxygen, sulfur and phosphorus.

PROTEOME
The entire set of proteins of an organism.

PROTEOMICS
A branch of biotechnology based on the application of techniques in molecular biology, biochemistry and genetics in order to analyze the structure, function and interaction of proteins produced by the genes of a particular cell, tissue or organism.

OMICS
A general term for the broad science and engineering discipline based on the analysis of interactions between the objects of biological information of diverse "omes".

RNA
Abbreviation for ribonucleic acid. It is generally single stranded (although double-stranded in some viruses) and plays a role in the transfer of information between the DNA and the protein development system of the cell.

SEX CHROMOSOME
A type of chromosome within the genome that is involved in the determination of sex as well as in the development of an organism's sex-linked characteristics. They occur in pairs within somatic cells and separately within sex cells (gametes).

SNP
A variation in the DNA sequence that occurs when a single nucleotide (A, T, C or G) in the genome sequence is altered. Each individual has many nucleotide polymorphisms that together create a DNA pattern unique to that person.

THYMINE (T)
A pyrimidine base exclusive found in DNA paired with adenine. One of four nucleotide bases found in DNA.

URACIL (U)
A pyrimidine base found exclusively in the RNA paired with adenine. One of the bases found in the nucleotides of an RNA strand.

ZYGOTE
The diploid cell produced after fertilization or the union of two haploid gametes; in the case of humans, the union of sperm (male sex cell) and egg (female sex cell).