

# Glossary of technical terms

This glossary of technical terms indicates the source of the definition. It presents, in some instances, more than one definition of a term, with the second entry providing an expanded explanation. Expanded definitions may also focus on the application of the terms in the field of genetic modification rather than in their widest context. Entries have been edited to conform with Report style if necessary. Some entries, marked [New Zealand], provide an explanation particularly applicable to New Zealand circumstances.

## **a-amylase, alpha-amylase**

Alpha amylase breaks the alpha-1,4-glucosidic bonds of starch to yield oligosaccharides. Slightly different versions of this enzyme are produced by the bacteria *Bacillus amyloliquefaciens*, *B. licheniformis*, *B. subtilis* and the fungus *Aspergillus oryzae*. Alpha amylase is used to make corn syrup, beer, wallpaper removers, cold-soluble laundry starch, and digestive aids.

*BioTech Life Sciences Dictionary*

Any of a group of enzymes that are present in saliva, pancreatic juice, and parts of plants and catalyze the hydrolysis of starch to sugar to produce carbohydrate derivatives.

*The American Heritage Dictionary of the English Language*

## **b-carotene, beta-carotene**

An antioxidant which protects cells against oxidation damage that can lead to cancer. Beta carotene is converted, as needed, to vitamin A.

A yellow carotenoid pigment that gives a reddish colour to plants such as carrots and tomatoes. It is often used as a vitamin supplement because the liver can convert it into Vitamin A.

*Nutritional and Metabolic Diseases.*

The isomeric form of carotene that is widely distributed in nature and most efficiently converted to vitamin A by the body.

*The American Heritage Dictionary of the English Language*

## **allergen**

A substance that causes an allergic reaction.

*Waiter, there's a Gene in My Food*

*also* **allergic reaction, allergy**: an exaggerated physical response to some

antigen, typically a common environmental substance, that produces little or no response in the general population, resulting when histamine or histamine-like substances are released from injured cells. It involves various respiratory and dermatological symptoms, such as sneezing or itching.

*Academic Press Dictionary of Science and Technology*

*also* **allergenicity**: Ability to induce various types of allergic responses (also known as hypersensitivity responses).

*Virology/Immunology*

### **amino acid**

The basic subunit of a protein, coded by triplets of bases in the DNA blueprint. There are 20 amino acids universally found in proteins.

*Bernie May*

The fundamental building blocks of a protein molecule. A protein is composed of a chain of hundreds or thousands of amino acids. Our bodies can synthesise most of the amino acids. However, eight amino acids (called “essential amino acids”) must be obtained from food.

*About Biotechnology*

### **antibiotic resistance**

The ability of a bacterium to synthesise a protein that neutralises an antibiotic.

*BioTech Life Sciences Dictionary*

*also* **antibiotic resistance genes**: Genes in a microorganism that confer resistance to antibiotics, for example by coding for enzymes that destroy it, by coding for surface proteins that prevent it from entering the microorganism, or by being a mutant form of the antibiotic’s target so that it can ignore it.

*BioTech Life Sciences Dictionary*

### **antibody**

A protein produced in response to the presence of a specific antigen.

*About Biotechnology*

### **antigen**

A usually protein or carbohydrate substance (as a toxin or enzyme) capable of stimulating an immune response.

*Merriam-Webster’s Collegiate Dictionary*

### **antimetabolite**

A substance that replaces or inhibits an organism’s utilization of a metabolite

*Merriam-Webster’s Collegiate Dictionary*

**aquaculture**

The cultivation of the natural produce of water (as fish or shellfish).

*Merriam-Webster's Collegiate Dictionary*

1. The cultivation of aquatic plants and animals for human food consumption or other human use.
2. Specifically, freshwater cultivation, as opposed to marine cultivation (mariculture).

*Academic Press Dictionary of Science and Technology*

**aspartame**

An artificial sweetener,  $C_{14}H_{18}N_2O_5$ , formed from aspartic acid.

*The American Heritage Dictionary of the English Language*

**autoimmune**

A condition where the body's immune system is unable to distinguish between foreign particles and the body's own cells and as a result attacks normal body tissue.

*BioTech Life Sciences Dictionary*

**bacteriophage**

*see phage*

**base pair**

One of the pairs of chemical bases composed of a purine on one strand of DNA joined by hydrogen bonds to a pyrimidine on the other that hold together the two complementary strands much like the rungs of a ladder and include adenine linked to thymine or sometimes to uracil and guanine linked to cytosine

*Merriam-Webster's Collegiate Dictionary*

The pair of nitrogenous bases, consisting of a purine linked by hydrogen bonds to a pyrimidine, that connects the complementary strands of DNA or of hybrid molecules joining DNA and RNA. The base pairs are adenine-thymine and guanine-cytosine in DNA, and adenine-uracil and guanine-cytosine in RNA.

*The American Heritage Dictionary of the English Language*

**biocontrol, biological control**

The use of one organism to control the population size of another organism.

*About Biotechnology*

The agricultural use of living things, such as parasites, diseases, and predators, to control or eliminate others, such as weeds and pests, rather than by using chemicals (herbicides and pesticides).

*BioTech Life Sciences Dictionary*

### **biodiversity, biological diversity**

The existence of a wide range of different types of organisms in a given place at a given time.

*BioTech Life Sciences Dictionary*

The variability among living organisms from all sources including, among other things, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems.

*World Foundation for Environment and Development*

*also* **biodiversity prospecting** or **'bioprospecting'**: The search for useful genetic and biochemical compounds and materials and related information in nature.

### **bioinformatics**

The newly developed computer-based discipline that organises biological data, particularly genetic data.

*The Current Uses of Genetic Modification*

The use of computers in solving information problems in the life sciences; mainly, it involves the creation of extensive electronic databases on genomes, protein sequences, etc. Secondly, it involves techniques such as the three-dimensional modelling of biomolecules and biological systems.

*BioTech Life Sciences Dictionary*

### **biomedicine**

Medicine based on the application of the principles of the natural sciences and especially biology and biochemistry.

*Merriam-Webster's Collegiate Dictionary*

*also* **biomedical engineering**: The use of engineering technology, instrumentation and methods to solve medical problems, such as improving our understanding of physiology and the manufacture of artificial limbs and organs.

*BioTech Life Sciences Dictionary*

### **bio piracy**

The commercial development of naturally occurring biological materials, such as plant substances or genetic cell lines, by a technologically advanced

country or organisation without fair compensation to the peoples or nations in whose territory the materials were originally discovered.

*The American Heritage Dictionary of the English Language*

The unauthorised and uncompensated taking of biological resources.

*World Foundation for Environment and Development*

### **bioreactor**

A device or apparatus in which living organisms and especially bacteria synthesise useful substances (as interferon) or break down harmful ones (as in sewage)

*Merriam-Webster's Collegiate Dictionary*

An apparatus, such as a large fermentation chamber, for growing organisms such as bacteria or yeast that are used in the biotechnological production of substances such as pharmaceuticals, antibodies, or vaccines, or for the bioconversion of organic waste.

*The American Heritage Dictionary of the English Language*

### **bioremediation**

The use of plants or microorganisms to clean up pollution or to solve other environmental problems.

*BioTech Life Sciences Dictionary*

### **biosecurity**

The protection of people and natural resources from unwanted organisms capable of causing harm.

*Environmental Performance Indicators Programme*

[New Zealand] The cost effective protection of any natural resources from organisms capable of causing unwanted harm. The Biosecurity Act 1993 is the main act dealing with biosecurity issues. It has resulted in changes to the way biosecurity is managed and viewed.

Previously, pest management largely had an agricultural or horticultural focus. But this tended to overlook other pests, like environmental pests. With the passing of the Biosecurity Act, when we now talk about biosecurity pests, we mean a wide range of organisms that are harmful, not only to production industries, but also to the environment (including the land, freshwater and marine environments, as well as to people). That includes undesirable animals, undesirable plants such as weeds, and organisms that attack animals and plants (including disease-causing microorganisms).

*MAF Rural Bulletin May 1999*

## **biosphere**

The part of the Earth's environment where life exists

*Cambridge International Dictionary of English*

- (1) The part of the world in which life can exist
- (2) Living beings together with their environment

*Merriam-Webster's Collegiate Dictionary*

## **biotechnology**

Any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use.

*World Foundation for Environment and Development*

The industrial use of living organisms or biological techniques developed through basic research. Biotechnology products include antibiotics, insulin, interferon, recombinant DNA, and techniques such as waste recycling. Much older forms of biotechnology include breadmaking, cheesemaking and brewing wine and beer.

*BioTech Life Sciences Dictionary*

## **bovine spongiform encephalopathy (BSE)**

An infectious degenerative brain disease occurring in cattle. Also called *mad cow disease*.

*The American Heritage Dictionary of the English Language*

## **bovine somatotropin (bovine growth hormone, bST, BGH)**

A growth hormone found in cattle; a version of this hormone is also found in all mammals, including humans. Injections of this hormone dramatically increase the milk production of lactating cows. In past years, the hormone was very expensive because it could only be taken from slaughtered cows, but in the early '90s researchers learned how to genetically engineer the bacterium *E. coli* to produce it. Now, many dairy producers use the hormone, but the practice is controversial because the use of bST may increase the incidence of mastitis (udder infection) in cows, and the long-term human health effects of the slightly increased hormone levels in the milk from treated cows have not been established.

*BioTech Life Sciences Dictionary*

## **carbohydrate**

Any of various neutral compounds of carbon, hydrogen, and oxygen (as sugars, starches, and celluloses), most of which are formed by green plants and which constitute a major class of animal foods.

*Merriam-Webster's Collegiate Dictionary*

**cell**

The smallest basic unit of a plant or animal.

*Cambridge International Dictionary of English*

A small usually microscopic mass of protoplasm bounded externally by a semipermeable membrane, usually including one or more nuclei and various other organelles with their products, capable alone or interacting with other cells of performing all the fundamental functions of life, and forming the smallest structural unit of living matter capable of functioning independently.

*Merriam-Webster's Collegiate Dictionary*

**chromosome**

Structure containing DNA and proteins in the cell nucleus.

*Bernie May*

Components in a cell that contain genetic information. Each chromosome contains numerous genes. Chromosomes occur in pairs: one obtained from the mother; the other from the father. Chromosomes of different pairs are often visibly different from each other.

*About Biotechnology*

**chymosin**

See rennin

**clone**

(of DNA): An identical copy. The term may be applied to a fragment of DNA, a plasmid that contains a single fragment of DNA, or a bacterium that contains such a plasmid.

(of animal): An identical offspring, generally created by transfer of an identical nucleus into a recipient egg.

*The Current Uses of Genetic Modification*

1. To insert a piece of DNA into a vector for subsequent amplification and isolation of that specific piece;
2. A piece of DNA composed of a vector and its insert.

*Bernie May*

*also cloning vector:* Biological carriers such as plasmids, bacteriophages, or cosmids used to amplify an inserted DNA sequence.

*Bernie May*

**containment**

(biological): Containment based on a biological barrier that prevents the transmission or escape of an organism.

(physical): Containment achieved by the control of access, restriction of air circulation, and/or the provision of other secure physical barriers.

*The Current Uses of Genetic Modification*

also **containment facility**: [*New Zealand*] A place approved in accordance with section 39 of the Biosecurity Act, for holding organisms that should not become established in New Zealand.

*MAF Biosecurity Authority*

### **copyright**

The exclusive legal right to reproduce, publish, and sell the matter and form (as of a literary, musical, or artistic work).

*Merriam-Webster's Collegiate Dictionary*

### **Creutzfeld-Jakob disease (CJD)**

A rare, usually fatal disease of the brain, characterised by progressive dementia and gradual loss of muscle control, that occurs most often in middle age and is caused by a slow virus.

*The American Heritage Dictionary of the English Language*

### **crippled bacteria, viruses**

Bacteria and viruses that have had parts of their genomes that would make them infective, removed.

*David Heaf*

### **cross-pollination**

The transfer of pollen from an anther of the flower of one plant to a stigma of the flower of another plant.

*The American Heritage Dictionary of the English Language*

### **cultivar**

A cultivated plant or animal that has no known wild ancestor.

*BioTech Life Sciences Dictionary*

A variety of plant produced through selective breeding by humans and maintained by cultivation.

*The Genomics Lexicon*

### **cytogenetics**

Study that relates the appearance and behavior of chromosomes to genetic phenomenon.

*An Agricultural and Environmental Biotechnology Annotated Dictionary*

**Demeter Association**

The international accreditation agency for Biodynamic agriculture.

*Demeter Association, Inc*

**DNA**

Deoxyribonucleic acid, the chemical at the centre of the cells of living things which controls the structure and purpose of each cell and carries genetic information during reproduction.

*Cambridge International Dictionary of English*

A nucleic acid that constitutes the genetic material of all cellular organisms and the DNA viruses; DNA replicates and controls through messenger RNA the inheritable characteristics of all organisms. A molecule of DNA is made up of two parallel twisted chains of alternating units of phosphoric acid and deoxyribose, linked by crosspieces of the purine bases and the pyrimidine bases, resulting in a right-handed helical structure, that carries genetic information encoded in the sequence of the bases.

*Academic Press Dictionary of Science and Technology*

**ecology**

(The relationships between) the air, land, water, animals, plants, etc., usually of a particular area, or the scientific study of this

*Cambridge International Dictionary of English*

1. Of or relating to the environment or to the science of ecology.of or relating to the environment or to the science of ecology.
2. Relating to the prudent use or beneficial management of natural resources and the natural environment.relatng to the prudent use or beneficial management of natural resources and the natural environment

*Harcourt Academic Press Dictionary of Science and Technology*

**ecosystem**

The complex of a community of organisms and its environment functioning as an ecological unit.

*Merriam-Webster's Collegiate Dictionary*

**endosperm**

A nutritive tissue in seed plants formed within the embryo sac

*Merriam-Webster's Collegiate Dictionary*

The nutritive tissue within seeds of flowering plants, surrounding and absorbed by the embryo.

*The American Heritage Dictionary of the English Language*

### **endotoxin**

A toxin of internal origin; *specifically*: a poisonous substance present in bacteria (as the causative agent of typhoid fever) but separable from the cell body only on its disintegration.

*Merriam-Webster's Collegiate Dictionary*

### **enzymes**

Proteins that control the various steps in all chemical reactions.

*An Agricultural and Environmental Biotechnology Annotated Dictionary*

Any of numerous complex proteins that are produced by living cells and catalyse specific biochemical reactions at body temperatures.

*Merriam-Webster's Collegiate Dictionary*

*also* **restriction enzyme**: any of various enzymes that break DNA into fragments at specific sites in the interior of the molecule — called also restriction endonuclease.

*Merriam-Webster's Collegiate Dictionary*

### **epigenetic**

Of, relating to, or produced by the chain of developmental processes in epigenesis that lead from genotype to phenotype after the initial action of the genes.

*Merriam-Webster's Collegiate Dictionary*

### **eukaryote**

an organism composed of one or more cells containing visibly evident nuclei and organelles — compare prokaryote.

*Merriam-Webster's Collegiate Dictionary*

### **expression (gene)**

The process by which proteins are made from the instructions encoded in DNA.

*NHGRI Glossary of Genetic Terms*

The process by which a gene's coded information is converted into the structures present and operating in the cell. Expressed genes include those that are transcribed into mRNA and then translated into protein and those that are transcribed into RNA but not translated into protein (eg, transfer and ribosomal RNAs).

*BioTech Life Sciences Dictionary*

### **field trial**

A trial of a new product in actual situations for which it is intended.

*Merriam-Webster's Collegiate Dictionary*

**gene**

A unit of hereditary information. A gene is a section of a DNA molecule that specifies the production of a particular protein.

*About Biotechnology*

A locus on a chromosome that encodes a specific protein or several related proteins. It is considered the functional unit of heredity.

*An Agricultural and Environmental Biotechnology Annotated Dictionary*

**gene construct**

A sequence of genes made by joining several genes together artificially in the laboratory.

*Genewatch*

**gene deletion**

The total loss or absence of a gene.

*Office of Rare Diseases, National Institutes of Health*

The total loss (or absence) of a gene. Gene deletion plays a role in birth defects and in the development of cancer.

*On-line Medical Dictionary*

**gene expression**

The process by which a gene's coded information is translated into the structures present and operating in the cell (either proteins or RNAs).

*Office of Rare Diseases*

The full use of the information in a gene via transcription and translation leading to production of a protein and hence the appearance of the phenotype determined by that gene. Gene expression is assumed to be controlled at various points in the sequence leading to protein synthesis and this control is thought to be the major determinant of cellular differentiation in eukaryotes.

*On-line Medical Dictionary*

**gene insertion**

The addition of one or more genes into a genome from an external source.

*On-line Medical Dictionary*

**gene knockout**

Inactivation of specific genes. Knockouts are often created in laboratory organisms such as yeast or mice so that scientists can study the knockout organism as a model for a particular disease.

*NHGRI Glossary of Genetic Terms*

### **gene product**

The protein produced by a gene.

*The Genomics Lexicon*

### **gene sequencing**

Determination of the sequence of nucleotide bases in a strand of DNA.

*On-line Medical Dictionary*

### **gene therapy**

The process of introducing new genes into the DNA of ... cells to correct a genetic disease or flaw. (1) Human gene therapy: Insertion of normal DNA directly into cells to correct a genetic defect. (2) Somatic cell gene therapy: The repair or replacement of a defective gene within somatic tissue.

*BioTech Life Sciences Dictionary*

(3) Germ line (gene) therapy: The repair or replacement of a defective gene within the gamete-forming tissues, which produces a heritable change in an organism's genetic constitution.

*An Agricultural and Environmental Biotechnology Annotated Dictionary*

### **gene transfer**

The transfer of genes into a cell by any of a number of different methods available.

*BioTech Life Sciences Dictionary*

Insertion of unrelated DNA into the cells of an organism. There are many different reasons for gene transfer: for example, attempting to treat disease by supplying patients with therapeutic genes. There are also many possible ways to transfer genes. Most involve the use of a vector, such as a specially modified virus that can take the gene along when it enters the cell.

*NHGRI Glossary of Genetic Terms*

### **genetic code**

The way genetic information is stored in living organisms.

*About Biotechnology*

The biochemical basis of heredity consisting of codons in DNA and RNA that determine the specific amino acid sequence in proteins and appear to be uniform for all known forms of life.

*Merriam-Webster's Collegiate Dictionary*

### **genetic drift**

Random variation in gene frequency from one generation to another.

*An Agricultural and Environmental Biotechnology Annotated Dictionary*

The random change of the occurrence of a particular gene in a population; genetic drift is thought to be one cause of speciation when a group of organisms is separated from its parent population.

*BioTech Life Sciences Dictionary*

### **genetic engineering (GE)**

*see* **genetic modification**

### **genetic marker**

A usually dominant gene or trait that serves especially to identify genes or traits linked with it.

*Merriam-Webster's Collegiate Dictionary*

A segment of DNA with an identifiable physical location on a chromosome and whose inheritance can be followed. A marker can be a gene, or it can be some section of DNA with no known function. Because DNA segments that lie near each other on a chromosome tend to be inherited together, markers are often used as indirect ways of tracking the inheritance pattern of a gene that has not yet been identified, but whose approximate location is known.

*NHGRI Glossary of Genetic Terms*

### **genetic modification (GM)**

Altering the genetic material of cells or organisms in order to make them capable of making new substances or performing new functions.

*The Genomics Lexicon*

The technique of removing, modifying or adding genes to a DNA molecule in order to change the information it contains. By changing this information, genetic engineering changes the type or amount of proteins an organism is capable of producing.

*About Biotechnology*

### **genetically modified organism (GMO)**

Organisms that have had genes from other species inserted into their genome.

*Functional Genomics Glossary*

An organism whose genome has been altered by the inclusion of foreign genetic material. This may be derived from other individuals of the same or wholly different species, or of an artificial nature. Foreign genetic information can be added to the organism during its early development and incorporated in cells of the entire organism. Genetic information can also be added later in development to selected portions of the organism.

*Functional Genomics Glossary*

## genome

The total hereditary material of a cell.

*About Biotechnology*

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

*An Agricultural and Environmental Biotechnology Annotated Dictionary*

*also* **genome projects:** Research and technology development efforts aimed at mapping and sequencing some or all of the genome of human beings and other organisms.

*BioTech Life Sciences Dictionary*

## genomics

The discipline involving the study of the collection of genes found in an organism.

*The Current Uses of Genetic Modification*

The study of genomes, which includes genome mapping, gene sequencing and gene function.

*BioTech Life Sciences Dictionary*

*also* **genomic healthcare:** Healthcare which utilises advances made by the science of genomics.

*The Genomics Lexicon*

*also* **genomic library:** A random collection of cloned DNA fragments (usually in viral or cosmid vectors) that together represent virtually all of an organism's DNA. Partial or subgenomic libraries contain only restriction fragments of a certain size range.

*Bernie May*

## germ cell

Reproductive cell.

*An Agricultural and Environmental Biotechnology Annotated Dictionary*

Sperm and egg cells, and their precursors. Germ cells are haploid and have only one set of chromosomes (23 in all), while all other cells have two copies (46 in all).

*The Genomics Lexicon*

## glyphosate

A white compound,  $C_3H_8NO_5P$ , that is soluble in water, used as a broad-spectrum herbicide.

*The American Heritage Dictionary of the English Language*

**heavy metal**

*Metallurgy.* any metal or alloy of high specific gravity, especially one that has a density higher than 5 grams per cubic centimetre.

*Academic Press Dictionary of Science and Technology*

**herbicide**

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

*An Agricultural and Environmental Biotechnology Annotated Dictionary*

Any agent, either organic or inorganic, used to destroy unwanted vegetation, especially weeds and grasses; selective herbicides eliminate weeds without destroying desirable crop or garden plants; nonselective herbicides destroy all vegetation in the given area.

*Academic Press Dictionary of Science and Technology*

**histology**

The scientific study of the structure of tissue from plants, animals and other living things.

Histology involves looking at cells under a microscope.

*Cambridge International Dictionary of English*

**homeopathy, homoeopathy**

A system of medical practice that treats a disease especially by the administration of minute doses of a remedy that would in healthy persons produce symptoms similar to those of the disease.

*Merriam-Webster's Collegiate Dictionary*

A system of therapy advanced in the late eighteenth century by Dr Samuel Hahnemann, based on the theory that “like cures like”; if the conditions produced by giving large doses of a drug to a healthy person are similar to conditions occurring as a natural consequence of disease, then that disease may be treated by the same drug in much smaller doses.

*Academic Press Dictionary of Science and Technology*

**homologous recombination**

*Genetics.* The recombination of a piece of DNA into a homologous sequence.

*Academic Press Dictionary of Science and Technology*

**horizontal gene transfer (HGT)**

The transfer of genes or genetic material directly from one individual to another by processes similar to infection. It is distinct from the normal process of vertical gene transfer — from parents to offspring — which occurs

in reproduction. Natural agents exist which can transfer genes horizontally between individuals. These are viruses, many of which cause diseases, and other pieces of parasitic genetic material, called plasmids and transposons, many of which carry and spread antibiotic and drug resistance genes. These are able to get into cells and then make use of the cell's resources to multiply many copies or to jump into (as well as out of) the cell's genome. The natural agents are limited by species barriers, so that for example, pig viruses will infect pigs, but not human beings, and cauliflower viruses will not attack tomatoes. However, genetic engineers make artificial vectors (carriers of genes) by combining parts of the most infectious natural agents, with their disease-causing functions removed or disabled, and design them to overcome species barriers, so the same vector may now transfer, say, human genes, which are spliced into the vector, into the cells of all other mammals, or cells of plants.

*ngin (Norfolk Genetic Information Network)*

### **immunosuppression**

Immunosuppression is intentionally stopping the body's immune system from working, or making it less effective, usually by drugs, especially in order to help the body accept an organ which has been taken from another person's body.

*Cambridge International Dictionary of English*

Suppression (as by drugs) of natural immune responses.

*Merriam-Webster's Collegiate Dictionary*

### **immune system**

The bodily system that protects the body from foreign substances, cells, and tissues by producing the immune response and that includes especially the thymus, spleen, lymph nodes, special deposits of lymphoid tissue (as in the gastrointestinal tract and bone marrow), lymphocytes including the B cells and T cells, and antibodies.

*Merriam-Webster's Collegiate Dictionary*

### **immunotherapy**

(1) A medical technique for stimulating a patient's immune system to attack and destroy disease-causing cells (viruses, bacteria, cancer cells, etc).

(2) A type of medical treatment which includes a combination of immunopotentiator and immunosuppressant agents, desensitisation to any allergens, bone marrow transplants, and thymus implantations.

*BioTech Life Sciences Dictionary*

**insecticide**

A chemical substance made and used for killing insects, especially those which eat plants.

*Cambridge International Dictionary of English*

**'in silico'**

In or by means of a computer simulation.

*World Wide Words*

**informed consent**

The process by which an individual willingly and voluntarily agrees to participate in an activity after first understanding the risks and benefits or participation (as against non-participation) in an activity or research study. In a genetic study, potential participants should be appraised of the study goals, risks, benefits, alternative to participation, disclosure policies, and financial and time commitments involved in study participation. The informed consent process should be documents, typically with a signed consent form approved by an Institutional Review Board. Special considerations apply to vulnerable populations (ie, minors, mentally handicapped individuals).

*The Genomics Lexicon*

**intellectual property**

Useful artistic and industrial information and knowledge.

*International Law Dictionary and Directory*

That area of the law involving patents, copyrights, trademarks, trade secrets, and plant variety protection.

*Shaping Genes*

**Integrated Pest Management**

An internationally recognised movement in which scientists attempt to create crop and livestock management systems that reduce reliance on broad spectrum chemical interventions and promote more ecologically integrated solutions to pest control (it is markedly closer to organic than to conventional production).

Ecologically based pest management that promotes the health of crops and animals, and makes full use of natural and cultural control processes and methods, including host resistance and biological control. It uses chemical pesticides only where and when the above measures fail to keep pests below damaging levels. All interventions are need-based and are applied in ways that minimise undesirable side-effects.

*CGIAR Policy Statement on Integrated Pest Management*

**knockout (gene)**

See gene knockout.

**lactase**

An enzyme capable of hydrolyzing lactose into glucose and galactose.

*The Random House Webster's Unabridged Dictionary*

**lactose**

A type of sugar which is found in milk

*Cambridge International Dictionary of English*

**lectin**

any of a group of proteins that bind to particular carbohydrates in the manner of an antibody and are commonly extracted from plants for use as an agglutinin, as in clumping red blood cells for blood typing.

*The Random House Webster's Unabridged Dictionary*

**marker genes**

Genes that identify which plants [or animals] have been successfully transformed.

*About Biotechnology*

**metabolic disease**

An inherited enzyme abnormality.

*Nutritional and Metabolic Diseases.*

**monoculture**

The agricultural practice of cultivating crops consisting of genetically similar organisms.

*An Agricultural and Environmental Biotechnology Annotated Dictionary*

**mRNA (messenger RNA)**

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.

*An Agricultural and Environmental Biotechnology Annotated Dictionary*

**mutagenesis**

The occurrence or induction of mutation.

*Merriam-Webster's Collegiate Dictionary*

The introduction of permanent heritable changes (ie, mutations) into the DNA of an organism. In the case of site-directed mutagenesis, the substitution or modification of a single amino acid at a defined location in a protein is

performed by changing one or more base pairs in the DNA using recombinant DNA technology.

*Functional Genomics Glossary*

### **non-tariff trade barriers**

Economic, political, administrative or legal impediments to trade other than duties, taxes and import quotas.

*World Cargo Alliance, Inc.*

### **nucleus**

The central part of an atom, usually made up of protons and neutrons, or the part of a cell that controls its growth. DNA is stored in the nucleus of a cell.

*Cambridge Dictionaries Online*

### **nutraceutical**

Any substance that is a food or a part of a food and provides medical or health benefits, including the prevention and treatment of disease. [Note: “Nutraceutical” and “Nutriceutical” are frequently used interchangeably.]

*Nutraceutical Alliance*

### **nutriceutical**

Nutriceutical is a term derived from the words “nutrition” and “pharmaceutical” A nutriceutical is a product that combines food and an active ingredient such as a drug or a vitamin or some other chemical substance. These products are on the leading edge of development and are a 1990s phenomenon. [Note: “Nutraceutical” and “Nutriceutical” are frequently used interchangeably.]

*ScienceNet*

### **oleic acid**

An oily liquid,  $C_{17}H_{33}COOH$ , occurring in animal and vegetable oils and used in making soap.

*The American Heritage Dictionary of the English Language*

### **organic**

Of, relating to, yielding, or involving the use of food produced with the use of feed or fertiliser of plant or animal origin without employment of chemically formulated fertilisers, growth stimulants, antibiotics, or pesticides.

*Merriam-Webster’s Collegiate Dictionary*

### **organism**

An individual animal, plant, or single-celled life form.

*Waiter, there’s a Gene in My Food*

**patent**

Title by which a government grants the exclusive right to make use of an invention for a fixed time period.

*Money Words*

**PC1–PC4 containment**

Levels of containment. *See* **containment**

**pesticide**

A substance that kills harmful organisms (for example, an insecticide or fungicide).

*An Agricultural and Environmental Biotechnology Annotated Dictionary*

A chemical which is used to kill unwanted organisms such as rats, insects, nematodes, etc. Pesticides often act as nerve poisons, and they are hazardous to animals and humans (some pesticides can cause nerve or liver damage, birth defects and cancer).

*BioTech Life Sciences Dictionary*

**phage, bacteriophage**

A virus for which the natural host is a bacterial cell. Used as a vector for cloning segments of DNA.

*Functional Genomics Glossary*

(Bacteriophage) A virus that parasitises bacteria. It initiates infection by attaching itself by its tail to the wall of bacterial cell. Through enzyme action the bacteria wall is perforated and the bacteriophage DNA or RNA passes through into bacterial cell. It uses the cell's machinery to make more bacteriophage DNA and bacteriophages, which are released by breakage of the bacterial cell.

*A Dictionary of Biology*

**pharmaco foods**

A term coined by the Commission to mean a food genetically modified to deliver a particular therapeutic agent, such as a vaccine or a pharmaceutical.

**phenotype**

The observable characteristics of a genetically controlled trait.

*Marine Biological Laboratory*

The observable characteristics of an organism as opposed to the set of genes it possesses (its genotype). The phenotype that an organism manifests is a result of both genetic and environmental factors. Therefore, organisms with

the same genotype may display different phenotypes due to environmental factors. Conversely, organisms with the same phenotypes may have different genotypes.

*About Biotechnology*

### **Plant Variety Rights**

[*New Zealand*] A grant of Plant Variety Rights for a new plant variety gives the holder the exclusive right to produce for sale and to sell propagating material of the variety. In the case of vegetatively propagated fruit and ornamental varieties Plant Variety Rights gives the holder the additional exclusive right to propagate the protected variety for the purpose of the commercial production of fruit, flowers or other products of the variety.

*Plant Variety Rights Office*

### **plasmid**

A small, circular piece of DNA found outside the chromosome in bacteria. Plasmids are the principal tools for inserting new genetic information into microorganisms or plants.

*About Biotechnology*

A structure composed of DNA that is separate from the cell's genome. In bacteria, plasmids confer a variety of traits and can be exchanged between individuals — even those of different species. Plasmids can be manipulated in the laboratory to deliver specific genetic sequences into a cell.

*The Genomics Lexicon*

### **prokaryote**

a unicellular organism having cells lacking membrane-bound nuclei; bacteria are the prime example but also included are blue-green algae and actinomycetes and mycoplasma.

*WordNet Vocabulary Helper (NotreDame)*

### **protein**

A biological molecule which consists of many amino acids chained together by peptide bonds. The sequence of amino acids in a protein is determined by the sequence of nucleotides in a DNA molecule. As the chain of amino acids is being synthesised, it is also folded into higher order structures shaped, for example, like helices or like flat sheets. Proteins are required for the structure, function, and regulation of cells, tissues, and organs in the body.

*The Genomics Lexicon*

**proteomics**

The new discipline that aims to identify and characterise all the proteins present in a cell.

*The Current Uses of Genetic Modification*

**recombinant DNA**

DNA molecules that have been created by combining DNA from more than one source.

*The Genomics Lexicon*

Recombinant DNA is a fragment of DNA incorporated artificially into the DNA molecule of a suitable vector so that it can express itself many times. This way a large quantity of the DNA in question can be obtained. The DNA is usually one that contains genes of interest, such as interferon, insulin, or growth hormone. The DNA may also be intended to fix mutated genes causing diseases, such as haemophilia or sickle cell anaemia. The vector could be plasmids, bacteriophages, and cosmids (packaged plasmid DNA into a phage particle).

*BioTech Life Sciences Dictionary*

*also recombinant clones:* Clones containing recombinant DNA molecules.

*BioTech Life Sciences Dictionary*

*also recombinant DNA technology:* The technology upon which genetic engineering or genetic modification is based. The process involves DNA being joined together in novel combinations.

*The Current Uses of Genetic Modification*

**rennet**

A substance used for thickening milk, esp. to make cheese. Most cheese is made with rennet, which comes from the stomach lining of calves, and is therefore not vegetarian.

*Cambridge International Dictionary of English*

**rennin**

An enzyme that catalyzes the coagulation of milk, found in the gastric juice of the fourth stomach of young ruminants and used in making cheeses and junkets. Also called chymosin, rennet.

*The American Heritage Dictionary of the English Language*

**seed bank**

A facility designed for the ex situ conservation of individual plant varieties through seed preservation and storage.

*World Resource Institute*

*also* seeds naturally occurring on or in the soil.

### **sequencing**

Determining the order of nucleotides in a DNA or RNA molecule, or determining the order of amino acids in a protein.

*The Genomics Lexicon*

### **service mark**

A mark or device used to identify a service (as transportation or insurance) offered to customers.

*Merriam-Webster's Collegiate Dictionary*

A word, phrase, logo, symbol, color, sound or smell used by a business to identify a service and distinguish it from those of its competitors. If the business uses the name or logo to identify a product, such as a camera, it is called a trademark. In practice, the legal protections for trademarks and service marks are identical.

*Nolo*

### **substantial equivalence**

A comparative technique recommended by the Organisation for Economic Co-operation and Development (OECD): when faced with a novel or modified food or food product, you search for its nearest equivalent amongst existing organisms used as food or sources of food. These can then be used as the basis for comparison to assess risk, given that there should be extensive knowledge available.

*Waiter, there's a Gene in My Food*

### **'super-weed'/'super-bug'**

A weed or pest that has developed a resistance to a herbicide/pesticide that once destroyed it.

*Waiter, there's a Gene in My Food*

### **terminator technology**

The current popular term applying to the methods used to render plant seeds sterile and unable to germinate.

*The Current Uses of Genetic Modification*

### **toxicity test**

Controlled laboratory test to determine the toxicity of a chemical to an organism in terms of specific chemical concentrations.

An acute toxicity test establishes the concentration required to kill a predetermined proportion of test organisms within a relatively short period

of time, typically four days or less. A chronic toxicity test reveals the effects of a sublethal concentration applied throughout all or part of the life cycle.

*On-line Medical Dictionary*

### **trademark**

Symbol, logo, or design that legally identifies a business or its product.

*Money Words*

A word, phrase, logo, symbol, color, sound or smell used by a business to identify a product and distinguish it from those of its competitors. If the business uses the name or logo to identify a service, such as photo copying, it is called a service mark. In practice, the legal protections for trademarks and service marks are identical.

*Nolo*

### **transformation**

A change in the genetic structure of an organism as a result of the uptake and incorporation of foreign DNA.

*About Biotechnology*

### **transgene**

A gene transferred to a recipient organism using recombinant technology.

*The Current Uses of Genetic Modification*

### **transgenic**

An organism that has been genetically engineered to contain the genes from another species.

*Waiter, there's a Gene in My Food*

An organism whose genome has been altered by the inclusion of foreign genetic material. This foreign genetic material may be derived from other individuals of the same species or from wholly different species. Genetic material may also be of an artificial nature. Foreign genetic information can be added to the organism during its early development and incorporated in cells of the entire organism. As an example, mice embryos have been given the gene for rat growth hormone allowing mice to grow into large adults. Genetic information can also be added later in development to selected portions of the organism. As an example, experimental genetic therapy to treat cystic fibrosis involves selective addition of genes responsible for lung function and is administered directly to the lung tissue of children and adults.

*The Genomics Lexicon*

**transposon**

A [DNA] sequence that can move about in the genome of an organism.

*Marine Biological Laboratory*

A segment of DNA flanked by transposable elements that is capable of moving its location in the genome.

*Bernie May*

**vaccine**

A preparation of dead or weakened pathogen, or of derived antigenic determinants, that is used to induce formation of antibodies or immunity against the pathogen.

*An Agricultural and Environmental Biotechnology Annotated Dictionary*

**vector**

An organism or a biological molecule used to transfer material to a different organism or cell. In genetic modification, this refers to an organism, bacterium or plasmid able to transfer DNA.

*The Current Uses of Genetic Modification*

A self-replicating DNA molecule that exists with, but is separate from the genome of the host cell. Many different vectors have been identified and genetically engineered for use in molecular biology. DNA inserted into a vector will be replicated along with the vector. In this manner, DNA of interest can be obtained in large quantities, ie, cloned. For example, the human insulin gene can be cloned into the plasmid vector pBr 322 which, in turn, will replicate in *E. coli* cultures.

*Bernie May*

*also cloning vector:* DNA molecule originating from a virus, a plasmid, or the cell of a higher organism into which another DNA fragment of appropriate size can be integrated without loss of the vector's capacity for self-replication; vectors introduce foreign DNA into host cells, where it can be reproduced in large quantities. Examples are plasmids, cosmids, and yeast artificial chromosomes; vectors are often recombinant molecules containing DNA sequences from several sources.

*The Genomics Lexicon*

**virus**

An infectious agent composed of a single type of nucleic acid, DNA or RNA, enclosed in a coat of protein. Viruses can multiply only within living cells.

*About Biotechnology*

Viruses consist of a piece of nucleic acid covered by protein. Viruses can only reproduce by infecting a cell and using the cell's mechanisms for self-replication. They can cause disease; modified viruses can also be used as a tool in gene therapy to introduce new DNA into a cell's genome.

*The Genomics Lexicon*

### **xenotransplant**

Transplantation of tissue or organs between organisms of different species, genus, or family. A common example is the use of pig heart valves in humans.

*The Genomics Lexicon*

### **yeast**

A type of fungus which is used in making alcoholic drinks such as beer and wine, and for making bread swell and become light .

*Cambridge Dictionaries Online*

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