APPENDIX D

GLOSSARY

A

Acid Solution — One in which the H ions are in excess of the OH ions.

Adaptation — The process by which an organism becomes adjusted to its environment; the fitness of a particular part for a particular use; the state of being adjusted to the environment.

Adipose Tissue — A form of connective tissue, composed chiefly of cells filled with fat.

Adjustor — The neurons concerned in transferring a sensory impulse into a motor impulse.

Adrenal — An endocrine gland on or near the kidney.

Adrenalin — A hormone produced by the adrenal.

Aedes — A genus of mosquito. Transmits yellow fever organism.

Afferent Nerve — One that conducts (sensory) impulses from the periphery toward a nerve center.

Albumin — A compound protein. Found in white of egg.

Allantois — Sac formed by evagination from posterior floor of embryonic gut of Reptilia and higher vertebrates.

Allelomorph — (Genetics.) A pair of contrasting or alternative unit characters inherited in Mendelian fashion.

Alkaline Solution — One in which the OH ions are in excess of the H ions.

Alternation of Generations. A life cycle in which a sexual form alternates with an asexual form.

Amino-acid — Amino derivatives of organic acids, in which one H ion is replaceable with an amino group, NH_2. Fischer called amino-acids the building stones of the proteins.

Amitosis — Direct cell division in which cells divide without organizing a mitotic apparatus.

Amnion — An embryonic sac formed in reptiles, birds and mammals, filled with fluid and inclosing embryo.

Amoeboid — Having form and movement of an Amoeba.

Amphimixis — The mingling of two bodies of germ plasm in fertilization.

Anabolism — A general name for the constructive phases of metabolism.

Anaerobic — Refers to types of bacteria that live in absence of free oxygen.

Analogy — Similarity.

Anatomy — The science that deals with organ structure of living things.

Angiosperms — Sub-phylum of Spermatophyta in which inclosed (hidden) seeds are formed.

Anion — An ion that bears a negative charge of electricity.

Annelida — A phylum of worm-like animals with a segmented body. (Annulata or Annelids.)

Anopheles — A genus of mosquito that transmits malaria.

Annual — A plant that completes its life cycle in one season.

Antero-Posterior Differentiation — A form of body which has a front or head end and a tail or hinder end.

Anther — The outer end of a stamen where microspores (pollen) are produced.

Antheridium — A male sex organ in plants where microgametes (male gametes) are produced, as in Marchantia.

Anthoceros — A liverwort, unique in that the sporophyte is green.

Antibody — A substance formed in the blood which tends to render antigens harmless.

Antigen — A substance which, when introduced into the blood, will cause the formation of an antibody, which inactivates it.

Archaeopteryx — Fossil reptile-bird of the Jurassic Period. Had feathers and teeth. Claws on its digits.

Archegonium — Female sex organ in plants where megagametes (female gametes) are produced, as in Marchantia.

Archenteron — (Embryonic) Intestine of a gastrula. Primitive gut.

Artery — A blood vessel which carries blood away from the heart.

Arthropoda — A phylum of invertebrates having segmented body and jointed appendages.

Artificial Parthenogenesis — Stimulation of eggs to develop by artificial agencies, not by sperm.

Artificial Selection — Production of desired qualities in domestic forms by repeated breeding of selected individuals.

Autosomes — (Genetics) Refers to all other chromosomes exclusive of sex chromosomes.

Autotomy — Refers to an operation carried on by some animals when they cast off an injured organ, as when a starfish drops an injured arm.

Autolysis — Self-digestion of an organ by enzymes produced by that organ. Under normal conditions such enzyme activity is prevented.

Axil — Angle between a leaf or branch and the stem.

Axon — That part of a neuron which conducts impulses away from the cell body or cyton.

B

Bacillus — A rod-shaped bacterium.

Basic Metabolism — Those processes (chemical) concerned in *maintaining* the life of the cell or organism. (See functional metabolism.)

Bilateral Symmetry — A form of symmetry in which one half is similar to the other half.

Binomial Nomenclature — System devised by Linnaeus for naming species in which the form has two names, one for the genus and one for the species.

Biogenesis — The biologic law that, so far as we know, all organisms are derived from organisms; "All cells from cells." Opposed to theory of spontaneous generation.

Biogenetic Law — Law of recapitulation — that organisms in their development go through stages resembling ancestral forms of the group of which that animal is a member.

Biology — The science of living things, *i.e.*, organisms.

Blastopore — Opening to archenteron of a gastrula. Blastopore serves as mouth *and* anus.

Blastula — Embryonic stage in metazoan development — a sphere consisting of a single layer of cells inclosing a 'segmentation cavity.'

Botany — That branch of biology dealing with plants.

Brownian Movement — The vibratory movement of dispersed particles of a colloid.

Bud — An embryonic structure developing from the main body of an organism and which will form an organ or another individual.

Budding — Vegetative reproduction in animals by forming buds. In horticulture, a method of grafting.

C

Calyx — Outer set of floral envelope (Green). Composed of sepals.

Cambium — Meristematic tissue between xylem and phloem of a stem.

Capillaries — Fine network of thin-walled vessels in tissues, carrying blood to them.

Carboniferous — The latter part of the Paleozoic Era. Coal Age.

Carpel — A simple pistil or a part of a compound pistil of a flower.

Carpellate Cone — (Gymnosperms.) A cone (strobilus) composed of megasporophylls, which produce megaspores.

Cation — (Kation.) An ion that carries a positive charge of electricity.

Cell Membrane — The outer protoplasmic envelope of a cell.

Cell Theory — All organisms are single cells, or organizations of cells.

Cellulose — A carbohydrate substance forming the outer wall which incloses plant cells. Cotton fibers are almost pure cellulose.

Cenozoic — The latest geologic Era — the age of mammals.

Central Apparatus — Consists of centrosome, centrosphere and astrosphere. Forms apparatus for mitosis. Centrosome not present in all cells.

Cerebellum — That part of vertebrate brain posterior to optic lobes and anterior to medulla.

Cerebrum — The anterior part of vertebrate brain. Cerebral hemispheres in man.

Chitin — Horny substance forming the exoskeleton of insects and crustacea.

Chlorophyll — In plant cells, the green coloring matter which can transfer energy of sunlight into chemical energy for carbohydrate synthesis.

Chloroplast — Small chlorophyll-containing plastids found within certain plant cells.

Chromatin — Unique nucleo-protein substance in the nucleus of cells, plays essential rôle in heredity.

Chromidia — Little masses sometimes found in cytoplasm, possibly chromatin discharged from nucleus.

Chromoplasts — Colored plastids in cytoplasm.

Chromosomes — Chromatin bodies of definite size, shape and number appearing at mitosis. All members of a given species have similar chromosomes.

Cilia — Microscopic hair-like cellular processes having a whip-like motion.

Cleavage — Early cell divisions in the developing egg.

Close or Self-Pollination — Transfer of pollen from stamens of a flower to stigma of the same flower.

Cnidoblast — Special ectoderm cell in such forms as Hydra, producing a nematocyst.

Cocci — Bacteria, spherical in shape.

Cochlea — That part of the inner ear which possesses the sensory cells, and other apparatus of hearing.

Coelenterates — A phylum of animals in which the body plan is essentially like that of a gastrula, *i.e.*, diploblastic, with ectoderm and endoderm.

Coelome — The true body cavity between intestine and body wall. Lined with derivatives of mesoderm.

Coenosarc — Central living core of hydroid 'stems,' composed of ectoderm and endoderm with a central cavity within endoderm.

Colloid — A state of matter in which very minute but ultramolecular particles remain in suspension in a fluid. Colloids are not easily crystallized, do not readily diffuse in solutions

nor do they easily pass through membranes derived from organisms.

Commensalism — An association between two forms with no harm to either.

Complete Metamorphosis — A transformation in which an insect in its development has an egg, larva, pupa and imago (adult) stages.

Conceptacle — Cavity in receptacle of Fucus containing antheridia, oogonia or both.

Conifers — A subdivision of Gymnosperms, *i.e.*, pine, hemlock.

Conjugation. A form or reproduction in which two individuals come together and (*a*) as in Spirogyra, contents of one cell pass over and fuse with cell contents of other; or (*b*) as in Paramoecium, there is an exchange of nuclear material.

Continuous Phase — That phase of a colloid in which particles are dispersed (suspended). In smoke, air is the continuous phase and carbon (etc.) particles, the dispersed phase.

Contractile Vacuole — A vacuole forming in cytoplasm of many protozoa, probably filling with excretions, which are discharged when the vacuole contracts.

Copulation — Temporary conjugation of a male and female animal for transfer of sperm from male to female.

Corolla — Set of floral leaves or petals within the calyx.

Cranial Nerves — Those that originate from the brain.

Cranium — That part of skull inclosing the brain.

Crossing Over — In synapsis, chromosomes may twist around each other, so that in the reduction division there might be effected a new arrangement of linkage groups of genes.

Cross-Pollination — Transfer of pollen from one flower to pistil of another flower of the same species.

Cryptogam — Subdivision of plants including Thallophytes, Bryophytes and Pteridophytes.

Crystalloid — A substance composed of crystals which will completely dissolve and can be recovered in crystalline form.

Cupules — Small cups on dorsal surface of Marchantia thallus, which produce gemmae.

Cuticle — Outer limiting membrane of many animals. It is non-cellular. Example, cuticle of earthworm.

Cyst — A protective case or sac around a resting organism, although some cysts contain fluid (pathology).

Cytology — The science of cell morphology and physiology.

Cyton — The cell-body of a neuron, *i.e.*, that part containing the nucleus.

Cytoplasm — The protoplasm between the nucleus and cell membrane of a cell. Contrasted with nucleoplasm, the substance of the nucleus. The nucleus is a *body* and the word cytosome is used as meaning the *body* of the cell outside the nucleus.

Cysticerci — Bladder worms — asexual passive or encysted stage in the life cycle of the tapeworm.

D

Darwinism — See Natural Selection.

Dehydration Synthesis — A chemical process which involves the decomposition of molecules, the subsequent union of portions of them, resulting in formation of a new compound *with the loss of water*. Molecules of glucose and fructose unite forming cane sugar and water.

Dendrites — Short, stubby, irregular branching processes of a neuron which conduct impulses into the cyton.

Dialysis — Process by which a membrane permits diffusion of some

substances in solution but withholds others.

Dicotyledon — An angiosperm whose embryos have two seed leaves.

Diencephalon — Part of brain of vertebrate between cerebrum and optic lobes. (The between brain.)

Diffusion — The distribution of particles of substances in solution as sugar in water; or when two liquids or gases are brought together.

Digestion — The process of changing complex compounds to a simpler form capable of being absorbed through cell membranes.

Dihybrid — A cross involving two pairs of alternative characters.

Dinosaurs — Great herbivorous and carnivorous reptiles of the Mesozoic Period.

Dioecious refers to organisms in which there are separate sexes, *i.e.*, males and females.

Diploblastic — Referring to animals whose tissues are derived from two germ layers, *i.e.*, ectoderm and endoderm, *i.e.*, coelenterates.

Diploid — Paired condition of chromosomes and their contained genes in zygote cells, resulting from the contribution of one member of each pair from each parent.

Dipnoi — Lung-fish, which in water breathe by means of gills. In absence of water, their air bladder functions as a lung.

Disaccharid — A carbohydrate having the formula — $C_{12}H_{22}O_{11}$. Example: cane sugar.

Distal — Away from central axis of body.

Dominance — A Mendelian law according to which one member of an alternative pair of characters (which are both present in the same zygote) expresses itself over the other (recessive) member.

Dorso-Ventral Differentiation — A morphological relation in which there is a definite back or dorsal side, and a belly or ventral side.

Dura Mater — Tough connective tissue membrane inside skull and over the brain.

E

Echinodermata — Phylum of spiny-skinned animals with secondary radial symmetry.

Ecdysis — Shedding of exoskeleton by Arthropoda, or of skin by snake.

Ecology — Study of relation of organisms to their environment.

Ectoderm — Outer layer of cells of a gastrula.

Ectoplasm — Clear, non-granular layer of protoplasm at periphery of some cells.

Effector — The motor or muscular part of a reflex mechanism.

Efferent Nerve — A motor nerve which carries impulses from a center out to a muscle or gland.

Electrolyte — A substance which in solution breaks up into ions, having opposite electrical charges and thus becomes a conductor of an electric current.

Electron — Smallest particle of negative electricity; revolves about the nucleus of an atom.

Elephantiasis — Disease caused by Filaria, a nematode worm.

Embryo — The organism in its developmental stages. In higher mammals, the well-advanced embryo is called a foetus.

Embryology — The science of the development of organisms.

Emulsoid — A colloid in which the dispersed and dispersing phases are liquid. Cream is droplets of fats dispersed in water. Most protoplasmic fluids are emulsoid.

Endocrine Gland — A ductless gland which secretes hormones into the blood stream.

Endoderm — Inner of two layers of cells of a gastrula.

Endomixis — Nuclear reorganization without conjugation, as in Paramoecium.

Endoplasm — (Endosarc.) Granular cytoplasm inside ectoplasm (ectosarc) of some cells.

Endosperm — Food tissue formed adjacent to embryo in embryo sac of some Spermatophytes.

Enteron — Gut or intestinal tract.

Enzymes — Protein-like compounds that hasten speed of organic chemical reactions.

Eohippus — The " dawn " horse of the Eocene Period of the Cenozoic Era.

Epicotyl — The portion of an embryo plant above the cotyledons. At upper tip is plumule, embryonic leaf bud.

Epidermis — Outer protective tissue of plants. Also outer part of skin of vertebrates.

Epigenesis — Idea that embryos do not exist preformed in the egg, but that from generalized egg substance, a differentiated adult develops.

Epithelium — One of the main types of animal tissues, forms membranes which cover adjacent tissues.

Erythrocyte — Red blood cell, possesses hemoglobin.

Eugenics — A study of human heredity with a view toward discovery of principles, which, if applied, will improve the quality of the human race.

Euthenics — The study of environmental methods of improving the quality of the human race.

Evolution — In biology, the theory that plant and animal forms are constantly changing and that from time to time new races and species have been formed from preceding simpler and more generalized forms. Opposed to idea that all existing forms came into existence *all at once*, long ago.

Excretion — The process by which wastes of metabolism are eliminated from the cells and from the organism.

F

F_1 — The first filial generation, *i.e.*, the first generation produced in hybridizing or crossing parents of different varieties or species.

F_2 — The second filial generation produced by interbreeding members of the F_1 generation.

Factor — See ' gene.'

Fats — Compounds of fatty acids and glycerine.

Fauna — The animal life of a region.

Feces — Mostly undigested materials discharged from the anus of animals.

Female Gamete — Equivalent to egg cell or ovum or megagamete.

Female Gametophyte — A gametophyte that has only female sex organs.

Fertilization — A physiological process involving the union of a male and female gamete, *i.e.*, egg and sperm, forming a zygote.

Fibrin — Solid protein network formed from fibrinogen of the plasma when blood coagulates. It enmeshes the corpuscles.

Filterable Virus — Toxic material which passes through finest filters and causes disease, suggesting that it contains ultramicroscopic bacteria.

Fission — A form of reproduction in which the cell is divided into equal-sized daughter cells. Applied to single-celled organisms.

Flagellum — A whip-like motile appendage of certain cells. Larger than a cilium.

Flora — Plant life of a region.

Flower — That organ of an Angiosperm where microspores or mega-

spores or both are produced and where seeds may be formed.

Fossil — (Something that is dug up.) The petrified remains of a prehistoric organism.

Frond — The leaf of a fern, including stipe and blade.

Fruit — Seeds surrounded by ripened wall of ovary and sometimes by overlapping receptacle.

Functional Metabolism — Chemical processes having to do with the special work of a cell or organ, *i.e.*, over and above basic metabolism.

G

Gametangium — A structure producing gametes.

Gametes — Sex cells, which uniting produce a zygote.

Gametophyte — Sexual generation in plants which alternates with the asexual sporophyte.

Ganglion — A collection of nerve cells, forming a nerve center.

Gastrin — A stomach hormone causing gastric secretions.

Gastrula — An embryonic stage in metazoan development consisting of two germ layers, ectoderm and endoderm.

Gel — The solid state of a colloid.

Gene — A substance in the chromosome which is the determiner of specific hereditary qualities; supposedly an ultramicroscopic multimolecular body. The terms "Factor," "Unit character" and "Determiner" are less concrete.

Genetics — The study of the phenomena of inheritance according to which offspring are similar to and also different from their parents, and having in view the discovery of laws according to which characters are inherited.

Genotype — A group of individuals that have the same genic composition so far as certain specific characters are concerned.

Geographical Distribution — That branch of biology which seeks to explain the peculiarities of plant and animal distribution in different geographical areas.

Geotropism — Growth response of plants to the force of gravity.

Germination — Renewal of growth and development of embryos in seeds after a resting period following their formation.

Germ Layer — An embryonic group of cells from which similar adult tissues or organs will develop. The germ layers are ectoderm, mesoderm and endoderm.

Germ Layer Theory — Each embryonic germ layer develops into particular tissues in the triploblastic metazoa, *i.e.*, endoderm forms the lining of the gut; mesoderm, muscle tissue; ectoderm, skin and nerves, etc.

Germ Plasm — That protoplasm of which the germ cells (sperm and eggs) are composed.

Germ Theory of Disease — Certain types of disease are caused by bacteria, *i.e.*, by microorganisms.

Gills — Organs of respiration in an aquatic organism. Spore-bearing tissue under cap of mushrooms.

Gill Slits — Slits or openings in wall of pharynx of fishes, provided with gills. (See tunicate and Amphioxus in text.) Also in embryos of higher vertebrates.

Gland — An organization of cells whose function is secretion.

Glucose — A monosaccharid, $C_6H_{12}O_6$.

Glycogen — Animal starch, stored in liver.

Goiter — Enlarged thyroid gland correlated with deficiency of thyroxin.

Gonad — General name for repro-

ductive glands of animals, *i.e.*, ovary or testis.

Gonangium — Reproductive member of a hydroid colony. Produces medusae, asexually.

Grafting — Propagation of plants by special vegetative process. A portion of the plant to be propagated, known as the 'scion,' is *grown to* the 'stock' plant, which is commercially of little value. Seedless oranges can be propagated only in this way.

Growth — Involves increase in size of cells; formation of more cells; development of young cells into specialized mature tissues.

Gymnosperms — Sub-phylum of Seed Plants in which *exposed* seeds are formed.

H

Haemocyanin (Hemocyanin) — A protein-copper compound in arthropod blood, having an oxygen-transporting function.

Haploid — By oogenesis and spermatogenesis, the zygote pairs of chromosomes are separated so that each germ cell receives one chromosome of each pair of chromosomes possessed by the zygote cells. Paired genes are also segregated.

Haemoglobin (Hemoglobin) — The pigment in red blood cells which forms a temporary association with oxygen. A protein-iron compound.

Heart Wood — Centrally located xylem tissue, within the sap wood and no longer conducting soil water up the trunk.

Hermaphrodite — Organisms in which male and female sex organs are present in same individual. (Monoecious.)

Heterogametes — Dimorphic sex cells, *i.e.*, small microgametes and large megagametes.

Heterozygous — When the two members of a given factor pair, in the zygote chromosomes, are dissimilar genes, *i.e.*, alternative genes. Half the sex cells of that individual carry one of these genes and the other half carry the gene for the alternative character.

Hibernation — Refers to an animal remaining dormant during winter.

Hirudin — A substance obtained from glands of the leech, Hirudo. Prevents coagulation of blood.

Histology — Science of tissue construction of organs.

Holoblastic Cleavage — When entire egg undergoes cleavage, *i.e.*, equal in amphioxus and unequal in frog, etc.

Homoiothermic — Refers to warm-blooded animals in which a *constant* temperature is maintained.

Homolecithal — Even distribution of yolk in an egg.

Homology — Underlying similarity in structure indicating phylogenetic relationships.

Homozygous — When the two members of a given factor pair are similar genes, then the individual is homozygous for that character. *All* of its sex cells will carry the gene for that character.

Hook-Worm — A nematode parasite which causes hook-worm disease.

Hormone — A protoplasmic soluble substance which brings about integration of functions; a chemical messenger stimulating particular organs to function.

Hyaloplasm — Clear part of cytoplasm.

Hybrid — Offspring of parents belonging to different varieties or species. Theoretically it possesses pairs of alternative genes.

Hydranth — Hydra-like member of a hydroid colony.

Hydrogen-ion Concentration — The

proportion of H ions to OH ions in a solution.

Hydrolysis — A chemical reaction in which water is added to some compound and a new compound formed.

Hypha — A filament of a fungus plant body. The mass of hyphae form the mycelium.

Hypocotyl — Portion of the embryo plant below the cotyledons. Lower tip of hypocotyl is embryonic root.

I

Ichthyopsida — Fishes and Amphibia. Term used by Huxley.

Insulin — Hormone which controls metabolism of glucose (carbohydrate); elaborated by islands (of Langerhans) in pancreas.

Invertebrates — Animals without a backbone, *i.e.*, all forms except vertebrates. Used by Lamarck, 1797.

Ion — Subdivision of an electrolyte. Ions bear positive or negative charges of electricity. *See* anion.

Irritability — Property possessed by protoplasm by which the equilibrium of the protoplasmic system is upset by a stimulus. This property belongs especially to sense cells.

Islands of Langerhans — Patches of endocrine tissue in pancreas which secrete the hormone, insulin.

Isogametes — Similar sized gametes, as in Ulothrix.

Isolation — A theory of Evolution: Restriction of animals in a sequestered region for a long time promotes development of new types.[5]

K

Katabolism — A general name for destructive phases of metabolism.

L

Lamarckism — Theory of the inheritance of parental modifications or acquired characters as a cause of organic evolution.

Larva — Worm-like stage in development of insects; also stage in development of lower forms.

Larynx — Portion of trachea containing the voice box.

Law of Adaptive Radiation — Animals which are all members of a certain group become adapted to different environmental conditions and become accordingly specially modified so that diverse types result.

Law of Convergence of Form — Due to adaptation to same environmental medium, diverse animals have assumed similarity of form.

Leucocyte — (Leukocyte.) White blood cells.

Leucoplasts — Unpigmented bodies around which starch grains form in plant cells.

Lichen — A Thallophyte in which there is a symbiotic association between an alga and a fungus.

Linin — Fiber network in nucleus which supports chromatin particles.

Linkage — The theory that *inheritance together of groups of characters* is due to the *linkage* of a *series of genes* responsible for the characters and the transmission of these *linkage groups* to the zygote.

Liver-Fluke — Parasitic trematode, in liver of sheep.

Lymph — Colorless fluid in tissue spaces and lymph vessels.

M

Malaria — Disease caused by a sporozoan, Plasmodium.

Male Gamete — A sex cell which united with a female gamete produces a zygote. (Equivalent to microgamete or sperm cell.)

Male Gametophyte — A Gametophyte that has only male sex organs.

Mammary Gland — Between skin

and ventral body wall of mammals; secretes milk. A modified oil gland.

Marsupium — Pouch on abdominal wall of Metatheria.

Mechanistic Theory — Organic activities are due to the operation of the same physical and chemical forces as operate in the inorganic world.

Medulla — Posterior part of vertebrate brain, anterior to spinal cord.

Medusa — Free-swimming, sexual stage of certain coelenterates.

Megagamete — A female or egg cell or large gamete which united with a microgamete forms a zygote, or fertilized egg.

Meganucleus — The larger, vegetative nucleus of Paramoecium.

Megaspore — A large spore that will develop into a female gametophyte.

Megasporophyll — A sporophyll that produces only megaspores.

Mendelism — The theory of inheritance based on principles discovered by Mendel.

Meristem — Plant tissue, the cells of which retain the power of cell division and growth as at the tip of roots and stems.

Mesoderm — Middle germ layer formed from endoderm or ectoderm.

Mesogloea — Jelly-like tissue between endoderm and ectoderm of coelenterates. Contains a few cells.

Mesonephros — Succeeds the pronephros and is functional kidney of fishes and amphibia but embryonic in higher vertebrates.

Mesophyll — Middle tissue of a leaf. Cells contain chlorophyll.

Metabolism — Totality of chemical processes that take place in living protoplasm.

Metanephros — Succeeds pronephros and mesonephros in developing reptiles, birds and mammals in which it is the functional adult kidney.

Metagenesis — Alternation of a sexual with an asexual generation in the life cycle of such animals as Obelia.

Metamere — One of the segments of a metameric animal, as the worm.

Metamerism — A morphological characteristic, referring to the segmented condition of the body of annelids, arthropods and vertebrates.

Metamorphosis — Change in form, as different forms assumed by a moth in its development, *i.e.*, egg, larva, pupa, imago; or by a frog which has a tadpole stage.

Metazoa — The many-celled animals in which there is more or less tissue differentiation.

Mesozoic — That geologic era between the Paleozoic and the most recent or Cenozoic. The great age of reptilian life.

Microgamete — A male sex cell, small gamete, sperm.

Micron — The thousandth part of a millimeter. $\frac{1}{25400}$ part of an inch.

Micronucleus — The smaller reproductive nucleus of Paramoecium.

Microspore — A small spore that will develop into a male gametophyte.

Microsporophyll — A sporophyll that produces only microspores.

Millimeter — The thousandth part of a meter, and the tenth part of a centimeter.

Mimicry — Similarity in external appearance of a defenseless form to an immune model.

Mitochondria — Discrete, permanent, spherical or linear masses in cytoplasm of many cells, lipoid in nature. Function problematical.

Mitosis — Division of cells involving elaborate division mechanism. An exact division of chromosomes is effected. Indirect cell division.

Mollusca — A phylum of soft-bodied invertebrate animals, having a

muscular organ of locomotion called the *foot* and in most cases, a shell of calcium carbonate.

Monocotyledons — Angiosperms that have only one seed leaf.

Monoecious — Organisms in which male and female sex organs are present in the same individual.

Monosaccharid — Carbohydrate having the formula $C_6H_{12}O_6$, *e.g.* Glucose.

Morphology — The science that deals with the form and structure of organisms.

Morula — Late cleavage stage in metazoan development, consisting of a spherical mass of cells. Modified in many cases.

Mycelium — Plant body of a fungus consisting of a mass of filaments.

Myogenic Theory — The basic rhythmical beat of the heart is due to an innate property of heart muscle and not to nerve impulses.

Myotomes — Segmentally repeated muscle masses of Amphioxus, fishes and embryos of higher vertebrates.

Mutation — A different, discontinuous and permanent variation appearing in offspring of a parental line that did not possess it. In inheritance it is transmitted according to Mendelian principles.

N

Natural Selection — Darwin's theory that overcrowding, struggle for existence and survival of the fittest acted as a natural selection in the production of new species. Sometimes called Darwinism.

Nemathelminthes — A phylum of invertebrate animals; the round worms or nematodes, worm-like with complete intestinal tract and a body cavity which is not a true coelome.

Nephridium — A kidney. The excretory tubule of the earthworm. Tubule of the vertebrate embryonic kidney.

Nephrostome — Internal opening or mouth of a nephridium.

Nerve Impulse — A progressive physico-chemical change passing along a nerve fiber.

Nitrogen-Fixing Bacteria (Bacillus leguminosum) — Have power of utilizing free nitrogen of atmosphere, making nitrogen compounds used by legume plants with which these bacteria are associated.

Notochord — A cellular rod extending lengthwise of the body above the intestine and under the nerve cord. Present in the chordates. Embryonic in most vertebrates.

Nucellus — Tissue immediately surrounding the megaspore in the ovule.

Nucleolus — Small body in the nucleus. Function problematical.

Nucleus (from Latin "kernel") — A round or oval body within a cell, containing chromatin. The nucleus differs chemically from cytoplasm. It is the center of cellular activities and is essential to life of the cell.

O

"Omnis cellula a cellula" — Dictum of R. Virchow. All cells are derivatives of cells. Opposed to spontaneous generation theory. *See* 'Biogenesis.'

Ontogeny — Developmental history of an individual.

Oogenesis — Process of producing ova from ovary, involving reduction of chromosomes.

Oogonium — A simple female sex organ of plant, producing one or more ova as in Oedogonium and Fucus.

Operculum — A lid; covers gills of bony fishes, also internal gills of frog. See also operculum of Polytrichum spore case.

Orthogenesis — Evolution in a

straight line, determined by internal organization of germ plasm.

Osmosis — A process which occurs when a solution of a substance is separated from the solvent of that substance by a membrane permeable to the molecules of the solvent but impermeable to the molecules of the substance in solution. Molecules of the solvent pass back and forth through the membrane. Molecules of the substance are kept on the side of the membrane where they are in solution. In a given unit of time more molecules of the solvent will pass into the solution than will pass from the solution out through the membrane. This is due to a difference in diffusion pressure of the solvent in the two situations.

Osmotic Pressure — Osmotic pressure is the difference in diffusion pressure between (*a*) molecules of a solvent forming a solution with a substance and (*b*) the molecules of the pure solvent when they (*i.e.*, *a* and *b*) are separated by a membrane, permeable to the molecules of the solvent but impermeable to the molecules of the substance in solution. As a result of forming a solution, the pressure of the molecules of the solvent, per unit volume, are decreased as compared with the pressure of the molecules of the pure solvent outside the membrane and as a consequence more molecules of the pure solvent per unit of time will pass into the solution than will pass out. This will continue until equilibrium is attained. An osmometer, which measures osmotic pressure, is read at the time equilibrium is attained.

Oviducts — Ducts which convey eggs from ovaries.

Oviparous — Animals that produce eggs that develop outside the body of the female.

Ovum — An egg cell or female gamete.

Oxidation — A physiological process in which oxygen unites with a carbon compound such as glucose and effects a transfer of energy, utilized in metabolism.

P

Paedogenesis — Sexual reproduction in a larva.

Paleozoic — Era of geologic time, after the Proterozoic, when living forms first appeared in abundance, evidenced by fossils, mostly invertebrates. Great paucity of fossils in the Proterozoic and none in the preceding Archeozoic Era.

Pandorina — A spherical colony of cells which form an organism belonging to the Mastigophoran Protozoa. It resembles the morula embryo stage of some Metazoa.

Palaeontology — Science of organic life of past geologic ages.

Parthenogenesis — Development of ova without union with sperm cells, as in aphids.

Parasite — An organism that lives on, or in, or at the expense of another organism.

Parenchyma — A fundamental tissue of plants consisting of somewhat elongated, thin-walled cells. Acts as starch storage tissue in some cases.

Pathology — Study of changes in normal structure and functions brought about by disease.

Pectoral Girdle — The cartilages or bones which connect the anterior appendages of vertebrates to the spinal column.

Pelvic Girdle — The cartilages or bones which connect the posterior appendages of vertebrates to the spinal column.

Peripheral Nervous System — Re-

fers to the cranial nerves and spinal nerves.

Penis — Male organ of copulation by which sperm are introduced into female genital receptacle.

Pepsinogen — A precursor of pepsin, a protein enzyme of the stomach.

Perianth — The calyx and corolla of a flower.

Perichondrium — The sheath of special connective tissue covering and nourishing cartilage. Chondriogenetic.

Periosteum — Sheath of special connective tissue which covers and nourishes bone. Osteogenetic.

Peripatus — A worm-like arthropod, considered similar to probable ancestors of insects.

Peristalsis — A wave-like movement or succession of movements of tubes which have longitudinal and transverse muscle cells.

Peritoneum — Thin membrane lining body cavity. Derived from mesoderm.

Petal — Colored, leaf-like division of the corolla.

Pharynx — Portion of digestive tract between posterior part of oral cavity and the oesophagus. Gill slits of dogfish are in lateral walls of pharynx.

Phenotype — A group of individuals that have similar appearance but have different genetic constitutions.

Phloem — Tissue in plants which is used for conduction of sugar solutions.

Phylogeny — The evolution of a group of organisms, *i.e.*, the development of the race as opposed to ontogeny, the development of the individual.

Physiology — The science that deals with the functions of organisms.

Phanerogam — Spermatophyte, *i.e.*, plants which have flowers and seeds.

Photosynthesis — Process by which starch is made in the green leaf from carbon dioxide and water, when sunlight is present.

Pistil — A megaspore-producing organ of a flower; consists of outer stigma; middle style and lower ovary which contains ovules in which megaspores are produced.

Pituitary — Endocrine brain-gland, located ventral to the diencephalon.

Placenta — Embryonic and foetal structure in Eutherian mammals, connecting foetus and mother for nutritive purposes.

Placoid Scale — Tooth-like scale in skin of elasmobranchs. Considered ancestral form of vertebrate teeth.

Plankton — Population of floating microorganisms of the ocean.

Plasma — Non-cellular, liquid part of blood which has not coagulated.

Plastids — Cytoplasmic bodies in cells, *e.g.*, chloroplasts.

Platyhelminthes — Phylum of invertebrate animals: Triploblastic; no coelome.

Poikilothermic — Refers to so-called cold-blooded animals in which body temperature varies with that of external medium.

Pollen Grain — Microspore of spermatophytes.

Pollen Tube — Male gametophyte of spermatophytes.

Pollination — Transfer of pollen from stamens to pistils. See kinds of.

Polysaccharid — A carbohydrate having formula $(C_6H_{10}O_5)_n$. Many combinations are possible. Examples: starch and cellulose.

Porifera — Phylum of invertebrates — the sponges — pore-bearing.

Preformation — The idea that the embryo exists preformed in the egg, opposed to epigenesis.

Prelocalization — Some eggs exhibit evidences of localization of different tissue-forming substances.

Prenatal Influence — Idea that par-

ticular experiences during pregnancy will produce related effects in the offspring. Lacks scientific proof.

Procambial Strands — Elongated groups of procambium cells from which primary vascular bundles will develop in young roots and stems.

Proglottid — One of segments of a tapeworm.

Promeristem — Homogeneous tissue at tip of stem and root in which cell divisions take place in any plane.

Pronephros — Primitive embryonic kidney of vertebrates.

Prophylaxis — Measures taken to prevent disease. Also to prevent spread of disease.

Protective Resemblance — When an organism resembles some part or feature of its environment so that it escapes notice, it is said to possess protective resemblance.

Protein — Compounds of amino-acids essential to life.

Prothallus — Small, flat, heart-shaped gametophyte of the fern.

Protista — Group of primitive (unicellular) organisms which are neither distinctly plant or animal. (Haeckel)

Proton — Smallest particle of positive electricity; the nucleus of an atom.

Protonema — A filamentous, branching, multicellular structure which develops from a moss spore. Buds on the protonema grow up into moss plants. It is part of gametophyte cycle.

Protophyta — Simple plant forms, unicellular or colonies of similar cells.

Protoplasm — The substance of which cells are composed and in which the processes of life occur.

Protozoa — Single-celled animals or animals that are colonies of similar cells.

Proximal — Toward central axis of body.

Pruning — Thinning out or cutting back the branches of a shrub or tree.

Pseudopodia — Irregular protoplasmic processes of locomotion in Sarcodina and other cells.

Pteridosperm — A seed-bearing fern-like plant of the Carboniferous Age. Considered ancestor of Cycads.

Pterodactyl — Flying reptile of the Mesozoic Era.

R

Receptor — General name for peripheral cell or sense organ which receives stimuli.

Recessive — A character which is not apparent when the gene of the alternative dominant character is present in the same zygote.

Reflex Action — Involuntary act caused by nerve impulses passing over a reflex mechanism. Name given by Descartes.

Regeneration — Repair of a cell from part of a cell; or of a tissue from a portion of it or of an organ from a part.

Respiration — Function concerned in delivering oxygen to cells and carrying away carbon dioxide.

Rhizoids — Hair-like extensions of under-epidermal cells, holding plant to earth and absorbing soil fluids. Found under Marchantia thallus and under prothallus of fern.

Rhizome — Underground root-like stem, as in Pteris.

Root Cap — Cap of cells at outer end of root tip.

Root Hair — Microscopic thin-walled outgrowths of root epidermis of higher plants, in contact with soil; the gateway of soil fluids into the plant.

Rudimentary Character — One that begins its development but remains immature.

Rhyncocephalia — Primitive lizard-

like reptiles of New Zealand. Almost extinct.

S

Saprophyte — Plant that lives on dead organic matter.

Sap Wood — Peripheral region of xylem which transports soil water up the trunk.

Schizophyta — Fission plants, *i.e.*, Cyanophyceae and Bacteria.

Sclerenchyma — Strengthening tissue in plants; short, thick-walled cells.

Scolex — Head end of tapeworm.

Secretin — Duodenal hormone, activating pancreas to secrete.

Secretion — Process by which products elaborated by cells are discharged, also the product.

Seed — Embryonic plant with reserve food and protective coats.

Segregation — Mendelian principle. In germ-cell formation, alternative characters, associated in the zygote, are separated and each passes to a different germ cell.

Seminal Receptacles — Sacs in the earthworm which receive and store sperm received from another worm in copulation.

Seminal Vesicles — Sacs in the earthworm where are stored sperm produced by the testes of that worm.

Sepal — One of the divisions of the calyx.

Septa — Transverse partitions between intestine and body wall of a worm.

Sex-Linked Inheritance — Special case of linkage of some character with sex.

Sexual Reproduction — Involves union of male gamete and female gamete to form a zygote.

Smooth Muscle — Involuntary. Unit is a spindle-shaped uni-nucleated cell.

Sol — The liquid state of a colloid. Opposed to gel.

Somatoplasm — All of the body except germ plasm. Weismann's conception.

Somite — Segment of body of worm.

Sorus — Cluster of sporangia on under side of fertile frond of fern.

Spermatogenesis — Process of producing sperm from testis in which the diploid chromosomes of the zygote are reduced to the haploid number of the sex cell.

Spirillum — Bacterium — corkscrew in form.

Spongioplasm — More solid part of cytoplasm.

Sporangiophore — Stalk bearing a spore case as in Rhizopus.

Sporangium — Structure in which spores are produced. (Same as sporange.)

Spore — Reproductive cell which is asexual.

Sporophyll — Specialized leaf-like organ that bears sporangia.

Sporophyte — Asexual generation in plants; alternates with the sexual form or gametophyte.

Sporozoites — Spore-like stages in life cycle of Sporozoa.

Spring Wood — Large xylem cells formed in spring of year.

Staminate Cone — Composed of microsporophylls and producing pollen in Gymnosperms.

Statocysts — Organs of equilibrium in some Invertebrates.

Stele — Central vascular cylinder in woody stems.

Stoma — Air pore between two guard cells in epidermis of leaf.

Striated Muscle — Voluntary skeletal muscles. Unit is muscle fiber, an elongated, protoplasmic, striped, multinucleated cylinder.

Strobilus — Cone-shaped structure with a central axis, bearing sporophylls. In Pteridophytes and Gymnosperms.

Submicron — The thousandth part of a micron or millionth part of a millimeter.

Summer Wood — Small cells of xylem formed during later period of growing season.

Suspensoid — Colloid in which dispersed phase consists of solid particles.

Symbiosis — Living together of two forms with mutual benefit.

Sympathetic Nervous System — Two long, slender nerve trunks alongside backbone, possessing a series of ganglia and nerve connections to the central system and organs of the body. It is the *efferent* connection between central system and smooth muscle and glands.

Synapse — Junction by contact between peripheral end of one neuron and dendrites of another neuron.

Synapsis — Pairing of chromosome mates just before reduction divisions in spermatogenesis and oogenesis.

Syncytium — Mass of cells which have no separating cell membranes.

T

Tadpole — Fish-like larval stage of amphibians.

Taxonomy — Science of classification of plants and animals.

Telegony — Idea that mating of a female with a certain type of male will affect the offspring of that female mated with another type of male. No scientific proof of it.

Telolecithal — Accumulation of yolk at one end of egg resulting in definite animal (active) pole where cell division is more frequent and an opposite vegetal (passive) end or yolk region as in the frog's egg.

Testis — Male sex gland which produces spermatozoa.

Texas Fever of Cattle — Disease caused by a sporozoan. Intermediate host is the female tick.

Thallus — A simple plant body without stem, root or leaves.

Theory of the Gene — The characters of an organism are determined by the genes brought together at the time of fertilization of the egg. Includes all inheritance phenomena explained by the gene hypothesis.

Toadstool — Popular name for certain inedible and poisonous Basidiomycetes.

Trachea — Windpipe of land vertebrates and air tube of insects.

Tracheid — Special type of xylem cell in plants. Long, thick-walled and tapering ends, with thickenings on inside, spiral or annular.

Transpiration — Plant function in which water vapor is dissipated from such organs as leaves.

Trichinosis — Disease caused by Trichinella, a nematode.

Trichocysts — Spindle-shaped cavities in ectoplasm (of Paramoecium), explode and discharge threads for offense or defense.

Trihybrid — Cross between three pairs of alternative characters.

Trilobite — Primitive arthropod found only in fossil state. Extinct since late Paleozoic.

Triploblastic — Refers to animals whose tissues develop from three primary germ layers.

Trochophore — Larval stage of some annelids, resembling some adult rotifers and larvae of some flatworms and mollusks.

Tropism — Response of an organism to modification of the environment, as phototropism and geotropism of plants and phototropism and chemotropism of Paramoecium or worm. From the Greek "to turn."

Trypanosome — A parasitic flagellate (Mastigophora) causing Sleeping Sickness disease. Intermediate host, tsetse fly.

Typhlosole — Projection of gland tissue along dorsal mid-line of earthworm intestine.

U

Urea — Waste product of protein metabolism $(NH_2)_2CO$.

Uterus — Posterior enlarged end of oviduct. Stores eggs temporarily in the frog. In the Primate it is the fusion of a portion of the posterior ends of both oviducts.

V

Variation — When members of a species resemble each other in species characteristics yet *differ* from each other in other characters. The differences are environmental or germinal.

Vasa Deferentia — Ducts which convey sperm from the testes.

Vasa Efferentia — Ducts which convey sperm from testis to kidney as in frog. In higher vertebrates they are ducts within the testis.

Vascular Bundle — Small mass of conducting tissue in stems, consisting of a mass of xylem, cambium and phloem.

Vegetative Reproduction — A special form of asexual reproduction in plants. In horticulture plants are propagated by cuttings and by grafting.

Vein — Vascular tissue in the mesophyll of the leaf. Also a blood vessel in animals. A vein carries blood toward the heart.

Ventricle — A chamber in the vertebrate heart; also a cavity in the vertebrate brain.

Vertebrate — A chordate with a backbone or spinal column composed of elements called vertebrae.

Vessel — In plants, a type of xylem cell.

Vestige — A persisting trace of an organ, once functional in an organism or in an ancestor of that organism.

Viscera — General name for organs of the body cavity.

Vitalism — Philosophical idea that activities of living organisms are directed by forces neither physical nor chemical, *i.e.*, ultra-scientific.

Vitamin — Organic accessory food substances which control normal metabolism.

Viviparous — Animals that bring forth living young. (*See* oviparous.)

Volvox — A colonial flagellate protozoan resembling the blastula stage of higher metazoan embryos.

W

Wolffian Duct — The ureter of Amphibia. Serves as a sperm duct also. Homologous with sperm duct of reptiles, birds and mammals.

X

Xylem — Soil-water conveying tissue of higher stems. In dicotyledons it is inside cambium.

Z

Zone of Tissue Differentiation — Levels in young stems and roots, where adult tissues are forming.

Zoospores — Motile spores as in Ulothrix and Oedogonium.

Zygospore — Literally, a cell formed by the union of two spores. The gametes of Ulothrix uniting form a zygospore. The gametes resemble the zoospores although smaller and with two instead of four motile processes.

Zygote — Cell formed by union of two gametes (*i.e.*, male and female sex cells) and also the individual that develops from this fertilized egg.