Genomics in Society
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Vocabulary List

Genomic selection: Refers to the use of genomics technology to identify and subsequently select for specific traits (phenotypes) in a study species; these traits are selected for by identifying markers and/or differences in the study species genome that are associated with the selected trait/trait of interest.

Tree traits: See phenotypes; traits specific to trees such as height, stomata number, leaf wax composition, and others.

Phenotype(s): The detectable physical and physiological traits of an individual, which are determined in its genetic makeup. Also, the specific trait associated with a particular allele.[1]

Genotype(s): All of the alleles of every gene present in a given individual. May refer specifically to the alleles of a particular set of genes under study.[1]

Natural variation: Natural variation in plants refers to the genetic diversity of a single plant species in the wild. Natural variation is a valuable source of beneficial traits for plant breeding.[3]

Clone(s):

1) An individual that is genetically identical to another individual.[1]
2) A lineage of genetically identical individuals or cells.[1]
3) As a verb, to make one or more genetic replicas of a cell or individual.[1]

Growth stimuli: an environmental or biochemical change that interacts with an organism (e.g. a plant) to promote a growth response. For example, in labs, researchers will apply growth hormones to their plant samples so they grow faster, i.e. they will stimulate the metabolic process that controls the plant's growth by applying an external stimulating agent.

Genome-Wide Association Study (GWAS): a genomics technology that involves rapidly scanning a complete genome of an organism to identify markers associated with phenotypes or a specific physiological response.[4] → more information provided on GWAS in the slideshow.

***Arabidopsis thaliana*:**

a) A small plant species used as a model organism.[1]
b) The best-studied of all land plants.[1]
c) A plant with a well-studied and sequenced genome, so researchers can use it as a baseline (i.e. model organism) to compare with other plant species.

Leaf Area Index (LAI): the mathematically projected area of leaves over a unit of land, i.e. the approximate amount of equivalent land area that the leaves on a tree occupy.[5]

Photosynthetic rate(s):

a) Photosynthesis: the complex biological process that converts the energy of light into chemical energy stored in glucose and other organic molecules. Occurs in plants, algae, and some bacteria.[1]
b) The rate at which a plant completes photosynthesis.

Carbon sequestration: The process of capturing and storing atmospheric carbon dioxide.[6]

Phytoremediation:

a) Bioremediation: Processes that use living organisms (usually naturally occurring) such as plants, bacteria, yeast, and fungi to break down hazardous substances into less toxic or nontoxic substances.[7]
b) A bioremediation process that uses various types of plants to remove, transfer, stabilize, and/or destroy contaminants in the soil and groundwater; there are several different types of phytoremediation.[7]

Chloroform: An organic chemical compound; a colourless, strong-smelling, dense liquid. It is used in several different ways in chemical research methods to produce a desired outcome.[8]

Gas chromatography: Gas chromatography is an analytical technique used to separate the chemical components of a sample mixture and then detect them to determine their presence or absence and/or how much is present. These chemical components are usually organic molecules or gases.[9]

Fatty acid(s): A lipid consisting of a hydrocarbon chain bonded to a carboxyl group (—COOH) at one end. Used by many organisms to store chemical energy; a major component of animal and plant fats.[1]

Primary/secondary alcohol:

a) Alcohol: A chemical compound; any of a class of organic compounds characterized by one or more hydroxyl (—OH) groups attached to a carbon atom of an alkyl group (hydrocarbon chain).[10]
b) Alcohols may be classified as primary, secondary, or tertiary, according to which carbon of the alkyl group is bonded to the hydroxyl group.[10]

Aldehyde(s): A chemical compound; any of a class of organic compounds in which a carbon atom shares a double bond with an oxygen atom, a single bond with a hydrogen atom, and a single bond with another atom or group of atoms.[10]

Hydrocarbon: A chemical compound; any of a class of organic chemical compounds composed only of the elements carbon and hydrogen.[10]

a) **Alkane(s):** hydrocarbons in which all the bonds are single.[10]
b) **Alkene(s):** hydrocarbons that contain a carbon-carbon double bond.[10]

Ketone(s): A chemical compound; any of a class of organic compounds characterized by the presence of a carbonyl group in which the carbon atom is covalently bonded to an oxygen atom.[10]

Wax ester(s):

a) Ester: A chemical compound; any of a class of organic compounds that react with water to produce alcohols and organic or inorganic acids.[10]
b) Wax esters are esters specifically found in the leaf surface waxes (cuticular waxes).

Cuticle: a protective coating secreted by the outermost layer of cells of an animal or a plant.[1]

Cutin: a waxy, water-repellent substance occurring in the cuticle of plants and consisting of highly polymerized esters of fatty acids.[11]

Cuticular waxes: See cuticle; waxes that cover the cuticle layer on plant leaf surfaces. These waxes are made up of different chemical compounds based on the genetics of the plant species.

Epicuticular waxes: A coating of wax covering the *outer* surface of the plant cuticle. It is comprised of hydrophobic organic compounds.[12]

Inter/intracuticular waxes: Waxes that occur *within* the plant cuticle layer.

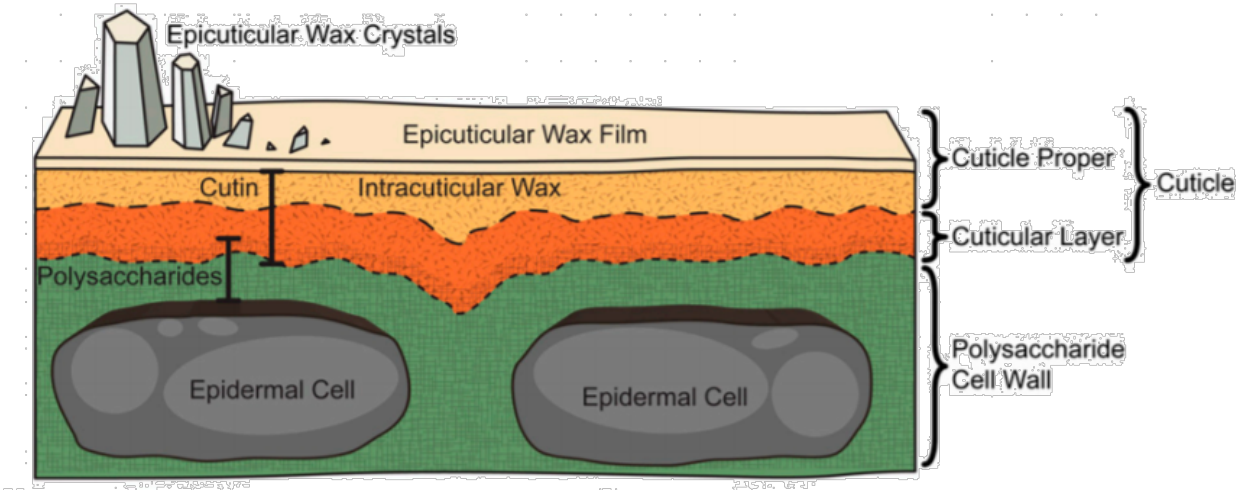

Fig 2. Cross-section diagram of the surface layer of leaf and its chemical components.

Wax composition: Refers to the chemical components/chemical makeup of the wax coating (cuticle) on a leaf.

Hydrophobic: Not interacting readily with water. Hydrophobic compounds are typically nonpolar compounds that lack charged or electronegative atoms and often contain many C—C and C—H bonds. The opposite of hydrophilic.[1]

Stoma/stomata/stomates: Generally, a pore or opening. In plants, a microscopic pore on the surface of a leaf or stem through which gas exchange occurs.[1]

*singular: stoma; plural: stomata/stomates

Chromosome(s):

a) Gene-carrying structure consisting of a single long molecule of DNA and associated proteins (e.g. histones). Most prokaryotic cells contain a single, circular chromosome; eukaryotic cells contain multiple noncircular (linear) chromosomes located in the nucleus.[1]

b) Bundles of tightly packed DNA located in the nucleus of eukaryotic cells; plants are eukaryotic organisms.[2]

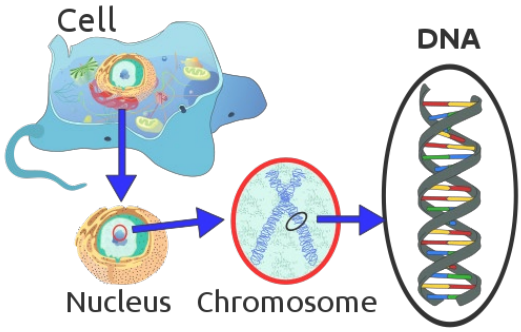

Fig 2. The hierarchy from the cell to the nucleus to the chromosome to DNA. Chromosomes contain the organism's genetic material, and there are multiple chromosomes in cellular nuclei.[2]

Erosion: Erosion is the geological process in which earthen materials are worn away and transported by natural forces such as wind or water.[13]

Geographical structure: Refers to the infrastructure and man-made landscape features across a large region that interfere with the naturally occurring landscape features (e.g. forests).

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