

Chapter 1 : Plant anatomy - Wikipedia

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He developed concepts of plant morphology and classification, which did not withstand the scientific scrutiny of the Renaissance. A Swiss physician and botanist, Gaspard Bauhin, introduced binomial nomenclature into plant taxonomy. He published *Pinax theatri botanici* in 1623, which was the first to use this convention for naming of species. It was in the late 17th century that plant anatomy became refined into a modern science. Italian doctor and microscopist, Marcello Malpighi, was one of the two founders of plant anatomy. In 1671 he published his *Anatomia Plantarum*, the first major advance in plant physiogamy since Aristotle. The other founder was the British doctor Nehemiah Grew. He correctly identified and described the sexual organs of plants flowers and their parts. While the exact structural level which is to be considered to be scientifically valid for comparison and differentiation has changed with the growth of knowledge, the basic principles were established by Linnaeus. He published his master work, *Species Plantarum* in 1753. Using a scientific basis, he established structural criteria for defining and separating plant genera. In 1825, Franz Meyen published *Phytotomie*, the first comprehensive review of plant anatomy. A German-Polish botanist, Eduard Strasburger, described the mitotic process in plant cells and further demonstrated that new cell nuclei can only arise from the division of other pre-existing nuclei. Gottlieb Haberlandt, a German botanist, studied plant physiology and classified plant tissue based upon function. On this basis, in 1898 he published *Physiologische Pflanzenanatomie* *Physiological Plant Anatomy* in which he described twelve types of tissue systems absorptive, mechanical, photosynthetic, etc. British paleobotanists Dunkinfield Henry Scott and William Crawford Williamson described the structures of fossilized plants at the end of the nineteenth century. He published his *The Anatomy of Woody Plants* in 1898. The growth of comparative plant anatomy was spearheaded by British botanist Agnes Arber. She published *Water Plants: A Study of Aquatic Angiosperms* in 1900, *Monocotyledons: A Morphological Study* in 1913, and *The Gramineae: A Study of Cereal, Bamboo and Grass* in 1916.

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Examples of early botanical works have been found in ancient texts from India dating back to before BC, [8] [9] in archaic Avestan writings, and in works from China before it was unified in BC. De Materia Medica was widely read for more than 1, years. These gardens continued the practical value of earlier "physic gardens", often associated with monasteries, in which plants were cultivated for medical use. They supported the growth of botany as an academic subject. Lectures were given about the plants grown in the gardens and their medical uses demonstrated. Botanical gardens came much later to northern Europe; the first in England was the University of Oxford Botanic Garden in Throughout this period, botany remained firmly subordinate to medicine. Bock created his own system of plant classification. Physician Valerius Cordus " authored a botanically and pharmacologically important herbal Historia Plantarum in and a pharmacopoeia of lasting importance, the Dispensatorium in Naturalist Ulisse Aldrovandi " was considered the father of natural history, which included the study of plants. In , using an early microscope, Polymath Robert Hooke discovered cells , a term he coined, in cork , and a short time later in living plant tissue. During the 18th century, systems of plant identification were developed comparable to dichotomous keys , where unidentified plants are placed into taxonomic groups e. The choice and sequence of the characters may be artificial in keys designed purely for identification diagnostic keys or more closely related to the natural or phyletic order of the taxa in synoptic keys. This established a standardised binomial or two-part naming scheme where the first name represented the genus and the second identified the species within the genus. The 24th group, Cryptogamia, included all plants with concealed reproductive parts, mosses, liverworts, ferns, algae and fungi. Adanson , de Jussieu , and Candolle all proposed various alternative natural systems of classification that grouped plants using a wider range of shared characters and were widely followed. Botany uses Latin names for identification, here, the specific name glauca means blue. Late modern botany[edit] Micropropagation of transgenic plants Building upon the gene-chromosome theory of heredity that originated with Gregor Mendel " , August Weismann " proved that inheritance only takes place through gametes. No other cells can pass on inherited characters. Her books Plant Anatomy and Anatomy of Seed Plants have been key plant structural biology texts for more than half a century. The concept that the composition of plant communities such as temperate broadleaf forest changes by a process of ecological succession was developed by Henry Chandler Cowles , Arthur Tansley and Frederic Clements. Clements is credited with the idea of climax vegetation as the most complex vegetation that an environment can support and Tansley introduced the concept of ecosystems to biology. These developments, coupled with new methods for measuring the size of stomatal apertures, and the rate of photosynthesis have enabled precise description of the rates of gas exchange between plants and the atmosphere. Thimann in enabled regulation of plant growth by externally applied chemicals. Frederick Campion Steward pioneered techniques of micropropagation and plant tissue culture controlled by plant hormones. With the rise of the related molecular-scale biological approaches of molecular biology , genomics , proteomics and metabolomics , the relationship between the plant genome and most aspects of the biochemistry, physiology, morphology and behaviour of plants can be subjected to detailed experimental analysis. These technologies enable the biotechnological use of whole plants or plant cell cultures grown in bioreactors to synthesise pesticides , antibiotics or other pharmaceuticals , as well as the practical application of genetically modified crops designed for traits such as improved yield. Molecular analysis of DNA sequences from most families of flowering plants enabled the Angiosperm Phylogeny Group to publish in a phylogeny of flowering plants, answering many of the questions about relationships among angiosperm families and species. The study of plants is vital because they underpin almost all animal life on Earth by generating a large proportion of the oxygen and food that provide humans and other organisms with aerobic respiration with the chemical energy they need to exist. Plants, algae and cyanobacteria are the major groups of organisms that carry out photosynthesis , a process that uses the energy of sunlight to convert water and

carbon dioxide [54] into sugars that can be used both as a source of chemical energy and of organic molecules that are used in the structural components of cells. In addition, they are influential in the global carbon and water cycles and plant roots bind and stabilise soils, preventing soil erosion. At each of these levels, a botanist may be concerned with the classification taxonomy, phylogeny and evolution, structure anatomy and morphology, or function physiology of plant life. Embryophytes are multicellular eukaryotes descended from an ancestor that obtained its energy from sunlight by photosynthesis. They have life cycles with alternating haploid and diploid phases. The sexual haploid phase of embryophytes, known as the gametophyte, nurtures the developing diploid embryo sporophyte within its tissues for at least part of its life, [61] even in the seed plants, where the gametophyte itself is nurtured by its parent sporophyte. However, attention is still given to these groups by botanists, and fungi including lichens and photosynthetic protists are usually covered in introductory botany courses. Cyanobacteria, the first oxygen-releasing photosynthetic organisms on Earth, are thought to have given rise to the ancestor of plants by entering into an endosymbiotic relationship with an early eukaryote, ultimately becoming the chloroplasts in plant cells. The new photosynthetic plants along with their algal relatives accelerated the rise in atmospheric oxygen started by the cyanobacteria, changing the ancient oxygen-free, reducing atmosphere to one in which free oxygen has been abundant for more than 2 billion years. Human nutrition The food we eat comes directly or indirectly from plants such as rice. Virtually all staple foods come either directly from primary production by plants, or indirectly from animals that eat them. This is what ecologists call the first trophic level. When applied to the investigation of historical plant-people relationships ethnobotany may be referred to as archaeobotany or palaeoethnobotany. Some of these processes are used in their primary metabolism like the photosynthetic Calvin cycle and crassulacean acid metabolism. Plants make various photosynthetic pigments, some of which can be seen here through paper chromatography.

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