Plant Systematics- A Review

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Abstract:- The history of plant systematics—the biological classification of plants —stretches from the work of ancient Greek to modernevolutionary biologists . As a field of science, plant systematics came into being only slowly, early plant lore usually being treated as part of the study of medicine. Later, classification and description was driven by natural history and natural theology . Until the advent of the theory of evolution , nearly all classification was based on the scala naturae. The professionalization of botany in the 18th and 19th century marked a shift toward more holistic classification methods, eventually based on evolutionary relationships.

Plants have chlorophyll and an alternation of generations . They differ from the "green algae" in that the young sporophyte -- or diploid plant -- begins its development within the tissues of its parentgametophyte --or haploid plant. They also differ in that the sporophyte and gametophyte are heteromorphic, that is the two generations look and develop differently from each other. (1)

Introduction

The plant groups shown in this cladogram, except for the "seed plants", all have a free-living independent gametophyte which nurtures the young sporophyte. In the "bryophytes" (Hepaticophyta, Anthocerotophyta, and Bryophyta), the sporophyte plant remains small and dependent on the parent gametophyte for its entire life. In the "pteridophytes" (the remaining groups, except the "seed plants"), the sporophyte eventually becomes a large free-living and independent organism. In the spermatophytes ("seed plants"), the situation is reversed, and the gametophyte is the smaller and dependent generation. Click on the "Life History" button for more information.

Systematics within the Plantae is based on a number of features in addition to life-cycle characteristics. The presence of stomata in all plants but the Hepaticophyta suggests that they were the earliest group to diverge. Vascular tissue is found in all "seed plants" and "pteridophytes", with the exception of some early "rhyniophytes", and so these plants are often referred to as the tracheophytes ("vascular plants"). Relationships among the various groups of pteridophytes are poorly understood, though much research is being concentrated on this group.

The Primary Aim of Systematics

Discover all the branches of the tree of life, document evolutionary changes occurring along those branches, and describe all the species on Earth (the tips of the branches).

Secondary Aims of Systematics

To analyze and synthesize information into a classification that reflects evolutionary relationships

To organize this information into a useful, retrievable form

To gain insight into evolutionary processes that lead to diversity

Plant systematics has a long history. The first attempts at botanical classification were based on afew, very obvious external characters related by neither internal unity nor origin. Modern systems are based on a largenumber of facts and take into account genuine kinship ties. Theophrastus divided plants into four groups—trees, shrubs,subshrubs, and herbs. The only subsequent pre-Renaissance observations of interest are those of Albertus Magnus (Albertof Bollstädt), who was the first to note the difference between monocotyledonous and dicotyledonous plants.(2)

Discussion

In 1583, AndreaCesalpino published the first artificial classification of plants, which was based mainly on the structure of the fruits and seeds.In addition to the four plant groups proposed by Theophrastus, Cesalpino distinguished a group of seedless plants, whichincluded ferns, mosses, fungi, and algae. At the end of the 16th century, G. Bauhin established the separate categories ofgenus and species and laid the foundations of binominal nomenclature. In 1693 the English naturalist J. Ray established theconcept of the species, and in 1700 the French botanist Tournefort established the concept of genus. The third principaltaxonomic category, the family, was defined earlier, in 1689, by the French botanist P. Magnol. Tournefort's system, whichwas based on the structure of the corolla (class Labiatae, class of tetrapetalous flowers), received wide acceptance owing toits simplicity. More complex, but more natural, was Ray's system (1686–1704), which included the groups Dicotyledones(dicots) and Monocotyledones (monocots). Ray divided these two groups into classes according to the type of fruit, and theclasses were broken down into smaller categories according to the structure of the leaf and flower.

Plant systematic has great importance for the study of botany:

1. It isused to describe different species. The description of each new species is preserved. It is used for comparison.
2. Plant systematic is used to name different plants. It sets rule for nomenclature. ,This nomenclature has eliminated the confusion among different botanists. Now knowledge of plants can be shared between botanists of different countries without problem of language and culture.
3. Plant systematic develops evolutionary relationship among the different groups of plants. It gives evolutionary trends among the plants.
4. Plant systematic provides basis kw the comparison of morphological, anatomical and cytological structures among different structures.(3)

The history of the disciplines of systematics and taxonomy has shifted with the evolution over the years of the state of knowledge about living organisms, their origins, and their relationships. There has been a historical shift from an emphasis on classification (simply naming and identifying organisms) to the study of phylogenetic (evolutionary) relationships.

Classification traditionally focused on defining the relationships among organisms based primarily on their overall similarity in morphology and appearance. Phylogenetics is now the more common approach in studying the relationships among organisms and involves constructing phylogenies, or evolutionary trees, using evidence from evolutionary relationships.

Conclusion

Plant taxonomy is a field that has completely embraced modern methods and uses data from molecular genetics, biochemistry, and electron microscopy to gain greater insights into plant evolutionary relationships. The use of computers to perform detailed phylogenetic and cladistic analyses has also revolutionized the field.

A greater emphasis on evolutionary relationships and processes has led to a much better understanding of species concepts and relationships but has led others to consider doing away with the species concept as currently used. Continuing studies using modern approaches should lead to ever better classification systems that better reflect the evolutionary history of plants.

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