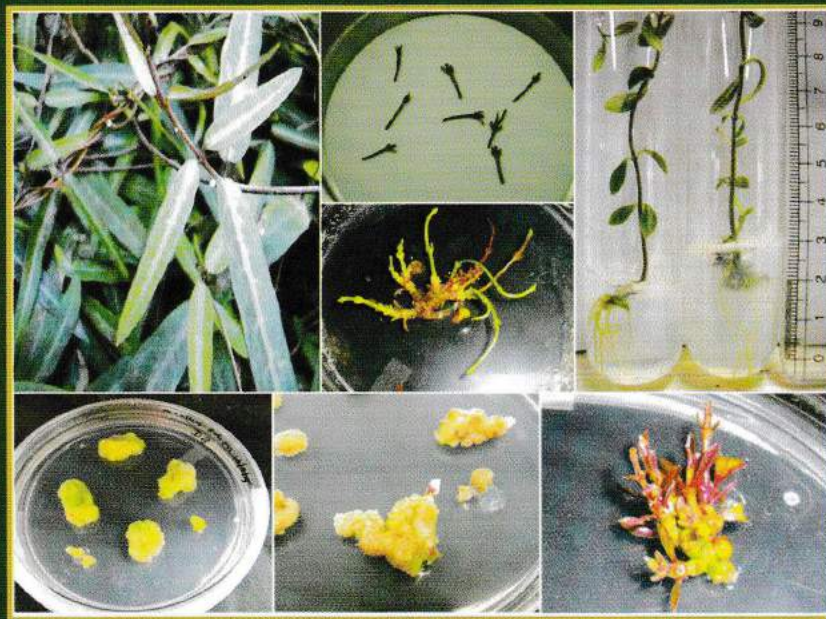


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### Angiosperm Phylogeny that points the way Ahead in Taxonomy

Taxonomy is the science of exploration, description, naming and classification of unknown living organisms. This is one of the earliest scientific disciplines that emerged thousands of years ago and provides fundamental data for all fields of biology. This is extended from the work of ancient Greek to modern evolutionary biologists. It has got great command and consequently plays a vital role for the cause of welfare of the human society.

The real genesis and development of this discipline of plant taxonomy can be marked from the contributions of the great Swedish botanist, physician and zoologist Carolus Linnaeus (1707-1778), also known as Carl Linnaeus or Carl von Linn, to whom we are immensely indebted. Since the time of Linnaeus there has been an exponential urge of work by various contributors to botanical science, classification in particular. This enabled the shift towards more holistic classification methods, eventually leading to evolutionary and phylogenetic treatments around the 18<sup>th</sup> and 19<sup>th</sup> century. In course of time when cladistics came into evolutionary, phylogenetic contents and classifications, and offered new methods for constructing branching pattern diagrams (Hennig 1950, 1966), there has been a revolutionary exposure on angiosperm phylogeny. Taking this into account we may start from the Angiosperms as a whole.

The traditional concept of angiosperms consisting of dicots and monocots as recognized and maintained in classifications by almost each and every workers in the past, is now subject to new thought. According to current ideas, the angiosperms represent a single homogeneous group, and the diversities shared by dicots and monocots are not deep enough to justify them as separate classes. This has support from cladistic analyses also.

Cladistic analyses based on morphology, rRNA, rbcL, and atpB sequences, do not support the traditional division of angiosperms into dicots and monocots. The **dicots** form a **paraphyletic complex** which appeared through different cladistic analyses. In sharp contrast, the **monocots** is resolved into a **monophyletic group** which is supported by morphology, as well as 18S rDNA, atpB and rbcL nucleotide sequences.

Dicots although apparently non-monophyletic, a large number of species amongst those of dicots form a well-supported clade, i.e. the **tricolpates or eudicots** based on tricolpate pollen (or tricolpate-derived), rbcL, atpB, and 18S rDNA.

Further, the non-monocot, non-tricolpate families represent a **paraphyletic primitive angiosperm complex**, as recognized by different authors (Cronquist, Takhtajan, etc.). The families of these complex are better recognized as the **magnoliids** (Magnoliales, Laurales, Illiciales) and the **paleoherbs** (Aristolochiales, Piperales, Nymphaeales, and Ceratophyllales). Phylogenetically, paleoherbs occupy a basal paraphyletic position in some recent analyses based on either morphology alone or rDNA combined with morphology.

A hallmark of the APG (Angiosperm Phylogeny Group) classification is mostly emblematic of monophyletic groups based on a combination of morphological features and position of branches on phylogenetic trees mainly based on molecular data that suggest evolutionary relationships.

In fact, molecular study alone will not give a precise idea about evolution. Evolution is the cause of a natural system of classification; again natural classification will represent the hierarchy of evolution. Classifications

about the gravity and reliability of APG systems of classification, but this could not be absolute as this is also combined with limitations of unplaced taxa even after fourth stage of contributions by renowned workers. This brings to our mind that now we are a long way from complete understanding of phylogenetic relationships of angiosperms.

The Plant Taxonomy in respect of angiosperms phylogeny is now a global issue and subjected to prospective discussion at the international platform. In view of the fact, a symposium entitled "New research frontiers in plant systematics" was arranged and held on 8 August 2000 at the Botany 2000 meeting in Portland, Oregon. The outcome of the symposium was subsequently published in *Taxon* in 2001. This issue got impetus after a decade when another international attempt was made through a symposium under the title "Where is Plant Systematics headed in the next ten years ?" which was organized on 10 July, 2012 in Columbus, Ohio, in conjunction with the Botany 2012 Meeting, and under the auspices of the International Association for Plant Taxonomy, and the American Society of Plant Taxonomists.

Plant Taxonomy is in acute crisis. Considering the great diversity and enormous plant wealth of the earth, most of which are still unexplored and not described, we need to fulfil the lack of taxonomists till today around the globe. Such efforts are being accelerated after the Biodiversity Convention held in Rio de Janeiro in 1992. We have now Global Taxonomy Initiative (GTI) to handle taxonomic expertise and data resources for biodiversity conservation facilitated by the advancement of internet and webpages. As a matter of consequence, there is hope for revival of interests and economic potential for strengthening Plant Taxonomy.

**N. D. PARIA**