

PALYNOTAXONOMY

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Introduction:

Palynotaxonomy is a specialized sub-discipline of plant systematics which attempts to investigate spore morphology of embryophytes and pollen morphology of seed plants and ~~and~~ favours its application in resolving complex and debatable systematic positions of taxa and in evaluating their phylogenetic relationships.

The contributions of Erdtman (1952) on pollen morphology marked the beginning of a new phase of plant taxonomy. Erdtman and several other palynologists (Ehrenberg, 1838; Wodehouse, 1928, Fagerl and Iversen, 1950; Heslop-Harrison, 1975) made available pollen descriptions of all angiospermic families including most of the genera and species to taxonomists. Taxonomists employed those attributes of pollen morphology in systematic and in solving controversial taxonomic and phylogenetic problems, identification and in determining their affinity.

Attributes of Pollen Morphology & Ultrastructure used in Taxonomy:

The following are the major pollen features of taxonomic significance:

- (i) Pollen size
- (ii) Polarity and shape
- (iii) Pollen Wall - structure, sporopollenin, Biomacromolecules, Sculpture or ornamentation, etc.
- (iv) Aperture

Application of different microscopic biochemical and physical tools and techniques has provided exhaustive information about the various pollen attributes of taxonomic significance.

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Groups of Families on the basis of palynological attributes:

On the basis of data on pollen morphology, plant families have been divided into two groups:

(a) Stenopalynous families - They do not exhibit marked variations of pollen types with regard to apertures and sporoderm stratification, etc.

e.g., Cappariaceae, Chenopodiaceae, Castiarinaceae, Poaceae, etc.

(b) Eurypalynous families - They exhibit marked variations of pollen types with regard to apertures and sporoderm stratification.

e.g., Bignoniaceae, Boraginaceae, Cucurbitaceae, Euphorbiaceae, etc.

Taxonomic application of this categorization:

Based on stenopalyny and eurypalyny inter- or intra-family affinity of taxa can be determined. Some common examples of this taxonomic and phylogenetic assessment of families are as follows:

(i) Pollen grains of grasses are all monoporate and phylogenetically Poaceae seems to be closely related to Restionaceae, Centrolepidaceae and Flagellariaceae group.

(ii) Morphological characters of pollen have been used to substantiate many taxonomic revisions.

For example, segregation of Trapaceae from Onagraceae, Bombacaceae from Malvaceae, union of Zingiberaceae, Cannaceae and Musaceae into Scitamineae, and Moraceae and Cannabinaceae into Urticaceae.

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(iii) Pollen morphology of Lauraceae is stenopalous having very uniform pollen structures in all its members. Pollen morphology has been used as supplementary criteria to aid in inter-generic and inter-specific differentiations.

(iv) Palynotaxonomic and phylogenetic studies have been done on Asteraceae also, but further attention is required in this regard with respect to Indian species. Palynologically the family Asteraceae is very distinct and differs quite conspicuously from families conventionally phylogenetically placed in its proximity. This is particularly valid for Calyceraceae and Campanulaceae which resemble rather strikingly with Asteraceae.

(v) Palynotaxonomic studies have also been carried out on the Strobilanthidinae tribe of Acanthaceae and many new taxonomic repositioning of taxa have been suggested.

(vi) Palynotaxonomic studies have further been made in several other families of angiosperms with several phylogenetic revaluative suggestions. These include Ranunculaceae, Passifloraceae, Iridaceae, Apocynaceae, Phytolaccaceae, Polygalaceae, Dioscoreaceae, Bromeliaceae, etc.

The above examples clearly establish the significance of palynotaxonomy and its valid emergence as an offshoot of taxonomy.