

## PALYNOLOGY IN RELATION TO TAXONOMY

- **Palynology** is the science, which deals with Pollen grains. The term is derived from Greek verb **Palynein means to scatter**.
- Pollen grains are often easily disseminated by wind etc., Pollen grains are found in every nook and corner, e.g., in glacier ice, in the air over the poles and over the oceans.
- Fossil spores are found in peat and other sediments, in lignite, coal and shales. They are evident since Pre Cambrian times hundreds of millions of years ago.
- Pollen grains morphology plays an important role in classification.
- Pollen grains may be **vesiculate (with air sacs); saccate or non saccate, fenestrate or non-fenestrate, colpate (furrows or colpi present) or porate (apertures present at the poles)**.
- According to position of apertures six subdivisions are made e.g., **ceta** (down, inwards in a tetrad), **ann** (up; outwards in a tetrad), **zone** is the zonal position i.e., at the equator, and panto is uniform distribution all over the spore surface.

### Basic evidentiary characters:

- (i) Pollen unit type
- (ii) Pollen grain polarity
- (iii) Pollen grain shape
- (iv) Pollen grain symmetry
- (v) Pollen grains nuclear state
- (vi) Pollen wall architecture
- (vii) Exine stratification
- (viii) Exine structure
- (ix) Exine sculpture
- (x) Aperture type

- (xi) Aperture number
- (xii) Aperture position
- (xiii) Aperture shape
- (xiv) Aperture structure.

- In *Magnoliidae* the pollen is binucleate.
- In *Caryophyllidae* the pollen is trinucleate.
- In *Ericaceae* the pollen is in tetrads.
- In *Asclepiadaceae* pollen remain in Pollinia.
- In *Taraxacum* the pollen wall is echinate.
- In *Quercus* the pollen wall is scabrate.
- Pollen grains of *Linaceae* and *Plumbaginaceae* (*Plumbagineae*-*Aegality*) are approximately of same type.
- The similarity in pollen morphology between *Linaceae* at *Plumbagineae* is greater than that of *Plumbaigineae* and *Staliceae*.
- In *Plumbagineae* the pollen grains are zontotreme (3 colpate) or pantotreme (e.g., *Linum heterosepalum*); Pantotrenre is found in *Plumbagella micrantha*.
- The evolution is traced from arboreces *Linaceae* to the *Plumbagineae* and to herbaceous *Staliceae*.
- *Hebeptalum* and *Roucheria* are Arboreus, *Linaceae* with 20 m. height.
- *Roucheria* has 10-15 stamens/flower. The stamen in *Plumbaginaceae* are epipetalous.
- *Linaceae* has reduction of epipetalous stamen while *Plumbaginaceae* has reduction of episepalous stamens.
- *Napenthaceae* and *Droseraceae* (except *Drosophyllum*) have spinuliferous pollen tetrads. Such type of pollen tetrads are not found in any other plant.
- Relationship between *Polygalaceae* and *Ephedraceae* are based on similarity between their pollen grains.
- In *Phytolaccaceae* the pollen of *Phytolacca* is 3- zonocolpate, whereas that of *Rivinia* is Pantocolpate.

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- Seven genera of Polygnaceae i.e., *Koenigia*, *Persicaria*, *Polygonum*, *Pleuropteryum*, *Bistoria*, *Tiniaria* and *Fagopyrum* are different in their Pollen morphology.
- In family Salicaceae, *Salix* has long narrowed 3-furrowed pollen, *Populus* has spherical pollen without apertures.
- At specific level in Anemori, *A. obtusifolia* the pollen grains are 3-zonocolpate, *A. rivularis* is pantocolpate, *A. alchemillaefoliath*, is pantoporate, and *A. fulgen* is spiraperturate.
- *Podophyllum* is separated from Berberidaceae as it has united pollen grains.
- Some families are recognized on the basis of pollen sculpture e.g., Malvaceae and Asteraceae has spinuous exine; Plumbaginaceae has verrucate exine and Poaceae has smooth sulcate exine of pollen grain.
- On the basis of Palynological characters Fumariaceae is separated from Papaveraceae and Nelumbonaceae from Nymphaeaceae.
- Hutchinson kept Araceae and Lemnaceae under Arales. However, Arecaceae has sculptured exine and Lemnaceae has spinous exine in Pollen grains.
- Malvaceae and Bombacaceae are separated on the basis of palynological studies where Malvaceae shows spinose exine and Bombacaceae shows reticulate exine in Pollen grains.
- Depending upon palynological studies two distinct phylogenetic stocks in the dicots have been suggested.
- One represented by Magnoliaceae with monocolpate type and the other represented by Ranunculaceae with tricolpate type of pollen grains.
- Monocots are considered to be closely related to magnolian stock on the basis of Monocolpate element. The Magnolian dicots are considered to be ancient palynologically as compared to Ranalian dicots where new apertural forms are present (monocolpate totally absent).
- *Kuprianova* (1948) suggested that most of the monocots are evolved from Arecaceae or Liliaceae. Helobiae are not related to other monocots but are specialized polycarpous with ranalian affinities.