

PALYNOLOGY

Dr. Amit Saha.

Assistant Prof. Stage III in Botany

Surendranath College, Kolkata

Palynology

- Palynology is the branch of science which deals with the study of spores and pollen grains both extant and extinct of embryophytic plants as well as other organic microfossils.
- This branch is utilized for paleontological and paleoenvironmental studies along with the study of evolution of land plants.
- The word **pollen** means fine flour. The term pollen is a collective plural noun and pollen grain is singular.
- The multicellular microgametophyte enclosed within the microspore wall of seed plants is called pollen grain.

Interdisciplinary Science

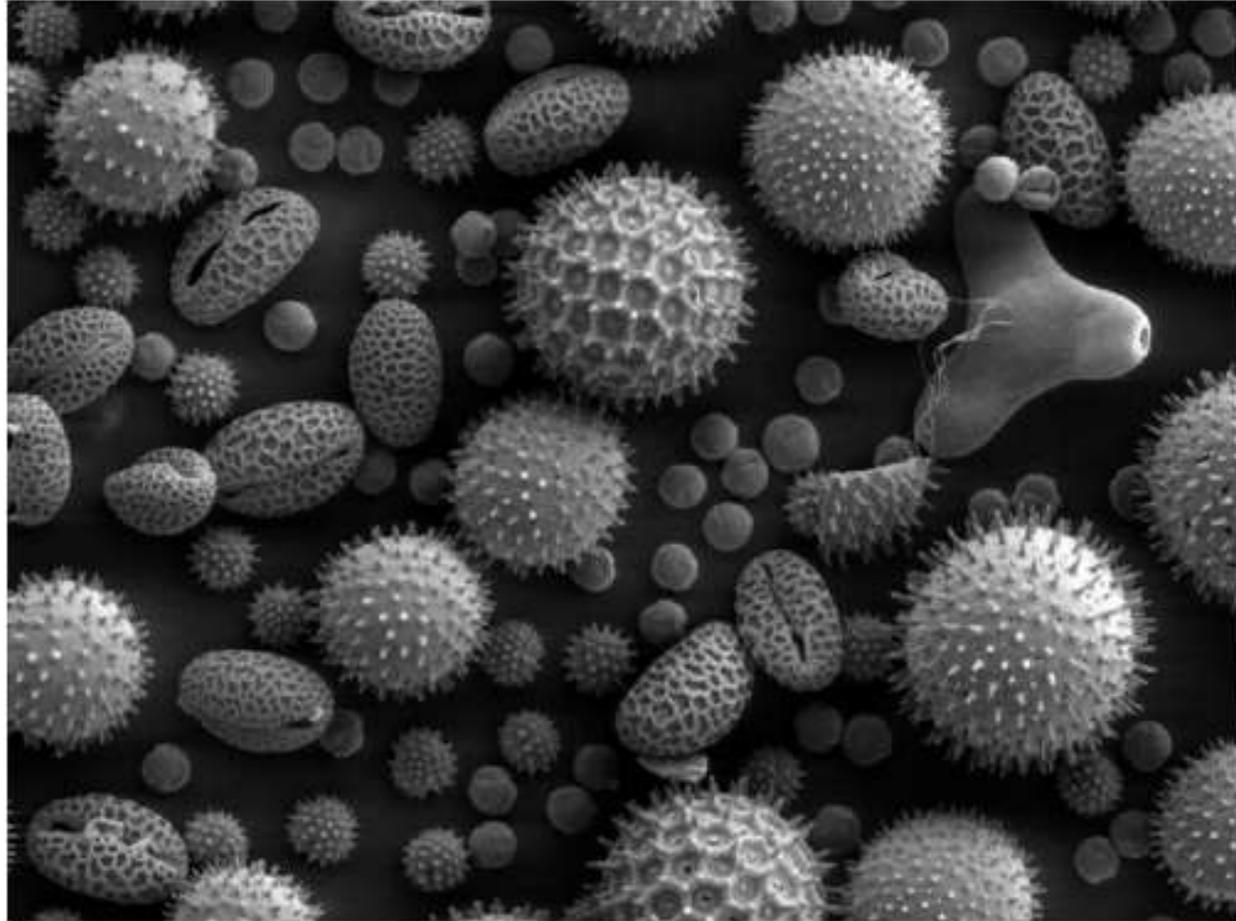
- Palynology is presently considered as an interdisciplinary science which deals with the study of extant and extinct palynomorphs that include pollen grains, spores, cysts together with particulate organic matter (POM) as well as fungal, algal and insect fragments, mites and other microbial contents of the atmosphere.

Historical background

- The term palynology was first introduced by Hyde and Williams in 1944.
- Pollen Analysis Circular was one of the first journals devoted to pollen analysis.
- It is derived from the Greek word Paluno which means to sprinkle and Pale which means dust which is similar to Latin word Pollen.

- The development of pollen research is based on plant anatomy, morphology and sophistication of microscopes.
- In 1640 Nehemiah Grew first microscopically observed pollen in Britain.
- Robert brown (1809) first noted the importance of pollen in systematic studies of spermatophytes.
- In 1838 Goeppert from Germany described fossil spores/pollen.

- The first report of an illustrated account of airborne particles including pollen grains, fungal spores, etc. was published in 1873 by the British physician Dr. D.D. Cunningham in the atmosphere of Alipore Central Jail, Calcutta.
- The first microphotograph fossil spore was published by Schopf et al.(1944) belonging to Carboniferous period and named *Reinschospora*.
- Wodehouse(1935) made a remarkable contribution on extant pollen in his book entitled Pollen Grains which is the first record of pollen illustrations.



Scanning Electron Microscope (SEM) image of miscellaneous pollen particles

http://upload.wikimedia.org/wikipedia/commons/a/a4/Misc_pollen.jpg

Applied Palynology

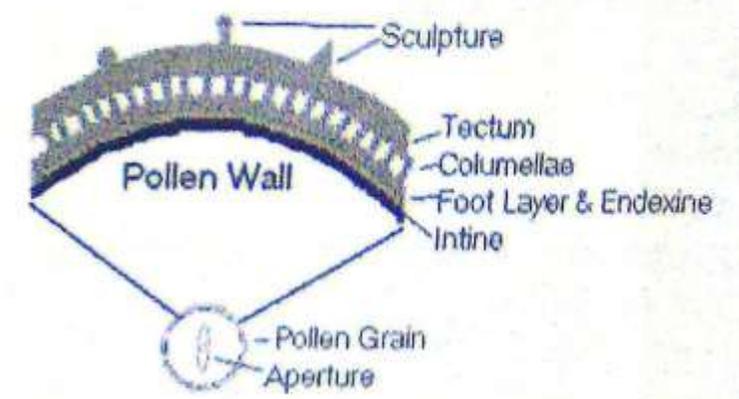
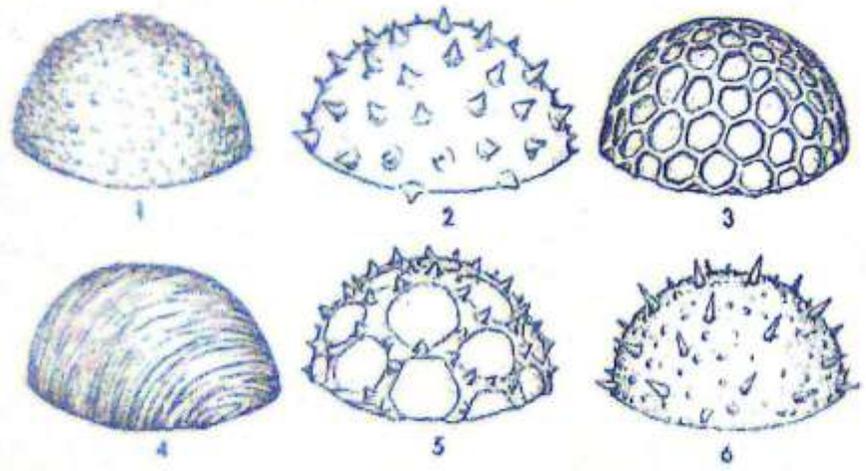
- It is the branch of science which deals with the utilisation of the knowledge about spores and pollens in different practical fields of application like
 - Areoplanology
 - Forensic palynology
 - Melissopalynology/Melittopalynology
 - Paleopalynology

Spores

- The minute unicellular or multicellular reproductive bodies which are formed to tide over unfavourable environmental conditions are called spores.
- Algal and fungal spores develop into different phases of complex life cycle.
- For palynologists spore refers to sporopolleninuous microspores and isospores of embryophytes.

- Isospores- these spores are of one kind and give rise to free living gametophytic generation.
- Meiospores- Meiotically produced algal spores. Eg. Zoospores, aplanospores
- Heterospores- Embryophytic plants produce spores of two types(microspores and megaspores) and are collectively called as heterospores.

- The pollen grain is the structure to transport male gamete to the female part of a flower.
- Pollen must be strong enough to protect the male gametes. The outer wall of the pollen grain called the exine is composed of sporopollenin which is very tough. The inner layer is made of cellulose and is similar to an plant cell wall.
- Pollen grains are microscopic about 15-100 microns.



Difference b/w spores and pollens

- A spore is produced for reproduction by bacteria, fungi and non flowering plants. A pollen grain is produced for reproduction by flowering and cone bearing plants.
- A spore can germinate asexually without the need to fuse with another spore to create a new organism. A pollen grain cannot germinate and create a new organism without being first joined to the pistil of a compatible plant species.

- A spore is forcibly ejected from the reproductive mechanism of the organism that created it. Grains of the pollen must be carried by wind, insects or animals to other plants of the same species that need fertilization.
- A spore is durable in unfavourable conditions and can germinate after years of dormancy. A pollen grain loses its ability to germinate if specific favourable conditions are not met.
- A spore has smaller maximum size. The largest spores can reach a size of 20 microns whereas the largest pollen grain can reach over 200 microns.

References

- Internet Archives
- K. Bhattacharya, M.R. Majumdar, S. Gupta Bhattacharya. A Textbook of Palynology New Central Book Agency P. Ltd
- Studies in Botany Vol I - Mitra, Mitra, Choudhury. Moulik Library, Kolkata.
- Erdtman, G. 1952. Pollen morphology and Plant Taxonomy. Angiosperms (An introduction to Palynology I). Almqvist & Wiksell, Stockholm.