SUBJECT - BOTNAY

Paper-3

CLASS- Bsc- 3 year Dr. DEEPTI SHARMA

Scope of Palynology

The palynology research can be either basic or applied.To the basic aspect belong the morphology in relation to taxonomy and to the applideaspect belong geopalynology(fossil pollen grain) aeropailnology(pollen found in atmospheric air), iatrppalynology(medical aspect such as hey fever, criminology, ect.) and melittopalynology(study of pollen in honey).

Applied Aspects of Palynology

The distribution of spore genera and species in coal is and important tool to investigate straigraphical problem like correlation of coal seam and oil field. It also determing the age of rock. The maximum use of applied palynology is in oil geology

Acropalynology is of great importance because of its application in medicine. Forestry and paleobotany.. It is now established air borne pollen cause allergies like hay fever and seasonal asthma. Information on the type of pollen in the air has been a great help in determining the allergens. Most of the plants that cause hayfever belong to weeds and grasses. Some of the allergenic taxa occurring in India are *bmgnthus spinosus Artemisia scoparia, Chenopodium album, Cynodon dactylon, Prosopisjuliflora, Ricinus communis* and *Sorghum vulgare.* Seed production forest trees is also closely linked with the occurrence of pollen in production forest tree is also closely linked with the occurrence of pollen in the air.

Pollen grains, to a great extent, reflect the vegetation of an area and its surroundings. In several cases it has been possible to locate the site of crime by studying pollen in the samples collected from dirt under the nails and Iran mud stuck to shoes, clothes etc.

Pollen, samples from the stomach contents or excrements, have provide a

clue to several deaths in[1] Brazil. The deaths were ascribed tothe use of poisonous honey. The pollen of a poisonous plant, *Serjania lethalis* (Sapindaceae), were present in the stomach contents of one of the victims who died after taking poisonous honey.

There are several reports regarding the useful properties of certain pollen tablets, tonics, creams etc. The pollens-tablets have been used in the treatment of prostatitis which has been confirmed by repeated experiments.*Pl*ants are a source of both pollen and nectar collected by the honey-bee for making "bee-bread" (Nair, 1966). The pollen not only . ides vitamins, minerals and amino acids in the honey, but also inforation about the plants from which the nectar and pollen have been gathered. It also helps detect adulteration in the honey and keeps in check the unscrupulous trades

Pollen Germination

Normally only one tube develops from a pollen grain .In polysiphonous grains, however, more than one tube may emerge from a, grain; upto 10 pollen tubes have been observed in *Althaea rosea* and *14 in Malva neglecta.* As a rule, only one of them makes further growth. In plant where pollen grains are united into tetards (orchids) or pollinia(Asclepiadaceae) several pollen tubes are produced at the same time and all of these may grow. Branching of pollen tubes is quite common in the members of some Ameniteferae.

Growth and Structure of Pollen Tube

The pollen tubes, as a rule, emerge at the germ pores on the pollen grains. Almost the entire contents of thegrain move into the tube. Rapid growth of the tube irestricted to the tip region. In a growing tube most of the cytoplasm is confined to the apical region, and a large vacuole fill the grain and the old region of the tube. To restrict the cytoplasm to the apical region Of the growing tube, a series of callose plugs are formed at a regular distance behind the tip. As a result a fully grown pollen tube is sub-divided intomany compartments due to these plugs. The plugs originate as ring on the inner side of the wall. They gradually grow toward the centre reducing the lumen and, finally sealing the tube. The small amount of cytoplasm is left behind the plug on the side of the grain, gradually degenerates.

Under a high power light microscope the extreme tip region of the tube appears hemispherical and transparent. The zone behind it looks granular.The transparent apical zone is called "cap block". It exists only as long asthe tube is growing and disappears when the growth ceases.

The cytoplasm behind the cap block is rich in the usual cell organelles namely, mitochondria, golgi bodies, rough and smooth endoplasmic reticulum, vesiscles, amyloplasts and lipid bodies. In the cap block region the aforementioned structures are absent, with the exception of which are present in abundance. These vesicles are rich in polysaccharides or RNA, and are associated with wall formation. Ungerminated pollen grains contain free ribosomes, Polysome assembly begins immediately after water uptake. Protein synthesis starts as soon as polysomes appear. Some enzymes needed for pollen germination and pollen tube growth are produced at this time. Once the pollen tube is initiated, polysomes break-down.

Pollen tube wall :

It is made up of cellulose and pectin. Wall at the cap bloc region is very rich in pectic content which gradually decreases towards the pollen grain. The cellulose microfibrils are arranged at random at the tip Whereas in the older regions the microfibrils are oriented in two directions, both at angles of approximately 45 degrees to the main axis of the tube. The pollen tube also synthesises callose which is deposited on the all behind the growing region. Only when the tube stops growing does the callose get deposited at the tip. Kroh and Knuiman (1981) have shown that the pollen tube wall in tobacco consists of two layers. The outer, primary wall is pectq-cellulosic in nature. The inner, secondary wall which thickens~considerably, shows pectin, cellulose and callose. They also believe that in the callose plugs, callose probably predominates over other polysaccharides.

A large part of information on the factors influencing pollen germination and pollen tube growth has been collected through the culture of pollen

grains in nutrient medium. In cultures it is possible to handle the pollen under controlled conditions and check their response to various substances We shall, therefore, deal first with pollen germination and pollen tube growth in the nutrient medium *{in vitro)* and then in the stigma, style and ovary *(in vivo).*

In vitro :

Pollen grains are resting plant organs. Uptake of water leads to swelling of the grains and their activation. Therefore, high relative humidity (RH) is the first essential requirement for pollen germination. Whether *in vitro* or *in vivo* Pollen of some plants germinate readily in saturated atmosphere.

Pollen viability

The pollen of most plants have short life span ,usually only in few species they retain viability for over two days. in several cases the pollen even fail to germinate after 30 minutes after its shedding. For examples pollen of Mango can remain viable for eight days but there viability can be increased up to 5 monthes by keeping them at a temperature of 4.5 to 9 degree centegrate.