

دور : يناير 2020
الفرقة الرابعة
شعبة : نبات و كيمياء
التاريخ : 2020/01/23



جامعة بنيها
كلية العلوم
قسم النبات

Palynology exam (431 n)(48 mark)

Answer the following questions

1- Explain The Following:

18 mark

- a- Sporangia in pteridophytes , Gymnosperm and angiosperm .
- b- Isolation of pollen .

2- Writ on :

18 mark

- a- Composition of pollen grain.
- b- Shape – Apertures and Sporoderm of grain .pollen
- c- Identification of pollen grain according to their Morphological characters .

3- Compare between Paleobotany and Palynology .

12 mark

DR / Ahmed abdElrazeek

Answer number one

1- Explain The Following:

a- Sporangia in pteridophytes and Gymnosperm .

In Pteridophytes sporangia are simple in structure. Tey are born on vegetative leaves. Each leaf carries one or more sporangia. Each sporangium has a short stalk,as wall made of firm cells and a mass of spore mother cells, which enveloped by a tapetal layer of nutritive cells. In Gymnosperms here microsporangia are born on specialized leaves known as microsporophylls, which are grouped together in the form of small cone or strobilus. The microsporophylls carry about 2 microsporangia. Each microsporangium consistes of mass of spore mother cells enveloped by a tapetal layer; both are bounded exerrnally by wall of firm cells.

b- Isolation of pollen .

Two main types the chemical and physical nature of the soil in which pollen grains are embedded.

of soil in which fossil pollen grains are preserved can be distinguished:

1- Peat:

Consists of the remains of the vegetation, which once lived in the same place from which samples of fossil pollen grains or spores are recovered.

2- Sediments:

Consists of material, which originated in a place and was transferred and re-deposited in another place.

Samples of peat or sediment may be taken from the soil surface and from various strata of the soil at fixed depths, from the bottom of a forest or from the bed of a lake or pond samples are collected from the surface till reach to 100-120 m.

Numerous techniques for isolation of fossil pollen grains from peat or sediment are available. They all depend on

3- Writ on :

a- Composition of pollen grain.

- Pollen grains originate in the anther from the spore mother tissue (or sporangial tissue).
- Each spore cell divides two successive divisions (meiotic then mitotic) to produce 4 haploid cells.
- Each cell is capable to produce a pollen grain.
- However, the 4 cells may still together forming one mass.
- Accordingly, the following forms of pollen may be recognized in the flowering plants:
 - 1- Monads:
 - 2- Dyads:
 - 3- Tetrads:
 - 4- Polyads:
 - 5- Pollinia:

b- **Shape - Apertures and Sporoderm of grain .pollen** of Pollen grains may be:

Shape

- 1- Symmetrical, if dimensions in polar & equatorial views are equal, as in rounded (globular) pollen grains.
- 2- Asymmetrical, when those dimensions are unequal, as in triangular, square, rectangular, pentagonal, oblong or hexagonal pollen grains.

-Apertures. Pollen grain germinates by the production of germination tubes, which penetrate the sporoderm through certain holes called apertures.

- The number, shape and distribution of these apertures vary from one species to another.

- When the sporoderm has no obvious apertures the pollen grain is described as “inaperturate” (or atrema).

- A special system has been devised to describe the Number, Position and Character of the apertures in pollen grains. It is generally known as the **NPC-system**.

1- Number of apertures:

Pollen grains may have 1, 2, 3, 4, 5, 6 or many apertures; are called mono, bi-, tri-, tetra-, penta-, hexa- or poly-aperturate respectively.

2- Position of apertures:

There are three different positions of apertures:

- Polar: when the pollen grain has only one aperture situated at its pole, or two apertures placed at two opposite poles of the pollen.
- Zono-aperturate (or Equatorial): where the grain has three or more apertures distributed at equal distances around its equatorial line.

- Panto-aperturate (or Global): in which the apertures are scattered all over the pollen wall at equal or unequal distances.

3- Character of apertures. Aperture may be known as:

A. Simple apertures: which is either pores or colpi.

B. Compound apertures: which is the colpate type.

According to the shape of the apertures in equatorial view, they can be distinguished into the three following types:

a. Pore: rounded or more or less circular apertures in surface view.

b. Colpus, which may be:

- Elongate or fusiform apertures. - Trizonocolpate means that the pollen grain has 3-apertures, which are distributed at equidistance around the equatorial line.

- Three-branched furrow (or trichotomocolpate) aperture.

- Orate, more or less rounded aperture or apertures

c. Colpate: which is a combination of the two previous types. The colpus is found in the outer layer of the exine, while the pore in the inner layers.

In order to describe the apertures of a pollen grain, one term is employed to cover their number, position and character. For example:

- Polyaperturate grains have numerous pores scattered all over its exine, *etc.*

The sporoderm is generally distinctly layered. There are 2 (or sometimes 3 principal layers) from outward to inward:

1. Perine (always decayed).
2. Exine (2-layers; sexine & nexine).
3. Intine.

1- Perine:

- Occurs specially in certain Pteridophytes.
- Still imperfectly known.
- Seems to develop after the exine.
- Forms a wrinkled outer part of the mature spores.
- Less resistant to decay.
- Sometimes, it is difficult to decide whether a layer belongs to perine or exine. In such cases, the term sclerine can be used for both of them.

2 -Exine:

- This is the most important layer of sporoderm.
 - Consists of 2 well-defined layers:
- a. Sexine: is the outer sculptured exine. It usually consists of 2 main parts:
- Tectum: is the upper partially or wholly covering layer.
 - Columella: is the lower rod-like elements.

b. Nexine: is the inner non-sculptured exine. It may be differentiated into:

- Outer nexine: "N1", which is similar in its staining and characters to the sexine.

- *Inner nexine*: “N2”, which may be different in its staining and characters to the sexine.

3- Intine:

- This is laid down after the formation of exine.
- It consists of substances, which have great swelling capacity.

3- Compare between Paleobotany and Palynology .

Paleobotany (Fossil botany)	Palynology (Pollen analysis)
1-Macroscopic multicellular bodies (visible by naked eyes).	1-Microscopic unicellular structures (only seen by a microscope \approx X100).
2-Among these are the remains of plant organs, flowers, fruits, wood blocks, <i>etc.</i>	2-It includes pollen grains, spores, microorganisms and structures of unknown origin.
3-Cell walls are not resistant.	3-Cell walls are highly resistant.
4-They made up of cellulose or lignin.	4-They made up of sporopollenin, chitin or suprin.
5-They are fossilized through chemical processes such as petrification, salicification, <i>etc.</i>	5-They are not replaced chemically and kept as it is among the other plant remains.