

Answer on the following questions:

**First question:** Write on the following: (18 degree)

- 1- Development of sporophytes in Bryophytes.
- 2- Development of stele in archegoniates.

**Second question:** compare between: (18 degree)

- 1- Capsule of *Funria* and capsule of *Polytrichum*.
- 2- Different classes of pteridophytes.

**Third question:** Discuss (12 degree)

- 1- *Anthoceros* is the most sporophytes development in hepaticae.
- 2- *Selaginella* cone is the most cones development in pteridophytes.

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**Question no.1:**

Generally the sporophyte in bryophytes depends completely on gametophytes and not having roots or vascular system. The more sterile tissues is increased plant evolution.

**1- Development of sporophytes in Bryophytes.**

The bryophytes classified into two classes the first is hepaticae and the second is musci. In the first one (hepaticae) the sporophytes may be composed of capsule only with wall of one layer of sterile cells as in *Riccia* or from foot, seta and capsule also with wall of one layer of sterile cells in addition to elaters (sterile cells) as in *Marchantia* species, or from foot, meristematic zone and capsule wall with more than one layer of sterile cells in addition to columella (more than one layer of sterile cells) as in *Anthoceros*. So the last one (*Anthoceros*) consider the most development in hepaticae to having more sterile cells.

In musci the sporophytes generally contains three parts namely foot, seta and capsule wall of more than one layers of sterile cells. Also enclosure wall usually contain pigments help them to rely on himself in the formation of food. e.g *Sphagnum*, *Funaria* and *Polytrichum*. Also in musci the methods of capsule dehiscence are more development than in hepaticae.

From above we found that the sporophyte of *Riccia* is more primitive than any ones of sporophytes in bryophytes, while sporophyte of *Polytrichum* is more development ones.

**2- development of stele in archegoniate.**

The archegoniate contain three divisions those are: bryophytes, pteridophytes and gymnosperms.

In bryophyte the sporophyte don't contain any mechanical tissues. In pteridophytes the vascular tissues become appears as the following: firstly it appears as protostele or called also solid stele (without pith) as in *Psilotum* of psilopsida, and *Lycopodium* of Lycopside and appears medullary stele (with pith) with secondary growth as in *Isoetes* species and pteropsida plants.

Finally appears the more development and complex stele in *Pinus* of gymnosperms.

**The second question: compare between;**

**1-Capsule of *Funaria* and capsule of *Polytrichum*.**

Capsule of *Funaria* consists of:

- a- Capsule mouth not central.
- b- Capsule wall of more than one layer of sterile cells.
- c- Apophysis region which contains pigments used in food determination.
- d- Peristome teeth long and annulus layer used in capsule dehiscence.
- e- One air cylinder layer between capsule wall layer and cylinder of spores.
- f- Columella in the central of capsule.

Capsule of *Polytrichum* similar to capsule of *Funaria* but it differ in having the following:

- a- Mouth in capsule central.
- b- Two air layers one air cylinder layer lie between capsule wall and cylinder of spores and another ones between spores layer and columella.
- c- Pores between peristome teeth used in spores distribution.
- d- Peristome teeth short and not used in spores distribution.

**2- Different classes of pteridophytes:**

Pteridophytes divided into four classes they are: 1- Psilopsida. 2- Lycopsidea. 3- Sphnopsida. And 4- Pteropsida. Each one characterized by the following:

1- Psilopsida characterized by;

- a- Sporophyte consists of rhizoids, stem and with or without small leaves.
- b- Sporangia havngHomomicrospores.
- c- Sporangia bearing on stem.
- d- Stem having Protostele.

2- Lycopsidea characterized by;

- a- Sporophyte consists of roots, stem and small leaves.
- b- Sporangia having homo and heterospores.
- c- Sporangia bearing on stem or on the end of stem and branches forming cones.
- d- Stem having Protostele.

3- Sphnopsida also characterized by;

- a- Sporophyte consists of roots, stem and small leaves.
  - b- Stem divided into node and internode.
  - c- Sporangia having homosporous.
  - d- Stem having protostele.
  - e- Sporangia bearing on cones consists of special branches and not leaves e.g. *Equisetum* sp.
- 4- Pteropsida characterized by;
- a- Sporophyte consists of roots, rhizome and large leaves.
  - b- Leaves called fronds.
  - c- Sporangia collected on the lower surface of leaves in groups called sori.
  - d- Spores are homosporous.
  - e- Stem having protostele and siphonostele.

**Third question:** Discuss.

- 1- In Hepaticae the sporophytes may be composed of capsule only with wall of one layer of sterile cells as in *Riccia* or from foot, seta and capsule also with wall of one layer of sterile cells in addition to elaters (sterile cells) as in *Marchantia* species, or from foot, meristematic zone and capsule wall with more than one layer of sterile cells in addition to columella (more than one layer of sterile cells) as in *Anthoceros* and pseudoelaters so the last one (*Anthoceros*) consider the most development in hepaticae to having more sterile cells represented in 1- wall, 2- columella, 3- meristematic zone, and 5- pseudoelaters.
- 2- *Selaginella* cone is the most cones development in pteridophytes. The cone of *Selaginella* consists of axis and leaves carrying on its upper surface sporangia. Sporangia contain heterospores. Note that, the heterospores considered the first step in the seed development. The spores of it characterized by special property known as inner growth i.e. the male and female gametophytes growing inside the spores and this character featured to higher plants, while all spores germinations of most pteridophytes outer growth. From above the cone of *Selaginella* characterized by 1- heterospores (developed character) and 2- internally growth of spores (developed characters) and 3- more primitive of gametophyte tissues where it represented by little amount of cells inside the spores (developed characters).

