BIO414 (CRYPTOGAMIC BOTANY II)

WEEK 5

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INTRODUCTION TO BRYOLOGY

Bryophytes, also known as mosses, is an informal group consisting of three divisions of non-vascular land plants and it includes approximately 25.000 species.

Members of the group have no vascular tissue or wood to lend them structural support, nor do they have large leaves or showy cones or flowers.

Bryophytes are widely distributed in all climates of the world, from the tropical regions where they exist to the extent they can survive, to the subarctic and subanthartic regions.

They produce enclosed reproductive structures (gametangia and sporangia) and they reproduce by spores.

The group contains 3 divisions; Marchantiophyta,

Cells of Bryophytes have different shapes. Moss cells are generally rectangular, while liver cells are isodiometric.

The differences in cell shapes in leafy bryophytes and their arrangement in leaves are important features in the identification of species.

Bryophytes are Poiklohydrous plants. So they provide the water they need from the surrounding water. This makes them directly affected by changes in their environment.

Bryophytes contain chlorophyll-a, b, xanthophyll and carotene, as do other members of the plant kingdom, and cell walls contain cellulose. Sporophyte and gametophyte do not contain ligninised tissue. Although they are terrestrial plants, they have many unique features.

They do not have a real root system, they have filamentous structures that can be single or multicellular, called rhizoid, whose main task is to hold onto the environment.

For this reason, photosynthesis, water and minerals are absorbed by all surfaces.

They cannot control water loss and gas exchange since their leaves do not have stomata.

Therefore, bryophytes are poikilohydric plants. Bryophytes do not have an advanced transmission system.

Instead, they have a superficial capillary system that plays a role in the transport of water, that is, they are etohydric.

The talli of bryophytes are generally small.

They can often be several cm in length and they are the dominant generation gametophytic progeny.

Gametophyte (n) has sporophyte (2n) on them in different ways.

In mosses and some liver grasses, the structure has a leafy appearance.

Bryophytes do not contain true roots, stems and leaves.

Leafy structures are called fillid, stem is caulid and root-like structures are called rhizoid.

Evolution of Bryophytes

The emergence and diversification of terrestrial organisms, including the ancestors of present-day embryophytes, occurred in the early paleozoic period.

Photosynthetic organisms have acquired certain properties for adaptation to increased carbon dioxide and reduced ultraviolet rays in their habitats.

Bryophytes are among the first terrestrial plants.

They are the group of plants in which life cycle is dominated by haploid gametophyte and diploid sporophyte develops on gametophyte.

Sporophyte does not branch and each sporophyte forms one sporangium or capsule.

Evolutionary development in plants has been in line with the desires of the environment in which they exist, as in other living things. The evolution of plants and animals in the aquatic environment is due to the advantages that this environment provides for the development of life.

For example, plants with all their surfaces in water are able to exchange substances directly with their environment, so that no transmission system and a root system for receiving nutrients are required between the cells and the external environment.

There is no need for a support system due to the high lifting force of the water. It is easier for gametes to maintain their vitality and meet in aquatic environment.

Therefore, organs such as roots, stems, leaves and flowers are not

Although the mosses have leaf-like structures in terms of their external appearance, they cannot be considered as leaves because they do not have real stomata and veins.

On the other hand, there is an upper epidermis with pores in the lungs, air spaces through which these pores are opened, and abundant chloroplastic cells surrounding them.

The relationship between pores and chloroplastic cells is reminiscent of stomas. However, the absence of leaf veins prevents this structure from being characterized as a leaf.

It is clear that this structure is a transitional phase in the formation of the actual leaf, and supports the idea that evolution in living things does not suddenly evolve, but gradually progresses to its final form.

Since the dependence on water for reproduction in bryophytes continues, this indicates that they cannot fully adapt to terrestrial life.

Accordingly, the first organizations that emerged in plants; chloroplast formation for photosynthesis;

The similarity of present-day specimens to paleontological specimens shows that bryophytes have not changed much from carboniferous to the present day.

Nowadays, approximately 280,000 plants live in terrestrial environments. About 25,000 of these are bryophytes. According to the fossil record, plants first settled on the land 420 million years ago.

They evolved from green algae living in freshwater. Phylogenetic analyzes indicate that land plants are a monophilic group evolved from green algae-like ancestors.

A common feature of all land plants, including bryophytes, is that they have embryos. In other words, they form a diploid organ composed of haploid ancestral cells and protected by sterile tissue.

Therefore, all land plants are also referred to as embryophytes. Bryophytes are considered primitive plants. T

he first fossil bryophyte record identified was the Hepaticies devonicus.

This fossil is a leafy liverwort thallus, composed of small fragments, which stands out in the Devonian age. Since this material does not carry sporophyte and sexual organs, it raises doubts.

This is because the gametophytes of some ferns are structurally similar to this structure.

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