Quadrant II – Transcript and Related Materials

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Notes

Introduction

Life cycle of *Psilotum* is characterized by alternation of generation. Like in other pteridophytes, in *Psilotum* too, the sporophytic and gametophytic phases are independent of one another. The sporophytic phase occupies major part of the life cycle during which it produces reproductive structures called synangia inside which numerous spores are produced as a result of meiosis. The haploid spores germinate to produce the gametophytic generation called as the prothallus. The prothallus bears the antheridia and archegonia which produce the male and female gametes, respectively. The fusion of the two gametes results in the formation of a diploid zygote which further develops into a multicellular embryo and finally a mature sporophyte.

Structure of mature prothallus

The prothallus formed as a result of spore germination is a simple, parenchymatous structure of about 0.5 to 2.5 mm x 20 mm in dimension. It is a subterranean, saprophytic body and is usually lobed. The prothallus is monoecious in nature that is,

it bears both antheridia (male reproductive organs) and archegonia (female reproductive organs) on the same thallus.

Surface of the prothallus is covered with unicellular rhizoids and sex organs (antheridia and archegonia). Number of antheridia is more than the number of archegonia.

Structure of antheridium

Antheridium is a small, spherical structure partly projected above the surface of the prothallus as a hemispherical dome. It has a single layered jacket of sterile cells which enclose a mass of spirally coiled, multiflagellate antherozoids. The jacket of the antheridium has an opercular cell which disintegrates at maturity to release antherozoids.

Structure of archegonium

Archegonium is almost completely embedded in the prothallus. Only a part of its neck projects out. The neck is made up of 4 vertical rows of cells with 4-5 cells in each row. It has two neck canal nuclei, a venter cell and an egg cell.

Fertilization

At maturity, the upper archegonial neck cells become thick-walled and cutinized. This results in the breaking of the neck cells at the distal end leaving 1-3 basal tiers only. Next, the canal and ventral nuclei disintegrate to form a free passage for the entrance of antherozoids. Antherozoids enter and fuse with the egg cell to produce a diploid zygote.

Young sporophyte

The diploid zygote formed as a result of fertilization slowly increases in size to occupy the venter cavity. It divides by a transverse wall into an upper epibasal and a lower hypobasal cell. Epibasal cell develops into a shoot while the hypobasal cell develops into foot. Some foot cells extend into the gametophyte tissue to derive nourishment from the prothallus. In order to protect the developing embryo, the cells of the prothallus adjoining the embryo forms a calyptra-like structure around it.

As the embryo matures, it grows through the calyptra projecting beyond the prothallus. It grows horizontally to form the rhizome which gets colonized by mycorrhizal fungus. Next, it starts branching dichotomously. Some branches turn upwards and develops into aerial shoots. Once established, the young sporophyte breaks off from the foot.