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Class: Deg.I(Hons.)
Paper: II(Bryophyta)
Topic: Anthoceros(contd.)
Lecture No.-181
Date: 7/12/2020

General account of Anthoceros(contd.):

Sporophytic Phase of Anthoceros:

After fertilization the diploid zygote or oospore still enlarges in size and fills the cavity of the venter of the archegonium. It secretes an outer cellulose wall.

Development of Sporophyte:

The first division of the zygote is vertical. In other Bryophytes the first division of the zygote is transverse. This is the important difference in the development of sporophyte of Hornworts and rest ‘of the Bryophytes.

The second division is transverse and is so oriented that the upper two cells are usually longer than the lower two (quadrant stage). All the four cells divide by vertical walls to produce eight cells (octant stage). The eight cells are arranged in two tiers of four cells each.

Further development of the sporophyte varies in different species. In A. erectus the lower tier of four cells of octant stage form the foot while the seta and capsule are formed from the upper tier of four cells.

In majority of the species like A. fusiformis, A. pearsoni and A. himalayensis upper tier of four cells divide by transverse division to form three tiers of four cells

each. The lowermost tier forms the foot, the middle tier forms the meristematic zone or intermediate zone and uppermost tier develops into the capsule.

The four cells of the lower tier divide by irregular divisions to form broad, bulbous foot, made up of parenchymatous cells. The uppermost tier of four cells which forms the capsule divide by one to two transverse divisions to form two to three tiers of cells.

It is followed by periclinal division to form an outer layer of amphithecium and the central mass of cells called endothecium. The entire endothecium develops into the sterile columella. In young sporophyte it is made of four cells but in mature sporophyte it is made of sixteen vertical rows of cells (4 x 4).

The amphithecium divides by a periclinal division to differentiate into an outer sterile layer of jacket initials and inner fertile layer.

The cells of the jacket initials divide by anticlinal and periclinal divisions to form four to six layered capsule wall. The outermost layer of the capsule wall is called epidermis. It is characterised by the presence of stomata. The cells of the inner layers of capsule wall have chloroplast.

In young sporophyte the archesporium over archs the columella. The archesporium may single layered in thickness throughout in its further development (e.g., A. erectus) or become two layered (e.g., A. pearsoni) or two to four layered (e.g., A. hallii).

On maturity the archesporium gives rise to two types of cells: spore mother cells and elater mother cells. These cells are arranged in alternate manner one above the another.

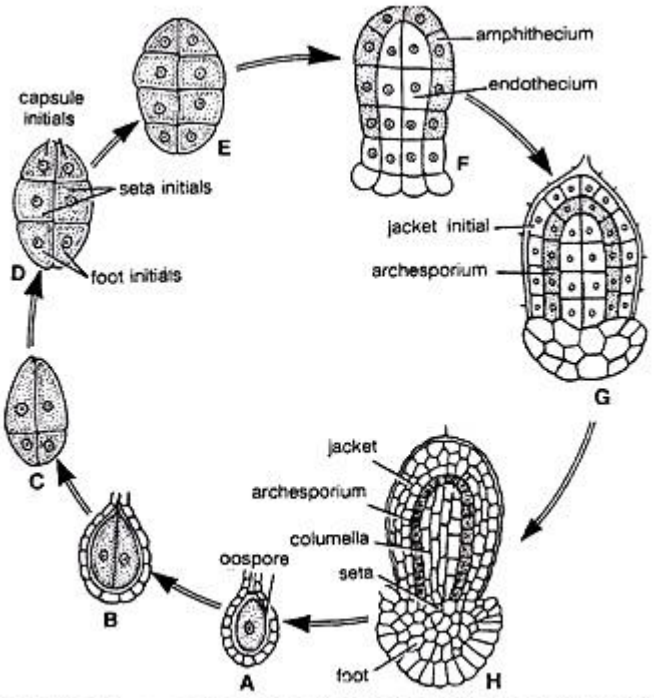

Fig. 7. (A-H). *Anthoceros*. Successive stages in the development of sporophyte.

Spore mother cells are spherical or oval with dense cytoplasm and large nuclei. These cells divide by meiotic divisions to form spore tetrads (Fig. 8 A). Elater mother cells are elliptical with small nuclei. These cells divide mitotically to form four celled elaters.

The four cells of the elaters may remain attached to each other or may break into 1-celled, 2-celled or 3-celled units. The broken units are called pseudo elaters. (The elaters are without thickening bands and therefore, called pseudo elaters, Fig. 8 A). By the activity of the meristematic zone various tissues of the capsule are continuously produced so that it becomes elongated.

The young sporophyte of the Anthoceros is surrounded by a fleshy covering or sheath. It is called involucre (Fig. 8 A). It is developed partly from the tissue of the archegonium and partly from the tissue of the gametophytic thallus. In young stages the sporophyte is completely surrounded by involucre.