NOTE.

DISCHARGE OF ANTHEROZOIDS IN FOSSOMBRONIA AND HAPLOMITRIUM HOOKERI.—Campbell,¹ in describing the discharge of antherozoids in *Porella Bolanderi* Aust., states that the cells of the wall absorb water with great avidity, and finally the upper part bursts open by a number of irregular lobes, which curl back so strongly that many of the marginal cells become completely detached. According to Humphrey,² the method is similar in *Fossombronia longiseta* Aust. In 1903, Cavers³ pointed out in connexion with the explosive ejection of antherozoids in *Fegatella* Radd., that the mechanism of discharge was partly associated with the mucilaginous nature of the antheridial wall. This seems to be the case also in certain species of *Fossombronia*⁴ recently described by the writer, and in *Haplomitrium Hookeri*. In both cases the discharge of antherozoids is preceded by a progressive series of changes in the wall of the antheridium.

In *Fossombronia*, the antheridia arise singly between the base of the leaf and the stem, and are generally shut in by a little basal leaf-flap. When young they are pale green, and the contents can be seen through the wall. As the organ ripens, the chlorophyll granules of the wall-cells become orange coloured, and appear to become mucilaginous. The change in the chlorophyll corpuscles is progressively downward

A, B. *Fossombronia*.

C. *Haplomitrium Hookeri*.

from the top of the antheridium. The corpuscles, in their final stage, are situated in the protoplasm close to the convex wall of the cell. They are of irregular shape, and are arranged in roughly parallel lines of granules or dentate rods, whose ends point toward the colourless concave side of the cell.

The wall of the antheridium shows differentiation into two forms of cells. Those standing up from the base of the antheridium are three or four times longer than broad, the others are polygonal and of irregular outline. If the latter cells were removed, the former would make with the stalk a wineglass-looking object. As the antheridium develops the wall-cells become more convex in outline, so that it has a warty appearance, and finally, on the point of dehiscence, it is difficult to convince oneself that the antheridium is not encased in tightly-fitting filaments. Dehiscence

¹ Mosses and Ferns, 1st ed., p. 101.

² Annals of Botany, xx, 1906, p. 94.

³ Annals of Botany, xvii, p. 274.

⁴ 'Observations on *Fossombronia* from Devonshire.'

began with the rise of one or two of the apical wall-cells. Then the remaining cells drew back with little jerks, presenting the appearance of the loosening of a claw of filaments. At the same time a stream of antherozoids appeared, which was helped out of the antheridium by the pushes given by individual cells jumping-off, and by filaments of wall-cells rising and drawing back. The appearance was very striking, and the discharge occupied about two minutes. The individual cells of the wall were turgid sausage-shaped bodies. After the rejection of the antherozoids, what remained of the cell-filaments could be seen attached to the rim of lower cells which acted as a kind of stalk.

The antheridia of *Haplomitrium Hookeri* are oval bodies, and are much larger than the more or less spherical ones of *Fossombronia*. When ripe, these are of an orange colour, due to a similar change in the chlorophyll corpuscles of the wall, which are roundish in outline. The wall of the antheridium lacks the differentiation seen in *Fossombronia*. The cells are five- or six-angled, and are arranged in a diamond pattern. As the antheridium ripens first, the apical cells, and later the lower cells, bulge outward, giving it a warty appearance, which is not so marked towards the base. In nature the discharge of antherozoids is sudden and rapid. In attempting to examine the process, dehiscence is often premature, and the discharge less rapid. In one case the contents passed out in a cloud, which became several times longer than the antheridium during a couple of sudden movements which resulted in the complete collapse of the spirally-arranged, turgid wall-cells. These remained attached to the basal portion of the antheridium.

In another case where the process was retarded, an orifice was formed at the apex, owing to the uprising of a few turgid cells. Previous to this the radial walls of the apical cells appeared thick and discoloured, due to the arrangement of a yellowish-brown mucilaginous matter about their walls. The free cells, bounded by a thin, clear membrane, soon lost their turgidity, and the orange or orange-brown coloured matter diffused from the changed chlorophyll corpuscles into the protoplasm. After the formation of an orifice, more and more cells rose, but did not float off, and the antherozoids oozed out. The wall of the antheridium bulged in places, and it could be seen that the membrane of the sausage-shaped cells was free from the limiting membrane (cuticle) of the wall.

To sum up, the following processes take place during ripening of the antheridium :—

1. Change in character of the chlorophyll corpuscles of the wall from above downwards.

2. Local degeneration of the middle lamella in the wall of the antheridium. Cell filaments are formed in *Fossombronia*. Special cells rise in *Haplomitrium*.

3. The upper wall-cells become free from the limiting membrane of the wall. When these processes have operated for a certain time—that is to say, when the antheridia are ripe—dehiscence takes place, and, since the wall-cells are normally in a turgid state, the mere access of water would be sufficient to start dehiscence. The disposition and behaviour of the wall-cells in each case provide a simple and efficient mechanism for the discharge of antherozoids.

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