but no other one had rhizomorphs of this type attached to its base. Comparable rhizomorphs have been described for other species of *Lycoperdon* such as *L. pyriforme* Pers. and *L. gemmatum* Pers. (Townsend, 1954), also *L. pedicellatum* Pk. (Swartz, 1936).

### INFECTION OF THE *Yoania* RHIZOME

Infection in some parts of the rhizome takes place by single hyphae, 2.0–5.2$\mu$ in diameter, which come off either from the superficial hyphal network or from thin mycelial strands, and enter the terminal cells of a projection usually through the tip of a hair. Sometimes the hypha proceeds directly to the base of the hair, completely destroying the transverse walls as it passes through; at other times it branches to form a strand which occupies the whole cavity of the hair. The external wall of the hair becomes thickened and lignified so giving support to the delicate fungal thread which traverses it. The cell at the base also develops a thickened lignified wall and here the hyphae may be up to 6.8$\mu$ in diameter. Sometimes the basal wall is greatly thickened and may develop short, finger-like projections into the cell below.

From the point of their entry into the rhizome the hyphae spread radially inwards into the cortex (Fig. 3) and then laterally around the rhizome to a varying depth of up to 15 cells from the epidermis, but not as a rule in the epidermis itself. Sometimes they spread completely around the rhizome. The hyphae are constricted as they pass through a wall and within the cells are septate. In the outer cortex they may pass straight through a cell or may branch a few times but do not form dense coils. The finer branches then collapse and disappear but the main branches persist. The infected cells remain alive with walls unaltered chemically. Sometimes the fungus penetrates to a distance of less than six cells from the epidermis and then is difficult to detect.

At other times the fungus penetrates to a much greater depth, even as far as three cells from the endodermis. In the middle region of the cortex it branches freely within the cells. In the innermost region of invaded cells, in a digestion zone two to four cells in depth, the hyphae at first branch and spread throughout the cell, then swell and become deeply staining with such stains as crystal violet (Fig. 6). Eventually most of them appear shrunken and empty, but there remains a conspicuous clump containing amorphous material which stains deeply with Sudan III. The nucleus of each of these digestion cells enlarges up to 2½ times its former diameter and frequently becomes irregular in outline. The size of the nucleolus also increases, to twice its original diameter. As the clumps diminish in size, cells near the endodermis contain many large, compound starch-grains which give a reddish-brown colour with iodine.

Infection in older parts takes place by single hyphae which come off from rhizomorphs, or by rhizomorphs themselves connected directly to the roots of taraire. The infection follows the same course as described above but differs in being more vigorous. Where rhizomorphs lie in the axils of scale leaves, fungal pseudoparenchyma occupies the cavities of many of the superficial cells of both the leaf and the rhizome, and the whole region is enclosed by thickened, lignified walls. Sometimes the rhizomorph attaches itself by an appressorium to either the surface of a hair or the surface of the rhizome, and both narrow and wide hyphae radiating from this point enter hair-cells where they branch repeatedly, filling the base of the hair with pseudoparenchyma (Fig. 5). Sometimes the infection spot is a whole conical projection, a region some six cells in diameter and two to three cells deep, all of whose cells are filled with pseudoparenchyma. Lignified wall-thickening may be present not only around the infection area but collenchyma-like on the angles to a depth of six cells below. At other times the primary infection area is 20 cells in diameter with the rhizomorph penetrating below the surface and digestion taking place in the middle cortex, some 10 cell-layers below, in a zone up to six cells in depth.