cells containing oil-bodies. It can be differentiated into an upper zone 0.1–0.2mm deep where the cells are 14–40° deep and in sagittal sections of the thallus have a length of 100–180μ, a middle zone 0.2mm deep where the cells are 40μ x 120μ diam. and in all older thalli contain septate fungal hyphae, and a lowermost zone 0.2mm deep where the cells are 12–32μ x 80–140μ diam. and are free of hyphae, except for those immediately above the smooth-walled rhizoids by means of which the hyphae gain entrance. Growth of the thallus is by division of a cuneate apical cell of the same type as occurs in *A. californica* (Haupt, 1929).

THE MALE BRANCH AND THE ANTHERIDIUM

The male branches are often of limited growth (Fig. 1) with a distal, expanded, heart-shaped portion some 3mm long x 4mm broad, sometimes much longer, attached to the parent thallus by a cylindrical stalk portion some 4mm in length. The antheridial receptacle is a slightly raised, circular or oval disc 2mm diam. extending backwards from the apex of the branch. Antheridia develop in acropetal succession, each one arising from a surface cell and gradually becoming sunk in a flask-shaped cavity as a result of the more rapid upward growth and division of the adjacent cells (Figs. 5, 7). Slender mucilage hairs arise from the wall of the cavity and the narrow canal leading to the surface opens by a simple raised pore. In old receptacles the antheridial cavities are of a reddish-purple colour.

The development of the antheridium corresponds with that described for *A. californica* (Haupt, 1929; Campbell, 1918). The antheridial initial is recognizable close to the apical cell. It divides transversely into a basal cell which produces the embedded portion of the antheridial stalk and an outer cell which separates from surrounding cells and produces the free portion of the antheridium (Fig. 4). The outer cell divides transversely to form a row of 4 cells (Figs. 5, 6) which now divide by 2 vertical walls at right angles to each other (Fig. 7). Meanwhile the basal embedded cell divides once transversely and then longitudinally. In the free portion of the antheridium, which is composed at this stage of 4 tiers of cells, those of the lowermost tier divide transversely producing the short free portion of the antheridial stalk, while those of the 3 upper tiers divide periclinally so that sterile jacket cells are set apart from a central fertile tissue (Fig. 8). The fertile tissue divides repeatedly to form a mass of spermatogenous cells. The jacket remains uniseriate (Fig. 9) and always was found to be extended at the top into a pointed beak as figured for *A. californica* (Campbell, 1918), although Haupt in referring to the same species states that this is not the rule (Haupt, 1929).

THE FEMALE BRANCH AND THE ARCHEGONIOPHORE

Female branches grow for a longer period than the male branches, but sooner or later a stalked archegoniophore arises at the apex (Fig. 1). The young head of the archegoniophore is hemispherical, but later it becomes broadly conical with a rough appearance due to crowded, elevated air-pores of a whitish colour which show up conspicuously under a lens. The air-pores differ from those of the thallus in being barrel-shaped; they are surrounded by 6–8 tiers of cells with the outer opening encircled by 7 or 8 cells. By the time the capsules are ripe the head of the archegoniophore is 5mm broad at the base and 3mm high. In many specimens slender colourless scales, hanging down from the under side to a distance of up to 9mm, produce a shaggy appearance, but these are not always a conspicuous feature. The stalk is 0.2–1.0mm broad and up to 5cm high, purplish