investigated, grew. They were found as has been already stated, virtually submerged in a peat-bog, and as a consequence, absence of proper water supply which has been noticed as a predisposing cause of apogamy, would not make itself felt. Possibly prothallia from the rich, rather dry soil of the Don valley might yield a greater number of examples. If we may infer apogamy from the presence of prothallial tracheides, the gametophyte of *Botrychium virginianum* is unique among the eusporangiate vascular Zoidogama, in this respect; unless the phenomenon is shown to be present in the tracheid-bearing Cycad endosperms described by Bower, and apogamy can no longer be considered as peculiar to the leptosporangiate *Filicineæ*.

Returning to the young sporophyte, the shoot-organs and the root possess fairly well marked apical cells, as is shown by Campbell[26] to be true also of the mature spore-plant. Figure 52 represents the terminal meristem of the young stem in vertical section. At *a* is probably the apical cell. In figure 53 the same region is shown in horizontal section. In figure 54 is the apex of the cotyledon in longitudinal section. Figure 55 represents a long section of the apex of the first root in an embryo which has not yet broken through the *calyptra*. A large primary segment is found on the side of the *pileorhiza*, a state of affairs rarely seen in later stages of the root, as subsequently the small cells of the inner part of the root cap abut immediately on the apical cell. This is possibly to be explained by the comparatively slight development of the *pileorhiza* which consequently requires only very occasional contributions from the apical initial. The root of *Botrychium virginianum* is an endotrophic *mycorhiza* and, as has been shown by Frank, there is a tendency to degeneracy in the root-cap of roots of this type. The apical cell is much more active on its flanks although even here it divides slowly, compared with the apical initial of the leptosporangiate *Filicineæ*. In figure 56 the root-apex is seen in transverse section, and unlike that of the stem, its initial cell is triangular in this plane.

Figure 57 shows an interesting case of polyembryony corresponding to that described by Treub[27] in *Lycopodium cernuum*. It was first noticed after a series had been made of what appeared externally to be a bifurcated embryo. The central cylinders of two plants, *a* and *b*, are shown; *a* is larger and much more abundantly supplied with reserve food-materials, which cause it to stain more intensely; *b* is smaller, less developed, and in a condition of malnutrition as is indicated by a corresponding paleness of hue; a^2 is the second root of embryo *a*, and is

26. Campbell. Mosses and Ferns; pp. 232, 235.

27. Etudes sur les Lycopodiacées; Extrait vi., p. 11.