

we have two kinds of Club Moss, viz., those without running stems and those with running stems.

The first class comprises *L. selago* and *L. lucidulum*, the two species we have seen reasons for considering primitive; and as though to compensate for the defects of their upright terminal growth, they have both devised the expedient of *detachable branches*. Near the apex of the annual growth, just above the region of fertile sporangia, 2 or 3 deciduous gemmæ or viviparous buds are formed. These detach themselves from the growing axis or are blown away by the wind and form new plants by striking root on contact with the ground. It is a purely vegetative form of reproduction and dispenses with the intermediate stage of the prothallus. It has its analogy in the bulbils of *Cystopteris bulbifera*. In many plants it is the roots that thus reproduce, e.g., the tubers of the potato; and in one species of Club Moss, *L. cernuum*, a more or less tropical kind, are found similar subterranean nuclei for plant-multiplication.

These gemmæ represent the plant's supreme effort at land-grabbing; their attempt to jump a claim. This is borne out by a curious fact I have noticed in *L. lucidulum*: the deciduous buds are centrifugal in nature; they nearly always are thrust forth on the side remote from the older and prostrate stem; if they do not always face in the direction towards which the plant has been struggling forward, they never look straight back towards the centre from which the plant started. In structure they seem to be modified leaves, for they take their regular place in the whorl of leaves, each being in its whorl a substitute for the normal leaf. Usually even when as many as three gemmæ are produced, they are all in the same whorl, or at most in two successive leaf-whorls.

So far we have seen how the Club Moss by adopting a more and more complex system of branching and rooting has progressed as a plant; we have yet to note the steps of advance it has made as a sporophyte. These steps are still on the principle of division of labour and consist in the separation of the vegetative from the reproductive tract. I said a little way back that all the various kinds of differentiation subserved the two functions of nutrition and reproduction. Of course the life-ambition of the plant is to perpetuate its kind; but to be fertile it must first be vigorous, and if you look at a young Club Moss you will see that its first care is the output of a vegetative system, a leafy shoot that will support the later output of sporangia.

In the archetype postulated by Prof. Bower, each of the leaves all round and all up the simple shoot performs a vegetative function and supports a sporangium at its base. The first change is by the lower leaves becoming abortive and no longer bearing