

IV, p. 267). They are distinguished from ordinary land and fresh-water plants by the high salt concentration of their sap, which enables them physically to hold their own in salt solutions, such as normal sea water ($3\frac{1}{2}$ per cent NaCl), or even higher concentrations. It is a singular fact that—apart from the salt marsh—the majority of seashore plants, especially those of shingle beaches and sand dunes, are not halophytes at all, and that if they are covered by an exceptionally high spring tide their tissues are liable to be destroyed and blackened. Nevertheless the apparent recklessness and regardlessness of consequences with which non-halophytes carpet the ground right down to tidal limits are consistently characteristic of vegetation. It is largely conduced by the fact that the ripe seeds of plants of all kinds are almost always impermeable to salt water, and being thus immune are liable to be distributed in good condition wherever the tide carries them. Should the ground on which the seeds are stranded be suitable for establishment it will inevitably be occupied by the seedlings. This is only a single instance of the way in which vegetated areas push their outposts to the extreme available limits.

4. *Attack by Animals*.—This is a factor not to be lost sight of in connection with plant establishment. Thus on waste ground near the sea the influence of rabbit-nibbling is often important enough to prevent a species of plant from flowering even if it does not lead to its extermination locally. The tread of human feet will prevent the establishment of certain plants on or near a path. For this reason a track over a heath is bare of *Calluna*, or a field path of thistles. Constant footsteps tend to eradicate certain plants from grassy turf without injuring the turf itself. That the factor is liable to operate differentially, and that it is not always easy of detection, will be sufficiently obvious.

5. *Availability of Plant Food*.—The last of the factors upon which plant establishment depends is the availability of the raw materials of a proper nutrition. Wind-blown sand from the foreshore and pure shingle, for example, as they accumulate to form dunes and beaches are inhospitable media. The soluble salts indispensable to a plant are available in new soils often