

flowers in the hydrocharids in order to effective pollination—these exemplify the same activity leading to renewed life rather than to the mere sloughing of parts moribund or dead.

The processes by which these results are brought about and the conditions leading to them constitute the subject of this essay. There is also the purpose of presenting a general summary of the problem of abscission as at present understood. It will be deemed unnecessary to make an extended historical review of the development of our knowledge, which, from lack of space, must in any event be excluded.² Only pertinent references, therefore, will be made during the progress of this discussion. Unless specific mention is made, it will be understood that the more highly organized plants are meant.

THE PARTS OF PLANTS WHICH MAY BE SHED.

Aside from the outer layers of the stem, namely, the epidermis and dead cortex, with included tissues, the parts of the plant which may be shed by the process of abscission are transverse segments of the stem, including one or more internodes, either with or without attached flowers; or any lateral organs, either foliar or floral.

Beginning with leaves as the most familiar examples, we notice further that either the leaf as a whole falls away from the supporting stem, or, when compound, the individual leaflets fall separately (Ash, Horse Chestnut, Boston Ivy, etc.). The instances of *Ampelopsis*, *Veitchii* and *Citrus* sp. may be especially mentioned since in these forms the apparently simple leaves are separated both at the base of the leafblade and at the base of the petiole. *Ampelopsis Veitchii*, however, produces trifoliate leaves on older shoots, and certain *Citrus* sp. have also compound leaves, so that the single blade may be regarded as a terminal leaflet or as a fusion product of three. In the cases which I have studied (*Ampelopsis*, *Vitis*, *Fraxinus*, *Aesculus*, *Negundo*) leaves and leaflets present no difference in the method of separation, in concurrence with earlier students (Tison, Loewi, (3) in *Citrus*), so far as attention has been paid to the matter.

The position of the plane of separation varies, but is to be found near the base of the organs in question. In the case of the petiole, it may occur at a point further removed from the stem, and thus leave the leafbase clasping more or less completely the axillary bud (*Smilax*, *Philadelphus*, *Platanus*). In *Smilax*, the leaf is cut off above the tendrils, so that, although these are of foliar origin, they are allowed to remain supporting

² This material may be in large part found in the detailed paper of Tison (2).