

CHAPTER III. CONCLUDING REMARKS.

The vegetative structures described in the preceding pages are those exhibited by arctic plants in general, and the examples cited are from material gathered on the north coast of this continent. As a feature especially characteristic is the persisting primary root, frequently developed as a thick fleshy tap-root, and well represented in various genera, as for instance: *Rumex*, *Papaver*, *Parrya*, *Oxytropis*, *Campanula*, *Artemisia*, etc. Or the root-system may be represented by a series of secondary, slender roots proceeding from a horizontally creeping rhizome, as for instance in *Saxifraga aestivalis*, *Pedicularis sudetica*, *Lagotis*, *Valeriana*, *Arnica*, *Saussurea*, etc. The tuberous roots so characteristic of *Ficaria* and *Corydalis* are rarely observed in these regions; however, *Ficaria* does occur in arctic Europe, and Kjellman discovered the tuberous-rooted *Corydalis pauciflora* Pers. at Port Clarence.

Then with regard to the subterranean stem, this may be quite thick and sparingly branched, lacking the slender, horizontally creeping ramifications known as stolons; this simple structure is found in *Polygonum viviparum*, *Lagotis*, *Valeriana*, *Arnica*, and *Saussurea*.

More frequently the rhizome develops stolons, often attaining a considerable length. This structure is exceedingly well represented by many Gramineae, Cyperaceae, and by a number of species belonging to different genera of the Dicotyledons, for instance: *Polygonum Bistorta*, *Oxyria*, *Stellaria longipes*, *Merkia*, *Italianthus*, *Anemone parviflora* and *A. Richardsonii*, *Ranunculus lapponicus*, *Polemonium*, various species of *Pedicularis*, *Petasites*, etc.

Aerial stolons are, of course, seldom met with but they are, nevertheless, profusely developed in *Glyceria vilfoidea*, *Ranunculus Cymbalaria*, *Saxifraga flagellaris*, and *Androsace Chamaejasme*.

Pseudo-rhizomes, we have seen, are not infrequent; they are characteristic of several members of the Caryophyllaceae, *Cerastium*, for instance, also *Chamaenerium*, various Papilionaceae, etc.

The bulb so characteristic of the Liliaceae is found in *Lloydia*, in *Allium sibiricum*, and among the Melanthaceae in *Zygadenus glaucus*. However, this type of stem recurs in some of the dicotyledonous genera, notably in *Saxifraga cernua* and *S. rivularis*, or as a secondary structure caused by transformation of flowers in *Saxifraga cernua*, *S. stellaris* forma *comosa*, *Polygonum viviparum*, and to some extent in the viviparous *Aira alpina* and *Festuca orina*.

As to the stem above ground we notice quite a considerable variation among the herbs ranging from the simple leafless scape emerging from a rosette of leaves in *Primula*, *Dodecatheon*, *Ranunculus Cymbalaria*, *Saxifraga aestivalis*, to the amply ramified shoots of all those species which have the cushion-like structure known so well from these regions. As examples may be mentioned *Silene*, *Douglasia*, *Phlox*, *Saxifraga trienspidata*, *S. bronchialis*, *Chrysanthemum integrifolium*, *Oxytropis arctobia*, *O. nigrescens*, etc.

Among the woody plants there are several, more or less prostrate shrubs, represented by the willows, by *Betula*, *Empetrum*, *Dryas*, *Vaccinium*, *Rhododendron*, *Loiseleuria*, etc., and even trees are not absent as the presence of *Picea canadensis* testifies.

Concerning the foliage, there are many different types from simple, entire to lobed or cleft, or compound: *Papaver*, *Artemisia*, *Polemonium*, *Selinum*, the Papilionaceae, Rosaceae, etc. Glabrous and hairy leaves are almost equally common, but succulent leaves are seldom met with; *Rhodiola* may be mentioned as an instance. In several of the herbs the leaves persist throughout the winter, and several of the shrubs are evergreen, for instance: *Dryas*, *Empetrum*, the Ericaceae, etc., not speaking of *Picea*.