

of stiff coriaceous leaves, so strongly reflexed that their filiform tips almost meet. Such rosettes are 1 ft. or so apart. The leaves are pale-green, bordered more or less deeply with red; they are 6 in. long,  $\frac{3}{4}$  in. broad at the base, and taper gradually to a fine point.

The inuka, grass-tree (*Dracophyllum longifolium*), is a small tree or shrub of an erect, fastigate habit, having many stiff vertical branches crowded together, bearing at their apices a number of long, closely inserted needle-like leaves, which are more or less vertical in direction. The leaves are remarkably like those of a xerophytic grass, the xerophily being secured by reduction of surface and loss of photo-synthetic power, whereas in *D. Menziesii* a much larger leaf-surface is available, owing to the reflexed habit, which avoids the direct rays of the sun and offers little resistance to the wind.

The tall species of *Olearia* and *Senecio* (daisy-tree, shrubby groundsel) have much the same life-form. The branches are spreading, naked below, but furnished near their extremities with rosettes of usually fairly large leaves, coriaceous, thick, and covered with a thick mat of tomentum beneath. Usually about three branches are given off fairly closely at a narrow angle, such branching being repeated several times, the final branchlets curving so as to bring the rosettes close together and into the light. Thus far-spreading rounded heads are formed, while below are a number of stiff, bare branches (see Photo No. 8, where towards centre, the twigs arching upwards and to the right, the naked branches of *O. Colensoi* may be seen). The leaf-tomentum in this life-form is an important adaptation, as it allows a maximum of leaf-development. (The rounded head may be seen in Photo No. 15.)

Of the twenty-nine shrubs under consideration, only one (*Nothopanax Colensoi*) has a compound leaf; one has a large leaf; eight have medium and twenty small leaves; eighteen have entire and eleven toothed leaves; all have more or less coriaceous or thick leaves, and those of fourteen are glabrous, while the remainder have them more or less hairy, and some tomentose. The leaf-anatomy shows chiefly xerophytic adaptations—e.g., strong cuticle (*Veronica buxifolia*, *V. Laingii*, *V. elliptica*, *Styphelia acerosa*, *Olearia Colensoi*, &c.); subepidermal water-tissue (*Senecio rotundifolius*, *Olearia nitida*, *O. avicenniæfolia*, *Veronica elliptica*, &c.); strong stereome (*Styphelia acerosa*, *Olearia ilicifolia*, &c.); sunken stomata (*Veronica buxifolia*, *V. Laingii*,\* &c.).

The branches are frequently stout, rigid, and stiff. In some cases, especially *Olearia Colensoi*, there is distinctly an hereditary tendency towards a prostrate trunk (see also Cockayne, 18, *re O. Lyallii*, of Auckland Islands), young seedlings growing in a still atmosphere being generally more or less prostrate.

#### (d.) Herbaceous and Suffruticose Plants.

The plants of this section consist of those which bear the stamp of the modified subantarctic climate of Stewart Island, and also of those ordinary New Zealand mesophytes which are not furnished with adaptations against extremes of wind, drought, acid soil, and so on. The whole consist, with a few exceptions, of evergreen herbs or subshrubs—i.e., plants whose aerial portions are perennial and herbaceous or suffruticose, as the case may be. Those plants with subterranean storage organs, so common in many temperate regions, may be called summer-green herbs; but this class (very few in New Zealand) is not in harmony with a mild climate, where great extremes are absent.

The mesophytic herbs, although numerous enough in species, play little part in the physiognomy of the vegetation, since they are usually not plants of the characteristic wet stations, but rather, owing to their being readily disseminated, find such a sheltered station as they need, where there is sufficient water for their requirements.

Plants spreading by means of stolons, rhizomes, prostrate rooting-stems, &c., are common, and frequently mat or turf forming, admirable life-forms in a boisterous climate.

The special subantarctic life-forms alone need mention here, the most important being the *cushion form*, so well suited to withstand wind.

##### (a.) Cushion Plants.

Cushion plants are represented in most diverse families—e.g., *Musci*, *Hepaticae*, *Gramineae*, *Cyperaceae*, *Centrolepidaceae*, *Epacridaceae*, *Stylidiaceae*, *Compositae*. The cushions are formed, generally speaking, by densely tufted branches, which branch profusely into very short branchlets, usually covered near their extremities with closely imbricating small leaves, and pressed together into a close and possibly very hard rounded mass. Such an organism as the Stewart Island vegetable-sheep (*Raoulia Goyeni*) looks more like a lump of coral than a living plant. Some shrubs are cushion plants. *R. Goyeni* would more correctly be so classed. No plant-form could seem more fixed and unchangeable than are these vegetable cushions, and yet with moist-air culture such a typical example as *Phyllachne clavigera* quickly grows out of recognition, putting forth long shoots with open leaves no longer crowded.† Here the cushion form vanishes; it has not really been a fixed structure, but dependent upon the station, plus an hereditary tendency to assume such a form under a certain stimulus. It is, in fact, much in the same position as a garden annual stunted through lack of nutrition when growing in a poor and dry soil.

##### (β.) Rosette Plants.

Rosette plants are another important life-form. *Plantago triandra* var. *Hamiltonii* has small flat rosettes of shining coriaceous leaves 1 in. or 2 in. in diameter, pressed close to the ground; and hundreds of these, all touching, making a hard glossy turf, as in one part of Centre Island, is a curious sight. The silvery rosettes of *Celmisia argentea* pressed closely together give that plant the cushion form (see Photo No. 9).

\* Really a meadow-plant.

† From an experiment of Professor Chilton in the experiment garden, Canterbury College. The plant unfortunately died before a photograph was taken.