FRONTISPIECE

For the frontispiece of this issue Mr. Cecil H. Dunn has drawn a fruiting specimen of Corokia macrocarpa.

This shrub, in its natural state, grows only on the Chatham Islands.

It bears bright yellow flowers which are followed by very attractive fruit.

Corokia macrocarpa could be a valuable addition to the shrubbery.

HYPSELA RIVALIS AND OTHER PYGMY PLANTS

L.B. Moore

At the Society's March meeting (1974) members were interested in a platter of pygmy plants brought by Y. Elder from the South Ashburton Valley. On March 9th when we visited the plantation at the Coleridge Power Station she passed round similar exhibits that she had collected nearby. The flat surface of each turf was covered with tiny leaves on firmly rooted creeping stems and scattered over these were relatively large upstanding flowers of three different kinds: (a) Blue, tending to be goblet-shaped, with four petals and two prominent stamens (Parahebe canescens = turning white when old); (b) Blue with five almost even petals, three of them with transverse purple markings associated with lime green patches (Hypsela rivalis = growing on stream sides); (c) White, two of the five pointed petals rather widely separated from each other, two yellow spots on the throat opposite the split, and a fine magenta line running down the outside of each petal (Pratia perpusilla = extremely small). The leaves, all similar in size and barely 5 mm long, were bright green in Hypsela, brownish with silvery hairs in the other two, alternate and toothed in the Pratia, opposite and entire in the Parahebe. The question arose, just what is Hypsela rivalis and how is it related to the plant long known as Isotoma fluviatilis?

In 1943 a German botanist, E. Wimmer, examined a plant from Broken River, Canterbury, and decided that it belonged to the genus Hypsela which was previously known only from one species in South

America; he placed the Canterbury plant in a new species which he called Hypsela rivalis (at the same time describing two other new species from New South Wales). He apparently did not realise that plants of this kind were familiar to New Zealand Botanists under the name Isotoma fluviatilis. In this Australian species the fruit is a dry, stiff-walled capsule that splits open regularly at the top to allow the seeds to escape. (McComb, 1970, says "Capsule obconical-cylindrical, 4-7 mm long, 2-3 mm wide, 2 apical valves dehiscing loculicidally, rarely somewhat fleshy and tardily dehiscent"). In our plant the fruit is not easy to find, being rarely more than 3 mm long, and more or less hidden under leaves. When ripe it has a very thin semi-transparent skin and looks like a little bag tightly filled with seeds; there is no regular splitting - the wall just bursts open raggedly somewhere along its sides and the seeds fall out.

In Australia Isotoma fluviatilis includes several different kinds of plants (McComb, 1970); subspecies fluviatilis has unisexual flowers (male on some plants, female on others) and a chromosome number 2n = 14; subspecies borealis has hermaphrodite flowers and 2n = 14; subspecies australis has hermaphrodite flowers and 2n = 28. Hypsela rivalis in New Zealand has the chromosome number 2n = 14 (Beuzenberg and Hair, 1959, as I.fluviatilis), a number also found in several species of Pratia and Lobelia; as far as my observations go, all its flowers are hermaphrodite and lack hairs in the throat. The sex of the flower is not too easily verified because the anthers develop early and are obvious in the form of a narrow tube for some time before the style pushes its way through them. The two-lobed stigma opens shortly before the corolla withers. Male flowers, if any, should lack good ovules.

To find out more about Hypsela Mrs. Elder and I revisited the two places and learned more about a peculiar vegetation type that is well represented in Canterbury. At Coleridge we went to a fold in the hills between the Power Station and the water intake at the lake. The other site lies near the road up the South Ashburton Valley beyond the turnoff to Lake Heron. In each place a broad hollow that holds water in winter has become filled or lined with fibrous mud that is as closely covered with low-growing plants as a fine-textured short lawn. Plants are differently sensitive to levels of water and how long it lies and so the various species make a mosaic with the pattern changing according to slope.

The vegetation of a similar "kettlehole" at Cass is described in B.M. Gilpin's 1943 thesis and we compared our list of species with his. Species well represented in all three places are Cotula perpusillum, Hypsela rivalis, Epilobium komorovianum, Hydrocotyle tripartita var. hydrophila, Plantago triandra, Viola cunninghamii, Haloragis micrantha, and Stackhousia minima. In both our localities we found plenty of Pratia perpusilla, Cyathodes fraseri var. muscosa,

Colobanthus strictus and an unidentified Lilaeopsis - all species not listed in the Cass kettlehole. In the Ashburton, as at Cass, Hypericum japonicum, Gentiana grisebachii and at least two species of Gnaphalium were abundant and Gratiola nana occurs in both these places. Green mats of a Drapetes were conspicuous against the dull-coloured surroundings at the Ashburton site and we found patches of almost black plants of Euphrasia zelandica with minute white flowers and relatively large, yellow-striped, unopened capsules. Hebe canescens was common at Coleridge. Not counting grasses, sedges and rushes, Gilpin lists nine species that we did not come across, but our list is certainly far from complete.

Altogether we noted 25 species (again omitting grasses, sedges and rushes) and 10 of these had leaves less than 5 mm long; seven had more or less linear leaves barely 5 mm wide and only half a dozen had leaves much larger than this. Nine species had creeping stems rooting into the soil and only an occasional plant stood as high as 10 cm. By no means all these species are confined to this special habitat, and under other conditions most of them grow bigger. Growth form can be quickly changed by keeping a turf very wet; within a week young shoots of Pratia perpusilla grew long internodes and stood erect, and the new leaves were narrow, smooth and green, contrasting strongly with those on the prostrate stems where they were broader, rough, hairy, grey, closely overlapping and all lay flat on the ground. Galium perpusillum, which is perhaps the most commonly present species, increased its leaves from about 1 mm to 3 mm long and they changed completely from thick, obtuse, reddish or brownish to become thin, acute and green. (The specific name perpusillum, = excessively small, is appropriate to both these miniature plants).

By dissecting turves taken from a kettlehole one finds how very small some of these plants are. A patch of Viola cunninghamii the size of an old penny consisted of at least 20 plants. A plant of Gentiana grisebachii had several leaves, and two branches, one with a flower, and yet the overall height was barely twice the length of its own corolla. Euphrasia zelandica with a root 10 mm long and a single even shorter stem bore two or three leaves and a full-sized capsule with its normal complement of seeds.

New Zealand's pygmy plants make a fascinating study and can be found in a variety of sites. In the turf near the edge of Lake Georgina some dozens of species can be counted within an area of perhaps two square metres. Cushion bogs yield a multitude of species in small space - who has seen the tiny white star flowers of Mitrasacme novae-zelandiae by the tarn on Arthurs Pass? On the shore of Lake Manapouri Pilularia novae-zelandiae, the little pillwort fern, grows in rock crevices and pushes up its centrimetre-long leaves and relatively hugh "pills" that are 3-4 mm in diameter. There too, by the lake edge, you may find a wonderfully small daisy,

Brachycome linearis; its basal tuft of leaves surrounds an erect stem and terminal white flower not much bigger than a pin. In very different conditions on top of the Old Man Range in Central Otago, a plant of Schizeilema exiguum, roots, stems, leaves, flowers and fruits, fitted comfortably on a one cent coin, though admittedly not all plants of this species are so small.

To go back to Canterbury kettleholes, the species listed there include several annuals. Such short-lived plants are not, on the whole, well represented in the New Zealand flora, but they might well be expected where conditions change so drastically between seasons. Does anyone know in what state Hypsela and its associates spend the winter, under water that freezes from time to time?

References:

Beuzenberg, E.J. and J.B. Hair 1959. Contributions to a Chromosome Atlas of the New Zealand Flora 3. N.Z.J.Bot.2: 531-8.

Gilpin, B.M. 1963. The Vegetation of a Kettlehole at Cass, Waimakariri R.Basin. Unpublished thesis (copy at Botany Division, D.S.I.R.).

McComb, J.A. 1970. A Revision of the Species Isotoma fluviatilis. Contr. N.S.W. Nat. Herb. 4: 106-11, Pl. V-VIII.

Wimmer, E. 1943. Campanulaceae - Lobelioideae. Pflanzenreich 106:121.