

NOTES ON EPILOBIUM.

1. E. PERNITENS & 2. E. GRACILIPES

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EPILOBIUM is both one of the most ubiquitous and one of the taxonomically most difficult genera in the NZ flora, to the extent that many botanists tend to ignore the group as beyond their abilities. This is a pity, since it does display one of our very finest examples of intensive adaptive radiation. Although the genus is distributed throughout the world in temperate latitudes, some very distinctive growth forms have evolved only in New Zealand.

The appearance of Raven & Raven's extremely elegant monograph (Raven & Raven 1971) does not appear to have alleviated this situation and may indeed have made it worse, principally because of the scale of the taxonomic and nomenclatural changes made in comparison with Allan (1961), which are such as to render Allan's Flora effectively obsolete for study of the genus. On the taxonomic front, of the 50 species included by Allan, three-fifths are modified in some way or another! Nomenclatural changes further exacerbate the situation, to the extent that of seven strictly prostrate, creeping species recognised by R. & R., only one has its name and rank unchanged from Allan.

In recognition of the difficulties presented by this situation, Josephine Ward and I recently published a concordance for Epilobium with respect to the treatments of Cheeseman, Allan & Raven. (Lovis & Ward 1982). A synoptic analysis of the changes in R. & R. relative to Allan is also included.

For those not wishing to involve themselves in the expense of acquiring R. & R.'s monograph, the second edition of Cheeseman's Flora (Cheeseman (1925) remains an entirely serviceable account of NZ Epilobium, the more so since R. & R.'s

treatment, recognising only 37 species, is too reductionist for the taste of some of our most experienced and perceptive field botanists. For example, both Burrows and Druce (pers. comm.) consider R. & R.'s conception of E. glabellum (inclusive of both rubro-marginatum and vernicosum) too broad. For continued effective use of Cheeseman, one requires only to take note of the subsequent nomenclatural changes and of those species (six in number) only recognised or discovered since 1925.

1. EPILOBIUM PERNITENS Cockayne & Allan.

The most recently described of the purely prostrate species (Cockayne & Allan 1926), it is not included in Cheeseman's Flora. It is very decidedly a mountain species, characteristically found on damp bare ground between stones near seepages or where snow has lain late. It attracts attention not only by its brightly shining leaves (for which it is named) but by the brilliance and variety of the colours of its leaves, which excel those of any other species of Epilobium. At first sight, one notices distinct zones of green and red leaves, with sometimes an intermediate zone of mixed autumnal hues, but the colouration is more complex than that. When young, the leaves are usually a very intense pure emerald green, like that of the brightest and glossiest of green apples (or cooked and glazed 'frozen' peas!). Colouration of older leaves is very variable; sometimes creamy-yellow or citrus yellow, but more often bright orange-red - an intense vermilion. These are presumably the hues of early senescence - yet older leaves are either pale chocolate or sienna brown, or else shades of orange suffused with red. Cockayne & Allan said that the species "is to be recommended for the alpine garden" (loc. cit., p. 23) and I hope I have said enough to indicate that it is indeed worth cultivation for its vegetative colours alone, if a site can be found where it will replicate its alpine performance.

Apart from their colour and reflectivity characteristics, the leaves are + round, convex, small (ca. 3 mm), thick,

occasionally bluntly but distinctly toothed, with the midrib sunken towards its base forming a channel; they often overlap and are usually very markedly reflexed backwards ($120^\circ < 180^\circ$). The description I have given is true of material both from Craigieburn and Mt. Hutt. Underneath, the leaves are often rich rose-purple, but never on the upper surface. Plainly, however, in this respect our Canterbury material differs from the original collections (Ruahines, Tararuas, Paparoas) since the original description of the leaves is "viridia, interdum purpurascens" [green, sometimes purple-tinged] with no mention of red or other colours. This description is effectively repeated in Allan's Flora and could mislead local botanists. Remarkably R. & R. state the colour of the stems, ovaries, petals, anthers, style and capsule, but say nothing of leaf colouration! Furthermore, I suspect that Keith West's colour plate (in R. & R., fig. 141, p. 276) may be taken from a well-grown pot plant since all the leaves are deep green. My experience is that plants freshly transferred to a rich mix will quickly cover the surface with brilliant green foliage, the coat of many colours becoming manifest only with age or nutrient exhaustion.

In its typical state, the high gloss of the leaves of E. pernitens alone makes it unmistakable, but both on Craigieburn and Mt Hutt I have gathered specimens in the vicinity of E. brunnescens (= pedunculare (excl. var. viride) of Allan's Flora) which seemed somewhat intermediate with that species, to which R. & R. state (p. 273) "it is undoubtedly closely related". (R. & R. use the character of pubescence decurrent from the petiole to discriminate these two species in their key, but acknowledge elsewhere (p. 259) the existence of glabrous forms of E. brunnescens.) These equivocal plants may not be the result of hybridisation between E. brunnescens and E. pernitens, but any such hybrid plants would not be distinguishable from these apparent intermediates.

2. EPILOBIUM GRACILIPES Kirk.

This local but very distinctive species first became known

to me in the vicinity of the Cass Field Station where it occurs (on greywacke rock) principally on the stony margins of small streams, usually partially shaded, at the base of Cass Hill, though it does also occur, much less frequently and in lesser quantity, in open spots in Schoenus pauciflorus flush.

E. gracilipes is found much more often on calcareous rock. R. & R. (p. 257) give its habitat as "in crevices and cliffs in limestone or marble," (seemingly a not quite exact use of language) information which aroused my interest because limestone crevices seemed a very different habitat to that preferred by this species at Cass. The type locality is the Broken River Basin where it was first gathered by Enys and Kirk in 1876. I have now studied E. gracilipes both on Castle Hill, in the Scientific Reserve and its environs, and on Flock Hill. It is possible, on Flock Hill at least, to find this plant in horizontal crevices or vertical channels, but it takes much searching to do so. Almost invariably it grows on the ground at the very base of the limestone rocks and tors, and there only on the shadier south aspect. Its most characteristic associate is Cystopteris tasmanica. E. gracilipes is still quite plentiful in such sites on both Castle and Flock Hills, but it is evident that in some sites it has already been usurped by E. nummulariifolium, which has taken over its exact niche. Sometimes the two species co-exist, but not often. (E. nummulariifolium is a story in itself, and a unique one, being a native which has responded all too successfully to the changed conditions produced by European settlement, prior to which it probably did not occur south of Auckland. Now its characteristic pale grey-green capsules, perched on contrasting dull purple-lilac pedicels, are seen in everyone's garden, and increasingly, as in the present instance, in novel wild habitats.)

Elsewhere, in higher rainfall areas such as N.W. Nelson, E. gracilipes might well be more commonly found in crevices on limestone faces, but in the Broken River Basin this location is clearly usually too arid. On reflection, it appears that in terms of microclimate, the Cass and Broken River habitats are not

so different as they at first appear. E. gracilipes may well be another of those NZ plants associated with limestone whose preference for calcareous rock is more climatic than chemical - the lack of a rich specialised limestone flora is one of the strangest features of the ecology of NZ plants.

Morphologically, the Cass and Broken River populations are utterly indistinguishable. Again, it seems worthwhile giving some elements of description, because the statement regarding colour in R. & R. does not fit our populations. Thus R. & R. state that the leaves are "often bright red", which I have never seen, although when senescing, leaves may turn a range of tints from bright red-orange to pale orange. Like those of E. pernitens, the leaves are thick, bluntly toothed, with a channelled midrib, often sharply reflexed, and shining (though never as glossy as E. pernitens) but there the resemblance ends. The leaves of E. gracilipes vary greatly in size and shape. The stems ascend at their tips. Leaves on prostrate portions of the stem measure ca. 5 x 4 mm, but the leaves at the base of the almost suppressed inflorescence are much larger (9-14 x 7-11 mm) and ovate - indeed arrow-shaped. The colour of the leaves is very distinctive, but difficult to identify exactly. The shade is a metallic green which I am inclined to call dull nickel-green, but that may not be right. The stems are nearly always a rich purplish-crimson, a colour which is suffused to a greater or lesser degree, often completely, over the leaf under-surface, and also may appear on the lower part of the midrib on the upper surface. This suffusion may spread over the upper lamina, but only rather rarely. The combination of nickel-green and crimson-purple is both distinctive and attractive, and this species I also consider worth a partially shaded damp corner in the rock garden.

E. gracilipes is one of our most distinctive species of Epilobium. R. & R. imply (p. 259), but do not say so directly, that this species may be most closely related to three New Guinea species. The name 'gracilipes' comes from the extremely long (ca. 5 cm) slender fruiting pedicels.

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KEY TO NEW ZEALAND GENERA IN THE PODOCARPACEAE

(from Nomina Nova III, 1977-1982. Edgar, E. & Connor, H.E. 1983 (N.Z.J. Bot. 21: 421-441). These authors took the key from a paper by Quinn, C.J. 1982 (Aust. J. Bot. 30: 311-320). As noted by them it is abbreviated from Quinn's key and is unchanged except for a slight rearrangement of the original couplets 8 and 9 by the junior author).

1. Adult leaves absent or reduced to non-photosynthetic scales; ultimate branchlets flat and leaf-like. Seeds erect and surrounded at the base by a symmetrical aril when mature Phyllocladus
Adult leaves not suppressed, ultimate branchlets not flattened and leaf-like 2
2. Adult leaves scale-like and imbricate or awl-like; female cones terminal on branchlets bearing ordinary leaves 3
Adult leaves not as above, distinctly flattened in cross section, linear to ovate and sometimes falcate; female cones on short lateral branchlets that are either leafless or bear leaves of reduced size 7