

Other monocots

<i>Astelia solandri</i>	8173
<i>Collospermum hastatum</i>	8112
<i>C. microspermum</i> +	
<i>Lemna minor</i> +	8131
<i>Wolfia australiana</i>	

Dicot herbs

<i>Cardamine debilis</i> agg.	
<i>Haloragis erecta</i> subsp. <i>erecta</i>	
<i>Rorippa palustris</i> +	8168

Composite herbs

<i>Senecio minimus</i> +	
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Footnotes

1 Since this paper was submitted *P. macilentata* has been discovered in the Mangatea Kahikatea Forest, Iauhei (WELT), (de Lange, in prep.). Although the distinction between *P. saxatilis* and *P. macilentata* is blurred in Basin collections, suggesting hybrid origin (Brownsey pers. comm., pers. obs. 1988 - based on specimens in WELT from Koromatua). *Lastreopsis velutina* has also been discovered in this locality where it is rare.

2 Recently large specimens have been discovered on the Iauhei Range, some of these enter the basin proper at Mangatea (de Lange, in prep.).

3 This record is probably based on *Nestegis lanceolata*. There is no supporting specimen of *Mida* in the Gudex collection and the kahikatea forest of Claudelands seems an unlikely site for this species.

4 Recently discovered in the Mangatea Kahikatea Forest (de Lange, in prep.)

Received 4 November 1987, amended 23 June 1988.

RHEOPHYTES IN NEW ZEALAND*

R.O. Gardner

Plants especially adapted for life in or near swift river waters, a life often hazardous and brief, but a well-illuminated one, are called rheophytes. The term, which strictly applies only to perennials, covers plants in a variety of situations from mountain stream boulder deposits to rocky gorge walls and river flats.

Rheophytes tend to have lanceolate glabrous leaves, often arranged in

*In memory of John Bartlett

streamlined tufts on drooping branches. Their stems are strong and flexible, they are usually exceptionally well-anchored and able to repair flood-damage by developing new roots at the base of their stems.

The monograph of van Steenis (1981) catalogues something like six hundred flowering plant rheophytes, about a third of these belonging to the Podostemonaceae, a family entirely of bizarre thalloid waterfall-encrusters, one of the great sights of the tropical world. Another extreme of this kind of adaptation is Homonoia riparia (Euphorbiaceae), widespread in the eastern tropics. Its saplings are impossible for a person to pull up from even a pebbly-sand substratum, while bigger plants can stand complete submergence for half the year or more.

Apart from the Podostemonaceae and some other notable exceptions most rheophytes appear to be fairly closely related to non-rheophyte taxa, a pattern which suggests that they might be relatively short-lived in geological time.

Another 245 flowering plants van Steenis describes as facultative rheophytes, that is, plants sometimes abundant close to the water but primarily adapted to a different kind of habitat. There are also a number of rheophytic ferns, and in New Caledonia a single species in each of Dacrydium, Podocarpus and Decussocarpus.

In New Zealand our most familiar examples besides the willows constitute what might be called a guild of tough street trees (pre-adaptation!) -- Syzygium australe, Tristania laurina and Nerium oleander. The first two are Myrtaceae of Australia, always found in riverine "scrub"; and of N. oleander van Steenis says: "native from the Cape Verde Islands to Persia ... along rocky stream beds and in torrents, common in gravel and sand riverbeds".

Syzygium australe is particularly interesting in showing how a species can avoid being trapped in single catchment by having fruit light enough to float, but substantial enough to be attractive to animals like birds and bats. The widespread rheophytic figs of Indo-Malesia are probably also of this type.

In the NZ native flora van Steenis noted only Carmichaelia species as having rheophytic tendencies, but there are better examples. Firstly, in the North Island we can point to Lindsaea viridis and Parahebe catarractae ssp. lanceolata, whose habitat in the Kauaeranga Gorge was first properly appreciated by John Bartlett (1978). Hymenophyllum atrovirens would be another, all habitat information known to me including notes such as "on stream boulders" "on rocky bed of stream partially submerged" or "trailing fronds into small waterfall".

The narrow-leaved Olearia cheesemanii, of river edges between the Ohinemuri and the Motu, might be a rheophyte as might just possibly Leptospermum sinclairii of Great Barrier Island, whose original habitat (in Glacial times?) somewhere on the steep ground below Mt Hobson can only be conjectured at.

All the above are plants of the hard rock parts of the North Island; sedimentary and limestone country are not encouraging to rheophytes. It might be expected then that there would be even more such species in the South Island, especially in North-West Nelson, but this seems not to be the case. Cortaderia richardii and some Cyperaceae of mountain streams, e.g. Schoenus pauciflorus, might be considered, as might forms of Olearia virgata and Coprosma propinqua. There are no conspicuously rheophytic species of Hebe, perhaps because the rather brittle (rayless) nature of the wood has prevented such evolution.

Two natives it might not be extravagant to claim as rheophytes are Podocarpus totara and P. acutifolius; they have limber firm-leaved saplings and a marked ability to develop new roots from the lower trunk after burial by sand and gravel. Perhaps other flood plain trees, such as the lacebarks, owe their similar juvenile form (i.e. flexuose, not divaricating) to river-shaping as much as to the moa.

Finally, we must consider the Waitakere Range's most abundant rheophyte, even though it is adventive -- mist flower (Eupatorium riparium). This is coming to dominate all our northern stream beds but does equally well on clay road cuttings or at the foot of slopes in woodland, e.g. Auckland Domain. Van Steenis suggests that in its home of Mexico or West Indies it might be a krennophyte, that is, a plant of steep banks such as river terrace scarps or landslide scars. He notes that it was deliberately introduced to highland Java for the purpose of stabilizing earth walls in tea and cinchona plantations!

Mist flower has the typical rheophytic leaf shape and can make strong growth of adventitious roots. It would seem to disperse a short way by wind and over longer distances through virtue of the barbellate nature of the achene and pappus.

Though mist flower is of interest as one of the relatively few rheophytes in the Compositae, we can hope that it will not be too long before some insect or parasite arrives (or that we adopt the Javanese practice of composting the species), giving our native rheophytes a chance of having their story told in greater depth than has been attempted here.

REFERENCES

- Bartlett, J.K. 1978. Parahebe catarractae (Scrophulariaceae) in the Kauaeranga Valley Coromandel Peninsula. N.Z.J. Botany 16: 279-80.
Steenis, C.G.G.J. van. 1981. "Rheophytes of the World: An Account of the Flood-resistant Flowering plants and Ferns and the Theory of Autonomous Evolution". Sijthoff & Noordhoff. Netherlands.

EQUISETUM FLUVIATILE - A NEW ADVENTIVE SPECIES IN NEW ZEALAND

P.J. de Lange

INTRODUCTION

de Lange (1988) records the presence of a previously unrecorded Equisetum species adventive in the country and compares the species with four Equisetum present in the country. Plants were considered closest to E. palustre L. but further material was sent on to the National Museum Herbarium (WELT) for Dr Brownsey to examine. Following examination of fresh material the species has now been correctly identified as Equisetum fluviatile L., the water horsetail of Toman & Felix (1974). The following briefly describes both the essential differences between E. palustre and E. fluviatile.