

mor formers as a group can make fairly good growth at a very low level of nutrition, using nothing more than the nutrient in their own organic residues plus a little extra mineral nutrient supplied in the rain and in atmospheric dust. Several cycles of trees growing on their own litter will naturally have a strong conditioning influence on soil processes and can produce very marked, permanent changes in the soil profile. Usually impervious pans develop and these hold up the rain-water and lead to the formation of gley soils which carry a swamp vegetation. This has occurred in the case of most terrace pakihi and flat gumlands.

In concluding I hope that I have said enough to make it plain that here is a field of plant ecology the surface of which has barely been scratched.

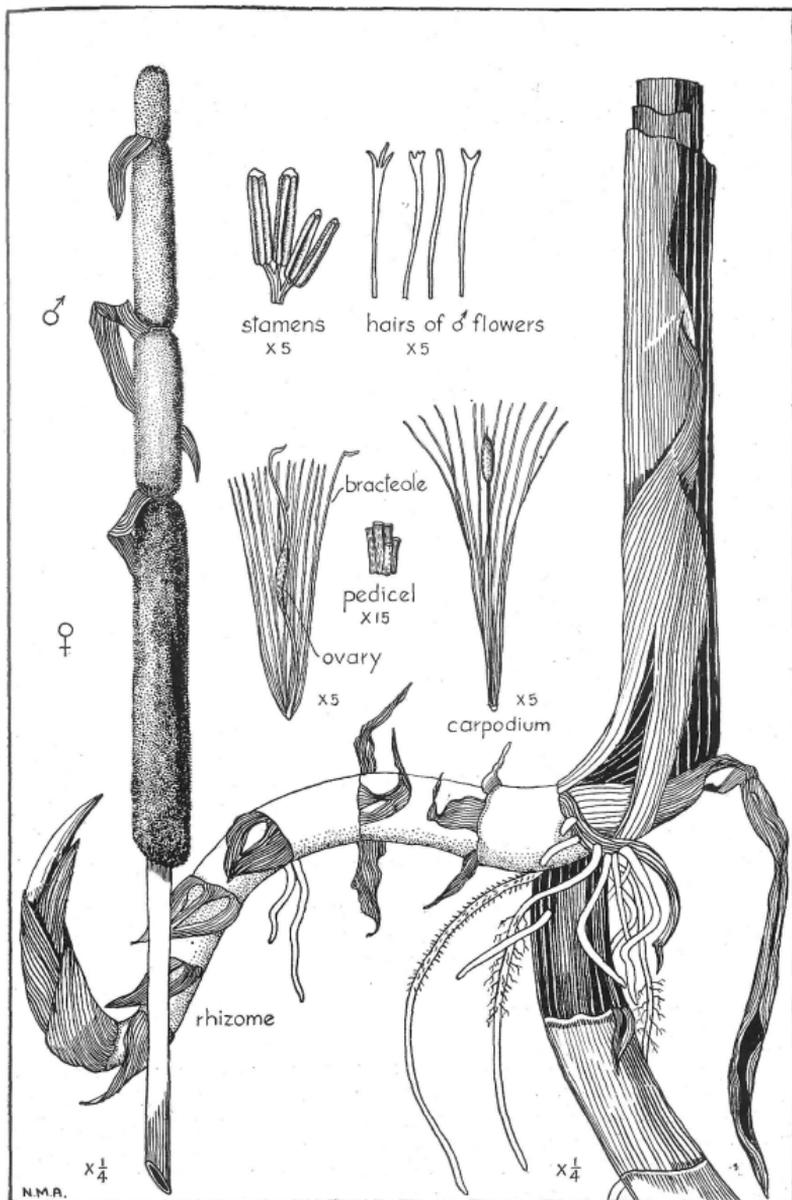
## Typha in New Zealand

R. Mason and N. T. Moar

Raupo is one of the most conspicuous plants in swamps and wet places, and may be regarded as commonplace and known to everyone; yet whether we have more than one form, and if so what botanical names should be applied to them, are questions which most of us would not care to answer from our own knowledge.

*Typha* is a genus with an almost worldwide distribution and some widely distributed species. Our plants were put by Forster under *T. latifolia* L., a species of Europe, North America, and parts of Asia, but all later botanists, except T. Kirk, have put them under *T. angustifolia* L., a species with a similar distribution. Kirk, who was familiar with both species in England, considered ours to be *T. latifolia*, and always used that name. The more obvious characters such as size and robustness, and the distance between the male and female spikes, were used to distinguish the species. Our plants certainly seem to be taller than *T. angustifolia* and to have broader leaves.

Cheeseman quotes Graebner (1900) as classifying our plants as *T. angustifolia* var. *brownii* and *T. angustifolia* var. *muelleri*, and states that var. *brownii* includes the larger and coarser states with contiguous spikes, and var. *muelleri* the smaller plants with a gap between the male and female spikes. Graebner, in fact, placed our plants under *T. angustifolia* in a proles *brownii* and in a subspecies *T. muelleri*. Although he stated both were found in New Zealand, he does not seem to have seen New Zealand material himself, and perhaps he was here relying on Rohrbach, who (according to Melvaine, 1940) referred to New Zealand specimens of *T.a.* var. *brownii*, and on Kronfeld, whose monograph of 1889 we have not seen. Graebner based his classification mainly on details of the floral structure.



The female inflorescence of *Typha* bears two types of flower, a fertile flower, and a sterile flower with an aborted ovary. A typical fertile flower—and there are many thousands crowded on the floral axis—consists of an ovary carried on a long stalk or stipe bearing translucent or whitish hairs. This ovary is narrowed into a long slender style, at the end of which there is a fairly long stigma of varying shape. The flower may be subtended by a bracteole, the presence or absence of which is a diagnostic character. In a sterile flower the aborted ovary forms a club-shaped thickening known as a carpodium. The female flowers are borne either directly on the axis of the inflorescence or on the base of the compound pedicels which cover the axis. Infertile flowers tend to be borne on the upper part of the pedicels. The male flowers consist of usually two or three stamens and of hairs which may be simple and linear, or broad and divided.

In *Typha latifolia* bracteoles are invariably absent from the female flowers; in *T. angustifolia* and its varieties they are invariably present. We found on referring to Graebner that we could not place our specimens satisfactorily, for although bracteoles on female flowers did not seem to be present, yet the plants did not fit *T. latifolia* or related species. Melvaine, however, has reconsidered the taxonomy of the New South Wales species of *Typha* (*T. muelleri* Rohrbach, and *T. brownii* Kunth were described from Australian material) and has found in some of the specimens on which Rohrbach based *T. muelleri*, that the bracteoles are often absent from the female flowers, occasionally even entirely wanting from the inflorescence.

Closer examination of New Zealand specimens showed that bracteoles were present in many but not in all flowers of an inflorescence. The flowers agree essentially with those of *T. muelleri* as illustrated by Melvaine, and with a specimen from Cygnet River, Tasmania, collected by Dr. Story. The bracteoles are inconspicuous, long, white and hairlike, with brownish more or less lanceolate tips bent at an angle to the stalk. In typical *T. angustifolia* the bracteoles are shorter, broader, spatulate, brown and conspicuous. Melvaine does not describe the pedicels, carpodia, or leaf bases of *T. muelleri*, but on comparing our plants with typical *T. angustifolia* (as shown in European material at the Botany Division, D.S.I.R.), and with descriptions and illustrations by Hotchkiss and Dozier (1949), it was seen that they differed also in having longer compound pedicels sometimes hair-like at the tip, rather differently shaped carpodia, and much broader leaves with the bases of the outer ones tapering into the blade, not auriculate.

Our plants differ from *T. latifolia* in having a brighter brown female spike, in having pollen grains single and not in tetrads, and in having brown, fairly broad, simple and forked hairs on the male flower, not simple hair-like white ones. *T. glauca*, a European and North American species, usually has no bracteoles, and when present they are brown, spatulate, and blunt.

Melvaine considers that *T. muelleri* should be maintained as a separate species. Since New Zealand specimens agree with the specimen of *T. muelleri* from Tasmania, and the floral structure of New Zealand plants examined appears to be essentially the same as that of *T. muelleri* of Australia, our plants should be called by this name.

We have found no New Zealand plants which fit *Typha angustifolia* var. *brownii*. This is close to *T. angustifolia* itself and the female flowers always have a bracteole which is broad, blunt and spatulate. When local botanists have called New Zealand specimens var. *brownii* it usually seems to have been because of the contiguous male and female spikes. But *T. muelleri* may sometimes have contiguous spikes, and Melvaine found that *T. angustifolia* var. *brownii*, in fact, rarely had contiguous spikes. It would be rash to say that *T. angustifolia* var. *brownii* does not grow here; but to identify it with certainty, details of the female flower must be examined. Melvaine records that there are three habit forms of *T. muelleri* and four of *T. angustifolia* var. *brownii*, differing in height, leaf width, and length, breadth and colour of spike. One of the forms of *T. angustifolia* var. *brownii* and one of *T. muelleri* are almost indistinguishable in the field.

### References

- Graebner, P., 1900. Das Pflanzenreich, Heft 2.  
Hotchkiss, N., and Dozier, H. L., 1949. Taxonomy and Distribution of North American Cat-tails. *Amer. Midland Nat.*, 41 (1): 237-254.  
Melvaine, A. T., 1940. A Revision of the Genus *Typha* L. in New South Wales. *Contrib. from N.S.W. Nat. Herb.*, 1 (2): 83-91.

### Requests for Plants

*Typha*: Miss R. Mason and Mr. N. T. Moar (Botany Division, 8 The Terrace, Wellington) would like specimens of raupo from all parts of New Zealand. It is preferable to collect whole plants, but if that is not possible the heads alone may be sent.