

## PACIFIC CAPSULAR MYRTACEAE 6

### The *Metrosideros* Complex: *M. perforata* and the *M. operculata* Group

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#### INTRODUCTION

*Metrosideros perforata* (J. R. et G. Forst.) A. Rich., *Essai Fl. N.Z.* (1832) 334, is restricted to New Zealand and is common in lowland forests except in the far south.

The *Metrosideros operculata* Labill., *Sert. Austro-Caled.* (1824) 61, group is restricted to New Caledonia and has a wide altitudinal range, mostly in shrub associations, from near sea level to about 1500 metres.

Guillaumin (1948) treats the group as one variable species, but a preliminary review of the situation in the herbarium and field leads me to believe that more than one and possibly several species are involved. The narrow-leaved, usually white-flowered form represented by the type specimen appears to be quite constant and is widespread, mostly along stream margins, on peridotite as well as sedimentary and metamorphic rocks.

A number of other forms, sometimes identified as *Metrosideros operculata* var. *francii*, can be found on peridotite and schists where they may or may not grow alongside streams. These forms have shorter and often broader leaves than the type and often red or pink flowers.

Probably the binomial *Metrosideros operculata* should be restricted to the typical form but at this stage it is not possible to predict how many species may be recognisable in the remainder of the group.

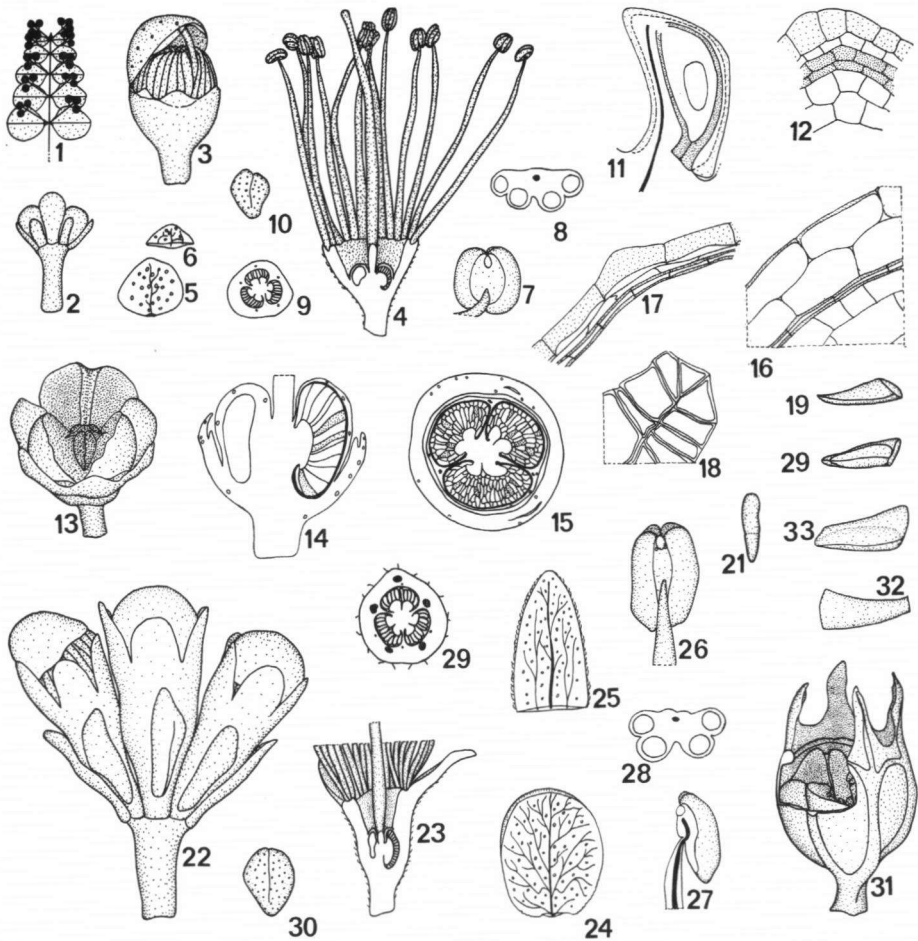
#### FEATURES SHARED BY METROSIDEROS PERFORATA AND THE *M. OPERCULATA* GROUP

Branching predominantly monopodial; bud scales wanting; leaves opposite, dorsiventral, nanophyllous to microphyllous; young parts pubescent, mature parts pubescent to almost glabrous.

Inflorescences (figs. 1, 2, 22) 3-flowered, in leaf axils below dormant vegetative apices, the latter sometimes separated from the uppermost inflorescences by a pair or two of reduced leaves.

Sepals 5, free (figs. 6, 25); petals 5 (figs. 5, 24), free, but cohering as a cap which falls as the flower opens (figs. 3, 22); stamens numerous, several times longer than the petals, free, not grouped; anthers (figs. 7, 8, 26–28) dorsifixed, versatile with one large oil gland at the tip of the connective and sometimes a few smaller glands.

Ovary usually 3-loculed (figs. 9, 29); style about as long as the stamens, set into the top of the ovary; stigma small, convex; placentas (figs. 10, 30) axile; ovules anatropous (fig. 11), numerous, close set all over the surface of the placenta; nucellus and integuments 2-layered in the median transverse plane of the ovule (fig. 12); the outer layer of the outer integument with a brown pigmentation; all ovules potentially fertile.



Figs. 1—21. *Metrosideros perforate* (WELTU 3126). — 1. Group of inflorescences. Black triangle at branch tip represents the dormant vegetative bud; nat. size. — 2. Young inflorescence;  $\times 3$ . — 3. Opening flower bud showing petal operculum being lifted off by elongation of the style;  $\times 3$ . — 4. L.S. flower;  $\times 3$ . — 5. Petal;  $\times 3$ . — 6. Sepal;  $\times 3$ . — 7. Anther, dorsal view;  $\times 13$ . — 8. T.S. anther;  $\times 17$ . — 9. T.S. ovary;  $\times 3$ . — 10. Placenta. Larger dots are ovule scars;  $\times 10$ . — 11. L.S. ovule. Close stipple inner integument, open stipple brown pigmented outer layer of outer integument;  $\times 75$ . — 12. Cell detail T.S. ovule. Close stipple inner integument, open stipple brown pigmented outer layer of outer integument;  $\times 300$ . — 13. Dehiscent capsule;  $\times 5$ . — 14. L.S. undehiscent capsule. Fertile seeds stippled;  $\times 5$ . — 15. T. S. undehiscent capsule;  $\times 5$ . — 16. Cell detail T.S. testa of immature fertile seed. Walls of outer layers of integuments stippled;  $\times 300$ . — 17. Cell detail T.S. testa mature fertile seed. Wall thickening of outer layers of each integument stippled;  $\times 300$ . — 18. Cell detail T.S. testa sterile seed;  $\times 300$ . — 19. Sterile seed;  $\times 10$ . — 20 ('29'). Fertile seed;  $\times 10$ . — 21. Embryo;  $\times 10$ .

Figs. 22 — 33. *Metrosideros operculata* (WELTU 9658). — 22. Inflorescence with opening flowers;  $\times 3$ . — 23. L.S. flower;  $\times 3$ . — 24. Petal;  $\times 5$ . — 25. Sepal;  $\times 5$ . — 26. Anther, dorsal view;  $\times 13$ . — 27. L.S. anther;  $\times 10$ . — 28. T.S. anther;  $\times 17$ . — 29. T.S. ovary;  $\times 5$ . — 30. Placenta. Larger dots are ovule scars;  $\times 10$ . — 31. Dehiscent capsule;  $\times 3$ . — 32. Sterile seed;  $\times 10$ . — 33. Fertile seed;  $\times 10$ .

The tissue between the style and placenta not elongating in the fruit (cf. figs. 4, 14).

Fertile seeds (figs. 20, 33) few; testa derived from both integuments (figs. 16, 17) outer layer of outer integument with very thick outer walls; inner layer of outer integument thin-walled and usually crushed; outer layer of inner integument greatly flattened tangentially with moderately thickened inner and outer walls; inner layer of inner integument thin-walled and crushed or absorbed.

Sterile seeds (figs. 19, 32) consisting of the outer layer only of the outer integument, the cells being moderately and evenly thickened (fig. 18).

Embryo (fig. 21) straight; hypocotyl equal to or shorter than the cotyledons; hypocotyl sheath wanting; cotyledons approximately the same width as the hypocotyl and lying face to face.

Seed release entirely through the free part of the capsule (figs. 13, 31).

#### DISTINGUISHING FEATURES OF *METROSIDEROS PERFORATA*

1. Root climbing liane. 2. Central flower in inflorescence without bracteoles (fig. 2). 3. Flowers white. 4. Sepals broader than long and shorter than petals (fig. 6). 5. Stamens in a single whorl (fig. 4). 6. Ovary semi-superior (fig. 4). 7. Veins of hypanthium weakly developed at fruiting stage (fig. 13). 8. Capsule exerted beyond rim of the hypanthium (figs. 13, 14).

#### DISTINGUISHING FEATURES OF *METROSIDEROS OPERCULATA* GROUP

1. Shrubs to small trees. 2. Central flower in each inflorescence bracteolate (fig. 22). 3. Flowers white, pink, or red. 4. Sepals longer than broad and about as long as petals (fig. 25). 5. Stamens in one or two whorls (fig. 23). 6. Ovary inferior (fig. 23). 7. Veins of hypanthium strongly developed at fruiting stage (fig. 31). 8. Capsule extending to about the level of the hypanthial rim (fig. 31).

#### DISCUSSION

*Metrosideros perforata* and the *M. operculata* group have more in common with *Mearnsia* Merrill (Dawson, 1970a) than with *Metrosideros* Banks ex Gaertn. (Dawson 1970b). The chief similarities with *Mearnsia* lie in the branching pattern, the lack of bud scales, the early appearance of brown pigmentation in the ovule epidermis, the lack of tissue extension between style and placentas in the fruit, and the anatomical details of the testa. The chief differences are the caducous petals and the seed release entirely through the free part of the capsule and not partly through openings in the hypanthium as in *Mearnsia*.

Perhaps *Metrosideros perforata* and the *M. operculata* group would be best treated as a section of *Mearnsia*.

#### REFERENCES

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