# PACIFIC CAPSULAR MYRTACEAE 3. THE METROSIDEROS COMPLEX: MEARNSIA HALCONENSIS GROUP AND METROSIDEROS DIFFUSA GROUP

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## INTRODUCTION

Merrill (Philip. J. Sc. 2, 1907, Bot. 284) based *Mearnsia* on specimens collected from Mount Halcon in the Phillipines and dedicated the genus to Major Mearns who accompanied him on the expedition.

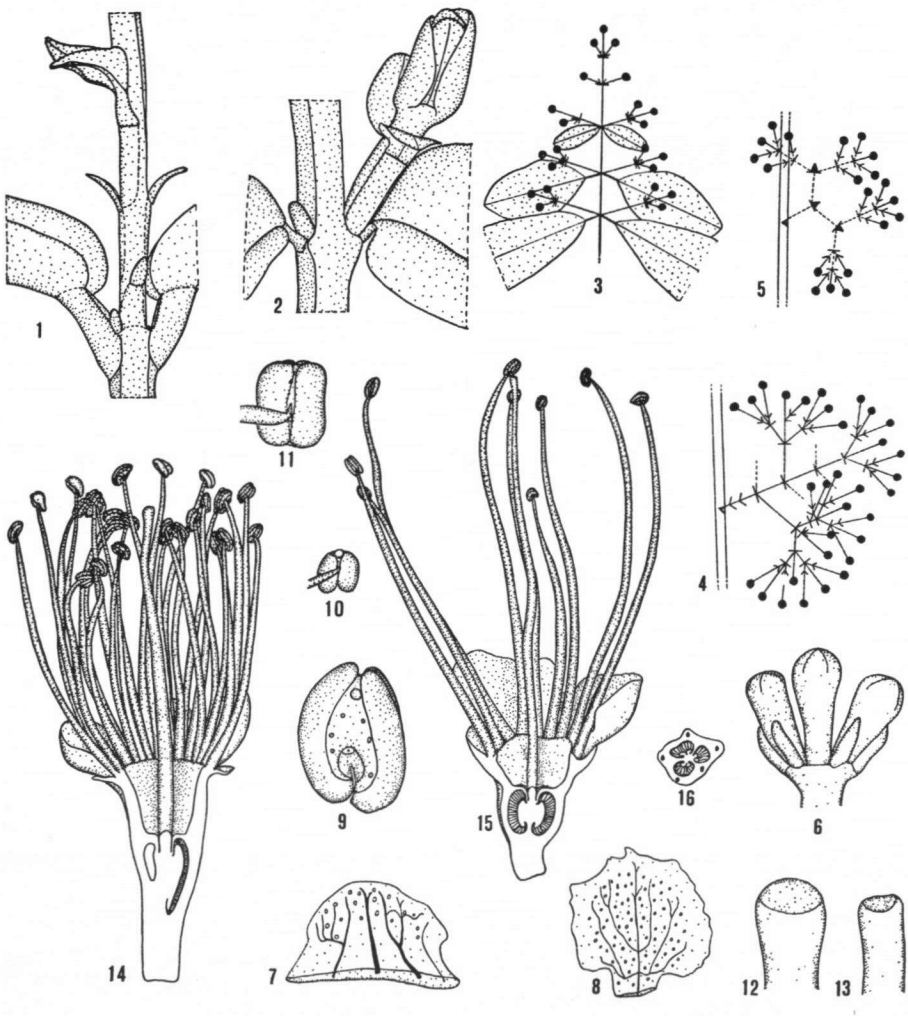
Merrill described the flowers of the sole species *(M. halconensis)* as 4-merous with 8 stamens and 2 carpels and the capsule as dehiscing by 'a single slit at the apex only and inside the persistent calyx tube'.

Diels (Bot. Jahrb. 57, 1922, 419) transferred a New Guinea species *(M. ramiflora)* and a New Caledonian species *(M. porphyrea)* from *Metrosideros* to *Mearnsia*, noting that the former species differed from *M. halconensis* in having 5-merous flowers with 3 carpels. He stressed the distinctive manner of capsule dehiscence in the genus, not noted by Merrill, in which the capsule valves break laterally through the hypanthium. He also described the persistent vein systems of the fruits, which he likened to 'little lanterns'. Diels believed that the nearest relatives of *Mearnsia* 'are those species of *Metrosideros* whose thin-walled receptacles are strongly extended above the ovary, such as *M. hypericifolia* (= *M. diffusa*) of New Zealand and its relatives. However in these the veins are only weakly formed so no ribs persist at dehiscence'.

I have examined herbarium material of *Mearnsia halconensis* and find that even in one inflorescence there can be some 4-merous flowers with 2 carpels and some 5-merous flowers with 3 carpels. Furthermore, the stamens can be up to four times the number of petals, so the tetramerous flowers with 8 stamens described by Merrill cannot be regarded as a diagnostic feature of the genus.

## FEATURES SHARED BY THE MEARNSIA HALCONENSIS AND METROSIDEROS DIFFUSA GROUPS

Much branched small trees or shrubs or root-climbing lianes; branching predominantly monopodial, sometimes partly sympodial; young parts mostly more or less pubescent with whitish hairs, mature parts often becoming glabrous or almost so; dormant buds without well-defined bud scales, being protected instead by the immature first or first few pairs of leaves which may later develop into small but otherwise normal leaves or remain scale-like (fig. 1, 2); young stems rectangular or elliptic in section; bark of older stems rough or flaky, leaves microphyllous or smaller, opposite, decussate, shortly petiolate, pinnately veined with one or two marginal veins, dorsiventral; leaves of young




Figs 1—16. — 1. *Metrosideros parkinsonii*. Vegetative; stem above lowermost node belongs to a shoot originating from a terminal dormant bud; note transition from scales to leaves; dormant bud in axil of lower left leaf; × 3½. — 2. *Metrosideros carminea*. Vegetative; dormant bud in left axil, developing shoot in right; note lack of bud scales; × 3½. — 3. *Metrosideros fulgens*. Terminal simple inflorescence; semi-diagrammatic; nat. size. — 4. *Metrosideros parkinsonii*. Simple inflorescence above leaf scar; to avoid confusion some flower groups have not been shown; nat. size. — 5. *Mearnsia halconensis*. Compound inflorescence above leaf scar; black triangles are dormant or abortive vegetative apices; dotted axes are actually very short to obsolete; nat. size. — 6. *Metrosideros fulgens*. Group of 3 flower buds with bracts and bracteoles; × 3½. — 7. *Metrosideros fulgens*. Sepal; circles are oil glands; × 5. — 8. *Metrosideros carminea*. Petal; circles are oil glands; × 5. — 9. *Metrosideros fulgens*. Ventral view of anther, filament broken off; × 10. — 10. *Metrosideros colensoi*. Ventral view of anther; × 10. — 11. *Metrosideros carminea*. Ditto; × 10. — 12. *Metrosideros fulgens*. Stigma; × 10. — 13. *Metrosideros carminea*. Stigma; × 10. — 14. *Metrosideros fulgens*. L. S. flower; × 2½. — 15. *Mearnsia halconensis*. L. S. flower; × 3½. — 16. *Mearnsia halconensis*. T. S. ovary; × 3½.

climbing stems of liana species distichous and smaller than the leaves on the non-climbing stems.

Inflorescences simple (fig. 3. 4), or compound (fig. 5), the former one to many flowered with a decussate branching pattern tending to become cymose in higher orders, terminal (fig. 3), axillary (in this case the branch bearing the inflorescences terminates in a dormant vegetative bud), or ramiflorous, in the last case either arising singly from the stem above a leaf scar (fig. 4) or from bract axils on a greatly condensed sympodial branch system situated above a leaf scar (fig. 5); except in the last case, axillary inflorescences are subtended by unreduced leaves; secondary and higher order inflorescence axes mainly subtended by caducous bracts; single flowers bearing a pair of bracteoles, groups of 3 flowers with the central flower ebracteate and each lateral flower subtended by a bract and bearing a pair of bracteoles (fig. 6); bracts and bracteoles mostly narrow-linear.

Flowers pedicellate to sessile; sepals mostly 5, sometimes 4, rarely 6 or 7, equal, acute to rounded (fig. 7); petals persistent, isomerous, equal, rounded, red, yellow, or white (fig. 8); exterior hypanthium, back of sepals and petals, and top of ovary glabrous to sparsely hairy, petal margins often ciliate; stamens usually same colour as petals, 3—10 times their number and several times their length, in a single whorl set behind the rim formed distally from the hypanthial lining or arising directly from it, sometimes 2 deep inward from the petals (fig. 14); anthers (fig. 9, 10, 11) dorsifixed, versatile, pollen sacs longitudinal, dehiscence longitudinal, connective above insertion of filament usually with one or more large oil glands distally and sometimes one or more smaller oil glands below them; hypanthium extending above the ovary; style stout to slender, as long as or longer than the stamens, usually set into a hollow at the top of the ovary, stigma (fig. 12, 13) concave to convex, a little narrower to a little wider than the style; filaments and style glabrous; ovary completely inferior (fig. 14, 15), mostly 3-loculed (fig. 16), sometimes some flowers in an inflorescence 4 or 2-loculed; placentas (fig. 17, 18) axile, ovules numerous, narrow-linear, close set all over the surface of the placenta and perpendicular to it or ascending, anatropous with two 2-layered integuments and a 2-layered nucellus (fig. 19, 20), all ovules potentially fertile.

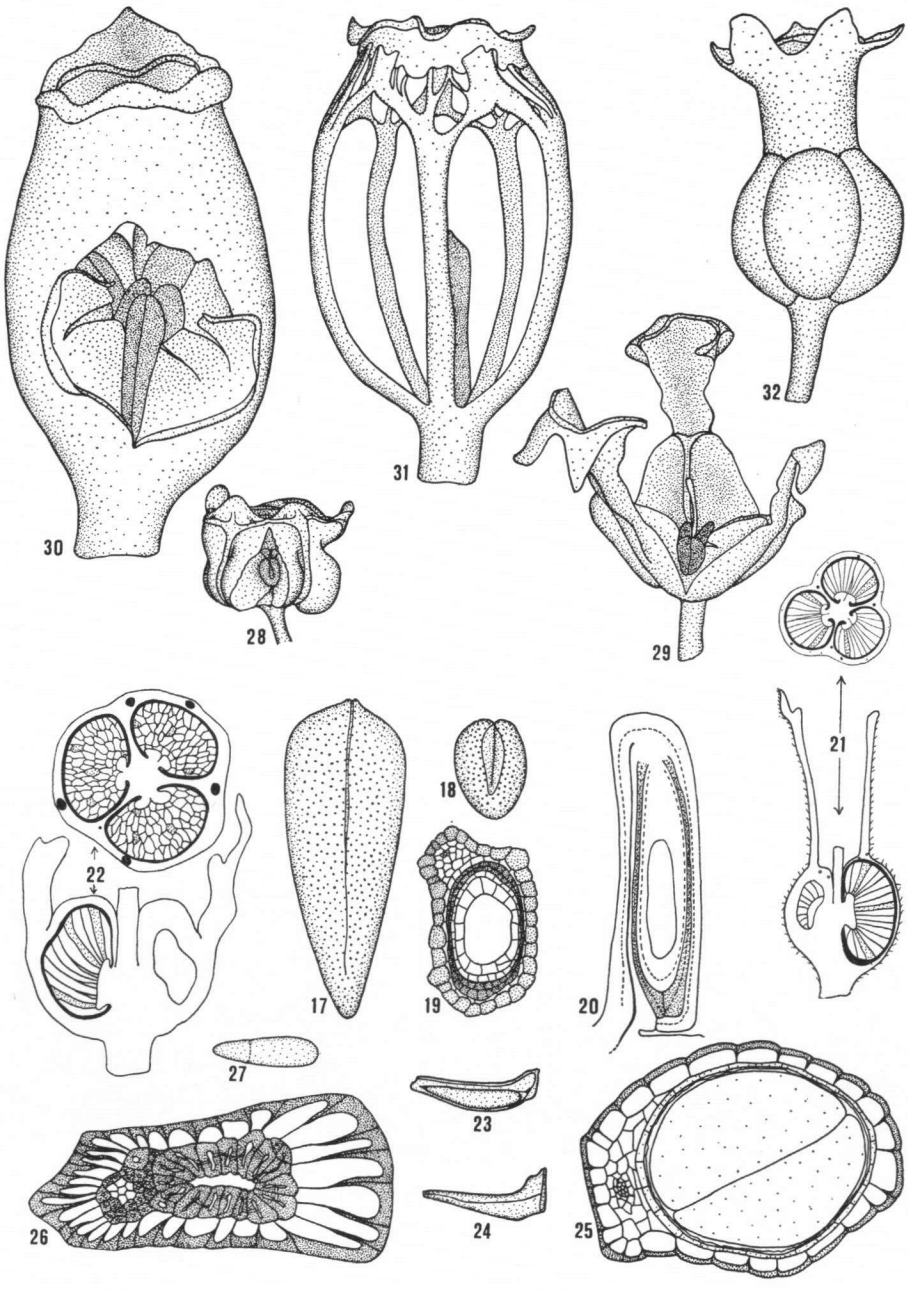
In the mature fruit the free part of the capsule retaining the same position relative to the hypanthial rim as in the flower (fig. 21) or protruding a little within the hypanthial tube (fig. 22), although remaining well below its rim, in both of these cases the base of the style remaining adjacent to the placentas.

Seeds (fig. 23, 24) narrow-linear, several times longer than broad, perpendicular to the placenta (fig. 21) or ascending (fig. 22); fertile seeds few, randomly disposed; testa of fertile seeds (fig. 25) derived from the outer layers of both integuments, the cells of the outer layer of the outer integument moderately flattened tangentially with their outer walls thickened and lignified, sometimes so extensively that their lumens are almost occluded, the cells of the outer layer of the inner integument greatly flattened tangentially with slightly to moderately thickened inner and outer walls; both testa layers becoming tannin-filled at an early stage; sterile seeds (fig. 26) consisting of outer integument only with the outer cells elongated radially and thickened and lignified on the outer and radial walls; inner cells, when present, of smaller isodiametric cells heavily thickened on all walls and with prominent pits or thickened on the inner and radial walls only.

Embryo (fig. 27) straight, hypocotyl equal to or shorter than the cotyledons; cotyledons approximately the same width as the hypocotyl and with their adaxial surfaces appressed.

Seed release through longitudinal slits (fig. 29) or irregular openings (fig. 30) in the fused capsule-hypanthial tissues as well as through the free part of the capsule.

Pollen tricolporate.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DISTINGUISHING FEATURES OF THE MEARNSIA HALCONENSIS GROUP

(1) Flowers red; (2) in the fruit, veins of the hypanthium strongly developed (fig. 28) and persisting after loss or decay of the other parts (fig. 31).

DISTRIBUTION

Philippines — *M. halconensis* (small tree).
New Guinea — *M. ramiflora* (small tree), *M. ramiflora* var. *humilis* (shrub), *M. ramiflora* var. *villosa* (small tree), *M. scandens* (liane), *M. ovata* (liane), *M. cordata* (liane).
Solomon Is — *M. salomonensis* (liane).
New Caledonia — *M. porphyrea* (small tree), *M. dolichandra* (small tree).
New Zealand — *Metrosideros parkinsonii* (small tree), *Metrosideros fulgens* (liane).

The Philippine, New Guinea, and Solomon Island species are ramiflorous with the inflorescences arising in clusters from condensed lateral branches or branch systems. The New Caledonian species have axillary inflorescences. Of the 2 New Zealand species *Metrosideros parkinsonii* is ramiflorous, but with the inflorescences arising singly above leaf scars, and *Metrosideros fulgens* has terminal inflorescences.

The tropical species occur in montane forests mostly above 1000 metres; the New Zealand species in lowland forests from sea level to 800 metres.

There are probably a few species yet to be described from New Guinea and another in New Caledonia, so the total would be about 13.

DISTINGUISHING FEATURES OF THE METROSIDEROS DIFFUSA GROUP

(1) Flowers of most species white; (2) in the fruit, veins of hypanthium weakly developed (fig. 32) and not persisting after loss and decay of other parts; (3) at dehiscence longitudinal splits often developing from top to bottom of the hypanthium and capsule, so that the fruits separate into 3 valves (fig. 29).

DISTRIBUTION

New Zealand — *M. diffusa* (liane), *M. colensoi* (liane), *M. albiflora* (liane), *M. carminea* (liane).

Figs 17—32. — 17. *Metrosideros fulgens.* Placenta, large dots indicate positions of attachment of ovules; × 10. — 18. *Metrosideros parkinsonii.* Placenta, ditto; × 10. — 19. *Metrosideros carminea.* T. S. ovule; close stipple: inner integument; open stipple: tannin filled outer layer outer integument; × 200. — 20. *Metrosideros carminea.* L. S. ovule; inner integument stippled; × 100. — 21. *Metrosideros colensoi.* L. S. and T. S. fruit; fertile seeds stippled; × 5. — 22. *Metrosideros parkinsonii.* L. S. and T. S. fruit; fertile seeds stippled; × 5. — 23. *Metrosideros fulgens.* Fertile seed; × 10. — 24. *Metrosideros fulgens.* Sterile seed; × 10. — 25. *Metrosideros fulgens.* T. S. fertile seed; close stipple: wall thickening of outer layer outer integument; open stipple: outer layer inner integument; × 100. — 26. *Metrosideros fulgens.* T. S. sterile seed; × 100. — 27. *Metrosideros fulgens.* Embryo; cotyledons to right of dotted line; × 10, — 28. *Mearnsia cordata.* Empty fruit; × 5. — 29. *Metrosideros albiflora.* Empty fruit; × 5. — 30. *Metrosideros fulgens.* Empty fruit; × 5. — 31. *Metrosideros fulgens.* Fruit skeleton; × 5. — 32. *Metrosideros albiflora.* Mature but undehisced fruit; × 5.

Only *M. carminea* has red flowers. *M. diffusa* is ramiflorous with the inflorescences single above leaf scars; in *M. colensoi* and *M. albiflora* inflorescences are terminal or sometimes terminal and axillary; inflorescences in *M. carminea* are mostly single flowered, axillary, and borne on branches terminating in dormant vegetative buds.

The species occur in rain forests from sea level to about 800 metres.