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AUSTRALIAN SPECIES OF *CELASTRUS*

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ABSTRACT

Lander, N.S. and L.A.S. Johnson (National Herbarium of New South Wales, Royal Botanic Gardens, Sydney, New South Wales, Australia) 1975, Australian Species of Celastrus *Telopea 1 (1): 33–39. Celastrus subspicatus* Hook and *C. australis* Harvey et F. Muell., previously united and synonymized under *C. paniculatus* Willd. by Ding Hou (1955 & 1963), are reinstated. Both of these species are described and discussed in relation to *C. paniculatus. C. subspicatus* and *C. australis* are the only Australian representatives of this genus. *C. australis* is lectotypified.

In his revision of the genus *Celastrus,* Ding Hou (1955) synonymized *C. subspicatus* Hook. and *C. australis* Harvey et F. Muell.; *C. subspicatus,* the older name, was given priority. At this date, Ding Hou recognized *C. paniculatus* Willd. and *C. subspicatus* as distinct species; later Ding Hou (1963) synonymized *C. subspicatus* under *C. paniculatus* without indicating why he did so. We consider that these three species are quite different.

Although *C. subspicatus* and *C. australis* have been confused in the past, these two species are, in fact, quite distinct and do not appear to hybridize or intergrade. Both are scandent shrubs. The leaves of *C. subspicatus* are generally larger than those of *C. australis,* are usually acute or acuminate, never falcate, and have a fine and reticulate ultimate venation. The leaves of *C. australis* are always acuminate, often falcate towards the tip, and more open in their ultimate venation. The inflorescences of *C. subspicatus* are less compact than those of *C. australis.* The fruits of *C. subspicatus* are usually larger than those of *C. australis* and lack the red spots present on the inner surface which are invariably observed in mature fruit of *australis. C. subpicatus* has yellow-green arils.

C. subspicatus is quite distinct from *C. paniculatus.* The leaf apices of *C. subspicatus* are obtuse or sometimes acute or rarely acuminate, whereas those of *C. paniculatus* are apiculate or sometimes obtuse or rarely emarginate. The primary lateral leaf veins of *C. subspicatus* number 7–12 whereas those of *C. paniculatus* number 5–7. Inflorescences of *C. subspicatus* are once compound or rarely twice compound but never thrice compound; those of *C. paniculatus* are thrice to multi-compound. *C. subspicatus* has pedicels 1.5–5.0 mm long; those of *C. paniculatus* are 6–10 mm long. These two species differ in their distributions: *C. subspicatus* is confined to the east coast of Queensland and New South Wales (see map 1) and possibly extends to New Caledonia and New Guinea whereas *C. paniculatus* is widely distributed in India, Burma, Thailand, Indo-China, China, and throughout Malesia.

C. australis also is quite distinct from *C. paniculatus.* The leaves of *C. australis* are narrowly lanceolate to elliptical, 3–8 cm long, 1–4 cm wide, with 6–15 pairs of primary lateral veins and with apices usually acuminate, sometimes acute, but never apiculate or obtuse. *C. paniculatus* has leaves which are elliptical, obovate, suborbicular, broadly ovate, ovate-oblong, 5–15 cm long, 2–6 cm wide, with 5–7 pairs of primary lateral veins and with apices apiculate, obtuse or

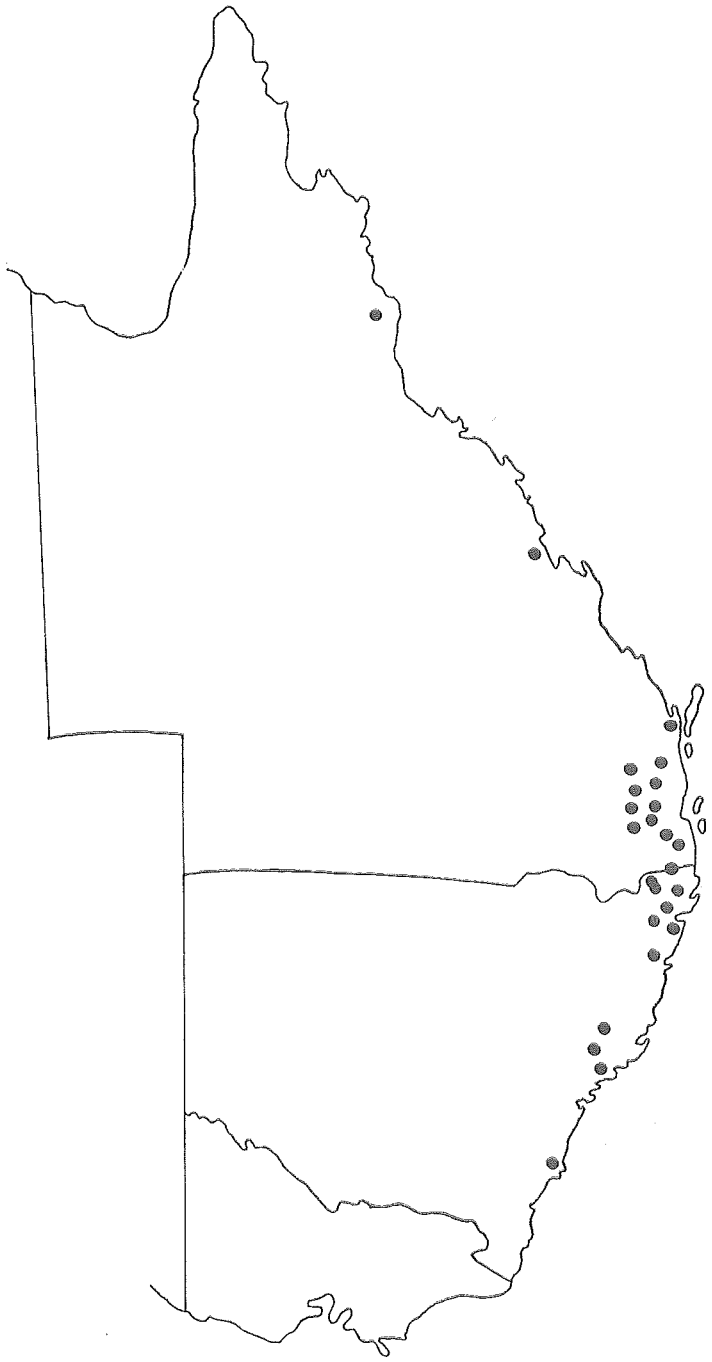

Fig. 1. Map of Eastern Australia showing distribution of *Celastrus subspicatus*. Note that this species occurs also in New Caledonia and New Guinea (see text).

rarely emarginate. The inflorescences of *C. australis* are compact and once compound, rarely twice compound. whereas those of *C. paniculatus* are loose in comparison and thrice to multi-compound. The mature fruits of *C. australis* are parchment-coloured with scattered red spots on their inner surfaces; those of *C. paniculatus* are similar but lack the red spots. *C. australis* is confined to southern Queensland, eastern New South Wales and north-eastern Victoria (see map 2).

Celastrus subspicatus *Hook.* in Hooker's Icon. Pl. 5: fig. 482 (1842); Ding Hou, Ann. Missouri Bot. Gard. 42: 236 (1955).

HOLOTYPE: Cultivated at Kew from seed of unknown source (K).

SYNONYM: *Celastrus papuanus* Warb. in Bot. Jahrb. Syst. 13: 366 (1891) as "papuana". *Celastrus paniculatus* Willd. var. *balansae* Loes. in Bot. Jahrb. Syst. 39: 160 (1906).

Scandent shrub, glabrous except for the younger branches, inflorescences and sepals which are clothed in a fairly dense light-brown indumentum. *Bark* light-brown on older branches, red on younger branches, both old and young branches covered in elevated, conspicuous lenticels. *Axillary buds* deltoid, spiniform, the outermost scales acuminate. *Leaves* alternate, narrowly lanceolate, elliptical or obovate 5–14 cm long, 2–7 cm wide, with 7–12 primary lateral veins, coriaceous, sometimes membranous, dark green above, pale yellow, the margins entire or minutely denticulate with up to 35 teeth on each margin, flat, with the apices acute, acuminate or sometimes obtuse; stipules filiform, 1.3–4.0 mm long; petioles 3.0–13.0 mm long, 1.0–1.3 mm wide. *Inflorescences* terminal, simply paniculate, once compound, rarely twice compound, with each secondary peduncle subtended either by a small tapering bract which is c. 1.5 mm long and 0.1 mm wide at the base, or occasionally, towards the base of the panicle, by a leaf. *Pedicels* 1.5–5.0 mm long, 0.3–0.8 mm wide, articulate towards the base, each subtended by a minute brown bract. *Flowers* 5-merous, apparently dioecious, yellowish-green, 3.5–4.5 mm in diameter. *Sepals* basally connate, persistent, broadly ovate, 1.0–1.5 mm long, 1.4–1.6 mm wide, obtuse. *Petals* spreading, narrowly elliptical, 2.3–2.8 mm long, 1.3–1.9 mm wide, contorted in the bud. *Stamens* 5, opposite the sepals, inserted on the margin of the floral disc; filaments flat, 0.40–0.75 mm long, c. 0.3 mm wide at the base; anthers basifixed, cordate, 0.8–1.3 mm long, c. 1.0 mm in diameter, 2-lobed, each lobe dehiscing by a single longitudinal slit. *Staminodes* of the female flowers similar to the fertile stamens but the filaments c. 0.3 mm long and 0.1 mm wide at the base and the anthers 0.5–0.7 mm long, c. 0.5 mm in diameter. *Floral disc* 1.2–1.8 mm in diameter, membranous. *Ovary* superior and free of the disc, 3-locular, smooth, glabrous; ovules 2 in each loculus, upright, attached basally on each side of the septa. *Style* terminal on the ovary, columnar, c. 1.0 mm long, shortly 3-lobed. *Fruit* a coriaceous capsule, ellipsoid or ovoid, 7.0–9.5 mm long, 5.0–9.0 mm wide, yellow when fresh, brown when dry, transversely rugose, 3-locular, dehiscing loculicidally into 3 valves, the inner surface of each valve parchment-coloured at maturity. *Seeds* 1–6 in each fruit, orbicular, plano-convex or angular-ovate in cross section, 4.5–6.0 mm long, 2.3-4.5 mm wide; arils completely surrounding the seeds, yellow-green or bright orange, membranous. *Flowering period* from November to December with one record for March.

DISTRIBUTION: On a variety of soils in rainforests of eastern Australia in the North Kennedy, South Kennedy, Burnett, Wide Bay, Darling Downs and Moreton districts of Queensland; North and Central Coast of New South Wales (see map 1). Possibly in New Caledonia and New Guinea (see note below).

SPECIMENS EXAMINED: AUSTRALIA: QUEENSLAND: **North Kennedy District:** Boonjie, W. of Mt Bartle Frere, *Webb & Tracey 6552,* —. 1962 (BRI); Gregory River, *Michael 1370* (BRI); Strathdickie, near Proserpine, *Michael 1124* (BRI). **South Kennedy District:** Cawley State Forest, W. of Cathu between Mackay and Proserpine, *Webb & Tracey 7664,* 6.1965

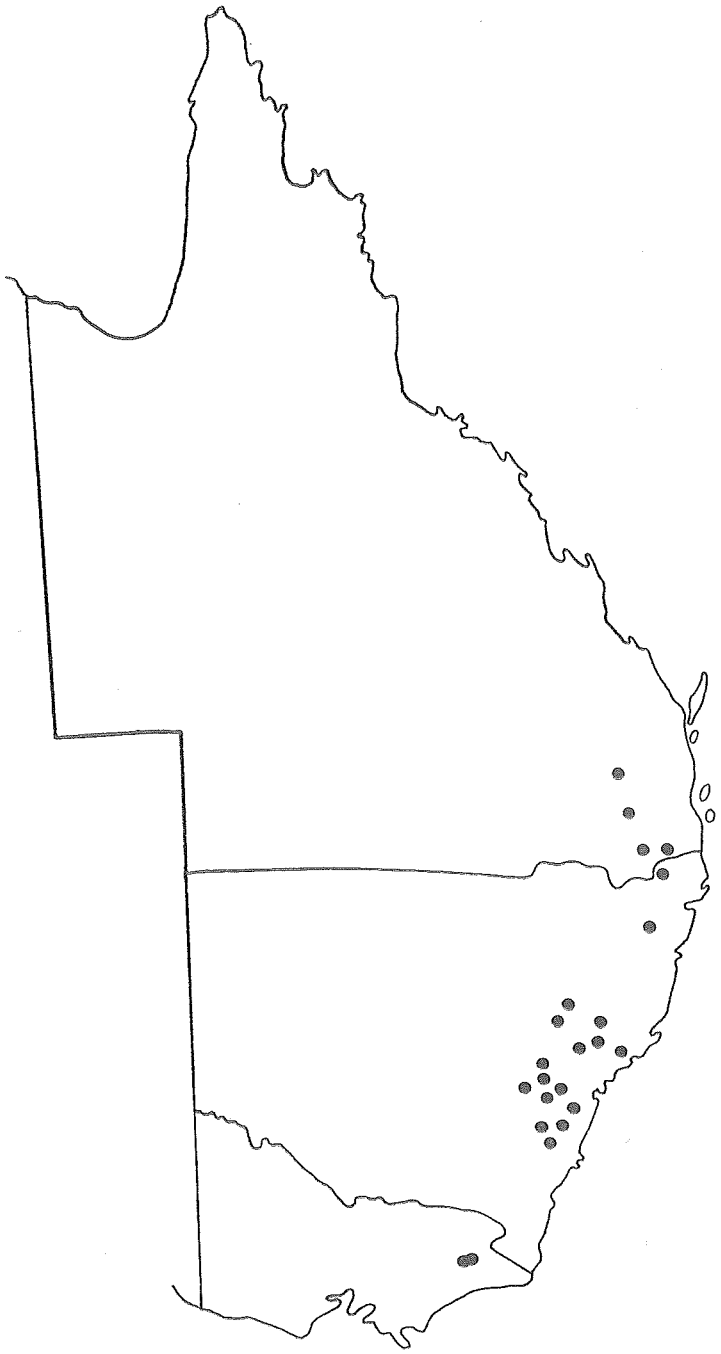

Fig. 2. Map of Eastern Australia showing distribution of *Celastrus australis*.

(BRI). **Leichhardt District:** Killarney, *White* 11.1917 (BRI). **Burnett District:** Kingaroy, *Michael 2959,* 11.1945 (BRI); Edenvale Hill, *Michael 3023,* 6.1947 (BRI). **Wide Bay District:** Maryborough, *Simon* 5.1918 (BRI); Gympie, *Kenny* (BRI); Imbil, *Weatherhead* 12.1917 (BRI); Eight Mile Scrub, *Kenny,* —. 1905 (BRI). **Darling Downs District:** Toowoomba, *Pechey* (BRI). **Moreton District:** Yarraman, *Rankin* 7.1927 (BRI), *Clemens* 8.1944 (BRI); Clear Mountain near Brisbane, *Ludeman* 3.1929 (BRI); Mt Glorious, *White* 5.1920 (BRI), *Williams* 6.1970 (BRI); Mt Tarampa, *Bailey* (BRI); Gold Creek Reserve, near Brisbane, *White* 6.1915 (BRI); Rosewood, *Bailey* (BRI); Tamborine, *Shirley NSW 122039,* 7.1915 (NSW); Tamborine Mountain, *White* 1.1916 (BRI), *White NSW 122040,* 1.1916 (NSW); O'Reilly's, Lamington National Park, *Smith & Webb 3589,* 5.1948 (BRI). NEW SOUTH WALES: **North Coast:** Unumgar, near Mt Lindsay, *White 12517,* 3.1944 (BRI); Unumgar State Forest, 20 miles [32 km] NW. of Kyogle, *Coveny 1669,* 7.1969 (NSW); Acacia Creek, *Boorman NSW 122041,* 2.1905 (NSW); Wollongbar, Richmond River, *Bäuerlen NSW 122043,* 5.1891 (NSW); Yabbra State Forest, c. 5 miles [8 km] S. of Urbenville, *Coveny 1701,* 7.1969 (NSW); Tuntable, *James NSW 122042,* 11.1910 (NSW); Mummulgum near Casino, *Cleland NSW 122044,* 12.1916 (NSW); Casino, *McLean NSW 122045,* 5.1918 (NSW); Ballina, *Bäuerlen NSW 122046,* 4.1892 (NSW); Sandiland Ranges, *Boorman NSW 122047,* 11.1904 (NSW); Coffs Harbour, *Boorman NSW 122049,* 9.1909 (NSW), *Boorman NSW 122048,* 6.1911 (NSW); Coffs Harbour to Grafton, *Maiden & Boorman NSW 122050,* 11.1903 (NSW); Hastings River, — NSW 122051 (NSW); Upper Williams River, *Fraser & Vickery NSW 122052,* 8.1935 (NSW), *NSW 122053,* 1.1934 (NSW); 16 miles [26 km] W. of Dungog, *R. Story 7347,* 5.1960 (NSW); Seal Rocks, *Blaxell 199,* 2.1969 (NSW); Morpeth, *Leichhardt NSW 122054* (NSW). **Central Coast:** Cambewarra Mountain, *Close NSW 122055,* 2.1920 (NSW).

NEW CALEDONIA: *Deplanche 92* (A).

NEW GUINEA: Kanosia, *Carr 11260,* 2.1935 (A).

The type of *C. subspicatus* came from a plant of uncertain origin long cultivated in the Royal Botanic Gardens, Kew. In comparison with the loose inflorescences of the bulk of the material of this species examined by us, the type has a very compact inflorescence indeed. We are at a loss to explain this difference and consider that it renders the choice of specific epithet an unfortunate one. However, since our material does not differ significantly from the type in any other character, we feel compelled to adopt the name *C. subspicatus* for it.

We note that Beadle, Evans & Carolin in both Handb. Vasc. Pl. Sydney Distr.: 303 (1963) and Fl. Sydney Region: 360 (1972) and Willis, Handb. Pl. Victoria 2: 353 (1972) follow Ding Hou (1955) in synonymizing *C. australis* under *C. subspicatus* and hence misapply the later name to specimens of *C. australis* from the Central Coast and Central Tablelands of New South Wales and from East Gippsland in Victoria respectively.

Ding Hou (1955) cites under *C. subspicatus* specimens from New Caledonia and New Guinea, commenting that they are morphologically similar and geographically related to the Australian material except in leaf shape. We have examined two of these specimens and find to the contrary that they are very similar indeed to Australian *C. subspicatus* in leaf size, shape, margins, venation, distribution of stomates, texture and pedicel length. They are similar in lenticel distribution and inflorescence structure. However, the New Caledonian specimen examined by us has flowers with petals 2.2 mm long and 1.4 mm wide — somewhat smaller than the bulk of Australian material. Further, the New Caledonian specimen is completely glabrous whereas the younger branches, inflorescences and sepals of Australian specimens are clothed in a fairly dense light-brown indumentum. The New Caledonian specimen has no mature fruit. Whilst the New Guinean specimen examined has a similar indumentum to Australian specimens the inside surface of its fruit is dark brown with conspicuous white streaks; that of Australian specimens of *C. subspicatus* is parchment coloured. Despite these differences, in the absence of sufficient specimens from New Caledonia and New Guinea we are unable to decide whether they warrant recognition as a separate taxon. We agree with Ding Hou (1955) that they are best included tentatively under *C. subspicatus.*

Celastrus australis *Harvey et F. Muell.* in Trans. Philos. Soc. Victoria 1: 41 (1854); Reissek in Linnaea 29: 265 (1858); F. Mueller, Fragm. 3: 93–4 (1862); Bentham, Fl. Austral. 1: 398–9 (1863); F. Mueller, Pl. Indig. Victoria 2: fig. 21 (1864–5); F. Mueller, Nat. Pl. Victoria 1: 125–6 & fig. 27 (1879); F. Mueller, Syst. Census Austral. Pl.: 26 (1882); F.M. Bailey, Syn. Queensland Pl.: 67 (1883); F. Mueller, Key Victorian Pl. 2: fig. 28 (1885); F. Mueller, Key Victorian Pl. 1: 146 (1887–8); F. Mueller, Second Syst. Census Austral. Pl.: 40 (1889); Moore & Betche, Handb. Fl. New South Wales: 87 (1893); F.M. Bailey, Queensland Fl. 1: 254 (1899); Maiden & Betche, Census New South Wales Pl.: 124 (1916); Loesener, Pflanzenfam. 20b: 134 (1942).

LECTOTYPE (*here designated*): Snowy River, *F. Mueller* (MEL 49330).

LECTOPARATYPES: Snowy River, *F. Mueller* (MEL 49328 & 49329); Murrindal (as Murrandale) River, *F. Mueller* (MEL 49331).

MISAPPLIED NAMES: Beadle, Evans & Carolin in both Handb. Vasc. Pl. Sydney Distr.: 303 (1963) and Fl. Sydney Region: 360, 696 (1972) and Willis, Handb. Pl. Victoria 2: 535 (1972) incorrectly refer this species to *C. subspicatus* (see note under *C. subspicatus*).

Scandent shrub, glabrous except for the younger branches, inflorescences and sepals which are clothed in a dense grey indumentum. *Bark* light-brown on older branches, red on younger branches, both old and young branches covered in elevated, conspicuous, white, ovoid lenticels. *Axillary buds* deltoid, spiniform, the outermost scales acuminate. *Leaves* lanceolate to elliptical, 3–8 cm long, 1–4 cm wide with 6–15 pairs of primary lateral veins, usually coriaceous, sometimes membranous, dark green above, pale below, margins entire or dentate with up to 37 teeth on each margin, flat, with apices usually acute or acuminate, often falcate towards the tip, stipules filiform, 0.8–1.8 mm long, petioles 3–15 mm long, 0.5–1.5 mm wide. *Inflorescences* terminal, simply paniculate, once or twice compound, with each secondary peduncle subtended either by a small tapering bract 0.8–3.0 mm long, c. 0.3 mm wide at the base, or, towards the base of the panicle, by a leaf. *Pedicels* 0.8–2.3 mm long, 0.3–0.5 mm wide, articulate towards the base, each subtended by a minute brown bract. *Flowers* 5-merous, apparently dioecious, yellowish green, 3.3–4.3 mm in diameter. *Sepals* basally connate, persistent, broadly ovate, 1.4–1.8 mm long, 1.5–2.0 mm wide, obtuse. *Petals* spreading, broadly elliptical, 1.8–2.8 mm long, 0.8–1.8 mm wide, contorted in the bud. *Stamens* 5, opposite the sepals, inserted on the margin of the floral disc; filaments flat, 0.6–1.0 mm long, c. 0.3 mm wide at the base; anthers basifixed, cordate, 1.1–1.3 mm long, c. 1.0 mm in diameter, 2-lobed, each lobe dehiscing by a single longitudinal slit. *Staminodes* of the female flowers similar to the fertile stamens but the filaments c. 0.3 mm long and 0.1 mm wide at the base and the anthers 0.6–0.8 mm long, c. 0.4 mm in diameter. *Floral disc* 1.2–1.6 mm in diameter, membranous. *Ovary* superior and free of the disc, 3-locular, smooth, glabrous; ovules 2 in each loculus, upright, attached basally on each side of the septa. *Style* terminal on the ovary, c. 1.0 mm long, shortly 3-lobed. *Fruit* a coriaceous capsule, ellipsoid or ovoid, 2.0–5.5 mm long, 3.3–6.0 mm wide, light-brown when fresh, black when dry, transversely rugose, 3-locular, dehiscing loculicidally into 3 valves, the inner surface of each valve parchment-coloured with scattered red spots at maturity. *Seeds* 1–6 in each fruit, orbicular, plano-convex or angular-ovate in cross-section, 3.0–7.2 mm long, 2.0–2.5 mm wide; arils completely surrounding the seeds, bright orange, membranous. *Flowering period* from October to June.

DISTRIBUTION: On a variety of soils in rainforests of eastern Australia in the Darling Downs and Moreton districts of Queensland; North Coast, Central Coast, Central Tablelands, North Western Slopes and Central Western Slopes of New South Wales; East Gippsland (Snowy and Buchan Rivers) in Victoria (see map 2).

SPECIMENS EXAMINED: QUEENSLAND: **Darling Downs District:** Bunya Mountains, *White* 10.1919 (BRI), *Clemens* 3.1944 (BRI); Toowoomba, *Longman NSW 122056,* 10.1910 (NSW); Rocky Mountain, Toowoomba, *Shirley* (BRI); Gladfield, *Bailey NSW 122057* (NSW). **Moreton District:** Lamington National Park, *Stauffer 5507,* 1.1964 (NSW). NEW SOUTH WALES: **North Coast:** Acacia Creek, *Boorman NSW 24208,* 2.1905 (BRI, NSW), *Dunn NSW 24209,* 10.1905 (NSW), *NSW 122058,* 4.1906 (NSW); Fernbrook, 8.5 miles [14 km] SW. of Dorrigo, *Hayes NSW 122059,* 1.1965 (NSW); Masseys Creek, Eccleston, *Rupp NSW 122060,* 10.1925 (NSW); Eccleston Bridge, Allyn River, *Rodd 1024,* 5.1970 (NSW); Morpeth, *Leichhardt NSW 122061,* 10.1892 (NSW); Hamilton, *Libier NSW 122062,* 11.1934 (NSW); Mount View, Cessnock, *Earp NSW 122063,* 4.1956 (NSW); Belmont, *Rupp NSW 122064,* 6.1930 (NSW). **Central Coast:** Freemans Reach, *Clements NSW 122066,* 1.1905 (NSW); Razorback Range, *Evans NSW 122068,* 10.1958 (NSW), *Burgess NSW 122069,* 1.1962 (NSW), *McBarron NSW 122070,* 10.1964 (NSW), *McBarron 15108,* 4.1968 (NSW); Mt Keira, near Wollongong, *Holloway NSW 127217,* 6.1972 (NSW); Mt Kembla, *Fletcher NSW 127271,* 11.1891 (NSW); Minnamurra Falls, *Judd NSW 122072,* 10.1953 (NSW); Saddleback Mountain, Jamberoo-Kiama road, *McBarron 10371,* 1.1965 (NSW); Kiama, *Allein NSW 24206,* —.1905 (NSW); Kangaroo Valley, *Gauba* 3.1952 (BRI); Cambewarra Mountain, Nowra, *Boorman NSW 122073,* 2.1910 (NSW); Cambewarra Range, *Rodway 1285,* 10.1931 (NSW). **Central Tablelands:** Mt Coricudgy, *Rodd 1297,* 4.1965 (NSW); Mt Irvine road, *Gregson NSW 122074,* 10.1906 (NSW); Mt Wilson, *Gregson NSW 24207,* 1.1899 (NSW); Mt Tomah, *Maiden NSW 122075,* 11.1898 (NSW), *Rodd NSW 122076,* 10.1965 (NSW); Jenolan Caves, *Blakely NSW 122077,* 6.1899 (NSW). **North Western Slopes:** On the Merriwa-Willow Tree road, c. 27 miles [46 km] NNE. of Merriwa, *Coveny 1202,* 6.1969 (NSW). **Central Western Slopes:** Cairds Gap, Liverpool Range N. of Merriwa, *Johnson & Constable NSW 122065,* 10.1954 (NSW). VICTORIA: **East Gippsland:** Murrindal (as Murrandale) River, *Mueller* 3.1854 (MEL); Snowy River, *Mueller* (MEL 49328, 49329 & 49330), *Walter NSW 122079,* 9.1901 (NSW).

In the above descriptions we have noted that both *C. subspicatus* and *C. australis* appear to be dioecious. The staminodes of female flowers are considerably smaller than the stamens of male flowers and yet no other floral characters seem to be discontinuous. We have examined the pollen of these species and find that, although otherwise well-formed, pollen from female flowers lacks the sculpturing found on that from male flowers. Ding Hou (1955) comments that members of the subgenus *Celastrus,* to which both species under discussion here belong, are usually dioecious.

KEY TO THE SPECIES DISCUSSED

1. Inflorescences once compound or sometimes twice compound, never thrice compound; Australia and possibly New Caledonia and New Guinea.
   2. Fruit 2.0–5.5 mm long, inside surface with scattered red spots ..... *C. australis*
   2.* Fruit 7.0–9.5 mm long, inside surface parchment-coloured without red spots ..... *C. subspicatus*

1.* Inflorescences thrice to multi-compound; widely spread in India, Burma, Thailand, Indo-China, China, and throughout Malesia — not found in Australia .... *C. paniculatus*

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