A SYSTEMATIC STUDY OF DELARBREA VIEILL. (ARALIACEAE)

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ABSTRACT

Delarbrea is a distinct, well-delimited genus of araliaceous treelets and small trees comprising six species, two of which are further divided into two subspecies each. The genus is centered in New Caledonia; *D. paradoxa* subsp. *paradoxa* also extends through Vanuatu and the Solomon Islands to the Moluccas and Lesser Sunda Islands, and *D. michieana* is endemic to Queensland, Australia. *Delarbrea* (including *Porospermum*) and its close relatives *Myodocarpus* and *Pseudosciadium* form a monophyletic assemblage with several common features: a clasping petiole base, articulated pedicels, five stamens, a bicarpellate gynoecium, and large secretory oil ducts in the fruit; the last is unique to the group and is almost certainly a shared, derived character. This group probably represents an old lineage within Araliaceae, and it may have been among the many remnants of the late Cretaceous–early Tertiary Australian flora that have survived in New Caledonia but were eliminated from Australia after their separation. It is not yet possible to determine whether *Delarbrea michieana* is a relict species or is derived from a more recent arrival via long-distance dispersal. *Delarbrea paradoxa* subsp. *paradoxa* most likely reached areas to the north and west of New Caledonia relatively recently, probably sometime after the Miocene. This taxon appears well adapted for long-distance dispersal to and establishment in new areas: it is the most common species in New Caledonia, where it occurs in a wide variety of habitat types; it is not a substrate specialist; and it has fleshy fruits that are probably bird-dispersed. Analytical keys are provided to the species and subspecies, along with a complete synonymy, detailed description, illustration, and distribution map for each taxon. *Delarbrea paradoxa* subsp. *depauperata* Lowry is described as new; it appears to be an allopatric derivative of the typical subspecies adapted to the special conditions of dry, maquis vegetation. One new combination is made, *D. montana* subsp. *arborea* (Vieill. ex R. Viguier) Lowry, and seven names are lectotypified.

INTRODUCTION

Delarbrea Vieill. is a small, well-delimited genus of Araliaceae, with six species (two of which are divided into two subspecies each) of sparsely branched trees and treelets. The group is centered in New Caledonia, where seven of the eight taxa are represented, six of them endemic to the island. A single, endemic species, previously placed in the monotypic genus *Porospermum* F. v. Muell., occurs in Australia (FIGURE 8), where it is restricted to the remnant rain forests of northern Queensland. The only widespread member of the genus is *D. paradoxa* subsp. *paradoxa,* which extends from New Caledonia and Vanuatu north and west through the Solomon Islands, New Britain, and New Guinea to the Moluccas and Lesser Sunda Islands (FIGURE 2). *Delarbrea* is very closely related to *Myodocarpus* and *Pseudosciadium,* both endemic to New Caledonia, and together these three genera comprise a clearly monophyletic assemblage.

The present study has grown out of a general revision of Araliaceae for the *Flore de la Nouvelle-Calédonie et Dépendances* being published by the Muséum National d'Histoire Naturelle in Paris. The work presented here is based on more than twelve months of field study in New Caledonia and Australia, during which all eight of the recognized taxa were studied and collected. This first-hand experience has proven essential in understanding the taxonomic limits and relationships within *Delarbrea,*

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because herbarium specimens are often incomplete or unrepresentative due to the large size and structural complexity of most of these plants. Extensive analysis of the available herbarium material has also been useful in supplementing data and observations gathered in the field, particularly from areas that were not visited.

Species of *Delarbrea* do not appear to have been utilized by native peoples in either Melanesia or Malesia. The genus is nevertheless of some economic importance as an ornamental, *D. paradoxa* subsp. *paradoxa* being cultivated for its delicate, dissected juvenile foliage. Several other species have equally attractive foliage but do not seem to have been brought into cultivation (Lowry, Miller, and Frodin, in press).

MORPHOLOGY

Habit and Leaves. Delarbrea species exhibit considerable uniformity in overall habit, forming monocaulous or rarely sparsely branched treelets or small trees from about 1.5 to 12 meters in height. The large, alternate, odd-pinnate leaves are clustered at the ends of the branches, giving the plants an appearance typical of many Araliaceae. The leaves have an unarticulated rachis and a clasping petiole base with evident membranous or scarious margins. Several species of *Delarbrea* also exhibit heteroblasty (another common feature in the family), with the leaflets of the juvenile foliage variously dissected or lacerate, whereas those of the adult leaves are entire or nearly so.

Inflorescence and Breeding System. All members of *Delarbrea* have inflorescences that terminate the growing shoots (i. e., their shoots are hapaxanthic), with subsequent vegetative growth coming from the development of the axillary meristem of one of the distal leaves. This fact, coupled with the typically unbranched habit, indicates that these plants fit Chamberlain's model of whole-plant architecture, as defined by Hallé et al. (1978). The occurrence of branching in species of *Delarbrea* is relatively rare and probably represents a response to injury.

The inflorescence is a panicle of umbellules and can be either erect or pendent, depending on the species. The pedicels are articulated below the ovary and generally free, although in *Delarbrea paradoxa* (and rarely in a few other species) they are often basally united into groups of 2–4. In most species the inflorescence contains both hermaphrodite flowers, generally in the umbellules that terminate the ultimate axes, and functionally staminate flowers that are usually borne in smaller, lateral umbellules; the plants are therefore andromonoecious. Furthermore, the hermaphrodite flowers are strongly protandrous and typically complete their female phase before the staminate flowers open. These plants are therefore duodichogamous, with three reasonably well-separated sexual phases. Only *D. harmsii* has exclusively hermaphrodite flowers; this is apparently a derived condition (cf. discussion under that species).

Flowers. The flowers of *Delarbrea* species are remarkably uniform in structure, although they vary considerably in relative size. They are actinomorphic, and the sepals are united basally to form a short tube, with the five free, valvate lobes expanding very little if at all in fruit. The five petals are imbricate in bud and conspicuously narrowed or clawed toward base. The five stamens are inflexed before anthesis, and the anthers are dorsifixed. The inferior ovary is consistently bicarpellate, although vestigial in the staminate flowers, and is crowned by a small, low nectar disc. The two styles are free, although they are closely appressed at anthesis, their receptive surfaces becoming exposed only as they spread following the loss of the stamens.

Fruit. Species of *Delarbrea* have ovoid to cylindrical drupes that appear to be well adapted for animal dispersal. They are crowned by the persistent calyx and spreading styles, and they are further characterized by the presence of large secretory oil ducts in the exocarp, a feature unique to *Delarbrea* and its close relatives *Myodocarpus* and *Pseudosciadium* (cf. discussion below).

SYSTEMATIC RELATIONSHIPS

All the major systems of classification proposed for Araliaceae are generally recognized to be highly artificial in nature. Most are either monothetic or based on a small number of comparatively labile characters of the flowers and fruits. Furthermore, considerable differences in the relative importance given to these characters have resulted in a notable lack of consistency among the systems (Philipson, 1979; Frodin, 1982). Nevertheless, there has been general agreement on the relative position and relationships of *Delarbrea* within the family. Bentham (1867), Harms (1894–1897), and Hutchinson (1967) all included this genus in the tribe Aralieae, which is defined by the imbricate nature of the corolla in bud and by the petals having a broad, rather than clawed, base. Similarly, Seemann (1868) included *Delarbrea* in his narrowly defined concept of Araliaceae, which is essentially equivalent to the Aralieae of other authors, comprising only those genera with imbricate corollas (the taxa with valvate petals were placed in his Hederaceae). Viguier (1906, 1925) placed *Delarbrea* in a segregate tribe, the "Myodocarpinae," although he considered this group closely related to subtribe "Aralieae" of the tribe "Polysciinae" (Viguier clearly indicated the rank of his infrafamilial taxa, and appears simply to have reversed the appropriate endings for his names). Only Baillon (1878, 1879) appears to have questioned this sort of classification. He pointed out that *Delarbrea,* while clearly related to members of Aralieae, has petals with an attenuate, often strongly clawed base, and suggested that this character is of only limited value in defining tribes within Araliaceae.

It is clear that *Delarbrea* is very closely related to *Myodocarpus* Brongn. & Gris, which has ten species endemic to New Caledonia. This relationship was pointed out by Vieillard (1865), and the two genera were placed together in all of the classifications mentioned above. Furthermore, Viguier's tribe Myodocarpinae contains only these two genera (along with *Porospermum,* which is here included in *Delarbrea*). Several characters are shared by *Delarbrea* and *Myodocarpus,* including overall inflorescence structure, the clasping petiole base, articulated pedicels, imbricate corolla in bud, and the presence of five stamens and a bicarpellate gynoecium, although they also occur in other genera. Both *Delarbrea* and *Myodocarpus* also appear to have a relatively primitive vascular system (Eyde and Tseng, 1971). The secretory oil ducts in the fruit, however, represent a unique feature that has consistently been recognized as distinguishing these genera from all other members of Araliaceae. These structures are very likely a shared derived character (synapomorphy) and suggest that this group represents a monophyletic assemblage within the family (Eyde and Tseng, 1971; Lowry and Keating, in prep.).

Secretory oil ducts also occur in the fruit of the monotypic New Caledonian genus *Pseudosciadium,* indicating that it too should be included in this group (Lowry and Keating, in prep.). When Baillon (1878, 1879) first described *Pseudosciadium balansae,* he indicated that it was closely related to both *Delarbrea* and *Myodocarpus* and

further suggested that it was intermediate between them. Indeed, he had initially intended to describe *P. balansae* as a species of *Myodocarpus,* but reconsidered because its petals are valvate rather than imbricate and also show a tendency toward having a narrowed base in some flowers. These facts led Baillon to question the value of a valvate versus imbricate corolla for distinguishing tribes within Araliaceae.

It is somewhat surprising, then, that in later treatments of Araliaceae, including those of Harms (1894–1897), Viguier (1906, 1925), and Hutchinson (1967), *Pseudosciadium* was separated from *Delarbrea* and *Myodocarpus* and included in the tribe Mackinlayeae. Despite the difficulties alluded to by Baillon, all three of these authors placed considerable emphasis on characters of the corolla. The Mackinlayeae were rigidily defined to include all the taxa with valvate, clawed petals (i. e., *Mackinlaya* and *Apiopetalum,* in addition to *Pseudosciadium*). As so defined, this tribe almost certainly comprised a polyphyletic group. In any case, although Harms and Viguier did suggest that *Pseudosciadium* was linked in some way with *Delarbrea,* it nevertheless remains unclear why this genus was placed in the Mackinlayeae, separated from its close relatives, especially considering the fact that its petals are not consistently clawed, as noted by Baillon.

Until recently the fruits of *Pseudosciadium* were completely unknown, as *P. balansae* was based on a single flowering collection. This probably accounts for the confusion in the placement of the genus. Within the last 20 years, however, a number of additional specimens, including some in fruit, have become available, and more recently I was able to supplement this material with several additional collections in bud, flower, and fruit, as well as FAA-preserved samples of all these stages. This has served as the basis of a comparative anatomical study that reveals a remarkable similarity between the fruits of *P. balansae* and those of several species of *Delarbrea* (Lowry and Keating, in prep.). More important, however, is the discovery that the fruits of *P. balansae* also contain the characteristic oil ducts previously known to occur only in *Delarbrea* and *Myodocarpus.* The presence of this unique feature in all three genera clearly demonstrates that they are closely related and form a distinct, monophyletic group within Araliaceae.

PHYTOGEOGRAPHY AND EVOLUTIONARY HISTORY

Araliaceae clearly have a long history in the Southern Hemisphere, dating back probably to at least the mid-Cretaceous (Raven and Axelrod, 1972, 1974), with fossil pollen reported from the lower Eocene of New Zealand (Couper, 1960). The family is particularly well represented in South America, Madagascar, and Malesia, and may have originated in the land areas that made up Gondwanaland, although it has also diversified considerably in southeastern Asia, perhaps more recently. The highest concentration of endemism and diversity of Araliaceae, however, occurs in New Caledonia, where the family makes up an unusually important and conspicuous part of the flora. Nearly 90 taxa, including species and subspecies (almost ten percent of the world's total), in eight genera are found on this relatively small, isolated Pacific island, many of them appearing to represent very old lineages.

New Caledonia has a very distinctive flora and is well known for a remarkably high concentration of endemic gymnosperms and primitive flowering plants, most of which appear to be derived from remnants of the late Cretaceous–early Tertiary flora of Australia. Available tectonic data indicate that New Caledonia separated from Aus-

tralia about 65 m.y. ago and moved to the northeast, reaching its present position about 50 m.y. ago (Coleman, 1980). In the process, the island carried with it a sample of this ancient Australian flora, the derivatives of which were able to survive in the relatively equable climate of New Caledonia but were in large part eliminated from Australia due to changing climatic conditions in Neogene times (Raven and Axelrod, 1972, 1974; Holloway, 1979; Raven, 1980). Several groups of Araliaceae were almost certainly among these relictual elements, which also include the gymnosperms, Amborellaceae, and Winteraceae, as well as relatively primitive members of a number of other families, such as Arecaceae, Cunoniaceae, Monimiaceae, Rutaceae, and Sapindaceae (Raven and Axelrod, 1972).

Delarbrea and its close relatives *Myodocarpus* and *Pseudosciadium* may represent one of these ancient lineages within Araliaceae, as suggested by the fact that the group as a whole is clearly centered on New Caledonia. This hypothesis is further supported by the fact that these genera share a number of characters with Apiaceae, the presumed sister group to Araliaceae, including an andromonoecious breeding system, clawed petals *(Delarbrea* and perhaps *Pseudosciadium),* a bicarpellate gynoecium, and in *Myodocarpus* a schizocarpic fruit with a central carpophore. Also, as indicated above, these genera have a unique fruit anatomy and a relatively primitive vasculature (Eyde and Tseng, 1971).

The presence of *Delarbrea michieana* in Queensland raises an interesting question: is this species a relict from before the time New Caledonia and Australia separated, or is it more recently derived following long-distance dispersal of one of the New Caledonian taxa? Several characters clearly distinguish *D. michieana* from its congeners in New Caledonia, most notably its remarkable steely blue fruits. This species, however, is very similar in a number of other respects to both *D. harmsii* and *D. longicarpa,* and could well be derived from either, or from an ancestor of either one or both species. Neither of these hypotheses can be firmly rejected on the basis of presently available information.

The factors leading to the widespread distribution of *Delarbrea paradoxa* subsp. *paradoxa* are less complex. This taxon probably originated in New Caledonia and spread to the north and west by a series of long-distance dispersal events; it is unlikely that its present-day distribution is relictual. While the Outer Melanesian System, which includes parts of both Vanuatu and the Solomon Islands, dates from the Middle/Late Eocene, perhaps 45 m.y. ago (Coleman, 1980), the Bismark Archipelago, northern New Guinea, and the Aru Islands were submerged until at least the late Miocene, about 10 m.y. ago (Axelrod and Raven, 1982). Furthermore, the eastern part of the Lesser Sunda Islands and the southeastern Moluccas, which geologically comprise the Inner Banda Arc (including Wetar and Banda) and the Outer Banda Arc (including Timor, Babar, and the Tanimbar Islands), likely were formed in the late Miocene, with migrations from areas farther to the east becoming possible only from about the early Pliocene (Hamilton, 1979; van Steenis, 1979; Audley-Charles, 1981).

Delarbrea paradoxa subsp. *paradoxa* is probably the best adapted member of the genus for long-distance dispersal to and establishment in new areas. It is the most common species in New Caledonia and occurs in a wider variety of habitat types than any of its congeners. This taxon also has fleshy, purplish black fruits that appear to be well adapted for bird dispersal (a character also found in its relatives). Furthermore, *D. paradoxa* subsp. *paradoxa* is the only taxon of the genus in New Caledonia that is not a substrate specialist, making establishment and survival in new areas more likely.

TAXONOMIC TREATMENT

DELARBREA Vieill. in Bull. Soc. Linn. Normandie **9:** 342. 1865. LECTOTYPE: *Delarbrea collina* Vieill., designated as type by Hutchinson, Gen. Fl. Pl. **2:** 63. 1967.

Porospermum F. v. Muell. Fragm. **7:** 94. 1870. TYPE: *Porospermum michieanum* F. v. Muell.

Monocaulous or sparsely branched, glabrous, unarmed treelets or small trees. Leaves imparipinnate, alternate, clustered at ends of branches; leaflets opposite to subopposite (or alternate, especially the lower ones), entire or remotely dentate (to deeply lacerate in juvenile foliage of some species), the base of the lateral ones oblique; rachis not articulated; petiole with an expanded, clasping base with membranous or scarious margins. Inflorescence a panicle of umbellules, terminal, erect or pendent, the lateral branches, peduncles, and umbellules subtended by membranous, scarious, or foliaceous bractlets, the pedicels free or basally united into groups of 2–4, articulated below flowers. Flowers hermaphrodite and protandrous, often also functionally staminate (due to abortion of gynoecium), actinomorphic. Sepals united below into a short tube, the 5 free lobes obtuse to rounded or oblate, valvate, not or only slightly expanding in fruit, the margins often somewhat scarious. Petals 5, imbricate, obovate to spatulate, keeled within, narrowed to clawed toward base. Stamens 5, inflexed before anthesis, the filaments stout, the anthers with 4 thecae, cream-white, dorsifixed. Ovary inferior, 2-carpellate, vestigial in staminate flowers, surmounted by a small, depressed conic nectar disc, the styles 2, free, erect and appressed at anthesis, spreading as the clavate stigmas become receptive. Fruit a drupe, ovoid to cylindrical, crowned by the persistent calyx and spreading styles; exocarp fleshy, with large secretory oil ducts, the endocarp papery; endosperm with shallow longitudinal grooves, not ruminate.

Vieillard described *Delarbrea* in honor of Monsieur Delarbre, an early editor of the *Revue Coloniale.* Two species were mentioned, *D. paradoxa* and *D. collina,* both of which are recognized in the present treatment, although a single description was provided for them. Nevertheless, it may be assumed that Vieillard regarded these as distinct species, since each is referred to by a separate number from his personal herbarium. In general, each of Vieillard's numbers refers to all the material he considered to represent a single species, rather than to a single gathering (N. Hallé, pers. comm.). Neither of these species, however, was designated as the type for the genus, and Hutchinson (1967) appears to have been the first to choose a lectotype, citing *D. collina* as the "type." Smith and Stone (1968) and Farr et al. (1979), presumably following Hutchinson, also indicated this species as the type for the genus.

The monotypic genus *Porospermum* was described in 1870 on the basis of a Dallachy collection from Queensland, Australia. In the original description Mueller separated his new genus from *Delarbrea* on the basis of several flower and fruit characters, although he suggested that it could be ascribed the rank of section within that genus. While Mueller (1889) subsequently united these two genera, most of his contemporaries continued to maintain *Porospermum* as distinct (e. g., Harms, 1894–1897; Bailey, 1883; Viguier, 1906, 1925). Results from the present study, however, clearly indicate that *Porospermum* falls within the limits of *Delarbrea* in nearly every respect, and that it does not even warrant recognition at the subgeneric or sectional level. This interpretation has been followed by most recent authors (e. g., Burbidge, 1963; Clifford and Ludlow, 1978; Philipson, 1979; Tracey, 1982), the only apparent exception being Hutchinson (1967).

Viguier (1925) was the first author to treat all the New Caledonian members of *Delarbrea,* recognizing five species, three of which were described as new, and three

new varieties. Guillaumin (1948) simply adapted this treatment without modification, although he did not recognize any infraspecific taxa. More recently, Hutchinson (1967) also indicated a total of five species for the genus (excluding *Porospermum*), while Smith and Stone (1968) suggested a total of about seven species. Philipson (1979), in his treatment of Araliaceae for *Flora Malesiana,* indicated that *Delarbrea* has only three or four species, although he did not elaborate further.

KEY TO SPECIES

1. Inflorescence axes and pedicels covered with a gray-brown, corky, exfoliating periderm, the basal portions of pedicels often united in fascicles of 2–4; leaflets often strongly folded adaxially along midvein and falciform, especially when pressed. ..... 1. *D. paradoxa*
1. Inflorescence axes and pedicels smooth, occasionally somewhat corky or lenticellate near base but never with exfoliating periderm, the pedicels free (rarely a few basally united); leaflets flat to weakly folded adaxially along midvein, rarely falciform when pressed.
  2. Leaves (55–) 75–130 cm. long; leaflets (13–) 15–35 (–43), never glaucous; inflorescence pendent (erect in *D. harmsii,* but then the leaflets greater than 7 cm. wide).
    3. Inflorescence erect, stout, the primary axis 10–20 mm. in diam. at base, leaflets subcoriaceous, broadly ovate to elliptic-oblong, the apex broadly acute to obtuse or retuse. ..... 2. *D. harmsii*
    3. Inflorescence pendent, slender, the primary axis 2–8 (–10) mm. in diam. at base; leaflets membranous, narrowly ovate to ovate-lanceolate or oblong-elliptic, the apex narrowly acute to acuminate.
      4. Petiole and rachis strongly flattened adaxially for about 20–40 cm. from base; fruit iridescent steely blue when mature, the surface finely ruminate when dry; tertiary veins usually evident on upper surface of leaflets. ..... 3. *D. michieana*
      4. Petiole and rachis terete; fruit purplish black when mature, smooth or ribbed when dry, never finely ruminate; tertiary veins obscure on upper surface of leaflets.
        5. Fruit 10–16 mm. long, with a prominent collar below calyx lobes; pedicels stout, 0.4–0.6 mm. in diam.; lateral branches of inflorescence usually with a single terminal umbellule of hermaphrodite flowers and 3–7 (–12) lateral umbellules of staminate (or occasionally hermaphrodite) flowers. ..... 4. *D. longicarpa*
        5. Fruit 5–7 mm. long, without a collar below calyx; pedicels slender, 0.2–0.3 mm. in diam.; lateral branches of inflorescence with a terminal and 8–35 lateral umbellules of hermaphrodite flowers, the peduncles of lateral umbellules often also with reduced umbellules of staminate flowers along their length. ..... 5. *D. collina*
  2. Leaves 20–55 (–65) cm. long; leaflets 5–13 (–15), often glaucous; inflorescence erect. 6. *D. montana*

1. **Delarbrea paradoxa** Vieill. in Bull. Soc. Linn. Normandie **9:** 343. (prior to 17 April) 1865.

Andromonoecious treelets or trees 1.5–10 m. tall. Leaves 20–70 (–85) cm. long; leaflets (7–) 9–19, usually strongly folded adaxially along midvein, dark green above and beneath, often appearing mottled when dry, with adjacent areas outlined by the evident tertiary venation of different colors, membranous to subcoriaceous, broadly to narrowly ovate or elliptic-oblong, often falciform, especially when pressed, 6–22 × 2–8 cm., the lowermost reduced, the apex acute to obtuse, the margin entire, often undulate, to deeply lacerate or pinnatifid in juvenile foliage, the base truncate to cordate; petiolules 5–15 mm. long; petiole terete, often lenticellate. Inflorescence pendent, covered throughout with a gray-brown, corky, exfoliating periderm, the bractlets 1–10 mm. long, scarious, triangular or subulate to elliptic or linear-ovate, persistent or early caducous, the primary axis 20–60 cm. long, 2–10 mm. in diam. at base, the secondary axes 9–45, scattered, (3–) 6–30 cm. long, each with a terminal umbellule of hermaphrodite flowers and usually 1–15 (–20) lateral umbellules of staminate or hermaphrodite flowers, when hermaphrodite occasionally also with 1–3 umbellules of usually staminate flowers borne along peduncle, the peduncles (tertiary axes) 0.5–4.5 mm. long, the umbellules 12–30 (–40) mm. in diam. (those with staminate flowers 6–12 mm.), with 4–40 flowers, the involucre of 3–6 triangular to ovate, often adaxially concave, persistent or early caducous bractlets each 1–6 mm. long, the pedicels 1–10 mm. long, often basally united in fascicles of 2–4 (–5). Sepals yellow-green, the lobes 0.5–0.8 mm. long. Petals yellow-green, 1–2.2 mm. long. Filaments

0.6–3.2 mm. long, yellow-green, the anthers 0.5–1.5 mm. long. Ovary 1–1.6 mm. long at anthesis, the styles 0.8–1.2 mm. long at anthesis, expanding slightly to 1.5 (–2) mm. in fruit (0.2–0.5 mm. in staminate flowers). Mature fruit purplish black, globose to ovoid, 5–10 mm. long, smooth or irregularly ribbed when dry.

Delarbrea paradoxa clearly represents a distinct, monophyletic group within the genus. Several critical characters distinguish it from its relatives, including the corky, exfoliating periderm of the inflorescence and the distinctive mottled appearance of the dried leaves. While the two subspecies of *D. paradoxa* are readily separated by a number of evident features, and while an argument could be made for treating them as distinct species, it is felt that such an approach would unnecessarily obsure their underlying close relationship.

Several recent authors, including Philipson (1951, 1979), Hutchinson (1967), Smith and Stone (1968), Bernardi (1979), and van Steenis (1979), have incorrectly applied the name *Delarbrea collina* Vieill. to this widespread species. Furthermore, Morat et al. (1984), in their detailed study of New Caledonian rain-forest plants, appear to have confused the names *D. collina* and *D. paradoxa*. This can be deduced from the fact that they list *D. paradoxa* as being restricted to non-ultrabasic soils, while indicating that *D. collina* is indifferent to soil type; the opposite is in fact true.

KEY TO SUBSPECIES

1. Leaves (35–) 40–85 cm. long, the largest leaflet (10–) 15–22 cm. long, the pedicels (15–) 20–40 per umbellule, the inflorescence 35–60 cm. long; bractlets of secondary axes and involucre (3–) 5–10 mm. long, elliptic to linear-ovate, adaxially concave, early caducous. ..... 1a. subsp. *paradoxa*
1. Leaves 20–30 cm. long, the largest leaflet 6–8 (–10) cm. long, the pedicels 4–15 (–20) per umbellule, the inflorescence 20–30 (–55) cm. long; bractlets of secondary axes and involucre 1–2 mm. long, triangular to subulate, persistent. ..... 1b. subsp. *depauperata*

1a. **Delarbrea paradoxa** Vieill. subsp. **paradoxa.** TYPE: NEW CALEDONIA: Ad montes, prope Wagap, *Vieillard 627"A"* (LECTOTYPE: P!, here designated; ISOLECTOTYPES: BM!, K!, NSW!, P!). FIGURES 1, 2, 3.

Cupania juglandifolia Seem. Fl. Vit. 46. (June) 1865. TYPE: NEW CALEDONIA: *J. R. & G. Forster s. n.* (LECTOTYPE: BM!, here designated; ISOLECTOTYPES: BM!, LIV!).

Delarbrea (?) *spectabilis* Linden & André in Ill. Hort. Ill. **9:** 76. *tab. 314.* 1878. TYPE: Based on cultivated material sent from New Caledonia. No specimen appears to have been preserved; the plate accompanying the publication of *D. spectabilis* must therefore serve as the type.

Delarbrea lauterbachii Harms in K. Schum. & Lauterb. Fl. Schutzgeb. Südsee, 485. 1900. TYPE: INDONESIA: MOLUCCAS: Kepulauan Banda, Bandanaira (= Bandaneira), Aug. 1899, *K. Lauterbach 3034* (HOLOTYPE: B (presumably destroyed); ISOTYPE: L!).

Delarbrea paradoxa var. *balansae* R. Viguier in J. Bot. (Morot) II. **3:** 55. 1925. TYPE: NEW CALEDONIA: Collines ferrugineuses situées à l'embouchure de la rivière Ouaïlou (Houaïlou), *B. Balansa 2209a* (LECTOTYPE: P!, here designated; ISOLECTOTYPE: P!).

Delarbrea paradoxa var. *macrophylla* R. Viguier in J. Bot. (Morot) II. **3:** 55. 1925. TYPE: NEW CALEDONIA: Bois des environs de Bourail, terrains schisto-feldspathiques, *B. Balansa 977* (LECTOTYPE: P!, here designated; ISOLECTOTYPES: HUH!, L (2 sheets)!, P (3 sheets)!, Z!).

Leaves (35–) 40–70 (–85) cm. long; leaflets 11–19, narrowly ovate to elliptic-oblong, 10–22 × (3.5–) 4–8 cm. Primary axis of inflorescence 35–60 cm. long, the bractlets of secondary axes and involucre (3–) 5–10 mm. long, elliptic to linear-ovate, adaxially concave, early caducous, the umbellules with (15–) 20–40 flowers, the pedicels (2.5–) 3–10 mm. long. Petals 1.6–2.2 mm. long. Filaments 1.5–3.2 mm. long, the anthers 1–1.5 mm. long. Mature fruit globose to ovoid, 6–10 mm. long.

Delarbrea paradoxa subsp. *paradoxa* is by far the most common and wide-ranging member of the genus (FIGURE 2), and, according to Philipson (1979), it has the largest distribution of any Malesian Araliaceae. Nevertheless, it shows considerable morphological uniformity throughout its extended range. It generally occurs in rain forests,

although in New Caledonia it has also been collected in disturbed and seasonally moist forests, at forest edges, and in relatively rich, undisturbed maquis. In Vanuatu and New Caledonia, this taxon is generally found from sea level to about 600 m., although

FIGURE 1. *Delarbrea paradoxa* subsp. *paradoxa*. A, leaf and infructescence, × 0.4; B, fruit, × 2; C, branch of infructescence, × 0.35; D, leaflet and part of a leaf, × 0.4; E, flower at anthesis, × 10; F, part of a juvenile leaf, × 0.35; G, juvenile leaflet, × 1.

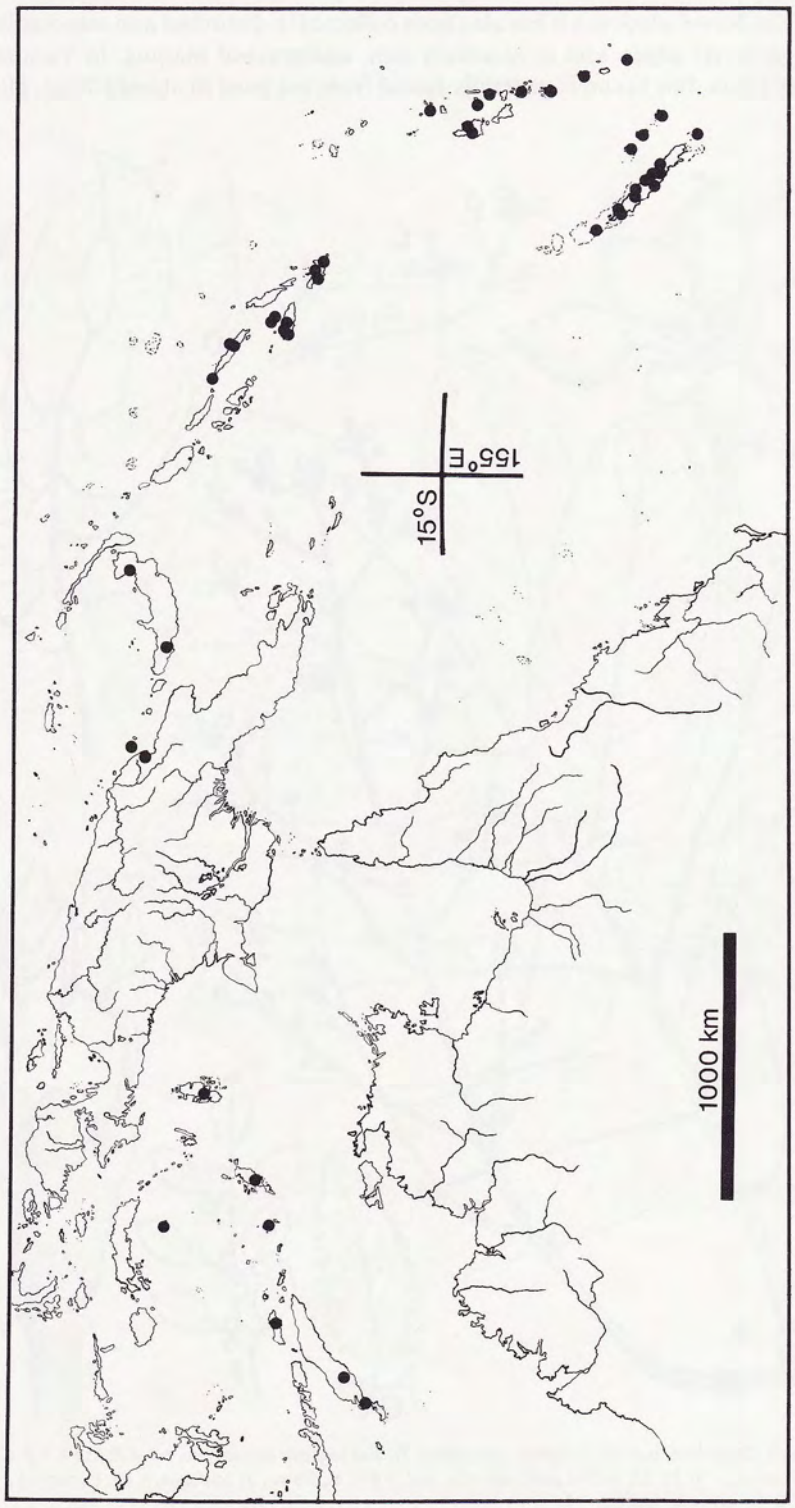

FIGURE 2. Geographic distribution of *Delarbrea paradoxa* subsp. *paradoxa*.

one collection from Mt. Tabwemasana on Santo gives an elevation of 1,600 m. In Indonesia and New Guinea, however, *D. paradoxa* subsp. *paradoxa* can often reach to nearly 1,000 m. Fertile material has been collected in every month of the year, but flowering appears to peak between April and August, with maximum fruit set occurring from July to January. In New Caledonia, *D. paradoxa* subsp. *paradoxa* has been collected on ultrabasic soils as well as those derived from metamorphic substrates such as schist, and on calcareous materials, including uplifted coral and limestone.

Vieillard described *Delarbrea paradoxa* in an article that appeared in Volume 9 of the *Bulletin de la Société Linnéenne de Normandie.* As indicated in the last pages of that volume, Vieillard's paper was read before the Société during its meeting of 2 May, 1864, but it has not been possible to determine the exact date on which the article was published. A reprint of the article, however, was presented to the Société Botanique de France on 17 April, 1865 (cf. J. Soc. Bot. France **12:** 173. 1865), clearly indicating that it appeared at some time prior to that date (S. Barrier, pers. comm.).

Lectotypification of *Delarbrea paradoxa* is necessary because the suite of specimens bearing the number *Vieillard 627* clearly represents four collections taken in varying stages of development and bearing somewhat different label data. As indicated above, the numbers appearing on Vieillard's specimens refer to what he considered a single species, rather than to material from one gathering. For matters of convenience and clarity, I have marked the different collections of *Vieillard 627* with the letters *"A"* through *"D."* The lectotype has been chosen from among the specimens that make up *Vieillard 627"A",* for several reasons. This number comprises the best preserved and most representative material, with both leaves and flowers. Also, the label data on these specimens correspond most closely to those given in the original publication. Furthermore, *627"A"* is the most widely distributed part of the original material.

A single specimen at the Arnold Arboretum bearing a label for *Vieillard 627* is actually a collection of *Delarbrea collina* and probably represents part of *Vieillard 625.* This, however, cannot be determined with certainty, and so the specimen has been marked *627"E",* and cited under *D. collina.*

Cupania juglandifolia was described in a footnote to the treatment of Sapindaceae in Seemann's *Flora Vitiensis* and was based on a Forster collection from New Caledonia. Examination of the type material from BM, mounted on two sheets, clearly shows that it is referable to *Delarbrea paradoxa* subsp. *paradoxa.* One of the two BM specimens contains a fertile branch, with leaves and a young inflorescence in bud, and that one is here designated as the lectotype; the other has only a single leaf. A third specimen, at LIV, with a very immature inflorescence, was presumably not seen by Seemann.

Baumann-Bodenheim (1974) cited three collections from Oua Tilou in New Caledonia *(Guillaumin & Baumann-Bodenheim 12275, 12303,* and *12312)* as representing a new species of *Delarbrea;* although no name or description was given, and the taxon was never published. These specimens clearly belong to *D. paradoxa* subsp. *paradoxa* and do not constitute a new species. Also, two specimens of *D. paradoxa* subsp. *paradoxa* collected by R. Parkinson on New Britain were identified by Harms as representing a new species, but the name has remained unpublished.

ADDITIONAL SPECIMENS EXAMINED:

Indonesia. LESSER SUNDA ISLANDS. TIMOR: Bibiçuçu, bud, *H. O. Forbes 4042* (BM). Niki-Niki, S. Central Timor, 700 m., fl., *M. C. Walsh 247* (BM). Laut, fr., *H. O. Forbes 3388* (BM, K, L). Without precise locality, bud, *H. O. Forbes 3662a* (BM), bud, *3641* (BM), fr., *3756* (BM), bud, *3899* (BM, L). WETAR: 24 km. N. of

Ilwaki, along Meta Lerai River, 700–900 m., fr., *S. Bloembergen 3573* (BM, HUH, K, L). BABAR: fr., *Riedel s. n.* (K). MOLUCCAS. ARU ISLANDS: Aru, P. Woham, ster., *P. Buwalda 5024* (L); without precise locality, Sep. 1874, ster., *Moseley s. n.* (K), fr., *Riedel s. n.* (K).

Papua New Guinea. MADANG DIST. KARKAR ISLAND: Mom, 900 m., fr., *C. E. Ridsdale NGF 36736* (BRI, HUH, K, L, NSW). BISMARCK ARCHIPELAGO. NEW BRITAIN: Dist. West, Subdist. Hoskins, Miller mapping point, 345 m., *P. F. Stevens & Y. Lelean LAE 58532* (L); without locality, 1901, fl., *R. Parkinson 15* (NSW), fr., *78* (NSW). SOLOMON ISLANDS. BOUGAINVILLE: Maisua, fr., *J. H. L. Waterhouse 536-B* (K, L).

Solomon Islands. SANTA ISABELA. Edge of village, 25 m., fr., *P. F. Hunt RSS 2667* (K). BAROLA FA. Mt. Sears area, 8 m., fr. *R. Mauriasi BSIP 16515* (L). KARUO. fl., *T. C. Whitmore BSIP 2679* (L). SANDFLY. 10 m., fr., *R. Mauriasi BSIP 18193* (K, L). BIG NGGELA. N. of Haleta Village, 15 m., fr., *I. G. Gafui BSIP 15069* (K, L). SMALL NGGELA. Mookolonga area, 150 m., fr., *I. H. Gafui BSIP 15494* (K, L). GUADALCANAL. Lambi Bay area, 350 m., fr., *R. Mauriasi BSIP 12486* (K, L). Konga, 8 km. inland, fl., fr., *T. C. Whitmore BSIP 2559* (K, L). E. slopes of Mt. Gallego, 450 m., fr., *T. C. Whitmore RSS 2084* (BRI, CANB, HUH, K, L, P). Wander Bay area, 180 m., fr., *R. Mauriasi BSIP 12216* (K, L). Honiara, above Vavaya Ridge, fr., *C. Morrison 213* (K, L). Rove Valley, Honiara, 50 m., fr., *A. Nakisi BSIP 8002* (K, L). Rove to White River area, first E.-W. ridge, 20 m., fr., *F. Kere BSIP 4973* (K, L). SAN CRISTOBAL. Waimamura, fr., *L. J. Brass 2679* (BM, BRI, G, HUH, L). Marogu area, 6 m., fr., *I. H. Gafui BSIP 10949* (K, L). Wairaha River, 8 km. from N. coast, fr., *T. C. Whitmore BSIP 4270* (L), *4347* (K, L). Tiuwe, bud, fl., *R. B. Comins 72* (K). Ridge W. of Tetere Village, 10 m., fl., *I. H. Gafui BSIP 12579* (K, L). Anganawai area, 10 m., bud, fl., fr., *I. H. Gafui BSIP 11038* (K, L). Namunga, Star Harbour area, 110 m., fr., *I. H. Gafui BSIP 10999* (K, L).

Vanuatu. BANKS ISLANDS. VANUA LAVA: Rain forest, 200 m., fr., *S. F. Kajewski 412* (BRI, HUH, K, NY, P). SANTO. Hog Harbor, rain forest, *I. & Z. Baker 72* (BM), *295* (BM). Mt. Tabwemasana, bud, fr., *A. N. Gillison & A. E. Beveridge RSNH 3521* (HUH, K, NOU, NSW, P); contrefort N.O., forêt de crête, 1,600 m., bud, fr., *J. Raynal RSNH 16352* (K, NOU, NSW). Vallée de la Pialapa, 420 m., *B. Suprin 324* (NOU, P). Crête N.O. du Tabwemasana, 1,400 m., *J. M. Veillon 2442* (NOU, P). AOBA. Without locality, bud, *A. Morrison s. n.* (K). PENTECOST. Vallée au Sud de Melsisi, *P. Cabalion 1160* (NOU). MALEKULA. Tisbel, *N. Hallé RSNH 6310* (P). EPI. Coté Sud du relais radio, Burumba, *P. Cabalion 929* (NOU, P). Mt. Savie, Baie Nelson, 450 m., *A. de la Rue s. n.* (P). EFATE. Near Rentapao, disturbed forest, 5 m., bud, fr., *P. S. Green RSNH 1096* (K, NOU, NSW, P). Vallée de Port-Vila, *D. Levat s. n.* (P). ERROMANGA. Fedmoghum Sud, 300 m., *P. Cabalion 1474* (NOU, P). Potiraousak, 330 m., *P. Cabalion 1699* (NOU). Nouankao River, *Agathis* forest, 150 m., fr., *Chew W.-L. RSNH 124* (K, NOU, NSW, P). Vicinity of Nouankao Camp, rain forest, 150 m., fr., *P. S. Green RSNH 1275* (K), fl., fr., *1277* (HUH, K, NOU, NSW, P). Dillon Bay, rain forest, sea level, bud, fl., *S. F. Kajewski 269* (BRI, HUH, K, NY, P, US). Summit of peak S. from Dillon's Bay, fr., *A. Morrison s. n.* (HUH, K). Au N. du Camp du km. 17, 450 m., *J. Raynal RSNH 16218* (K, NOU, NSW). S. E., forêt à Kaoris, 200–300 m., *M. Schmid 3156* (NOU). ANEITYUM. Centre-Sud, forêt néphéliphile de crête, 600 m., *M. Schmid 3921* (NOU, P). In vicinioribus Anawounamalo, malo per setitam ad rivum Inwa Lelgey, 10–180 m., *L. Bernardi 12945* (G, K, L, P). Ridge between Nitchiemhang and Nepeso valleys, N. N. E. of Anelgaohat, 200 m., bud, *Chew W.-L. RSNH 65* (K).

New Caledonia. ÎLES BÉLEP. ÎLE POTT: fr., *T. Jaffré 1615* (MO, NOU, P). ÎLE ART: Plateau Nord, 220 m., fr., *H. S. MacKee 30458* (G, MO, NOU, P). GRANDE TERRE. Crêtes calcaires au S. E. de la Corne de Koumac, 250 m., bud, fl., *H. S. MacKee 25238* (P), *25255* (B, CANB, HUH, K, MO, NOU, P, Z). Koumac, bud, *A. U. Däniker 1716* (P, Z). Haute Tipindjé, base ouest du Mt. Poindas, 250 m., fr., *H. S. MacKee 22105* (B, G, L, MO, NOU, P). Koné, route de la mine Confiance, fr., *J. M. Veillon 1899* (MO, NOU, P). Balade, fr., *Vieillard 627"C"* (P). Oubatche, 800 m., fr., *T. Lécard s. n.* (HUH, P, Z). Touho, Ponandou, 50 m., fr., *P. P. Lowry II 3256* (MO, P), fr., *3905* (MO, NOU, P), juv. lf., *3906* (MO, NOU, P); 150 m., bud, *H. S. MacKee 38045* (BR, G, HUH, L, MO, NOU, P). Wagap, fr., *Vieillard 621* (G, P), *627"B"* (P), *2679* (P). Basse Amoa (rive droite), fr., *H. S. MacKee 23947* (K, MO, NOU, P, Z). Poindimié, 50 m., fr., *H. S. MacKee 17221* (L, MO, NOU, P, Z), fr., *35466* (G, P). Monéo, 30 m., bud, *H. S. MacKee 14780* (P), fr., *27566* (G, K, MO, NOU, P). Houaïlou, Hô, 5 m., fr., *H. S. MacKee 20837* (BR, CANB, G, K, MO, NOU, P, Z). Poro, 30 m., fl., fr., *H. S. MacKee 14785* (BR, G, K, MO, NOU, P). Région de Kouaoua, 90 m., fr., *T. Jaffré 251* (NOU, P). Crête Katrikoin–Haute Kouaoua, 600 m., fr., *H. S. MacKee 41512* (B, MO, NOU, P). Bourail, juv., *Lécard s. n.* (P). Mt. Kopéa, fr., *A. U. Däniker 93* (Z). Sarraméa, Couli, 150 m., fr., *H. S. MacKee 24965* (CANB, HUH, MO, NOU, P, Z). Col de Petchicara, side toward Makoué, fr., *R. F. Thorne 28407* (P). Col de Petchicara (versant de Dothio), 300 m., fr., *H. S. MacKee 16106* (BR, CANB, G, K, L, MO, NOU, P). Dothio River valley, 50–100 m., fr., *G. McPherson 5396* (BISH, G, NOU, MO, P). Forêts du Dotio (Dothio), fr., *B. Balansa 3389* (P). Kanala à Uarail (= Canala à Bourail), juv., *Mazagot s. n.* (P). Baie de Thio, fr., *T. Lécard s. n.* (MEL, MO, NY, P). E. S. E. of Thio toward St. Roche, 5 m., fr., *P. P. Lowry II 3243* (MO, NOU, P), *G. McPherson 5893* (MO). Oua Tilou, 300 m., fl., *A. Guillaumin & M. G. Baumann-Bodenheim 12275* (L, Z), ster., *12303* (Z), juv. leaf, *12312* (Z). Ouraï, 13 Sep. 1876, fr., *T. Lécard s. n.* (MEL, MO, NY, P, Z). Mt. Mou, fl., *Godefroy s. n.* (L). Karikouye (= Karikouié), 150 m., juv., *Cribs 1660* (P). Nouméa, bud, *Vieillard 627"D"* (P). Baie de Prony, fl., *Godefroy s. n.* (L). ÎLE DES PINS. Îlot Brosse, fl., *G. Denizot s. n.* (P), fr., *R. Virot 994* (P). Road toward old sawmill, E. of Gadji, 5 m., fr., *P. P. Lowry II 3298* (MO), bud, fr., *3299* (MO, P). Forêt de Gadji, fr., *M. Hoff 2401* (NOU), fr., *H. S. MacKee 14057* (MO, P). About halfway from Baie de Kuto to the trailhead to Pic N'Ga, 10 m., bud, *P. P. Lowry II 3290* (MO, P), fl., *3743* (K, MO, NOU,

P), juv. leaf, *3744* (K, MO, NOU, P, US). Baie de Kuto, 5 m., juv. leaf, *P. P. Lowry II 3300* (K, MO, NOU, P); 10 m., fl., fr., *H. S. MacKee 14076* (BR, L, MO, NOU, P, Z), fr., *22277* (MO, NOU, P). Trail to Île Koungouati, Tribu de Touété, 10 m., fl., *P. P. Lowry II 3750* (BISH, G, K, MO, NOU, P, US), juv. leaf, *3751* (MO, NOU, P). Presqu'île d'Oro, Baie d'Upi, fr., *Ph. Morat 5752* (G, K, MO, NOU, P). Without precise locality, fr., *Le Rat 84* (P), fl., *Pancher 202* (= *Muséum Néocal. 244"A"*) (K, P). ÎLES LOYAUTÉ. OUVÉA: Crête du Casse-cou, Anawa, fr., *J. P. Blanchon 1522* (NOU). Route de St. Thomas, fl., *D. Bourret 796* (NOU). St. Paul, fl., *A. U. Däniker 1963* (P, Z). St. Joseph, fl., *A. U. Däniker 1963a* (Z). Naboba (Gossona (= Gossanat)), fl., fr., *A. U. Däniker 1963b* (P, Z). Côte est à la hauteur d'Ouloup (St. Gabriel), fl., fr., *H. S. MacKee 18944* (MO, NOU, P). LIFOU: Koumo, ster., *A. U. Däniker 2294* (Z). Route de Wanaham, fr., *Huguenin s. n.* (NOU). Mutchaweng, 30 m., bud, *H. S. MacKee 27185* (G, MO, P). S. E. du Cap Lafon, 90 m., fr., *H. S. MacKee 28289* (G, MO, NOU, P). Between Chépénéhé and Nang, bud, *G. McPherson 6614* (MO). Secteur de Hapetra, bud, fl., *M. Schmid 679* (NOU). Entre Wé et Hapetra, bud, fl., *J. M. Veillon 4085* (NOU, P). Sur le plateau, fr., *M. Schmid 989* (NOU). Without precise locality, fl., *B. Balansa 2209* (P), fl., *S. J. Whitmee 23* (BM, G), fr., *Deplanche s. n.* (K, P). MARÉ: 50 m., fr., *Ph. Morat 7730* (NOU, P). Secteur de Lion, fl., *M. Schmid 2190* (NOU). To, fr., *M. G. Baumann-Bodenheim 14702* (P, Z). Rawa, bud, *M. G. Baumann-Bodenheim 14717* (NY, P, Z), fr., *14735* (HUH, ILL, NY, P, Z). Ro, fr., *A. U. Däniker 2663* (Z), *2664* (Z). Pédé, 20 m., bud, fl., fr., *H. S. MacKee 25455* (MO, NOU, P). NEW CALEDONIA, without locality, fr., *Brousmiche s. n.* (P), fr., *Deplanche 373* (P), fr., *I. Franc 1281* (BM), juv., *Lahaie 1475* (P), fr., *J. F. Roberts s. n.* (MEL), fl., *Tiebaud 252* (P), fr., *Vieillard 611* (P), fl., *611'* (P). Nélembaye, 600 m., fl., fr., *T. Lécard s. n.* (P).

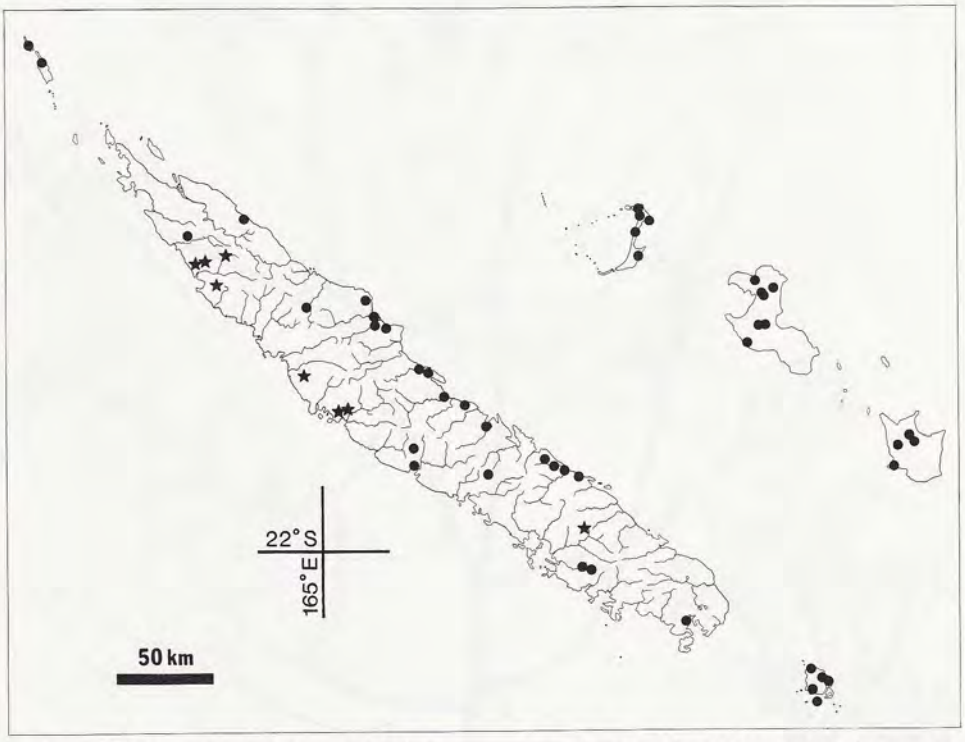

FIGURE 3. Geographic distribution of *Delarbrea paradoxa* subsp. *paradoxa* (●) and subsp. *depauperata* (★) in New Caledonia.

1b. **Delarbrea paradoxa** subsp. **depauperata** Lowry, subsp. nov. TYPE: NEW CALEDONIA: Southern slopes of Mt. Kaala, above village (of Kaala-Gomen), dense scrub, peridotite, 150 m., 6 Oct. 1982, *G. McPherson 4944* (HOLOTYPE: MO!; ISOTYPES: BISH!, G!, K!, MO!, NOU!, P!, US!). FIGURES 3, 4.

Folia (18–) 20–30 cm. longa; foliolis 7–13 (–15), ovatis vel late ovatis, 6–9 × 2–4.5 cm. Inflorescentia axe primario 20–30 (–55) cm. longo, bracteolis axium secundorum involucrique 1–2 mm. longis, triangularibus vel subulatis persistentibus, umbellulis

4–15 (–20) floribus praeditis, pedicellis 1–3 (–3.5) mm. longis. Petala 1–1.5 mm. longa. Filamenta 0.6–1 mm. longa; antheris 0.5–0.8 mm. longis. Fructus maturi globosi, 5–8 mm. longi.

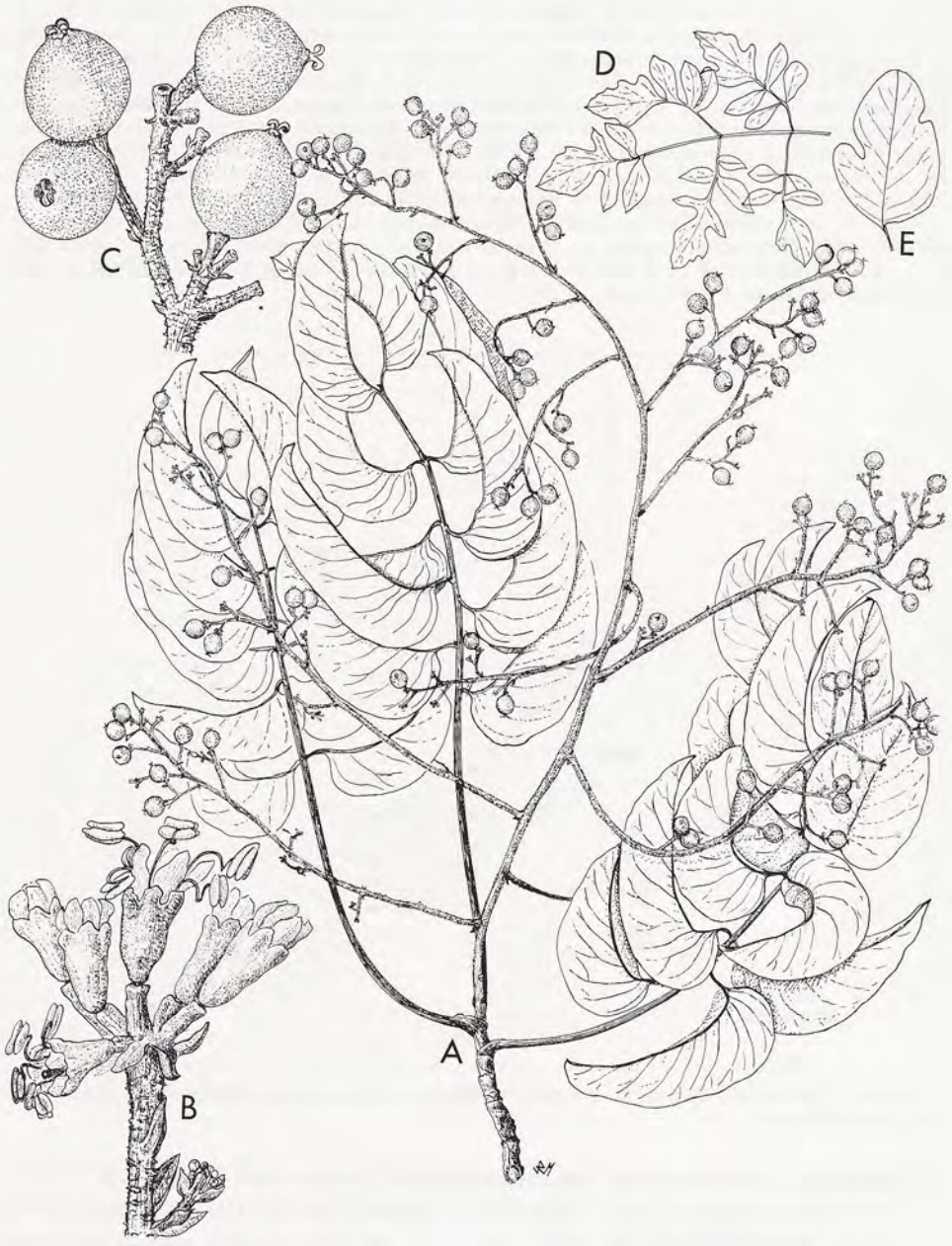

FIGURE 4. *Delarbrea paradoxa* subsp. *depauperata*. A, leaves and infructescence, × 0.4; B, umbellule of hermaphrodite flowers at anthesis, × 8; C, fruit, × 2.5; D, part of a juvenile leaf, × 0.35; E, juvenile leaflet (transitional from juvenile to adult), × 0.35.

This subspecies occurs exclusively in relatively dry, low, often somewhat disturbed maquis vegetation on ultrabasic soils, and is primarily restricted to the northwest coast of the island, from near sea level to about 400 m. in elevation. The only exception known to date is a single, disjunct population in the Tontouta River valley, nearly 100 km. to the south (FIGURE 3). The edaphic conditions and general aspects of the vegetation in this location are, however, very similar to those found in the rest of this taxon's range. *Delarbrea paradoxa* subsp. *depauperata* flowers from March to June, although fruiting specimens have been collected throughout most of the year.

The two subspecies of *Delarbrea paradoxa* have mutually exclusive geographic distributions and show a clear difference in habitat preference. The typical subspecies occurs in forest formations throughout nearly all of its range, generally in areas of considerable rainfall, in contrast to the dry maquis occupied by subsp. *depauperata*. Also, the few populations of subsp. *paradoxa* that occur in maquis vegetation are all in zones of moderate rainfall. It is likely, therefore, that *D. paradoxa* subsp. *depauperata* represents an allopatric derivative of the typical subspecies that is adapted to the comparatively dry conditions of the west coast of New Caledonia. This pattern of adaptation and speciation from forests into the maquis is very common and appears to account for a large fraction of the plants comprising this vegetation type (Morat et al., in press).

ADDITIONAL SPECIMENS EXAMINED:

New Caledonia. GRANDE TERRE. R. T. 1, 5 km. N. of Kaala-Gomen, 40 m., ster., *P. P. Lowry II 3784* (MO, P), juv. leaf, *3785* (MO). Pente S. du Mt. Kaala, 100 m., fl., *H. S. MacKee 12753* (BR, CANB, G, K, MO, NOU, P, Z); 100–300 m., fr., *H. S. MacKee 16638* (MO, NOU, P). Gomen, Ouéholle, 300 m., bud, fl., *H. S. MacKee 26468* (G, MO, NOU, P, Z). Mt. Ouazangou, 200–500 m., fr., *H. S. MacKee 17524* (G, HUH, K, L, MO, NOU, P, Z); 400–600 m., bud, *H. S. MacKee 25095* (BISH, BR, CANB, G, K, MO, NOU, P), juv. leaf, *25096* (NOU, P). Plateau de Tiéa, 200–400 m., fl., *H. S. MacKee 18602* (K, MO, NOU, P). Massif de Boulinda, en dessous Mine St. Louis, fr., *T. Jaffré 1165* (NOU), fr., *1226* (NOU, P), fr., *2609* (NOU, P). Poya, Avangui, 100–200 m., fl., *H. S. MacKee 29988* (G, P), juv. leaf, *29989* (G, P). Haute Tontouta, branche N., 300 m., bud, *H. S. MacKee 30271* (MO, P).

2. **Delarbrea harmsii** R. Viguier in J. Bot. (Morot) II. **3**: 52. 1925. TYPE: NEW CALEDONIA: Montagnes à Oubatche, 700 m., *R. Schlechter 15460* (HOLOTYPE: P!; ISOTYPE: B, presumably destroyed). FIGURES 5, 6.

Polyscias gigantea R. Viguier in J. Bot. (Morot) II. **3**: 72. 1925. TYPE: NEW CALEDONIA: Sommet (de la Table) Unio, 1,350 m., *T. Lécard s. n.* (LECTOTYPE: P!, here designated).

Hermaphrodite trees 3–12 m. tall. Leaves 75–130 cm. long; leaflets 15–25, flat, dark green above, lighter beneath, coriaceous, broadly ovate to elliptic-oblong, 12–30 × 7–14 cm., the lowermost reduced, the tertiary venation evident above, the apex broadly acute to obtuse or retuse, the margin entire, the base obtuse to truncate; petiolules 8–40 mm. long; petiole terete to laterally compressed and elliptical, but never flattened adaxially, often sparsely lenticellate at base. Inflorescence erect, smooth to somewhat lenticellate at base, the bractlets evident, somewhat foliaceous, triangular-ovate, often exceeding 15 mm. long, the primary axis 20–60 cm. long, 10–20 mm. in diam. at base, the secondary axes (12–) 15–25, scattered, 30–45 cm. long, with 1–4 terminal and 13–25 lateral umbellules of hermaphrodite flowers, the peduncles (tertiary axes) 25–80 mm. long, with 2–7 scarious bractlets each 4–8 mm. long along the axis, the umbellules (1.5–) 2–3 mm. in diam. in flower, enlarging to 40–60 mm. in fruit, with about 20–40 flowers, the involucre of 5–8 rounded to ovate, adaxially concave bractlets each 3–6 mm. long, the pedicels deep rose-pink, 3–12 (–14) mm. long, 0.5–1 mm. in diam., free or occasionally 2 (or 3) united basally. Sepals rose-pink below, the lobes light yellow-green, 0.4–0.8 mm. long, not expanding in fruit. Petals yellow-green, 2–2.5 mm. long. Filaments 1.2–1.5 mm. long, the anthers 2.4–2.8 mm. long. Ovary 2–3 mm. long at anthesis, the styles 2.2–2.6 mm. long at anthesis, expanding to 3–4 mm. in fruit. Mature fruit blackish purple, ovoid, (13–) 17–25 mm. long, ribbed when dry.

FIGURE 5. *Delarbrea harmsii.* A, branch of an infructescence, × 0.4; B, part of a leaf, × 0.4; C, fruit, × 1.5; D, flower before anthesis, × 6.

This species occurs in wet forests on metamorphic substrates from about 300 m. to well over 1,000 m. in elevation (FIGURE 6). It is the largest member of the genus and is

easily recognized by its stout, erect inflorescence and large, broad leaflets. *Delarbrea harmsii* flowers throughout the year, although there is a peak from January to June, while fruit set occurs from September to February.

Delarbrea harmsii is unique in the genus in having exclusively hermaphrodite flowers (i. e., all of its flowers have the capacity to produce seeds as well as viable pollen); staminate flowers are unknown in this species. Recent work suggests that this represents a derived feature resulting from the conversion of staminate flowers to the hermaphrodite condition, rather than by the loss of staminate flowers or umbellules (Schlessman, Lowry, and Lloyd, unpubl. data). The secondary inflorescence axes of this species have a terminal and numerous lateral umbellules of hermaphrodite flowers. By contrast, in *D. longicarpa,* which appears to be the closest relative of *D. harmsii,* many of the lateral umbellules have staminate flowers. This andromonoecious breeding system and associated inflorescence structure are also found in the other species of *Delarbrea,* as well as in all the members of the closely related genus *Myodocarpus,* strongly suggesting that it represents the primitive condition for the group.

The name *Polyscias gigantea* was based on a mixed collection comprising a leaf of *Delarbrea harmsii* and fruit of a species of *Cissus.* Since the original description is based primarily on the leaf, that part has been chosen as the lectotype, in accordance with Article 9.2 of the *International Code of Botanical Nomenclature* (Voss et al., 1983).

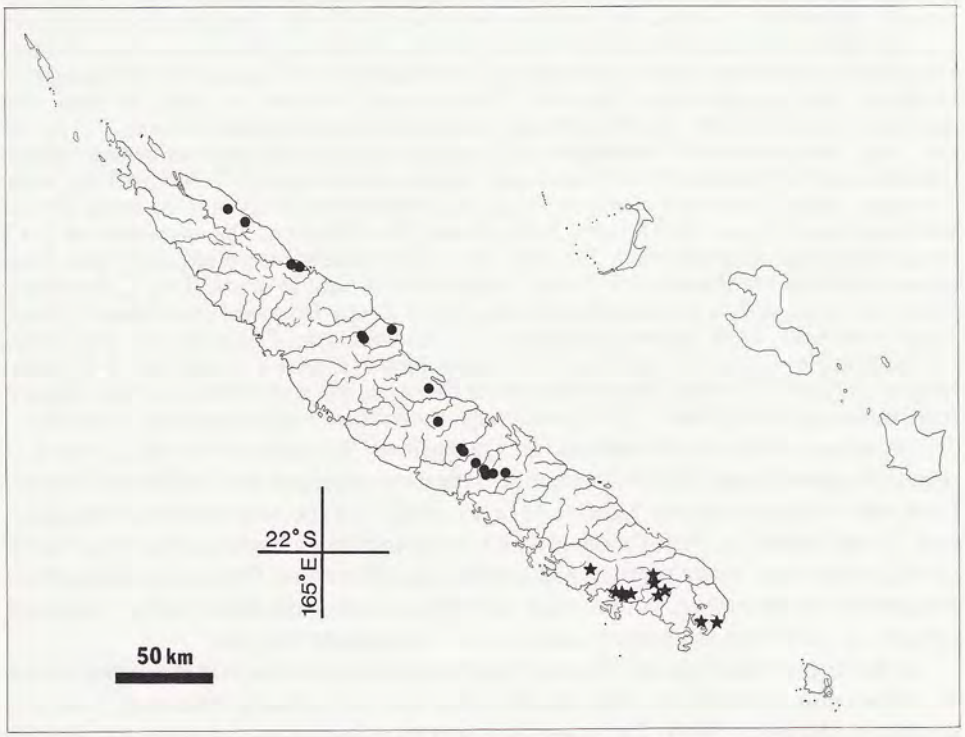

FIGURE 6. Geographic distribution of *Delarbrea harmsii* (●) and *D. longicarpa* (★).

ADDITIONAL SPECIMENS EXAMINED:

New Caledonia. GRANDE TERRE. Montagnes de Balade, bud, fl., *Vieillard 621* (P). Mandjélia, above Pouébo, 600 m., fr., *G. McPherson 6279* (BISH, G, K, MO, P, US, Z). Ignambi, 1,080 m., fr., *H. Hürlimann 3003* (HUH, NY, P, Z). Roches d'Ouaïème, above Ouenguip, 850 m., fr., *P. P. Lowry II 3913* (MO). Massif de Ton-Non (secteur S.), 800–900 m., fl., *H. S. MacKee 18544* (G, MO, NOU, P). S. of Poindimié, 75 m., fl., fr., *P. P. Lowry II 3909* (BM, BR, CANB, F, G, HUH, K, L, MO, NOU, NY, P, QRS, UC, US, Z). Crête entre Haute Tchamba et Haute Amoa (exploitation forestière Letocart), 600 m., fr., *H. S. MacKee 13705* (B, G, MO, NOU, P). Haute vallée de la Tchamba (exploitation forestière Letocart), 400 m., fr., *H. S. MacKee 15700* (B, CANB, G, K, L, MO, NOU, P, Z); 300 m., fr., *H. S. MacKee 21141* (BR, CANB, G, K, L, MO, NOU, P). Mt. Arago, 800 m., fr., *J. M. Veillon 1602* (B, HUH, MO, NOU, P). Plateau du Col des Roussettes, route forestière, près côte 501, vers rivière Ouen-Sieu, fr., *J. P. Blanchon 1044* (NOU, P). Mé Ouié, crête entre la Haute Kouaoua et la Haute Boghen, 700 m., fl., *H. S. MacKee 12857* (CANB, HUH, L, MO, NOU, P, Z). Katrikoin (Haute Boghen), exploitation forestière Launay, 400–500 m., bud, *H. S. MacKee 12809* (G, K, MO, NOU, P). Col d'Amieu, route du Col Toma, 400 m., bud, fl., *H. S. MacKee 13329* (MO, NOU, P). 1 km. au S. du Col d'Amieu, 500 m., bud, *H. S. MacKee 8143* (K, L, P, US). Col d'Amieu, versant de Couli, 400 m., fr., *H. S. MacKee 15027* (HUH, K, L, MO, NOU, P, Z). Plateau de Dogny, trail from Sarraméa, 660 m., fl., fr., *P. P. Lowry II 3685* (BISH, BRI, CANB, K, G, MO, NOU, NY, P, QRS, US); 600 m., fr., *G. McPherson 4922* (BISH, G, HUH, K, MO, NOU, P, US). Koindé, 700 m., fr., *P. Bamps 5814* (BR, P). Without locality, fl., *Pancher 202B* (P), bud, *Pancher s. n.* (P), bud, fl., *Mus. Néocal. 244"B"* (P).

3. **Delarbrea michieana** (F. v. Muell.) F. v. Muell. Second Syst. Census Austral. Pl. 105. 1889. *Porospermum michieanum* F. v. Muell. Fragm. 7: 95. 1870. TYPE: AUSTRALIA: QUEENSLAND: Rockingham Bay, 26 Dec. 1869, *J. Dallachy s. n.* (LECTOTYPE: MEL!, here designated; ISOLECTOTYPE: MEL!). FIGURES 7, 8.

Andromonoecious trees 2.5–5 m. tall. Leaves 90–120 cm. long; leaflets 15–35 (–43), flat, medium green above, lighter beneath, membranous, ovate to narrowly ovate or elliptic, 12–25 × 3–7 cm., the lowermost strongly reduced, the tertiary venation usually evident above, the apex caudate-acuminate, rarely acute, the margin entire, the base broadly attenuate to obtuse or truncate; petiolules 2–10 mm. long; rachis and petiole strongly flattened adaxially for 20–40 cm. from base, with an evident scarious margin. Inflorescence pendent, smooth throughout, the bractlets scarious, narrowly triangular to linear, the primary axis (50–) 60–110 cm. long, 5–8 mm. in diam. at base, the secondary axes (10–) 30–70, often several borne together in a pseudoverticil, (7–) 10–40 cm. long, with a terminal umbellule of hermaphrodite flowers and numerous lateral umbellules of hermaphrodite or staminate flowers, the peduncles 7–30 mm. long, with 1–several minute bractlets along the axis, the umbellules 20–25 mm. in diam. (those with staminate flowers 8–15 mm.), with about 20–40 flowers, the involucre of 5–12 linear-triangular bractlets each 2–4 mm. long, the pedicels rose-pink, 4–10 mm. long (those of staminate flowers 1.5–3 mm. long), 0.3–0.9 mm. in diam., free. Calyx lobes light rose-pink, yellow at margins, scarious, 0.6–1.2 mm. long, not expanding in fruit. Petals rose-pink, light yellow at margins, 2.5–3.2 mm. long. Filaments 2–3 mm. long, the anthers 1.6–1.8 mm. long. Ovary 1.5–3 mm. long at anthesis, the styles 1.5–2.5 mm. long at anthesis (1.5 mm. long in staminate flowers), not expanding in fruit. Mature fruit iridescent steely blue, 15–20 mm. long, the surface finely ruminate when dry.

Delarbrea michieana is endemic to Queensland, Australia (FIGURE 8), where it occurs in various types of rain forest, especially mesophyll and microphyll vine forests, from near sea level to about 1,200 m. (Tracey, 1982). It is the only member of the genus that is not found in New Caledonia and is distinctive in having attractive, highly visible, steely blue fruits that are presumably bird-dispersed. Flowering occurs from September to December, with a peak in fruiting during the same period, although collections with fruit have been made almost throughout the year.

In his original description, Mueller listed *Delarbrea michieana* in synonymy under *Porospermum michieanum;* this combination was not actually validated, however, until later (Mueller, 1889). The name *Porospermum michieanum* commemorates Sir Archibald Michie (1810–1899).

FIGURE 7. *Delarbrea michieana.* A, part of a leaf, × 0.4; B, upper part of an infructescence, × 0.4; C, flower at anthesis, × 7.5; D, fruit, × 1.3.

ADDITIONAL SPECIMENS EXAMINED:

Australia. QUEENSLAND. Timber Reserve 176, Monkhouse, Lorna Doone logging area, 15°48′S., 145°16′E., 450 m., bud, *B. Hyland 12233* (QRS). 1 km. N. of Stuckies Gap, Bloomfield River area, 15°50′S., 145°19′E., ster., *L. J. Webb & J. G. Tracey 8372* (BRI). 28 km. N. N. W. of Daintree, 16°01′S., 145°14′E., fr.,

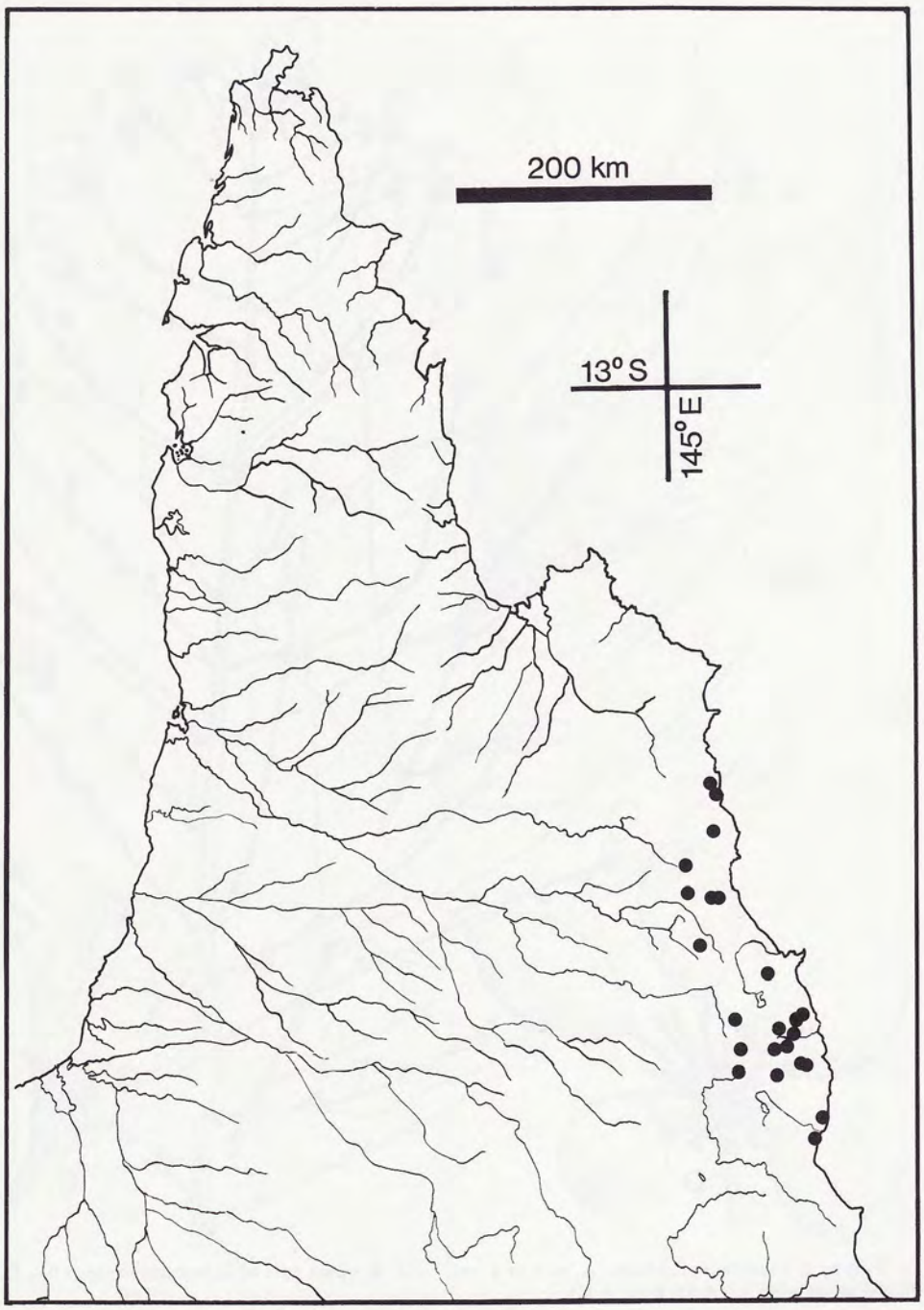

FIGURE 8. Geographic distribution of *Delarbrea michieana*.

D. E. Boyland & J. G. Gillieatt 425 (BRI, CANB, HUH, K, QRS). State Forest Reserve 144, 16°15′S., 145°05′E., Sep. 1983, juv. leaf, *S. Dansie s. n.* (QRS). Mt. Misery on Mt. Carbine tableland, 16°27′S., 145°06′E., 1,300 m., ster., *L. J. Webb & J. G. Tracey 11691* (BRI). Mt. Lewis, 16°30′S., 145°18′E., 1,000 m., fr., *R. Tucker & C.*

Lyons 390 (QRS). Devil Devil Creek, 9.6 km. S. of Mossman, about 16°30'S., 145°20'E., 360 m., fr., *L. S. Smith 3959* (BRI). Mt. Spurgeon, 16°46'S., 145°12'E., fl., fr., *C. T. White 10542* (BRI, HUH). Copperlode Falls Dam site, Cairns, fr., *C. H. Gittins 2201* (NSW). State Forest Reserve 607, 17°05'S., 145°05'E.,ster., *A. K. Irvine 764* (BRI). State Forest Reserve 194, 6 km. W. S. W. of Atherton, 17°17'S., 145°26'E., 1,200 m., fr., *V. K. Morairty 2020* (BRI, QRS). Harvey Creek (Railway Station), 51 km. S. of Cairns, 17°16'S., 145°55'E., 40 m., 9 Nov. 1947, bud, fr., *H. Flecker s. n.* (NSW), fr., *F. M. Bailey s. n.* (K), fr., *W. A. Sayer 270* (MEL). Windin logging area, yield plot 208/36, 17°18'S., 145°44'E., fl., *L. Smith 10427* (BRI). Bellenden Ker, fr., *C. T. White 1269* (BRI, HUH, NSW); 900 m., Jan. 1923, fr., *C. T. White s. n.* (BRI, HUH, NSW). The Boulders Park, 7 km. E. of Babinda, 80 m., young fr., *P. P. Lowry II 3627* (MO). Weinerts Creek, Babinda, 17°20'S., 145°55'E., 80 m., fr., *R. L. Jago 422* (QRS). Russell River, Walt Hill, fl., *F. von Mueller s. n.* (MEL), 1887, fr., *W. A. Sayer s. n.* (MEL), 1889, fr., *W. A. Sayer s. n.* (MEL). 8 km. E. of Lamonds Hill, Atherton Tableland, fr., *I. S. Olsen 370* (BRI, NSW). Atherton Tableland, 5 May 1928, ster., *W. D. Francis s. n.* (BRI). Timber Reserve 1230, Boonjee logging area, 17°23'S., 145°45'E., 700 m., fl., fr., *A. W. Dockrill 1335* (QRS), juv. leaf, *B. Hyland 11819* (QRS). Boonjie, 17°24'S., 145°45'E., fr., *V. K. Morairty 1150* (CANB). Hypipamee Crater, 17°26'S., 145°29'E., 1,000 m., 31 Dec. 1946, fr., *Stephens s. n.* (QRS); The Crater Park, fl., *P. P. Lowry II 3631* (MO). Barong logging area, State Forest Reserve 755, 17°31'S., 145°50'E., 60 m., fr., *G. C. Stocker 1715* (QRS). Johnstone River, Oct. 1915, fr., *N. Michael s. n.* (NSW), Nov. 1915, fr., *N. Michael s. n.* (BRI). Ravenshoe, Jun. 1913, fr., *E. W. Birch s. n.* (K). Downey Creek, State Forest Reserve 756, 17°40'S., 145°45'E., 350 m., bud, *G. C. Stocker 809* (QRS). Mission Beach, S. of Clump Point, 17°52'S., 145°06'E., 1971, *F. H. J. Crome 155* (CANB). Along road from Tully to Mission Beach, 0.7 km. S. W. of turnoff to S. Mission Beach, 15 m., bud, fl., fr., *P. P. Lowry II 3626* (MO, QRS). Rockingham Bay, 26 Dec. 1869, fl., *J. Dallachy s. n.* (MEL), 1899, ster., *J. Dallachy s. n.* (MEL).

4. **Delarbrea longicarpa** R. Viguier in J. Bot. (Morot) II. **3:** 53. 1925. TYPE: NEW CALEDONIA: Forêts situées au-dessus de la Ferme-Modèle, 600 m., Oct. 1869, *B. Balansa 643* (LECTOTYPE: P (mounted on 3 sheets)!, here designated).

FIGURES 6, 9.

Andromonoecious trees 2–6 m. tall. Leaves 80–100 cm. long; leaflets (13–) 15–19 (–21), flat or slightly folded adaxially along midvein, dark green above, lighter beneath, membranous, ovate to narrowly ovate or elliptic-oblong, (12–) 15–28 × (5–) 6–8.5 cm., the lowermost slightly reduced, the tertiary venation somewhat obscure above, the apex acute to acuminate, occasionally caudate-acuminate, the margin entire or often with a pair of small, spinulose-tipped lobes 1–4 cm. below apex, the base broadly attenuate to truncate or occasionally subcordate; petiolules 5–12 mm. long; petiole terete or nearly so. Inflorescence pendent, smooth throughout, the bractlets scarious, narrowly triangular to linear, the primary axis 45–75 cm. long, 4–8 (–10) mm. in diam. at base, the secondary axes (8–) 15–40, scattered, each (6–) 8–35 cm. long, with a terminal umbellule of hermaphrodite flowers and 3–7 (–12) lateral umbellules of staminate (rarely hermaphrodite) flowers, the peduncles (5–) 10–40 (–60) mm. long, with 1–several small bractlets along axis, the umbellules 30–40 mm. in diam. (those with staminate flowers 4–20 mm.), with about 20–40 flowers, the involucre of 8–12 obovate to broadly spatulate, adaxially concave bractlets each 4–7 mm. long, the pedicels 5–12 mm. long (those of staminate flowers 2–4 mm.), 0.4–0.6 mm. in diam., free or rarely 2 (or 3) united basally. Calyx lobes 0.5–0.8 mm. long, the united basal portions forming a prominent collar expanding to 1.5–2.5 mm. high in fruit. Petals yellowish, with venation tinged deep pink, 1.5–2.5 mm. long. Filaments 1.2–1.6 mm. long, the anthers 1.4–1.6 mm. long. Ovary 1.5–2 mm. long at anthesis, the styles 2–3 mm. long at anthesis, only slightly expanding in fruit (1–1.5 mm. long and erect in staminate flowers). Mature fruit blackish purple, narrowly ovoid to cylindrical, 10–16 mm. long, ribbed when dry.

Delarbrea longicarpa is restricted to ultrabasic soils in the southern part of New Caledonia (FIGURE 6), where it occurs in coastal and rain forests from near sea level to about 400 m. elevation. Flowering occurs from January to March, while material in fruit has been collected throughout the year.

Viguier (1925) cited three collections in his original description of *Delarbrea longicarpa,* none of which was designated as the type. Several duplicate specimens of each of these gatherings can be found at P and together they comprise a suite of

syntypes. One of these collections, *Balansa 643,* is the best preserved and most complete, and has therefore been chosen as the lectotype.

FIGURE 9. *Delarbrea longicarpa.* A, upper part of an infructescence, × 0.4; B, part of a leaf, × 0.4; C, leaf bases, × 0.5; D, fruit, × 1.1.

ADDITIONAL SPECIMENS EXAMINED:

New Caledonia. GRANDE TERRE. Partie supérieure de la vallée de Bourail, ravins boisés, fr., *B. Balansa 1523* (P). Mt. Mou, 250 m., fl., *R. H. Compton 514* (BM). Hermitage, 400 m., fr., *M. G. Baumann-Bodenheim 14510* (BRI, HUH, ILL, NY, P, Z). Mt. Algaoué, fr., *A. Guillaumin & M. G. Baumann-Bodenheim 7057* (HUH, ILL, NY, P). Pente au N. de la Conception, 200 m., fr., *H. S. MacKee 16343* (G, HUH, K, MO, NOU, P). Réserve de la Thy, 210 m., fr., *H. Brinon 1326* (NOU). Vallée de la Thy, 200–300 m., fr., *H. S. MacKee 2632* (L, P, US); 100–300 m., bud, *H. S. MacKee 3890* (K, L, P); 200 m., fr., *G. McPherson 1548* (K, MO, NOU, P); slope toward Mt. Koghi, 400–500 m., fr., *H. S. MacKee 4966* (HUH, K, P), fr., *A. Guillaumin 8033* (ILL, P, Z). Route de Yaté, Les Dalmates, 150 m., fr., *H. S. MacKee 39023* (G, MO, NOU, P). Rivière des Pirogues, *Nothofagus* forest on ultrabasic soil, 350–400 m., ster., *A. Gentry, G. McPherson, & M. Crosby 34568* (MO). Haute Rivière des Pirogues, Forêt Faux Bon Secours, 300 m., fr., *H. S. MacKee 35082* (G, K, MO, NOU, P), fr., *A. Nothis 385* (MO, NOU, P). Forêt Bon Secours, 400 m., fr., *A. Guillaumin & M. G. Baumann-Bodenheim 11841* (ILL, P, Z). Rivière Blanche, 400 m., fr., *J. M. Veillon 4568* (NOU, P). Port Boisé, S. of Yaté, 30 m., ster., *P. P. Lowry II 3590* (MO, P), bud, fl., *T. Jaffré 146* (NOU, P), bud, fl., *M. Schmid 2659* (NOU, P), fr., *J. M. Veillon 1926* (MO, NOU, P), fr., *G. McPherson 5155* (MO, P). Prony, fr., *Godefroy 553NC* (P). Without locality, fr., *Deplanche 48* (K, P), fr., *Pancher s. n.* (MO, P).

5. **Delarbrea collina** Vieill. in Bull. Soc. Linn. Normandie **9:** 343. 1865. TYPE: NEW CALEDONIA: .In collibus circa Wagap, fl., *Vieillard 625"A"* (LECTOTYPE: P (mounted on 2 sheets)!, here designated; ISOLECTOTYPES: G (2 sheets)!, K!, L!, NSW!). FIGURES 10, 11.

Andromonoecious trees (1.5–) 2–8 m. tall. Leaves (55–) 70–90 cm. long; leaflets (13–) 17–19, slightly folded adaxially along midvein, medium green above, lighter beneath, membranous, narrowly ovate to ovate-elliptic, (8–) 12–20 × 3.5–8 cm., the lowermost only slightly reduced but often ovate, the tertiary venation somewhat obscure above, the apex acute to acuminate, the margin entire, to deeply lacerate in juvenile foliage, the base broadly attenuate to truncate; petiolules 6–14 mm. long; petiole terete, usually densely lenticellate. Inflorescence pendent, smooth throughout or sparsely to moderately lenticellate at base, the bractlets scarious, narrowly triangular, the primary axis (50–) 60–150 cm. long, 5–9 mm. in diam. at base, the secondary axes (18–) 20–50, scattered, (15–) 30–75 cm. long, the tertiary axes (8–) 15–35 per secondary axis, 4–8 (–10) cm. long, each with a terminal umbellule of hermaphrodite flowers and (3–) 5–20 small, scarious bractlets borne along its length, the uppermost 1–5 often with a small, axillary umbellule of staminate flowers, the umbellules 15–40 mm. in diam. (those with staminate flowers 4–8 mm.), with about 25–40 flowers (10–15 in staminate umbellules), the involucre of 5–7 rounded bractlets each 1–2 mm. long, the pedicels 3.5–8 mm. long (those of staminate flowers 1–2 mm. long), free. Calyx lobes greenish, scarious, especially along margin, 0.2–0.3 mm. long. Petals yellow-green, 1–1.4 mm. long. Filaments 0.8–1.4 mm. long, the anthers 0.6–0.8 mm. long. Ovary 0.8–1.5 mm. long at anthesis, the styles 0.8–1.2 mm. long at anthesis, expanding to 1.2–1.5 mm. long in fruit (0.2–0.5 mm. long in staminate flowers). Mature fruit olive-green, ovoid, 5–7 mm. long, smooth (rarely ribbed) when dry.

This species is endemic to New Caledonia, where it is restricted to wet forests, primarily along the northeast coast (FIGURE 11) from near sea level to almost 250 m. Label data and personal observations indicate that *Delarbrea collina* occurs only on soils derived from metamorphic substrates, although a series of collections from a transition zone between schists and ultrabasic soils was made in the lower Tiwaka River valley. Material in flower has been collected in February, April, and May, while fruiting occurs from October to December.

Vieillard 625, which constitutes the type material for *D. collina,* clearly comprises two different collections, one in flower and the other in fruit, which I have designated as *625"A"* and *625"B",* respectively. Several duplicate specimens subsequently distributed to other herbaria contain material from these two gatherings mounted together, and the different parts have been marked accordingly. The lectotype has been chosen

from among the flowering material that comprises *Vieillard 625"A"* because this collection is better preserved and exhibits more of the distinguishing characters of the species.

FIGURE 10. *Delarbrea collina.* A, branch of an infructescence, × 0.4; B, leaf, × 0.4; C, juvenile leaflet, × 0.5; D, flower at anthesis (anthers and 3 petals removed), × 15; E, flower at anthesis (top view), × 15; F, fruit, × 2.2.

As indicated above in the discussion under *Delarbrea paradoxa* subsp. *paradoxa*, the name *D. collina* has been misapplied to that widespread taxon by a number of recent authors.

ADDITIONAL SPECIMENS EXAMINED:

New Caledonia. GRANDE TERRE. Haute vallée de Hienghène, bud, fl., *H. S. MacKee 14667* (MO, P). Tiwaka, entre Pombéï et Bopope, schistes, 250 m., bud, fl., *H. S. MacKee 25545* (K, MO, NOU, P); Tiwaka, 250 m., bud, *H. S. MacKee 26259* (G, K, MO, NOU, P); Tiwaka, Bobetio (= Bobeitio), 250 m., fl., *H. S. MacKee 26666* (BR, G, HUH, L, MO, NOU, P, Z); Basse Tiwaka, transition schistes-serpentines, 10 m., bud, fl., *H. S. MacKee 38055* (G, K, MO, NOU, P), juv. leaf, *38056* (G, K, MO, NOU, P). In collibus, circa Wagap, fr., *Vieillard 625"B"* (BM, G, K, L, NSW, P). Ad montes, prope Wagap, fl., *Vieillard 627"E"* (HUH). Vallée de l'Amoa, 80 m., fr., *P. Bamps 5889* (BM, BR, NOU, P). Couliné (Nékaté), forest, 300 m., fl., *R. H. Compton 1278* (BM). Col des Roussettes, creek just N. E. of Creek Maillard, 200 m., fr., *P. P. Lowry II 3248* (K, MO, NOU, P), fr., *3604* (MO, NOU, P, US), juv. leaf, *3605* (MO, NOU, P), seedling, *3606* (MO, NOU, P, US). Mé Nou, 500 m., juv., *Cribs 1047* (P).

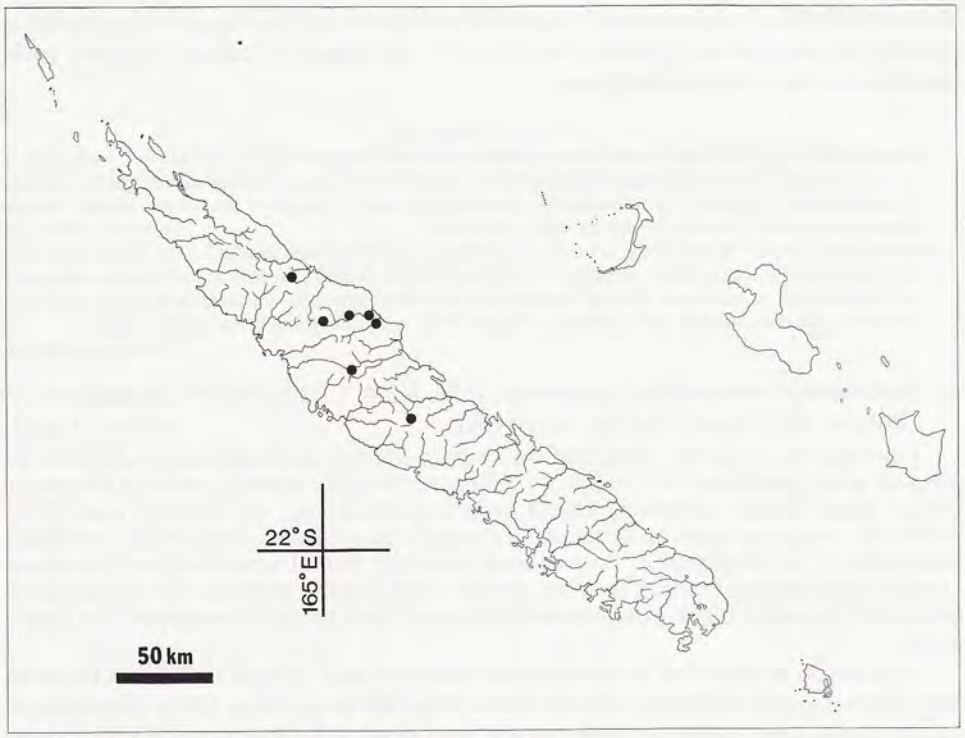

FIGURE 11. Geographic distribution of *Delarbrea collina*.

6. **Delarbrea montana** Vieill. ex R. Viguier in J. Bot. (Morot) II. **3:** 53. 1925.

Andromonoecious treelets or trees 1.5–7 m. tall. Leaves 20–55 (–65) cm. long; leaflets 5–13 (–15), flat or slightly folded adaxially along midvein, dark green and often tinged bluish above, lighter beneath, coriaceous to subcoriaceous, ovate to narrowly elliptic-oblong or linear-oblong, often glaucous, 6–17 × 2.5–7.5 cm., the lowermost reduced, the tertiary venation obscure above, the apex acuminate to obtuse or retuse, the margin entire, the base broadly attenuate to obtuse; petiolules 3–15 mm. long; petiole terete. Inflorescence erect, smooth throughout, the bractlets with scarious margins, triangular to linear, the primary axis 10–65 cm. long, 2–5 mm. in diam. at base, the secondary axes (12–) 15–25, scattered to weakly grouped in pseudoverticils, the lower ones 5–35 cm. long, with a terminal umbellule of hermaphrodite flowers and

(1–) 5–20 lateral umbellules of staminate or hermaphrodite flowers (when hermaphrodite often also with 1–3 umbellules of staminate flowers borne along their peduncles), the peduncles 5–50 mm. long, the umbellules 15–35 mm. in diam. (those with staminate flowers 6–12 mm.), with about 15–25 flowers, the involucre of 5 or 6 ovate-triangular, adaxially concave bractlets each 3–4.5 mm. long, the pedicels purplish, 3–9 mm. long (those of staminate flowers 2–3.5 mm. long), 0.5–0.8 mm. in diam., free or occasionally a few united basally. Calyx lobes tinged purple, with a lighter scarious margin, 0.4–0.6 mm. long, not expanding in fruit. Petals yellow-green, 1.8–2.3 mm. long. Filaments 0.8–1 mm. long, the anthers 1.5–1.8 mm. long. Ovary 1.5–1.8 mm. long at anthesis, the styles 1.5–2 mm. long at anthesis, expanding slightly to 1.8–2.3 mm. in fruit. Mature fruit medium green to yellow-green or occasionally dark purple throughout, often with the apex (including calyx and styles) tinged dark purple or brownish black, 7–16 mm. long, ribbed when dry.

Delarbrea montana is a distinctive species, restricted to the northern part of New Caledonia (FIGURE 14), and is the smallest member of the genus. Two reasonably well-delimited and geographically separated subspecies can be recognized, although a number of intermediate populations occur in the region of contact between their distributions (see discussion below).

KEY TO SUBSPECIES

1. Mature fruit 7–11 mm. long; lowermost secondary axes of inflorescence 5–10 (–14) cm. long, with a terminal umbellule of hermaphrodite flowers and 1–several lateral umbellules of staminate (rarely a few hermaphrodite) flowers, the inflorescence usually with only 2 orders of branching; largest leaflets generally only 2–2.5 times as long as wide, glaucous. ..... 6a. subsp. *montana*
1. Mature fruit (11–) 13–16 mm. long; lowermost secondary axes of inflorescence (12–) 18–35 cm. long, with a terminal and several lateral umbellules of hermaphrodite flowers, the lateral ones usually also with 1–3 umbellules of staminate flowers borne along their peduncles, the inflorescence with 3 orders of branching; leaflets usually 2.5–4 times as long as wide, only occasionally glaucous. 6b. subsp. *arborea*

6a. **Delarbrea montana** subsp. **montana**. TYPE: NEW CALEDONIA: Montagnes de Balade, *Vieillard 625 bis* (P! HOLOTYPE). FIGURES 12, 14.

Leaves 20–35 (–42) cm. long; leaflets ovate to oblong, generally only 2–2.5 times as long as wide, glaucous, 6–12 × 2.5–5 (–5.8) cm., the apex broadly acute to obtuse or retuse. Inflorescence compact, with 2 orders of branching, the primary axis 10–23 (–30) cm. long, the lowermost secondary axes 5–10 (–14) cm. long, with a terminal umbellule of hermaphrodite flowers and 1–several lateral umbellules of staminate (rarely a few hermaphrodite) flowers. Mature fruit usually with the apex tinged dark purple or brownish black or occasionally turning dark purple throughout, 7–11 mm. long.

This taxon is restricted to the extreme northern part of New Caledonia (FIGURE 14), where it grows in maquis and low forest from 500 m. to nearly 750 m. Populations on the Dôme de la Tiébaghi flower in October and set fruit from November to February, while those occurring from the Col d'Amoss to Mt. Mandjélia flower in February and March (with one collection from August) and may have fruit throughout the year.

Interestingly, *Delarbrea montana* subsp. *montana* is not substrate specific; populations occur on both ferrallitic soils on the Dôme de la Tiébaghi and on micaschists in the region of Mt. Mandjélia. Several other taxa also exhibit this pattern of distribution, occurring in both areas (J. M. Veillon, pers. comm.). These include, among others, *Coelospermum monticola* Baillon ex Guillaumin (Rubiaceae), *Halfordia kendac* (Montr.) Guillaumin (Rutaceae), *Podonephelium homei* Radlk. and *Dodonaea viscosa* (L.) Jacq. (both Sapindaceae), *Sloanea montana* (Labill.) A. C. Sm. (Elaeocarpaceae), and *Duboisia myoporoides* R. Br. (Solanaceae).

FIGURE 12. *Delarbrea montana* subsp. *montana*. A, leaves and infructescence, × 0.4; B, leaflet (detail of venation), × 0.6; C, fruit, × 2.2; D, flower (one petal removed), × 7.5.

In his review of New Caledonian Araliaceae, Bernardi (1979) referred to an undescribed species of *Delarbrea* from the Dôme de la Tiébaghi. That plant, however, clearly represents *D. montana* subsp. *montana*.

Viguier (1925) indicates that the type specimens of both *Delarbrea montana* and its variety *arborea* are located in the herbarium of the Faculté des Sciences de Caen. The phanerogamic part of that collection has, however, recently been transferred to the Laboratoire de Phanérogamie in Paris (P).

ADDITIONAL SPECIMENS EXAMINED:

New Caledonia. GRANDE TERRE. Dôme de la Tiébaghi, 590 m., fr., *P. P. Lowry II 3408* (MO); 570 m., fr., *P. P. Lowry II 3791* (MO), fr., *M. Hoff 3081* (NOU), fl., *T. Jaffré 1454* (NOU); 500 m., bud, fl., *H. S. MacKee 21020* (MO, NOU, P), fr., *21335* (BR, HUH, K, MO, NOU, P), fr., *26076* (G, MO, NOU, P), fr., *M. Schmid 2688* (NOU, P). Crête au S. du Col d'Amoss, 700 m., fr., *H. S. MacKee 8030* (P); 550 m., fl., *H. S. MacKee 14570* (P), fr., *14578* (P). Ridge S. of Col de Parari, 600 m., bud, *H. S. MacKee 4778* (P). Pouébo, crête entre Mandjélia et Salandane, 600 m., schistes, fr., *H. S. MacKee 21291* (K, MO, NOU, P), fl., *21633* (B, CANB, L, MO, NOU, P, Z). Haute Diahot, Paala, micaschiste, 600 m., fr., *H. S. MacKee 33456* (G, P). Pouébo, Mt. Mandjélia (exploitation forestière Frouin), 500 m., fr., *H. S. MacKee 20494* (MO, P); 600–700 m., fr., *H. S. MacKee 25220* (P), fr., *B. Suprin 1159* (NOU); Mt. Mandjélia, micaschiste, 750 m., fl., *H. S. MacKee 32785* (G, MO, NOU, P, Z); 650 m., fl., *G. McPherson 4781* (BISH, K, MO, NOU, P, US), fr., *4782* (MO, P); 750 m., fr., *P. P. Lowry II 3268* (MO, NOU, P); 650 m., fr., *P. P. Lowry II 3893* (MO, P); Pic de Pouébo (= Mandjélia), fr., *Deplanche 626* (K, P); Montagnes de Balade (= Mandjélia?), fr., *Vieillard 625 bis* (P), fr., *634 bis* (P), bud, *635* (P).

6b. **Delarbrea montana** subsp. **arborea** (Vieill. ex R. Viguier) Lowry, stat. nov. *Delarbrea arborea* Vieill. ex R. Viguier in J. Bot. (Morot) II. **3:** 54, pro syn. 1925. *Delarbrea montana* var. *arborea* Vieill. ex R. Viguier in J. Bot. (Morot) II. **3:** 54. 1925. TYPE: NEW CALEDONIA: Montagnes de Balade, *Vieillard 626* (HOLOTYPE: P!; ISOTYPES: NSW!, P (2 sheets)!). FIGURES 13, 14.

Leaves (32–) 35–65 cm. long; leaflets narrowly elliptic-ovate to linear-oblong, 2.5–4 times as long as wide, only occasionally glaucous, (7–) 9–17 × 2.5–6 (–7.5) cm., the apex acuminate to acute, occasionally nearly obtuse. Inflorescence diffuse, with 3 orders of branching, the primary axis (20–) 30–65 cm. long, the lowermost secondary axes (12–) 18–35 cm. long, with a terminal and several lateral umbellules of hermaphrodite flowers, the lateral ones usually also with 1–3 umbellules of staminate flowers borne along their peduncles. Mature fruit medium green to yellow-green or occasionally dark purple throughout, (11–) 13–16 cm. long.

This subspecies ranges from the southern slopes of Mt. Mandjélia on the Tendé River to Mt. Aoupinié, more than 110 km. to the southeast (FIGURE 14). It occurs from 350 m. to about 1,000 m., in dense to somewhat open forests, and is restricted to metamorphic substrates, particularly schists and graywackes. Flowering occurs in November and December, and fruiting appears to peak between April and July, although material has been collected in most months of the year.

Both isotypes at P bear herbarium names added by Baillon and Baumann-Bodenheim respectively, but neither name has been published.

ADDITIONAL SPECIMENS EXAMINED:

New Caledonia. GRAND TERRE. Haute Diahot, Tendé (exploitation forestière Frouin), 500–600 m., fr., *H. S. MacKee 20005* (G, K, MO, NOU, P). Mt. Ignambi, 1,000 m., fl., *M. Schmid 2475* (NOU); Crête de l'Ignambi, pente N., 600 m., y. fr., *J. M. Veillon 4300* (NOU). Mt. Panié, 400 m., fr., *P. P. Lowry II 3264* (MO, NOU, P); 920 m., fl., *P. P. Lowry II 3317* (MO, NOU, P); 600–800 m., fl., *H. S. MacKee 13869* (MO, NOU, P); 950 m., fl., *G. McPherson 2200* (MO, NOU, P); 600 m., fr., *J. M. Veillon 2312* (L, MO, NOU, P); 1,000 m., fr., *J. M. Veillon 3608* (NOU, P); 350 m., fr., *J. M. Veillon 5307* (NOU). Inédète, 500 m., fr., *J. M. Veillon 1967* (NOU, P). Poindimié, Povila (= Pohilla), crête schisteuse, 400 m., fr., *H. S. MacKee 26693* (BR, G, K, MO, NOU, P), fr., *28135* (G, MO, P), fr., *31541* (G, MO, P). Exploitation forestière Devillers, au-dessus de la Nohéa, près de Ponérihouen, 400–500 m., fr., *H. S. MacKee 10025* (K, L, NOU, P). Pente E. du Mt. Aoupinié, exploitation forestière Devillers, grauwackes, 500–600 m., fr., *H. S. MacKee 25378* (MO, NOU, P, Z), fr., *26581* (G, MO, NOU, P).

Specimens exhibiting combinations of characters intermediate between the two subspecies of *Delarbrea montana:*

Haute Diahot, Tendé (exploitation forestière Frouin), 500 m., fl., y. fr., *H. S. MacKee 20485* (MO, NOU, P). Piste de l'Ignambi, 700–800 m., fr., *J. M. Veillon 3829* (NOU). Mt. Colnett, 800 m., micaschistes, fr., *M. Schmid 4501* (G); 800–900 m., 27 Oct. 1977, fr., *Latham & Mercky s. n.* (NOU).

While the two subspecies of *Delarbrea montana* are quite distinct throughout most of their ranges, the collections listed immediately above represent morphological intermediates from the area where their distributions come together (FIGURE 14).

FIGURE 13. *Delarbrea montana* subsp. *arborea*. A, leaf and infructescence, × 0.4; B, fruit, × 1.2; C, umbellule just before anthesis, × 4; D, flower at anthesis, × 10.

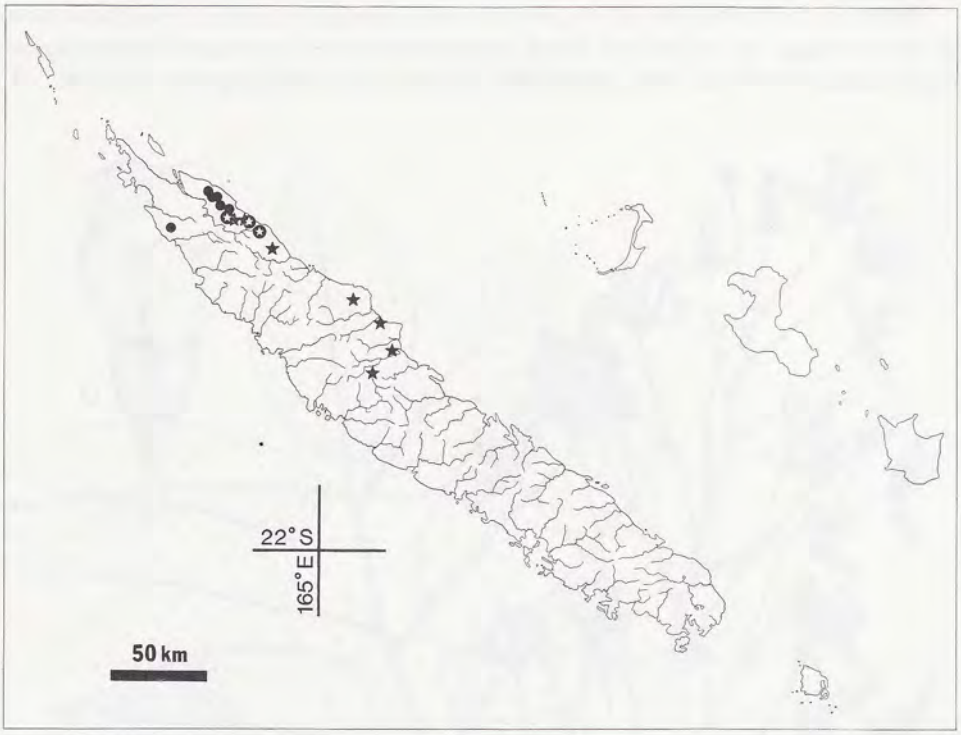

FIGURE 14. Geographic distribution of *Delarbrea montana* subsp. *montana* (●), subsp. *arborea* (★), and intermediate populations (✪).

MacKee 20485, a flowering specimen from the upper Tendé River basin, has an inflorescence typical for *D. montana* subsp. *arborea* but smaller and more compact, approaching that of subsp. *montana.* Despite the proximity of this population to individuals of subsp. *montana* a few kilometers to the north on Mandjélia, another collection made at the same locality *(MacKee 20005)* is readily referable to subsp. *arborea.* A number of specimens collected on Mt. Ignambi also show an intermediate combination of characters. *Veillon 3829* has an inflorescence structure similar to that of subsp. *arborea,* with both terminal and lateral umbellules of hermaphrodite flowers on its secondary axes, but in most other respects this collection is like subsp. *montana. Schmid 2475,* from 1,000 m. on Mt. Ignambi, appears to be a depauperate individual of *D. montana* subsp. *arborea* with a slender, sparsely branched, and poorly developed inflorescence. A third specimen from this area *(Veillon 4300),* however, is clearly referable to subsp. *arborea.* Intermediate collections are also known from Mt. Colnett. *Latham & Mercky s. n.* has fruits and leaves characteristic of subsp. *arborea* but an inflorescence structure like that of the typical subspecies, and *Schmid 4501* is like subsp. *montana* except for its narrow, nonglaucous leaflets. Finally, *MacKee 13869,* from Mt. Panié, has the characters of subsp. *arborea* except for its reduced inflorescence, which approaches that of the typical subspecies in size and structure.

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Synonyms are printed in *italics*, new names in **boldface** type; a page number in **boldface** type indicates a description. Names occurring in illustration legends are not indexed.