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Reappraisal of *Olea* Species in Malesia

RUTH KIEW

Singapore Botanic Gardens, Cluny Road,
Singapore 259569

Abstract

One new species, *Olea moluccensis* Kiew from the islands of Buru and Taliabu, is described and new combinations are made for three Philippine species, *O. gitingensis* (Elmer) Kiew, *O. obovata* (Merr.) Kiew, and *O. rubrovenia* (Elmer) Kiew, all originally described as Linocieras. *Olea decussata* (Heine) Kiew is synonymous with *O. rubrovenia*, *Linociera lauterbachii* Lingelsh. with *Olea paniculata* R. Br.; *L. longifolia* Merr. with *O. gitingensis*, and *L. pallida* (Merr.) Merr. and *L. philippinensis* Merr. with *O. borneensis* Boerl..

Introduction

Following the account of *Olea* for the Malesian region (Kiew, 1979), revision of *Chionanthus* for New Guinea and the Philippines reveals that several species previously described as *Linociera* have to be transferred to the genus. Consequently, nomenclatural changes are required.

Neither Elmer (1913) nor Merrill (1915) reported *Olea* species in their checklists of Philippine plants but both described *Olea* species under *Linociera* (*Linociera gitingensis* and *L. rubrovenia* by Elmer and *L. longifolia*, *L. obovata* and *L. philippinensis* by Merrill). The Philippines has in fact the greatest number of *Olea* species compared with other areas in Malesia (Fig. 1), including three endemics, *O. gitingensis*, *O. obovata* and *O. palawanensis* (Kiew, 1993).

Lingelsheim (1927) also did not include any *Olea* species in his account of the New Guinea Oleaceae but described *Linociera lauterbachii*, which is in fact conspecific with *Olea paniculata* R. Brown (1810).

Olea in Malesia is represented by a 'mixed bag' of species, which can be distinguished into four distinct species groups.

The first group is represented by a single species, *Olea paniculata*, which is unique among Malesian *Olea* species in possessing terminal as well as axillary inflorescences, an indumentum of large lepidote trichomes (even on the petals), hermaphrodite (as opposed to polygamous) flowers, corolla lobes that open widely and are not cucullate, stamens attached at the top of the corolla tube with a distinct filament that fully exposes the versatile anther, large and globose stigmas, and domatia on the leaves including those of the seedling (Brouwer, 1979). These domatia are domed

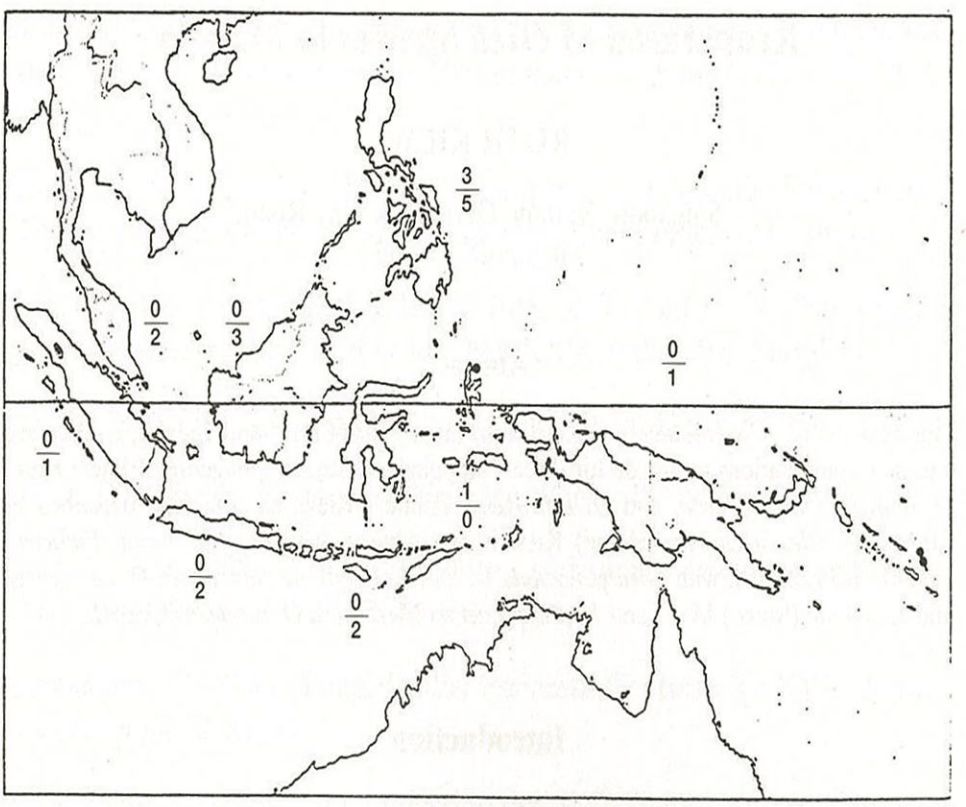


Figure 1. Distribution of *Olea* species in Malesia.
(Upper figure - number of endemic species, lower figure – total number of species)

with a wide mouth, which contains hairs, and so differ from those of *Jasminum*, which are in the form of a dense tuft of hairs.

Olea paniculata belongs to Section *Ligustroides* (Bentham and Hooker,1876), which includes an austro-african group of *Olea* species. In Malesia, it extends from New Guinea westwards to E. Java.

No other Malesian species possesses domatia or large lepidote trichomes, although they do have (as do *Chionanthus* species) small sunken peltate trichomes on the lower leaf surface, which may appear minutely punctate (Kiew & Che Su, 1982). All other species are polygamous with subsessile stamens attached near the base of the corolla tube; cucullate corolla lobes that when open expose only the tip of the anthers; and minute stigmas.

The second group comprises species previously included in the genus *Tetrapilus*. Among these is *Olea brachiata* (Lour.) Merr. (basionym: *T. brachiatus* Lour.), which is characterised by its subserrate leaves. Several other Malesian species, namely *O. borneensis*, *O. palawanensis* and *O. salicifolia* exhibit this character, although it may not be very obvious due to the teeth being small, distant and confined to the margin of the upper half of the lamina.

The third group of species is distinct in possessing entire, coriaceous

leaves that dry pale grey green or fawn and have obscure venation. This group includes three Malesian endemics, viz. *O. moluccensis* (endemic to the Moluccas Islands), and *O. gitingensis* and *O. obovata* (endemic to the Philippines).

The fourth group comprises the two montane species, *Olea javanica* and *O. rubrovenia*. These species differ markedly from the other Malesian species in having entire leaves that dry brownish with the lateral veins conspicuously darker beneath and unthickened petioles that dry black.

Blume described specimens of *Olea javanica* first in 1826 under the genus *Pachyderma* and again in 1828 under the genus *Stereoderma*. Bentham and Hooker (1876) reduced *Tetrapilus* and *Pachyderma* (including *Stereoderma)* to synonomy with *Olea*. Johnson (1957), on the other hand, reinterpreted *Olea* more narrowly to include only those species with lepidote trichomes, entire leaves and terminal and axillary inflorescences, which in Malesia would include only *Olea paniculata*. He then reinstated *Tetrapilus* as a distinct genus, in which he included *Pachyderma* (*Stereoderma)*, to accommodate those species that had dentate or entire leaves and which did not have lepidote trichomes nor terminal inflorescences. He included *O. javanica* and O. *rubrovenia*, as well as *Olea brachiata* and *O. dentata* (the latter synonymous *with O. salicifolia* Wall. *ex* G. Don) within *Tetrapilus*, which as shown above represent two dissimilar groups of species.

While it is important to appreciate the morphological diversity within *Olea* and the closely related *Chionanthus*, the division of *Olea* into several narrowly defined genera would create more taxonomic problems within the Oleaceae. If Johnson's narrow generic delimitation is followed, the two sections of *Chionanthus* in Malesia, namely Sect. *Ceranthus* and Sect. *EuLinociera*, should also be raised to generic level as the differences between them (Kiew, 1979) are as great as those between *Olea* and *Tetrapilus sensu* Johnson. The proliferation of generic (and subgeneric) names at this time, when the full diversity of tropical and subtropical *Olea* and *Chionanthus* species worldwide is not fully understood, is premature.

This is particularly the case as different combinations of characters are useful to distinguish species of *Olea* from those of *Chionanthus* in different regions of the world. For example, in South Africa, Verdoorn (1956) reported that *Chionanthus* (*Linociera*) species possess domatia but lack endosperm in the seed, which instead has thick cotyledons. In contrast, African species of *Olea* do not have domatia and the seeds are endospermic. In Malesia, no *Chionanthus* species has domatia and apart from species in Sect. *Ceranthus*, e.g. *C. ramiflorus* Roxb., the seed is endospermic.

For these reasons, *Olea* is here recognized in its traditional broad sense to include *Tetrapilus.*

This account includes the nomenclatural changes for species

transferred from *Linociera* to *Olea*, updates synonomy and includes the description of a new species from the Moluccas islands. A key to identify the ten Malesian species is also provided. For completeness, reference is made to recent publications with descriptions for all Malesian species.

Key to Malesian Species of *Olea*

1a. Inflorescences terminal and axillary. Leaves with domatia and large lepidote trichomes. Flowers hermaphrodite ..... **8. *O. paniculata***
1b. Inflorescences axillary, never terminal. Leaves without domatia and lepidote trichomes (though sunken peltate glandular trichomes are present). Flowers polygamous **2**

2a. Leaf margin entire, lamina drying pale grey-green or fawn, lateral veins obscure beneath **3**
2b. Leaf margin serrate or subserrate or, if entire then leaf dries brown with the lateral veins conspicuously darker beneath **5**

3a. Lamina 3.5–7 cm long, about twice as long as wide, apex rounded .... **6. *O. obovata***
3b. Lamina 14.5–28.5 cm long, about three times longer than wide, apex acute to acuminate **4**

4a. Inflorescences lax, 3.5–7 cm long. Pedicels 2–6 mm long. Fruits c. 5 x 4 mm with thin and brittle pericarp ..... **3. *O. gitingensis***
4b. Inflorescences condensed, 1–2 cm long. Pedicels c. 1 mm long. Fruits c. 16 x 15 mm with thick and leathery pericarp ..... **5. *O. moluccensis***

5a. Lamina margin entire **6**
5b. Lamina margin serrate or subserrate **7**

6a. Axillary buds large and mammose. Lateral veins of leaves 6–10 pairs. Pedicels 1–4 mm long, stamens always 2 ..... **9. *O. rubrovenia***
6b. Axillary buds minute and rounded. Lateral veins of leaves 4–7 pairs. Pedicels 2–8 mm, stamens 2, 3 or 4 ..... **4. *O. javanica***

7a. Leaf base cordate ..... **7. *O. palawanensis***
7b. Leaf base not cordate **8**

8a. Petiole conspicuously thickened and drying pale fawn. Lamina frequently obovate, drying grey-green. Flower very small (up to 1 mm long) ..... **1. *O. borneensis***

8b. Petiole not thickened, drying black. Lamina lanceolate. Flowers larger (1.5–5 mm long) **9**

9a. Lamina 2–2.5 times longer than wide, veins impressed above. Inflorescence short (1–2.5 cm), glabrous. Flowers 1.5–2.5 mm long, calyx glabrous ..... **2. *O. brachiata***

9b. Lamina 3 times longer than wide, lateral veins not impressed above. Inflorescence longer (9–11 cm with a range of 3.5–19.5 cm long), finely downy. Flowers 2–5 mm long, calyx finely downy ..... **10. *O. salicifolia***

1. *Olea borneensis* Boerl., Handl. Fl. Ned. Ind. 2 (1899) 332; Kiew, Blumea. 25 (1979) 308. **Type**: *Korthals s.n.,* Borneo (L lecto)
Synonyms: *Olea* sp., Vidal, Phan. Cuming. Philip. (1885) 125, Rev. Pl. Vasc. Filip. (1886) 181. *Mayepea pallida* Merr., Gov. Lab. Publ. (Philip) 35 (1906) 58. *Linociera pallida* (Merr.) Merr., Philip. J. Sci. 1 (1906) Suppl. 116 *non* K. Schumann (1901). *Linociera philippinensis* Merr., Philip. J. Sci.(Bot.). 4 (1909) 313. **Type**: *Ahern's Coll. 2874,* Bosoboso, Rizal Prov., Philippines (K lecto).

Notes: Elmer (1913) and Merrill (1915) did not recognise *Olea* as being present in the Philippines and Merrill (1906) renamed Vidal's *Olea* species as *Linociera (Mayepea) pallida.* Because K. Schumann (1901) had previously described a species from New Guinea as *L. pallida*, Merrill renamed the Philippine species *L. philippinensis*. The Philippine specimens match those from Borneo and so *L. philippinensis* becomes a synonym of *O. borneensis*.

Olea borneensis most resembles *O. brachiata* and *O. salicifolia* in its foliage, which is at least distantly toothed in the upper half of the lamina. It is easily distinguished from these two species by its thickened petiole. In addition, it is distinct among Malesian *Olea* species in possessing extremely small flowers.

Its geographical distribution does not extend to the Asian mainland. Endemic to Malesia, it is found as far north as the Guimaras Islands in the Philippines. It has been most commonly collected from Luzon. Further south it has been collected from Mindoro (Mt Yagaw), Mindanao (Mt Urdaneta), Palawan (Victoria Mts) and Sibuyan Is. (Mt Giting-giting). In Borneo, it is more common in the eastern parts with several collections from Sabah and a few from E. Kalimantan (Martapoera).

It has been collected from the lowlands (170 m) but is most commonly recorded from hill slopes, ridges and rocky ridge tops (up to 5000 m a.s.l. in Sabah). On Mt Yagaw, Mindoro, it was reported as 'badly battered by wind' (*Sulit & Conklin PNH 17640*). It has also been recorded from

ultrabasic soil on Mt Silam, Sabah.

Notes on *Addurn 226* report that on Mt Ibi in Lagum, Luzon, its wood was considered 'good for house construction beams'.

2. *Olea brachiata* (Lour.) Merr., Lingn. Agr. Rev. 2 (1925) 127, Kiew, Blumea. 25 (1979) 308. *Basionym*: *Tetrapilus brachiatus* Lour., Fl. CochinCh. 2 (1790) 611. **Type**: *Louriero* (BM lecto).
Synonym: *O. maritima* Wall. *ex* G.Don., Gen. Syst. 4 (1838) 49. **Type**: *Wallich Cat. 2813*. Singapore. (K lecto)

Notes: Bentham & Hooker (1876) included *Tetrapilus* Lour. and *Pachyderma* (*Stereoderma*) Blume as synonyms of *Olea*. In addition, they listed *Pachyderma javanica* as synonymous with *Olea maritima* (Wall.) *ex* G. Don and that *Notelaea zollingeriana* belonged to *Olea*. This was followed by later authors until Knoblauch (1895) recognised *O. javanica* as a species distinct from *O. maritima*. However, as he had not seen a specimen of *N. zollingeriana*, he made no change to its position as a synonym of *O. maritima* and there it has remained. (*Olea maritima* is currently considered a synonym of *O. brachiata* (Lour.) Merr.)

Javanese specimens referred to *O. brachiata* (Kiew, 1979) are atypical for the species in having entire leaf margins and in their habitat (inland, usually from mountain forest as opposed to being common on rocky shores). Re-examination of these specimens leads to the conclusion that they fall within the variation of *O. javanica* and that *O. brachiata* does not occur in Java.

The other Javanese taxon linked with *O. brachiata* is *O. graciliflora* Koord. & Valeton (Backer & Bakh.*f*., 1965). They distinguished this latter species from *O. javanica* in their key by its more floriferous and finely pubescent inflorescence and its long pedicels. Apart from its pubescence, *O. graciliflora* does not differ from *O. javanica,* neither does it have the serrate leaves of *O. brachiata.*

For these reasons, both *N. zollingeriana* and O. *graciliflora* are here assigned to the synonomy of *O. javanica* (see below).

3. *Olea gitingensis* (Elmer) Kiew, **comb. nov.**
Linociera gitingensis Elmer, Leafl. Philip. Bot. 5 (1913) 1653. **Type**: *Elmer 12290,* Mt Giting-giting, Sibuyan Is. (US lecto; Gray, K iso).
Synonym: Linociera longifolia Merr., Philip. J. Sci. (Bot). 20 (1922) 431. **Type**: *Miranda FB 20626*, Lanao, Mindanao (US lecto).

Notes: *Olea gitingensis* is endemic to the Philippines, not common but widely distributed in the lowlands at about 100 m altitude. It is a most distinctive species in its large, thick, broadly lanceolate leaves, which are glossy above. It most resembles *O. borneensis* in its leaves, which have obscure venation, dry greyish-green and in its thickened, fawn petioles, but its lamina is never toothed.

Merrill (1922) noted its alliance with *Olea*, but his material comprised only the type specimen, which was in young fruit, which did not allow him to settle this point. The foliage is typical of *Olea* and, in addition, the corolla lobes are shorter than the tube (a generic distinction for *Olea*, as *Chionanthus* flowers in most cases have an extremely short corolla tube). For these reasons, this species is transferred from *Linociera* to *Olea*.

This distinctive species has been collected from only five localities - Mt Giting-giting, Sibuyan Is (*Elmer 12168*, *12290*); Lanao (*Miranda FB 20626*) and Butuan (*Mendoza PNH42269*) from Mindanao; Lamao, Bataan Prov., Luzon (*Merrill 8626*); and Mt Timbaban, Panay (*Edano BS42391*). The single difference between the descriptions of *L. gitingensis* and *L. longifolia* is in the number of lateral veins, 6–8 pairs and 13–15 pairs, respectively. However, re-examination of the leaves of the type specimens show that *L. gitingensis* has between 8 and 10 pairs and *L. longifolia* between 10 and 11, so this difference is not supported.

Elmer (1913), in describing *L. gitingensis* referred to another collection from Agusan Province, Mindanao (*Elmer 13479*), which in fact belongs to O. *borneensis*.

At a glance, the foliage of *O. gitingensis* is closely similar in shape and thickness to that of *Chionanthus remotinervius* (Merr.) Kiew. This latter species is, however, typical of *Chionanthus* in its unthickened petiole that dries black and in its thick pericarp. (The ripe fruit of *O. gitingensis* remains unknown).

4. *Olea javanica* (Blume) Knobl., Bot. Centralbl. 61 (1895) 134; Koord. & Valeton, Meded. Lands. Plant. 59 (1902) 251; Backer & Bakh.*f*., Fl. Java 2 (1965) 215; Kiew, Blumea 25 (1979) 311. *Basionym*: *Pachyderma javanicum* Blume, Bijdr. (1826) 682;
Synonyms: *Stereoderma javanicum* (Blume) Blume, Fl. Javae Praef. 7 (1828) 8. **Type**: *Blume 2169a,* Java (L lecto; K iso).
Notelaea zollingeriana Teijsm. & Binn., Nat. Tijdschr. Ned. Ind. 27 (1864) 33. **Type**: *Binnendijk s.n.* Hort. Bot. Bogor (L lecto, K iso).
Olea graciliflora Koord. & Valeton, Meded. Lands. Plant. 59 (1902) 254. **Type**: *Koorders 29339* Gunung Wilis, Java (BO lecto).

Notes: Previously known only from mountains in Java, post-war collections have extended its geographical range to Flores and W. Sumbawa (Mt. Batulanteh) to the east and Sumatra (with a single sterile specimen from G. Pesagi) to the north.

Olea javanica is not a particularly variable species – the varieties described and illustrated by Koorders & Valeton (1902) fall within the range of variation of the species (Kiew, 1979). Their identical var. *acuminatissima* and var. *laxiflora* are, however, striking in their narrow leaves (three times longer than wide), which have extremely attenuated apices, and long, slender pedicels (5–10 mm long) compared with most specimens of this species, which have broader leaves up to 2.5 times longer than broad, acuminate apices and pedicels 3–5 mm long. An additional difference is recorded on *Lanjouw 61:* "fruits long-stalked hanging first green later black violet." (In all other varieties, and indeed in all other *Olea* species, the fruits sit on upright pedicels). It is possible that this difference has biological significance in terms of the dispersal agent. For other species of *Olea* and *Chionanthus* with fruits of a similar size that ripen purple black, birds are reported as dispersal agents for their fruits. Perhaps a different bird species may disperse these pendant fruits but until and unless there are data to support this, I refrain from recognising var. *acuminatissima* as a distinct variety.

Incidentally, the type of Blume's *Pachyderma* (*Stereoderma*) *javanica* (*Blume 2169a*) has similar narrowly attenuated leaves. The type of *Notelaea zollingeriana* also has narrowly lanceolate, entire leaves that are closely similar to those of *Blume 2169a*. For this reason, it is here recognised as a synonym of *Olea*.

5. *Olea moluccensis* Kiew, ***sp. nov.***

Differt a *Olea gitingensis*, inflorescentia brevibus condensatis foliis obovatis et fructis majoribus.

Typus: *Hulstijn & Atje 364,* Taliabu Is., Moluccas (BO (sheet no.1518–4) - holo; BO (sheet no. 95014–14), L – iso).
Figure 2.

Habit and bark unknown. Twigs moderately stout, drying white, nodes strongly flattened, glabrous, lenticellate. Petiole (0.8–)1–1.5 cm long and 3–5 mm thick, thickened and drying pale fawn, deeply grooved above. Lamina thickly coriaceous, glabrous, drying light brown or grey-green, slightly glossy above, slightly obovate, (14.5–)21(–28.5) x (5–)6.5(–9.5) cm, base cuneate and decurrent, margin entire and recurved, apex acute to

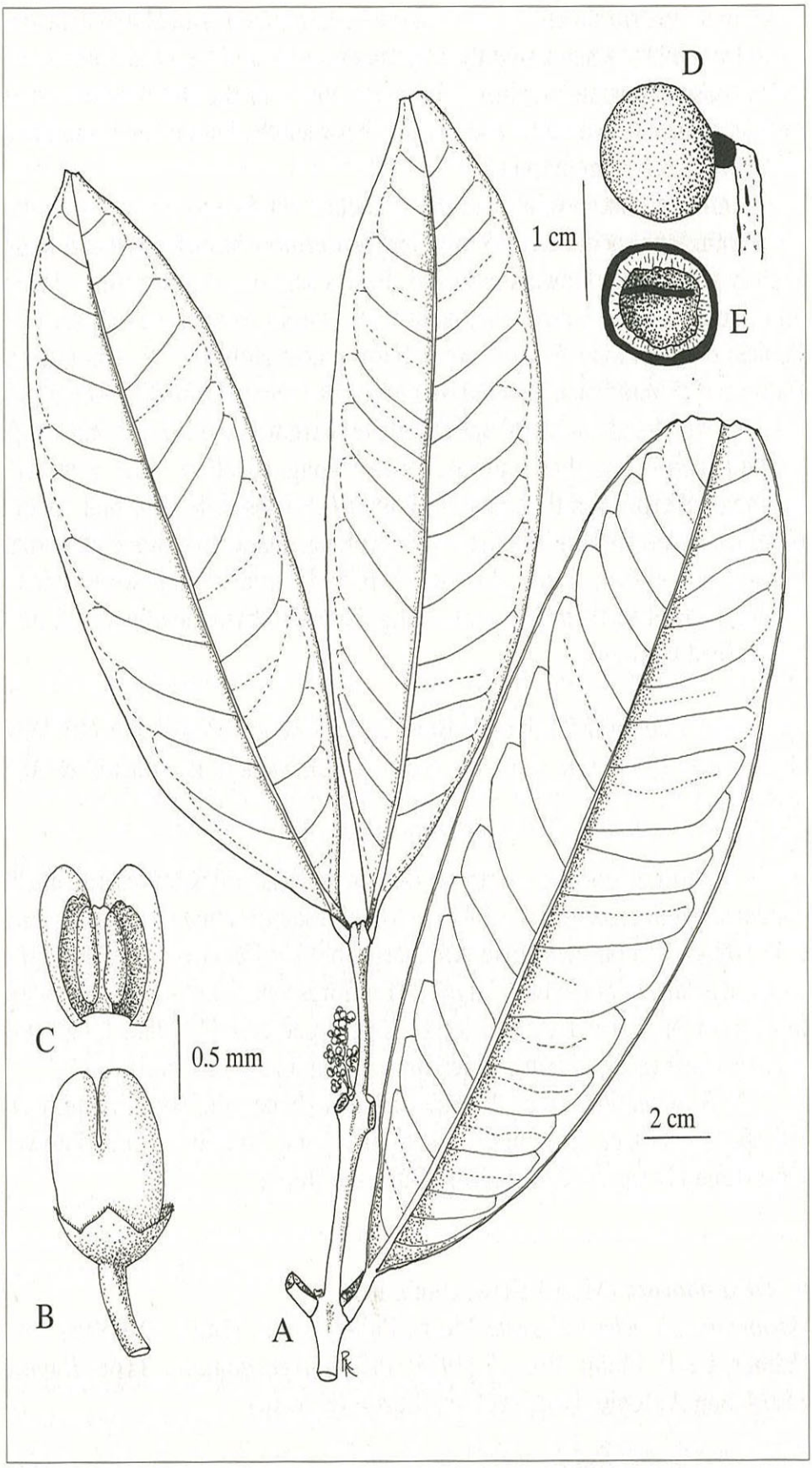


Figure 2. *Olea moluccensis* Kiew.
(A. twig; B. male flower; C. stamen and cucullate corolla lobes; D. fruit; E. T.S. fruit - *Hulstijn & Atje 364*, Talibu Is., Moluccas).

acuminate, midrib slightly impressed above, prominent and glossy beneath, lateral veins 11–14 pairs, slightly prominent above and beneath, intercostal veins conspicuous and slightly prominent above in the dried state with a distinct central vein parallel and midway between the lateral veins, marginal vein *c.* 3–4 mm from margin.

Inflorescences axillary, a once-branched condensed panicle, solitary, 10–20 mm long, peduncle 2–3 mm long, lowermost branch 5–10 mm long, slightly pubescent. Flowers crowded. Bracts scarious, lowermost *c.* 3 mm long, uppermost *c.* 1 mm long, persistent, margin ciliate, apex pubescent. Pedicel *c.* 1 mm long. Male flowers: buds almost globose, 1–1.3 mm diam. Calyx *c.* 0.5 mm long, divided slightly more than halfway, lobes acute opening widely, glabrous except for ciliate margin. Corolla 1–1.5 mm long, divided slightly less than halfway, lobes oblong, cucullate, apex rounded, opening to expose anther apices. Stamens 2, subsessile attached to the base of corolla, anthers oblong, *c.* 0.5 mm long, connective broad. Bisexual flowers not known. Fruit globose, *c.* 16 x 15 mm, drying with whitish bloom, pedicel thickened, 2–3 mm long, pericarp drying leathery, *c.* 2 mm thick. Seed unknown.

Specimens examined: Moluccas: Buru Is. *de Vriese & Teysmann HB 1834* (BO, L), *de Vriese s.n.*, sheet no. 1857–61 (L); Taliabu Is. *Hulstijn & Atje 364* (BO, L).

Notes: A most distinctive species of *Olea* in its large, thick leaves and much condensed inflorescences. Its foliage closely resembles that of *O. gitingensis* in its size, coriaceousness and entire margin but it differs from *O. gitingensis*, which has lanceolate leaves, larger, lax inflorescences (3.5–7 cm long with lowermost branches 1–2.5 cm long), longer pedicels (2–6 mm long) and smaller fruits (*c.* 5 x 4 mm), which have a thin and brittle pericarp.

It is endemic to the Moluccas Islands (hence the specific epithet). All specimens lack field notes so its habit and habitat are not known. Unfortunately the specimens from Buru are sterile.

6. ***Olea obovata*** (Merr.) Kiew, **comb. nov.**
Basionym: Linociera obovata Merr., Philip. J. Sci. (Bot.) 10 (1915) 338. (Elmer, Leafl. Philip. Bot. 5 (1913) 1652 *nomen nudum).* **Type**: *Ramos 15014,* San Antonio, Laguna Prov., Luzon (K lecto).

Notes: As Merrill (1915) noted, this is a very distinctive species in its small, thick, obovate leaves with a rounded apex and decurrent base, obscure lateral veins, recurved margin and dense pyramidal inflorescences and it is

quite unlike any other Malesian *Olea* species.

It is known only from Luzon, Philippines, with many of the collections from mountainous areas (Mt. Alzapan, Mt. Binuang, Montalban, Mt. Umingan). From Mt. Alzapan it is reported to grow in mossy forest at 2000 m (*Ramos & Edano BS 45667, 45716*). It has the habit of many trees of mossy forest as judged from its much branched, bushy canopy with bunches of upstanding, thick leaves with recurved margins at the tip of the twigs.

7. *Olea palawanensis* Kiew, Blumea. 38 (1993) 127. **Type**: *Ridsdale SMHI 1827,* Narra Victoria Peaks, Palawan, Philippines (L holo).

Notes: Its cordate leaf base distinguishes this species from all the other Malesian *Olea* species. It is endemic to Palawan, Philippines, where it appears to be confined to ultramafic soils.

8. *Olea paniculata* R.Br., Prodr. (1810) 523; Koord. & Valeton, Meded. Lands. Plant. 8 (1902) 256; Backer & Bakh.*f*., Fl. Java 2 (1965) 214; Kiew, Blumea. 25 (1979) 312.
Synonym: Linociera lauterbachii Lingels., Bot. Jahrb. 61 (1927) 8; Kobuski, J. Arn. Arbor. 21 (1940) 335. **Type**: *Schlechter 16984,* Minjem at Kelel, NE New Guinea (B+; A lecto).

Notes: Lingelsheim (1927) did not record any species of *Olea* as occurring in New Guinea. Although terminal inflorescences are atypical of *Linociera*, he described specimens of *Olea paniculata* as *Linociera lauterbachii.* His description differs from that of *O. paniculata* (Kiew, 1979) only in the longer inflorescence (15 cm as oppposed to 6.5–8 cm) and the absence of endosperm, which is unusual for *Olea.* Inflorescences of New Guinea specimens are indeed sometimes longer (6–13 cm) than those of Australian specimens. I have not seen any specimens that lack endosperm and it is possible that the absence of endosperm observed by Lingelsheim was due to immaturity of the fruit.

9. *Olea rubrovenia* (Elmer) Kiew, **comb. nov.**
Basionym: Linociera rubrovenia Elmer, Leafl. Philip. Bot. 2 (1909) 586, 5 (1913) 1652; Merr., Enum. Philip. Pl. 3 (1923) 305. **Type**: *Elmer 10224* Negros Is., Philippines (US lecto; A, K, L iso).
Synonyms: Tetrapilus rubrovenius (Elmer) L.A.S. Johnson, Contrib. N.S.W. Herb. 2 (1957) 408.

Ilex decussata Heine, Mitt. Bot. Staatssaml. Muenchen. 6 (1953) 209. *Olea decussata* (Heine) Kiew, Blumea. 25 (1979) 309. **Type**: *Clemens 28986,* G. Kinabalu, Sabah, Borneo (K lecto; L iso).

Notes: The discovery that *Linociera rubrovenia* is an *Olea* and is conspecific with *Olea decussata* necessitates a name change as 'rubrovenia' is the earlier name.

Olea rubrovenia is a montane species usually found above 1500 m (but has been collected from as low as 400 m a.s.l. in mixed dipterocarp forest on Bukit Mersing, Sarawak). It produces flushes of new leaves that are reported as tinged pink. These new shoots frequently bear inflorescences and their young green stems dry black.

Leaves of plants growing at high altitudes, e.g. on G. Kinabalu, or on exposed summits have smaller (up to 9.5 x 5 cm), bunched, upstanding leaves, which are thickly coriaceous, have recurved margins and the lateral veins are finely impressed above compared with the larger (up to 22 x 8 cm), less coriaceous leaves of plants growing at lower altitudes.

The high altitude plants (*Olea decussata* (Heine) Kiew) on G. Kinabalu are indeed distinctive but as the number of collections from this mountain has increased, it becomes clear that the high altitude form intergrades with the larger leaved one from lower altitudes and that *Olea decussata* therefore cannot be maintained as distinct from *O. rubrovenia.* Indeed, Green (1960) has already warned of 'dangers in Malaysian [Malesian] taxonomy which arise from phenotypic variation caused by differences in altitude' when he reduced the high altitude *Osmanthus sumatrana* P.S. Green (Oleaceae) to the synonomy *of O. scortechinii* King & Gamble.

In Borneo, this species in Sabah is a common tree on G. Kinabalu up to 3200 m altitude and has also been collected from G. Alab (Crocker Range) and G. Trusmadi; in Sarawak from G. Mulu, G. Dulit, G. Murut and Bk. Mersing; and in Kalimantan from G. Beratus. From the Philippines, it has been collected from the Negros Is. (Cuernos Mts., type locality), from Mindanao (Mt Apo, Mt. Camates, Mt. Matutum and Mt. Urdaneta), and from Luzon (Mt. Nagapatan).

Olea rubrovenia closely resembles *O. javanica* in its entire leaves, petioles that are not thickened and dry black, lateral veins that are conspicuous beneath, particularly as they dry darker than the lamina, foliaceous bracts (not always present because they are caducous), and the frequent occurrence of globose galls replacing the male flowers. However, the two species are distinct by a combination of the following characters:

Character	*O. javanica*	*O. rubrovenia*
axillary bud	minute and rounded	large and mammose
petiole length (mm)	4–10	7.5–25
no. lateral vein pairs	4–5(–7)	6–7(–10)
inflorescence length (cm)	(3.5–)4.5–9	2.5–5.5
pedicel length (mm)	2–8	1–4
no. stamens	2,3,4	2

Apart from being geographically separate, the clearest character that distinguishes these two species is undoubtedly the shape and size of the axillary buds.

10. *Olea salicifolia* Wall. *ex* G. Don., Gen. Syst. 4 (1837) 48. **Type**: *Wallich Cat. 2812*, Silhet, India (K, lecto).
Synonyms: *O. dentata* Wall. *ex* DC Prod. 8(1844) 286. Kiew, Blumea. 25 (1979) 310. **Type**: *Wallich 2840* (K lecto).
O. penangiana Ridl., J. Fed. Mal. States. Mus. 10 (1920) 148. **Type**: *Curtis 950*, Penang (SING lecto; K iso).

Notes: *Olea salicifolia* shows considerable variation from specimens with smaller willow-shaped leaves from Silhet and Khasia, India, to specimens with broader leaves from Thailand and Peninsular Malaysia.

In Malesia, this species is known only from Penang, where it was once common on the rocky coasts at Batu Ferringi and Telok Bahang and where its habitat is now much disturbed by beach resort developments, and from a single sterile specimen (*Mat 211*, SING) from Singapore (precise locality not stated) collected in 1893. This sterile specimen collected together with a wood sample is recorded with the local name of *penaga lilin*, a name usually used for the ironwood tree, *Mesua ferrea* (Guttiferae), an indication that it has hard wood. Kurz (1877) recorded that in Myanmar, it (which he called *O. dentata*) produces a 'very heavy...close-grained wood'.

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