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THE MALESIAN SPECIES OF THE SUBFAMILY MALOIDEAE (ROSACEAE)

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SUMMARY

Taxonomic revision, precursory to the treatment of the *Rosaceae* in Flora Malesiana. Generic limits in tribus *Sorbeae* are discussed, *Stranvaesia* is included in *Photinia* (5 spp. in Malesia), *Micromeles* (1 sp. in Malesia) is treated as generically different from *Sorbus*. Apart from these, there are in Malesia representatives of *Eriobotrya* and *Rhaphiolepis* (both 1 sp.), and some more species are cultivated and occasionally naturalized.

No new species are described. New combinations: *Photinia serratifolia* (basionym *Crataegus serratifolia* Desf., replacing illegitimate *Photinia serrulata* Lindl.), *Photinia nussia* (basionym *Pyrus nussia* D. Don, transferred from *Stranvaesia*), *Rhaphiolepis philippinensis* (basionym *Eriobotrya philippinensis* Vidal), *Micromeles corymbifera* (basionym *Vaccinium? corymbiferum* Miq., known as *Sorbus granulosa* (Bertol.) Rehd. or *Pyrus granulosa* Bertol.).

INTRODUCTION

Only eight species of the subfamily *Maloideae* (or family *Malaceae*, if one prefers) occur in a wild state in Malesia and all belong to genera having their centre of distribution on the Asian continent. This, together with the well-known difficulties in establishing the limits of the genera in this subfamily, makes a taxonomic revision for Malesia, an outpost of the area, rather hazardous. The work was distinctly facilitated by Vidal's papers on the Southeast Asian representatives in connection with his treatment in the Flore du Cambodge, du Laos et du Vietnam, although my decisions sometimes deviate from those made by Vidal.

Sumatra is the island with the largest number of species (6, of which 1 doubtful); in Malaya (3 species), Borneo (4 species), and the Philippines (3 species) the group is less well represented and only one species inhabits Java and the Lesser Sunda Islands. The eastern part of Malesia is entirely without representatives of the subfamily.

There is only one species endemic to Malesia and even this is doubtful (see remark 2 to *Rhaphiolepis philippinensis* on p. 435). The other seven species all occur on the continent too.

Except for *Eriobotrya bengalensis*, which is a lowland rain forest tree, the species grow at altitudes usually above 1000 metres and some of them go as high as 3000 metres or higher. *Photinia davidiana* seems to be confined to subalpine habitats from 2600 to 3600 metres.

For this revision I had at my disposal the collections of the Rijksherbarium, Leiden, and I also consulted the material present in Kew, British Museum (Natural History) and Utrecht. I want to thank the directors of those institutes for their hospitality and for the loan of specimens. Thanks are also due to dr. H. Heine, Paris, dr. C. H. Steinberg, Firenze, and Mr. J. C. Ledoux, Avignon, for their help in connection with my attempts to typify *Photinia serratifolia* (see p. 425).

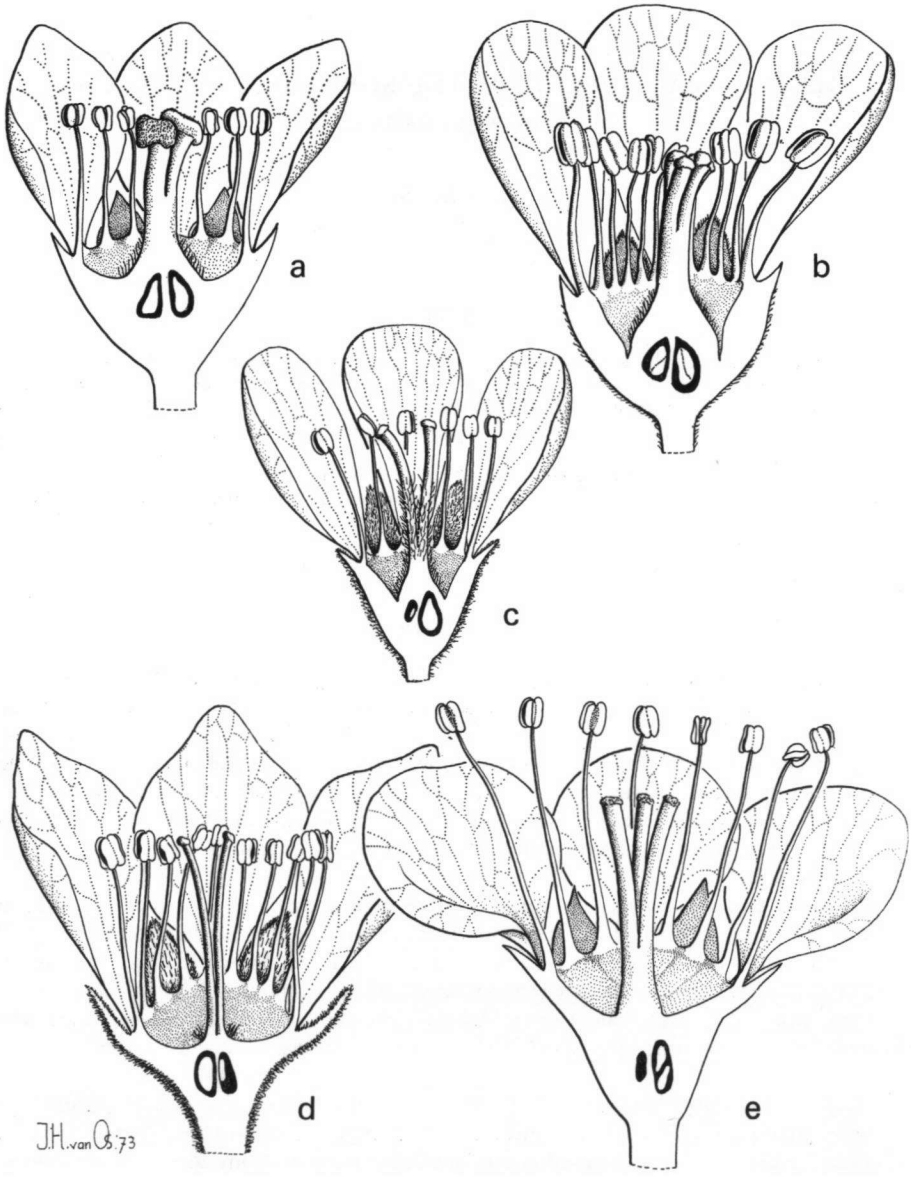

Fig. 1. Flowers, cut lengthwise and slightly idealized. — a. *Photinia integrifolia* var. *integrifolia* (*Meijer 1669*). — b. *Photinia davidiana* (*Fuchs & Collenette 21455*). — c. *Eriobotrya bengalensis* (*Krukoff 4086*). — d. *Rhaphiolepis philippinensis* (*Sulit PNH 12452*). — e. *Micromeles corymbifera* (*Meijer 3466*). — all ×7.

GENERIC LIMITS IN MALOIDEAE

The generic limits in the subfamily *Maloideae* have been disputed repeatedly and not without reason (see e.g. Kovanda, 1965). Although they have gradually become more or less stabilized, there certainly remain some large problems which can only be solved by a monographer of the subfamily as a whole.

The distinction of two tribes, *Crataegeae* and *Sorbeae*, seems to be well-founded. *Crataegeae* have a polypyrenous drupe, the inner layer of each carpel becoming hard and differentiating as a separate stone. In the *Sorbeae*, on the other hand, the endocarpium of all carpels together becomes firm and hard. Depending on the consistency of the endocarpium one must call the fruit a monopyrenous drupe (endocarpium stone-hard) or rather a pome (when the endocarpium is more bony or tough-membranous). In the *Sorbeae* the core or stone usually contains more than one seed.

Crataegeae do not occur in Malesia*, but the *Sorbeae* are represented by species of several genera, all of them centred in the continental part of Asia.

One group of genera can further be eliminated from the discussion, because they are not represented in Malesia. This is the group with more than two ovules per loculus: *Cydonia*, *Amelanchier*, *Chaenomeles*, and possibly some segregates.

A second group, consisting of *Pyrus* and *Malus*, can be distinguished by its simple, sometimes umbel-like racemes. Both genera are not indigenous in Malesia. All other taxa of the tribe *Sorbeae* have two ovules in each ovary-cell and the inflorescence is always a compound raceme (which rarely may be depauperated to a simple one in some specimens).

The genus around which the discussion about generic limits in the remaining group must centre, is *Sorbus*. Its limits have been drawn very differently in the past: some authors have divided it into several genera, others have taken an opposite view and reduced the whole genus to *Pyrus* (e.g. Focke 1888, 1892; Ascherson & Graebner 1906; Fernald 1950). The latter attitude, however, has now been abandoned by most authors.

Nowadays the genus *Sorbus* is usually taken in a moderately inclusive sense, along the lines already indicated by Fritsch (1898). The species-groups recognized by Koehne (1891) as separate genera, are placed on a subgeneric or sectional level, as done by e.g. Kovanda (1961) who divided the genus into five subgenera: *Sorbus*, *Aucuparia*, *Aria*, *Chamaemespilus* and *Torminaria*.

In several systems one will also find a section *Micromeles*. Formerly this group has also been placed on the generic level, e.g. by Koehne (1891, 1893) and by Schneider (1906). As Hedlund (1901) rightly observed, there are two characters by which *Micromeles* can be distinguished. In *Sorbus* (in the above-mentioned circumscription) the upper hypanthium ring does not fall off after anthesis, although in some species the sepals may ultimately become detached one by one. In *Micromeles* on the other hand, the sepals are caducous together with the upper part of the hypanthium. Moreover, in *Sorbus* the ovary is usually semi-inferior and when inferior, the top is not covered by the hypanthial disc, while in *Micromeles* the ovary is clearly inferior and covered by the disc. To me, this seems sufficient to separate *Micromeles* as a genus. In fact, *Micromeles* might be more closely related to *Rhaphiolepis* than to *Sorbus*.

Whether *Aronia*, an American group of possibly only one species, must be considered a distinct genus, I am unable to judge. Hutchinson (1964) who merges *Micromeles* into *Sorbus*, keeps *Aronia* separate mainly because of the glands on the midrib above. Such glands, however, are also present in *Micromeles corymbifera*.

* See p. 441 for a planted *Pyracantha* in Luzon.

Photinia and *Pourthiaea* are hardly different and are usually combined. The differences between *Sorbus* (as defined above) and *Photinia* (incl. *Pourthiaea*) are extremely slight and can be summarized as follows:

— Leaves pinnate or simple and then often coarsely lobed or toothed, usually with straight excurrent nerves, deciduous . . . . . *Sorbus*
— Leaves simple, usually shallowly and finely dentate or serrate, sometimes entire, with the nerves not running straight into the margin, deciduous or evergreen . . *Photinia*

This does not appear very impressive and Schneider (1906) exaggerates certainly in remarking 'Von *Sorbus* ... lassen sich die *Photinien* in jedem Falle durch ihre Blätter sehr leicht scheiden'. Nevertheless it is a useful difference that seems to separate two natural groups, and to my mind there is no objection against keeping both on the generic level.

Stranvaesia presents a difficult case. Traditionally it has been separated from *Photinia* on account of one or both of the following characters: a 4- or 5-merous ovary (*vs.* the 2- or 3-celled one of *Photinia*) and dehiscent fruits. This has also been upheld by Vidal (1965). The difference in the number of carpels is not as clear as it seems at first sight. Several specimens of '*Stranvaesia davidiana*' (incl. *Photinia havilandii*) were seen in which 3-merous ovaries were present (see remark 3 to *Ph. davidiana*, p. 428) instead of the normal 4- to

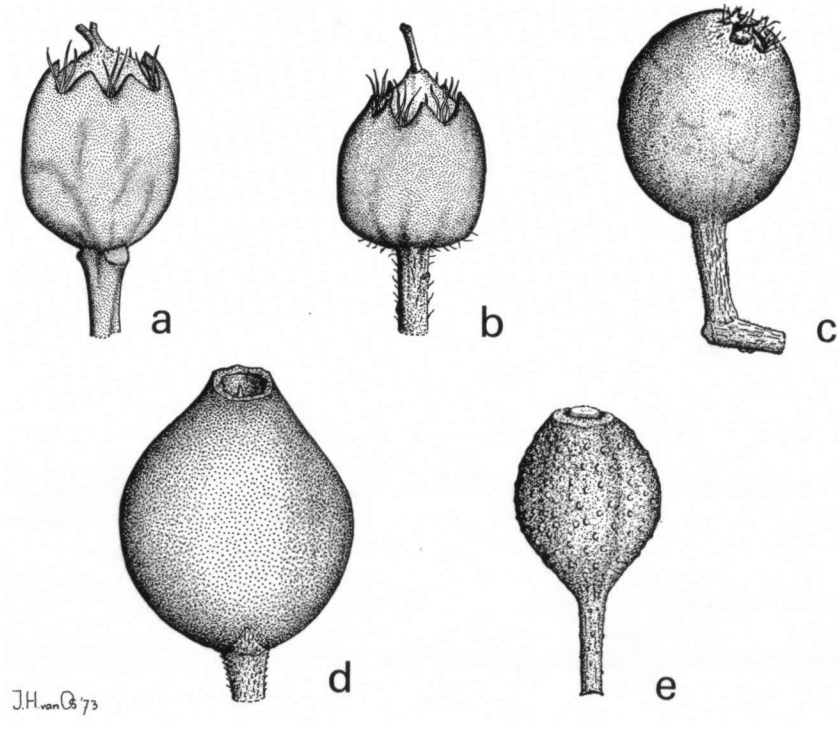

Fig. 2. Ripe fruits. — a. *Photinia integrifolia* var. *integrifolia*, ×4 (*Hochreutiner 908*). — b. *Photinia davidiana*, ×4 (*Fuchs & Collenette 21431*). — c. *Eriobotrya bengalensis*, ×2 (*Thorenaar 101*). — d. *Rhaphiolepis philippinensis*, ×4 (*Sulit PNH 7760*). — e. *Micromeles corymbifera*, ×2 (*Rahmat Si Boeea 10727*).

5-celled ones. Vidal (1965, p. 235) remarked that in the type specimen of *Stranvaesia glaucescens* var. *yunnanensis* (which he reduced to *Ph. davidsoniae*) half of the flowers have a 3-merous ovary, the other half a 4-merous one. As I saw myself (remark 2 to *Ph. integrifolia*, p. 421) there are 4- and 5-merous ovaries in *Photinia*, and all this of course weakens the difference considerably. In Hutchinson's description (1964) of *Photinia*, in which *Stranvaesia* is not included, the ovary is said to be '5—2- (rarely 1-)locular' and I suppose that Hutchinson also observed that not all flowers of all species of *Photinia s.s.* have a 2- or 3-celled ovary.

As for the supposed dehiscence it must be stated that this does not exist. I observed a shrub of '*Stranvaesia davidiana*', cultivated in the Botanic Garden at Leiden, in all stages from flowering to shriveled old fruits and I am quite convinced that these fruits remain closed.

Schneider (1906) does not mention any dehiscence in his description, but says about the fruit: 'Frucht von dem freien Teil der Blüten-Achse und den bleibenden Kelch bedeckt, das ganze Kernhaus sich als ein zarthäutig umhüllter 'Scheinstein' herauslösend'. This seems to be inspired mainly by the situation in '*S. nussia*', the species which Schneider obviously knew best in a living state. The same statement can be found in Krüssmann (1962, p. 505): 'Zur Fruchtreife das ganze Kernhaus leicht von dem fleischigen Teil lösbar'.

When in fruit, the upper part of the connate carpels rises as a hard-shelled dome above the fleshy hypanthium. This dome is for a large part covered by the upper part of the hypanthium and by the persistent sepals. The bony pericarpium of that dome can be broken, of course, when pressure is applied and in some cases the places of rupture may not be accidental but show relation to the place of the carpels. The dehiscence-story has obviously come into the world through herbarium specimens with more or less broken 'crowns', broken that is from pressure during drying etc.

Summarizing: it seems to me that *Stranvaesia* cannot be upheld as a genus separate from *Photinia*. The two species occurring in Malesia are accordingly treated as *Ph. davidiana* and *Ph. nussia* respectively.

There are very few floral characters which can be used in the present group as generic distinction-marks. Koehne (1891) observed that in this subfamily the carpels are often not entirely connate, neither with each other, not with the enveloping part of the hypanthium. He attached much value to these characters and used them in his classification. Schneider (1906), however, mentioned that in this respect there is too much variability within species and individuals, and I agree with him.

In some of the smaller 'satellite' genera the number of carpels per flower may be restricted, but in the larger, central genera of the complex (*Sorbus* and *Photinia*), and also in *Eriobotrya*, the entire variation from 2- to 5-celled ovaries is present.

The distinction between inferior ovaries with the top covered by the hypanthial disc, and semi-inferior (to ± inferior) ovaries with a free top, seems to be useful as seen above in the case of *Sorbus* and *Micromeles*

Rhaphiolepis has the same inferior ovary as *Micromeles* and also caducous sepals, but its species are evergreen, not deciduous. The value of the latter character as a means of separating genera, is disputable, and in *Photinia* both types are found. There is, however, one more criterion on which *Rhaphiolepis* and *Micromeles* may be distinguished, *viz.* the number of seeds. In fruits of *Rhaphiolepis* usually only one seed develops (rarely two), but in *Micromeles* the number of seeds is larger since nearly all ovules present will develop into seeds. Consequently, I think that *Rhaphiolepis* may be retained as a separate genus.

Eriobotrya presents more or less the same case. The main nerves are running to the

margin, which links the genus with *Sorbus*. The same differences as mentioned above, are found here. *Eriobotrya* is evergreen and has few seeds in each fruit; *Sorbus*, on the contrary, is deciduous and the number of seeds is larger, most of the ovules developing.

Several of the distinctions made above may seem to be rather superficial and not very 'hard'. It would not be difficult to present the facts in such a way as to lead to the conclusion that only one genus exists in the tribe *Sorbeae*. It seems to me, however, that here the task of the taxonomist is not to find out what can be united, but to ascertain what can sensibly be kept apart. On which level the groups mentioned above, are placed does of course not really matter but to recognize them as genera is, firstly, in accordance with decisions made by other authors and, secondly, more convenient and practical than placing them on a subgeneric level.

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KEY TO THE GENERA OF THE SUBFAMILY MALOIDEAE OCCURRING IN MALESIA

1a. Plants with thorns. Drupe with 5 pyrenes. Planted . . . . . **7. Pyracantha**
b. No thorns present. Fruit a drupe with one stone, or a pome 2
2a. Inflorescence a simple raceme. Cultivated . . . . . **5. Pyrus, 6. Malus**
b. Inflorescence a compound raceme 3
3a. Upper hypanthium ring with the sepals persistent after anthesis. Ovary semi-inferior, more rarely inferior, its top free from the hypanthium, exposed, and usually hairy 4
b. Sepals (and upper ring of hypanthium) deciduous after anthesis, leaving a circular scar on the top of the fruit. Ovary inferior, its top not exposed but covered by the hypanthial disc 5
4a. Nerves arching upwards before reaching the leaf margin, not excurrent. **1. Photinia**
b. Nerves terminating in the leaf margin . . . . . **2. Eriobotrya**
5a. Evergreen. Ovary 2-celled. Fruits 1-, rarely 2-seeded. Seed thick, embryo with thick cotyledons . . . . . **3. Rhaphiolepis**
b. Deciduous. Ovary usually 3-celled (2—4). Fruit with usually 2 seeds per cell. Seed flat, embryo with thin cotyledons . . . . . **4. Micromeles**

1. PHOTINIA

Photinia Lindl., Trans. Linn. Soc. Lond. 13 (1821) 103; DC., Prod. 2 (1825) 631; Bl., Bijdr. 17 (1826) 1103; Lindl. in Edwards, Bot. Reg. 23 (1837) nr. 1956; Miq., Fl. Ind. Bat. 1, 1 (1855) 387; B. & H., Gen.

Pl. 1 (1865) 627, *p.p.*; Decne, Nouv. Arch. Mus. Paris 10 (1874) 140; Hook. *f.*, Fl. Brit. Ind. 2 (1878) 380; Focke in E. & P., Nat. Pfl. Fam., 3, 3 (1888) 25; Boerl., Handl. 1, 2 (1890) 435; K. & V., Bijdr. 5 (1900) 360; Cardot in Lec., Fl. Gén. I.-C. 2 (1920) 672; Hutch., Gen. Flow. Pl. 1 (1964) 214; Backer & Bakh., Fl. Java 1 (1964) 513; Vidal, Adansonia 5 (1965) 221; Fl. Camb. Laos & Vietn. 6 (1968) 35; Fl. Thail. 2 (1970) 39. — T y p e s p e c i e s: *Ph. arbutifolia* Lindl. from California was mentioned by Hutchinson, l.c. as the lectotype species. This does not seem a sensible choice from the four species given by Lindley, because M. Roemer (Syn. 3, 1847, 105) transferred this species to a separate monotypic genus *Heteromeles*, which is still being maintained by American authors. Rehder (Bibl. Cult. Trees & Shrubs, 1949) and Vidal (1968) noted *Ph. serrulata* Lindl. as the type species.

Stranvaesia Lindl. in Edw., Bot. Reg. 23 (1837) t. 1956; B. & H., Gen. Pl. 1 (1865) 627; Baill., Hist. Pl. 1 (1869) 411, 476; Decne, Nouv. Arch. Mus. Paris 10 (1874) 178; Hook. *f.*, Fl. Brit. Ind. 2 (1878) 382; Focke in E. & P., Nat. Pfl. Fam. 3, 3 (1888) 26; Hutch., Gen. Flow. Pl. 1 (1964) 213; Vidal, Adansonia 5 (1965) 221; Fl. Camb. Laos & Vietn. 6 (1968) 53; Fl. Thail. 2 (1970) 41. — T y p e s p e c i e s: *S. glaucescens* Lindl.

Pourthiaea Decne, Nouv. Arch. Mus. Paris 10 (1874) 146; Focke in E. & P., Nat. Pfl. Fam. 3, 3 (1888) 26.

Unarmed trees or shrubs, evergreen or deciduous. *Leaves* spirally arranged, petioled, simple, entire to dentate-serrate, the main nerves not running to the margin. Stipules free. *Flowers* in terminal, glabrous or hairy, panicle- or corymb-shaped compound racemes, bisexual, 5-merous, bracteate. *Hypanthium* obconoid to campanulate, elongate above the ovary. Sepals persistent. Petals more or less distinctly clawed, glabrous or with hairs at base inside. Stamens 16—25. Ovary semi-inferior, (1—)2—5-celled, usually hairy on the free top; styles as many as cells, connate at base to free; ovules 2 per cell, collateral, basal. *Fruit* a more or less fleshy 'drupe' or pome, enclosed at apex by the persistent free part of the hypanthium and the sepals, 'stone' or core consisting of the ± bony endocarp; *seeds* 1 or 2 per cell, rather small, ellipsoid, testa rather hard, endosperm thin (or absent).

D i s t r i b u t i o n. 50 species (or probably less), distributed mainly in Eastern Asia, from the Himalaya region to Japan and South Malesia. One species in California (if *Heteromeles* is included).

KEY TO THE MALESIAN SPECIES

1a. Leaves, when dry, with many black to brown glandular dots scattered on the undersurface . . . . . **3. Ph. prunifolia**
b. Leaves without these dark dots 2
2a. Leaves entire 3
b. Leaves crenate to serrate, at least in upper part 4
3a. Ovary 2 (or 3)-celled . . . . . **1. Ph. integrifolia**
b. Ovary 4- or 5-celled . . . . . **4. Ph. davidiana**
4a. Inflorescences glabrous. Ovary 2 (or 3)-celled . . . . . **2. Ph. serratifolia**
b. Inflorescences rather densely shortly woolly. Ovary (4- or) 5-celled **5. Ph. nussia**

1. Photinia integrifolia Lindl.

Ph. integrifolia Lindl., Trans. Linn. Soc. Lond. 13 (1821) 103; DC., Prod. 2 (1825) 631; Bl., Bijdr. 17 (1826) 1103; Miq., Fl. Ind. Bat. 1, 1 (1855) 387; Decne, Nouv. Arch. Mus. Paris 10 (1874) 142; Hook. *f.*, Fl. Brit. Ind. 2 (1878) 381; Backer & Bakh., Fl. Java 1 (1964) 513; Vidal, Adansonia 5 (1965) 226; Fl. Camb. Laos & Vietn. 6 (1968) 37; Fl. Thail. 2 (1970) 39. — *Pyrus integerrima* Wall. *ex* D. Don, Prod. Fl. Nepal. (1825) 237, *nom. illeg., superfl.* — T y p e: *Wallich 669* from Nepal (K-W, holo; L).

Ph. notoniana W. & A., Prod. 1 (1834) 302; Decne, o.c. 141; Hook. *f.*, o.c. 380; K. & V., Bijdr. 5 (1900) 361; Backer, Schoolfl. (1911) 465; Koord., Exk. Fl. Java 2 (1912) 318; Steenis, Bull. Jard. Bot. Btzg. III, 13 (1934) 242; Meeuse & Adelb. in Backer, Bekn. Fl. Java (em. ed.), Fam. 116 (1944) 8. — *Ph. integrifolia* Lindl. var. *notoniana* Vidal, o.c. (1965) 227, *nom. illeg., epith. variet. superfl.*; Vidal, o.c. (1968) 40. — L e c t o t y p e chosen by Vidal (1965): *Wight 1014* from India (K, holo; P). *Wallich 671* from India is a paratype (K-W, mixed collection).

Ph. eugenifolia Lindl. in Edwards, Bot. Reg. 23 (1837) nr. 1956. — *Ph. notoniana* W. & A. var. *eugenifolia* Hook. *f.*, o.c. 381. — T y p e: *Wallich 670* from Pundua, India (K-W).

Ph. dasythyrsa Miq., Fl. Ind. Bat. 1, 1 (1855) 387; Steenis, l.c. — *Ph. integrifolia* Lindl. var. *dasythyrsa* Vidal, o.c. (1965) 227. — T y p e: a fragmentary specimen from Sumatra in U, bearing a label in Miquel's handwriting, may be the type.

Ph. integrifolia Lindl. var. *subdenticulata* Miq., Fl. Ind. Bat. 1, 1 (1855) 387. — T y p e: *Horsfield 1135* from Mt. Prahu, Java (K, holo; BM).

Ph. integrifolia Lindl. var. *sublanceolata* Miq., l.c. — T y p e: *Horsfield 432* from Solo (Surakarta), Java (K, holo; BM).

Ph. lindleyana auct. non W. & A.: Koch in Miq., Ann. Mus. Bot. Lugd.-Bat. 1 (1864) 250.

Ph. notoniana W. & A. var. *angustata* Bl. *ex* Koch in Miq., Ann. Mus. Bot. Lugd.-Bat. 1 (1864) 250, *nomen nudum*.

Ph. notoniana W. & A. var. *ceylanica* Hook. *f.*, Fl. Brit. Ind. 2 (1878) 381. — *Ph. notoniana* W. & A. forma *vulgaris* K. & V., Bijdr. 5 (1900) 362, 364. — T y p e: from Ceylon, not clearly indicated, several specimens from Herb. Hookerianum in K.

Ph. notoniana W. & A. var. *macrophylla* Hook. *f.*, l.c. — T y p e: from Khasi Hills, not clearly indicated, several specimens in K.

Ph. blumei Decne, Nouv. Arch. Mus. Paris 10 (1874) 142. — L e c t o t y p e chosen by Vidal (1965): *Anderson 83* from Java (P, holo, not seen; K).

Ph. micrantha Decne, o.c. 143. — *Ph. notoniana* W. & A. forma *micrantha* K. & V., o.c. 363, 364. — T y p e: *Griffith 2098* from India (K).

Ph. notoniana W. & A. forma *grandiflora* K. & V., o.c. 362, 364. — T y p e: not indicated, from Mt. Gedeh, Java.

Ph. sambuciflora W. W. Sm., Notes Roy. Bot. Gard. Edinb. 10 (1917) 60. — L e c t o t y p e chosen by Vidal (1965); *Forrest 9722* from Yunnan, not seen; paratype: *Forrest 12293* (K, iso).

Ph. flavidiflora W. W. Sm., o.c. 59. — *Ph. integrifolia* Lindl. var. *flavidiflora* Vidal, Adansonia 5 (1965) 227, Fl. Camb. Laos & Vietn. 6 (1968) 38. — L e c t o t y p e chosen by Vidal (1965): *Forrest 9221* from Yunnan (K, iso); paratypes: *Forrest 7901* (not seen), *8079* (K, iso), *9294* (K, iso).

Shrubs or small trees, up to *c.* 10 m. Twigs glabrous or the young parts more or less hairy. Kataphylls (budscales) up to 8 mm long, dark, hard. Stipules on base of petiole, triangular, up to 2 by 1 mm, very early caducous. *Leaves* (petiole and blade) glabrous or with few hairs when young, petiole, midrib, and leaf margins often ± red. Petiole ½—4 cm long. Leaf blade elliptic to oblong (rarely obovatish), index 1¾—3, 4—15(—21) by 2½—8 cm, base cuneate to rounded, apex obtuse to acute, usually shortly acuminate, entire (rarely faintly toothed); midrib sunken above, prominent below, nerves 6—12 pairs, usually not well distinguishable from stronger tertiary nerves, ± flat above, slightly prominent below, venation widely reticulate, (hardly) visible above, scarcely prominent to just visible below; often thick and firm. *Inflorescence* a terminal compound raceme, branched up to the 4th order (in Sumatra the inflorescences sometimes terminal on almost leafless laterals), up to 7(—12) cm long, with up to 12 or even more spreading branches first order, the lower of these often in axils of leaves and up to 8(—10) cm long; all axes including the pedicels short-hairy or glabrous. Bracts and bracteoles early caducous; bracts up to 2½ mm; bracteoles 2, on the pedicel, up to 1½ mm. Pedicel 0—7 mm. *Flowers* fragrant. Hypanthium obconoid, 1—2 mm long, upper half free from ovary, usually glabrous outside, sometimes sparsely hairy, the inside lined with a glabrous disc. Sepals triangular, obtuse, (½—)¾—1(—1½) by 1—2 mm, glabrous, persistent. Petals (sub)-orbicular, 2½—4 by 2—4 mm, hardly clawed, white, glabrous or with few hairs on base, patent to reflexed during anthesis. Stamens 17—21, glabrous; filaments up to 2½(—4) mm; anthers ½—¾ mm long. Ovary semi-inferior, usually hairy on the free apex, 2 (or 3)-celled, see remark 2; styles 2 (or 3), 1—3 mm, sometimes free but usually shortly to ± halfway connate, glabrous, less often with hairs at base; stigma peltate. *Fruit* subglobular, 4—8 by 3½—6½ mm, red, upper part of hypanthium and sepals closely appressed against top of fruit; pericarpium with ± fleshy middle layer and hard, bony inner layer. *Seeds* usually 2 per cell, ± ovoid, up to 4 mm long, with hard, brown, glabrous testa, endosperm thin.

Distribution. Continental South-East Asia (Himalayan region, Assam, Burma, S. China, Laos, Thailand, S. India, Ceylon, according to Vidal also in Vietnam), Malesia (Malaya, Sumatra, Java, Lesser Sunda Is).

Remarks. 1. There can be hardly any doubt of the conspecificity of *Photinia integrifolia* and *Ph. notoniana*, and in agreement with Backer & Bakhuizen van den Brink (1964) and Vidal (1965) I have taken the species in its wider sense.

Several characters have been used in distinguishing varieties etc.; the most important ones will be briefly discussed.

a. Length of petiole, already mentioned by Hooker as the best character to distinguish *Ph. integrifolia* from *Ph. notoniana*. It is a highly variable character as can be seen from the graph (fig. 3b). On the Continent there seems to be a slight discontinuity in the group with the glabrous inflorescences, but the rest of the material completely spoils it.

b. Inflorescence. There is of course some variability in the characters which determine the shape etc. of the inflorescence: degree of branching, position and dimension of branches, length of pedicels. It is possible to select from the material two specimens with quite different-looking inflorescences, one extreme being a compact panicle with short, stout, upright branches, the other extreme being widely-branched with thin axes and long pedicels. Much of the difference is due to differences in age, the pedicels and branches becoming longer when anthesis sets in and then becoming thicker and stiffer when the fruits develop. The difference in branching, i.e. the difference between rich and poor inflorescences of course is found in every species and does not show a pattern different from that in other *Rosaceae*. Apart from the variation determined by age, there remains a variability but this is quite gradual.

c. Flower size. This is usually put into very unexact terms: flowers large, largish, rather small, very small, fleurs très petites, non très petites, etc. In most *Rosaceae* the dimensions of the flower as such cannot be given, because neither length nor diameter are suitable to be exactly measured and compared. To indicate flower size one has to give dimensions of the flower parts, and of these the length of the hypanthium and length and width of the sepals especially are useful. Of course, both have always to be measured in the same stage, viz. shortly before, during, or shortly after anthesis.

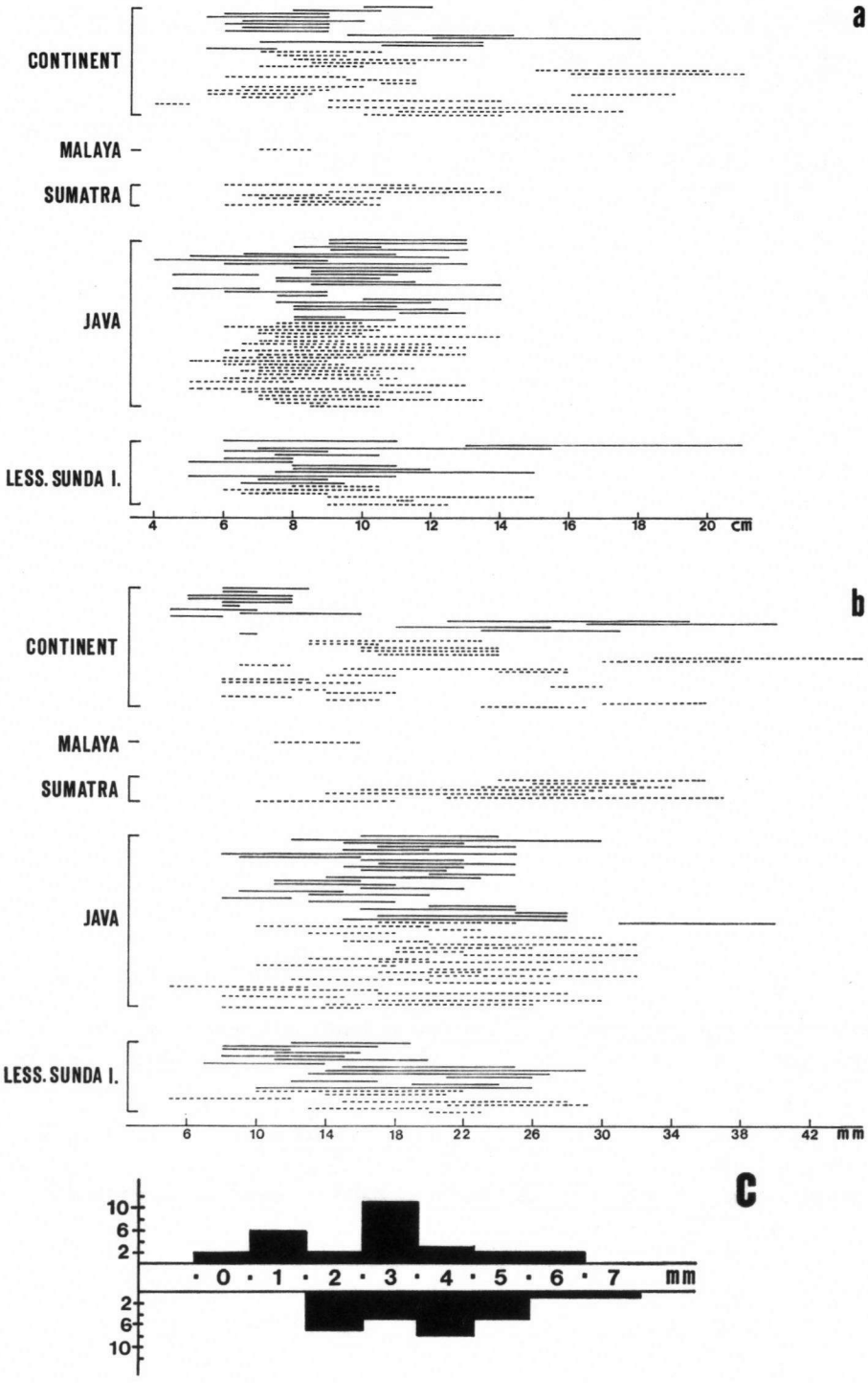
In the species at hand, flower size is undoubtedly variable, but no more so than in many other species. It is impossible to translate the existing differences into millimetres.

d. Indumentum, especially on the branches of the panicle. Many specimens have the panicles quite glabrous, irrespective of age. On the other hand, many specimens have a hair cover which of course is slightly variable in its density and which certainly becomes less dense with age. The assessment in fruiting material may sometimes be a bit difficult, but flowering specimens almost never give any trouble in placing them into either the glabrous or the hairy group. This difference, however, is not correlated with any other (see the graphs for three of the more obvious characters), so I would think it very unwise to use the character on the specific level. Accordingly I have distinguished two varieties.

The type of *Ph. integrifolia (Wallich 669)* belongs to the group with glabrous inflorescences. For the variety with the hairy panicles the choice is between Miquel's varietal epithets *subdenticulata* and *sublanceolata*, both regrettably unapt. I have chosen for the latter epithet.

Sterile specimens cannot be identified with certainty. If there are hairs on the young twig ends one may be reasonably certain that the specimen belongs to var. *sublanceolata*, but specimens with glabrous young twigs may belong to either of the varieties.

2. The ovaries of this species are as a rule bilocular, 3-celled ones are quite rare. The


a
CONTINENT
MALAYA
SUMATRA
JAVA
LESS. SUNDA I.
4 6 8 10 12 14 16 18 20 cm
b
CONTINENT
MALAYA
SUMATRA
JAVA
LESS. SUNDA I.
6 10 14 18 22 26 30 34 38 42 mm
c
10 6 2
0 1 2 3 4 5 6 7 mm
2 6 10

specimen *Van Steenis 8481*, however, is a significant exception: of 15 flowers examined six appeared to have a 2-celled ovary, seven a 3-celled one, and in the remaining two the ovary was 4-, resp. 5-celled. As can be seen in the key to the species on p. 419, the 2- or 3-locular ovary *versus* the 4- or 5-locular one is the main distinction between the present species and *Ph. davidiana*. I do not believe, however, that at this stage the rare presence of 4- and 5-merous ovaries in one specimen of *Ph. integrifolia* must be interpreted as a reason for not longer separating this species from *Ph. davidiana*, not even although this could be strengthened by the presence of 3-merous ovaries in two (also Sumatran) specimens of *Ph. davidiana* (see remark 3 to that species). Pending further evidence, I rather believe that this mixing of characters is connected with hybridization between the two clearly related species.

3. The description was drawn from the Malesian specimens only.

a. var. integrifolia

Ph. integrifolia Lindl. *sensu* DC., Miq. (excl. var. *subdenticulata* & var. *sublanceolata*), Decne, Hook. *f.*, Backer & Bakh. (*p.p.*), Vidal (*p.p.*: var. *integrifolia* & var. *notoniana*). — *Pyrus integerrima*. — *Ph. notoniana* W. & A. *sensu* Decne, Hook. *f.* (*p.p.*: var. *ceylanica* & var. *macrophylla*), K. & V. (*p.p.*: forma *vulgaris* & forma *grandiflora*), Koord. (*p.p.*), Steenis (*p.p.*), Meeuse & Adelb. (*p.p.*). — *Ph. sambuciflora*.

Rachis and branches of the inflorescence, and also the pedicels glabrous. Twigs always glabrous.

Distribution. Tibet, Nepal, Sikkim, NE. India, Assam, Yunnan, Thailand, Ceylon, Java, Lesser Sunda Is.

Habitat. In Java and the Lesser Sunda Islands this variety has been collected in montane forest and in subalpine shrubbery, especially at altitudes between *c.* 2000 and *c.* 3350 m, but also lower (to *c.* 1400 m).

JAVA. West. Mt. Pangerango: *Hochreutiner 908, Kern 8370, Van Ooststroom 13347, Pulle 3036, Reinwardt s.n., Reijnvaan 154, Smith s.n.*; Mt. Gedeh: *Djamhari 292, Meijer 1669*; Mt. Papandajan: *Ridley s.n., Van Steenis 4067*. — Central. Mt. Diëng: *Junghuhn 98*; Mt. Prahu: *Hochreutiner 2420*; Mt. Lawu: *Dorgelo 249, Rant 2*. — East. Mt. Walirang: *Backer 37005*; Mt. Ardjuno: *Arens s.n., Koorders 38030β*; Mt. Tengger: *Backer 37332, Kobus s.n., Koorders 37735β, 37736β*; Jang Plateau: *Van Dillewijn 186, Van Steenis 10797*. — Without exact locality: *Koorders 6468β, Zollinger 1922*, and some dubious sterile specimens.

LESSER SUNDA Is. Lombok. *Elbert 991, 1370, 2221, 2242, 2345*. — Flores. *Schmutz 1976, Verheijen 1626/27*. — Timor. *Cinatti 278, Forbes 3832, 3845, 3880a, Van Steenis 18451, De Voogd 2262*.

b. var. sublanceolata Miq.

Ph. integrifolia Lindl. *sensu* Bl., Miq. (*p.p.*: var. *sublanceolata* & var. *subdenticulata*), Backer & Bakh. (*p.p.*), Vidal (*p.p.*: var. *dasythyrsa* & var. *flavidiflora*). — *Ph. eugenifolia*. — *Ph. dasythyrsa*. — *Ph. integrifolia* var. *angustata*. — *Ph. blumei*. — *Ph. micrantha*. — *Ph. notoniana* W. & A. *sensu* W. & A., Hook. *f.* (*p.p.*: var. *eugenifolia*), K. & V. (*p.p.*: forma *micrantha*), Backer, Koord. (*p.p.*), Steenis (*p.p.*), Meeuse & Adelb. (*p.p.*). — *Ph. flavidiflora*.

Fig. 3. *Photinia integrifolia*. — a. Variation in length of leaf blade. Each collection is represented by a line showing the full range of normally developed leaves, excluding those in or just under the panicle. Drawn lines: group with glabrous inflorescence (var. *integrifolia*); interrupted lines: group with hairy inflorescence (var. *sublanceolata*). — b. Variation in petiole length, shown in the same way as a. — c. Histogram showing the length of the longest pedicel in flowering specimens from Java. Above the line: group with glabrous inflorescence (28 specimens), under the line: group with hairy inflorescence (26 specimens).

Rachis and branches of the inflorescence, and also the pedicels with a cover of short, appressed hairs, not entirely disappearing with age. Twigs glabrous or ± distinctly hairy when young.

Distribution. NE. India, Assam, Burma, Yunnan, Laos, Southern India, Ceylon, Malaya, Sumatra, Java, Lesser Sunda Is.

Habitat. This variety has been collected in montane forest and in subalpine vegetations, at altitudes between 1300 and 3200 metres.

MALAYA. Pahang. Mt. Benom: *Whitmore Kep. FRI 3337.*

SUMATRA. North. Mt. Leuser (Lösir): *Van Steenis 8481*, see remark 2. — Central. Mt. Malintang: *Bünnemeijer 4082*; Mt. Singgalan: *Beccari 299, Schiffner 2011*; Mt. Kerintji: *Bünnemeijer 9718, Robinson & Kloss 7300*; Mt. Tudjuh: *Jacobs 4491, Meijer 7268.*

JAVA. West. Mt. Salak: *Bakhuizen v. d. Brink f. 587, Blume 1846/1848, Koorders 24463β, Van Steenis 3040*; Mt. Pangerango: *Blume 534*; Mt. Gedeh: *Docters van Leeuwen — Reijnvaan 12944, Van Ooststroom 13938, Ridley s.n.*; Mt. Patuha: *Backer 12583*; Mt. Malabar: *Anderson 83, Monterie 5.* — Central. Mt. Diëng: *Junghuhn 86*; Mt. Prahu: *Horsfield 1135*; Mt. Merbabu: *Kooper 1702, 1705*; Mt. Muria: *Kostermans 6367 A*; Mt. Lawu: *Coert 1011, Dorgelo 446, Elbert 246*; Solo: *Horsfield 432.* — East. Jang Plateau: *Backer 9863.* — Without exact locality: *Forbes 920, 955, 960a, Junghuhn 297, 306, Koorders 6469β, Zollinger 2965*, and others.

LESSER SUNDA IS. Flores. *Kostermans & Wirawan 593, 893, Schmutz 1014, 1571, 1977, Verheijen 792, 2084/2085, 2353, 2589, 2855.* — Timor. *Friedberg 1159, Forbes 3588.*

2. **Photinia serratifolia** (Desf.) Kalkm., *comb. nov.*

Crataegus serratifolia Desf., Cat. Hort. Paris, ed. 3 (1829) 288, 408. — Type: probably non-existent; see remark 1.

Crataegus glabra auct. non Thunb. (Fl. Japon., 1784, 205): i.a. Aiton, Hort. Kew., ed. 2, 3 (1811) 202; Sims, Bot. Mag. 47 (1819) t. 2105.

Ph. serrulata Lindl., Trans. Linn. Soc. Lond. 13 (1821) 103, *nom. illeg., pro parte*; DC., Prod. 2 (1825) 631; Bl., Bijdr. 17 (1826) 1103; Miq., Fl. Ind. Bat. 1, 1 (1855) 388; Koch in Miq., Ann. Mus. Bot. Lugd.-Bat. 1 (1864) 250, *p.p.*; Franch. & Sav., Enum. Pl. Japon. 1, 1 (1873) 141; Decne, Nouv. Arch. Mus. Paris 10 (1874) 140; Cardot, Bull. Mus. Nat. Hist. Nat. Paris 25 (1919) 399; Merr., Enum. Philip. 2 (1923) 226; Steenis, Bull. Jard. Bot. Btzg. III, 13 (1934) 242; Vidal, Adansonia 5 (1965) 225. — *Ph. glabra* (Thunb.) *sensu* Maxim. var. *β chinensis* Maxim., Bull. Acad. Sci. St. Pétersb. 19 (1873) and Mél. Biol. 9 (1873) 179.

Ph. lindleyana W. & A., Prod. 1 (1834) 302. — Type: *Wight 1012* (K, holo).

Ph. pustulata Lindl. in Edwards, Bot. Reg. 23 (1837) nr. 1956. — Type: *Parkes* specimen from China, conspecific according to Rehder, Bibl. Cult. Trees & Shrubs (1949) 263.

Small trees, up to *c.* 15 m. Twigs glabrous, some hairs when very young. Kataphylls (budscales) up to *c.* 13 by 11 mm, dark and hard, partly shortly hairy outside. Stipules on base of petiole, subulate, 4½—5½ by 1 mm, midrib excentric, margin glandular, few hairs on midrib inside but otherwise usually glabrous, very early caducous. *Leaves* with some scattered long hairs on both surfaces and on the petioles when very young, but soon quite glabrous. Petiole 2—3 cm long. Leaf blade oblong to elliptic (rarely more obovate), index 2—3, 8½—13½ by 3½—5½ cm, base acute to rounded, apex usually acute, sometimes more or less acuminate, margin regularly and rather finely crenate to serrate, entire at extreme base only; midrib grooved above, prominent below, nerves up to 14 pairs, often not distinguishable from the stronger tertiary veins, flat above and only slightly prominent below, venation widely reticulate, not prominent. *Inflorescence* a terminal compound raceme, more or less corymbose to semiglobular in shape, up to *c.* 8 cm long, branched up to the 3rd or 4th order, with up to 12 laterals of 1st order, these up to 9 cm long, the lowermost sometimes in axils of normal leaves; all axes including the 2½—4 mm long pedicels glabrous, sometimes faintly hairy when very young. Bracts small, subulate, early caducous; bracteoles often more than 2 on a pedicel, partly with axillary bud. *Flowers* 5-merous, rarely 4-merous. Hypanthium obconoid, 1½—2 mm long, upper half

free from the ovary, glabrous outside and inside. Sepals broadly triangular, 1—1¼ by 1¼—1⅝ mm, glabrous, persistent. Petals suborbicular to broadly ovate, 3—4½ by 3—3½ mm, shortly (*c.* ½ mm) but distinctly clawed, spreading during anthesis, white, slightly hairy inside at base. Stamens 16—20, glabrous; filaments up to 3 mm; anthers ½—⅝ mm long. Ovary semi-inferior, hairy on the free top, 2- (rarely 3-) celled; styles 2, rarely 3, up to 2½ mm, free, glabrous. *Fruit* subglobular to obovoid with a more or less flattened apex, up to *c.* 5½ by 6 mm *(in sicco)*, red (to purple?), upper part of hypanthium and sepals closely appressed against top of fruit; pericarpium with a rather hard inner layer (but the fruit not really a drupe) and a fleshy middle layer. *Seeds* 2—4 (rarely —6), ± ellipsoid, *c.* 3 mm long, with a firm, brown, glabrous testa; thin layer of endosperm remaining around the embryo; cotyledons rather flat.

Distribution. Japan, China, Taiwan, S. India, Philippines, Sumatra (remark 2). Often cultivated.

Habitat. In the Philippines the species occurs (according to the very scarce fieldnotes, and also to Merrill) in the mossy forest at an altitude of *c.* 2500 m. The only specimen from Sumatra was collected at about the same altitude, but in a '*Gleichenia* vegetation with scattered trees'.

PHILIPPINES. Luzon. Mt. Data: *Ramos & Edaño BS 40259*; Mt. Pauai: *Santos BS 31650*, *Sulit PNH 7564*; Mt. Singakalsa: *Celestinó c.s. PNH 4452*, *Sulit PNH 7671*; Mt. Tabayoc: *Jacobs 7475*. — Mindanao. Mt. Candoon: *Ramos & Edaño BS 38908*.

SUMATRA. Central. Mt. Kerintji: *Jacobs 4363*, identification uncertain, see remark 2.

Remarks. 1. It has appeared necessary to change the name of this rather well-known species, which is not rarely cultivated as an ornamental. The complete history is as follows. *Crataegus glabra* Thunb. was published in 1784. The type specimens, *Thunberg 11860* and *11861* (seen in I.D.C. microfiches) have rather small leaves and short petioles. A plant introduced to England in 1804, was called *C. glabra* Thunb. by Aiton and figured under that name by Sims, although its leaves were certainly different and much larger. In Thunberg's description, however, no dimensions were given, which makes the error understandable.

In 1821 Lindley erected the genus *Photinia*, placing some old *Crataegus* species in it. Also the introduced '*Crataegus glabra*', which he saw in a living state, was recognized by him as a *Photinia*. Following his description he mentioned *Crataegus glabra* Thunb., without expressing any doubt, as a synonym, but he gave the plant the name *Ph. serrulata*, thus creating a superfluous, hence illegitimate epithet, which cannot be saved.

Not before 1873 it was recognized that the true *glabra* and Lindley's species are not the same. In that year (published on 4 November, according to Stafleu, Taxonomic Literature, 1967) Franchet and Savatier separated the two taxa on a specific level, calling them *Ph. glabra* and *Ph. serrulata*. This was also done by Decaisne in 1874. A few weeks later than Franchet & Savatier, on November 30, Maximowicz published his paper in which he made the same distinction on a varietal level, calling the taxa *Ph. glabra* var. *α typica* and var. *β chinensis*.

In the opinion of several authors and also in mine, the two taxa are best considered as two closely related species. *Ph. glabra* (Thunb.) Franch. & Sav. occurs in Japan and China. For the other species a new epithet is necessary and this has been supplied by the obscure *Crataegus serratifolia*, a name given by Desfontaines to a tree growing in the Jardin du Roi in Paris.

The unsatisfactory aspect of the choice of this epithet is that a type specimen is wanting. Desfontaines' general herbarium was acquired by Webb and is now at Firenze, but prof.

dr. C. H. Steinberg, who checked all *Rosaceae* in the Webb herbarium, could not find a specimen of *Crataegus serratifolia*. Neither could it be located in Paris, where dr. H. Heine made a thorough search. Most probably Desfontaines had only a young and sterile plant and did not make a herbarium specimen of it.

From the very short description published by Desfontaines, it is impossible to judge what kind of plant he had. According to Decaisne (1874), however, it has to be referred to *Ph.* '*serrulata*' Lindl. and I have decided to accept his judgment for two reasons. Firstly, Decaisne may have had some means of ascertaining the identity of Desfontaines' species, since he also worked in Paris. Secondly, the confusion between *Ph.* '*serrulata*' and *Ph. glabra* (see above) had more or less been sorted out in 1874.

I have not found any reference to Desfontaines' species in the period between 1829 and 1874. It was not mentioned, e. g., by Spach (Hist. Nat. Vég., Phan. 2, 1834). Dr. Heine informed me, however, that in an interleaved copy of Desfontaines' 1829 Catalogue, present in Paris, and abundantly annotated by Spach, the latter has written '= *Raphiolepis salicifolia Lindl.*'.

A specimen in Kew may be relevant to the problem. It is a specimen stamped '*Herbarium Benthamianum 1854*' and bearing in handwriting the annotation '*Photinia serratifolia*' *Hort. Requien.* (Quotation marks present in the original). E. Requien (1788—1851) worked in Avignon and cultivated many plants in his garden. Mr. J. C. Ledoux, now conservator of the Muséum Requien at Avignon, on my request tried to find a specimen with the name *Crataegus serratifolia* (or something like it) in Requien's herbarium, but in vain. It does not seem likely that the Kew specimen, probably sent by Requien to Bentham, is in any way linked to the specimen that Desfontaines used as basis for his *Crataegus serratifolia*, but it may show how Desfontaines' contemporaries interpreted his species. Unless, of course, the name '*Photinia serratifolia*' on the Requien specimen, is only a slip of the pen and not more than a coincidence.

The identity of *Crataegus serratifolia* is, consequently, not quite clear but I think that the decision to accept Decaisne's judgment, is the best that can be made at the moment.

2. The only specimen from Sumatra has very old flowers and young fruits and is not really sufficient to be certain about its identification. The resulting geographical distribution is rather strange.

3. The description was drawn from the material from the Philippines only. Specimens from China and Japan have often longer leaves (up to 16 cm) with more nerves (±20 pairs).

3. **Photinia prunifolia** (Hook. & Arn.) Lindl.

Ph. prunifolia (Hook. & Arn.) Lindl. in Edwards, Bot. Reg. 23 (1837) t. 1956; Decne, Nouv. Arch. Mus. Paris 10 (1874) 141; Vidal, Adansonia 5 (1965) 223; Fl. Camb. Laos & Vietn. 6 (1968) 40. — *Ph. serrulata* β *prunifolia* Hook. & Arn., Botany Beechey's Voy. (1833) 185. — T y p e: *Beechey's coll. s.n.*, specimen from Macao, China (K, holo).

Ph. melanostigma Hance and *Ph. consimilis* Hand.-Maz. are synonyms according to Vidal, types not seen.

Small trees, up to 12 m. Twigs and leaves glabrous, only when very young sometimes with some short appressed hairs. Stipules on base of petiole, subulate, 3—6 mm long, with some marginal glands, very early caducous. Petiole ¾—1½ cm long. *Leaf* blade lanceolate, index 3—5, 9—14 by 2—4½ cm, base cuneate, apex gradually tapering, margin irregularly, finely and densely glandular-serrate except at very base; midrib grooved above, prominent below, nerves *c.* 12—16 pairs, not always easily distinguishable from the intermediary tertiary veins, flat above and not very prominent below, venation reticulate, less visible than the nerves; upper surface glossy, under surface dull, in a dry state with

many scattered brown to black glandular dots. *Inflorescence* a terminal compound raceme, ± corymbose in shape, up to 8 cm long, branched up to the 4th order, with up to 8(—12) laterals of 1st order, the lower of these up to 6 cm long, in the axils of bracts or of normal leaves; all axes sparsely and shortly appressed-hairy. Pedicels up to 5 mm, long appressed-hairy. Bracts not seen; bracteoles 2, acicular, not opposite. *Hypanthium* obconoid, rather wide and low, 1—1½ mm high, 2½ mm wide at mouth, usually more than half of its length free from the ovary, sparsely long appressed-hairy outside, on inside lined with a glabrous, radially plicate disc. Sepals triangular, pointed, 1—1½ by 1½—2 mm glabrous outside, hairy inside. Petals elliptic, 4—4½ by 2½—3 mm incl. a short claw (*c.* ½ mm), white, long hairy near the base inside. Stamens *c.* 20, glabrous; filaments up to 3 mm; anthers *c.* ¾ mm long. Ovary semi-inferior, hairy on the free apex, 2-celled; styles 2, up to 3 mm long, ± halfway connate, hairy in the basal part. *Fruit* obovoid, *c.* 6 by 4 mm when ripe (measured *in sicco*), red, free part of hypanthium and sepals closely appressed against the top of the fruit; pericarpium glabrous outside, with a probably fleshy middle layer and a hard, ± bony inner layer. *Seeds* 3 or 4 per fruit, ellipsoid, 4 by 2 mm, testa with a hard brown inner layer and a whitish-opaque mucilaginous outer layer; endosperm thin; cotyledons flat.

Distribution. China, North and South Vietnam, Sumatra, Borneo.

Habitat. The specimens from Sumatra and Borneo have been collected between 1100 and 1700 m altitude, in primary or secondary montane forest.

Collector's notes. One fieldnote states that the bark is irregularly fissured and scaly. The wood is dirty yellow-ochre. Another fieldnote says that the bark is brownish.

SUMATRA. Central. Mt. Sago (=Mt. Malintang): *Jacobs 4669, Meijer 3229, 3672, 5287.*
BORNEO. Sabah. Mt. Kinabalu: *Aban Gibot* (*SAN*) *61781*; Mesilau: *Meijer SAN 48090.*

Remarks. 1. The species seems to be closely related to *Ph. serratifolia*, but is easily distinguished by the numerous small dark dots on the lower leaf surface. There are other differences too (see key), one of them being that *Ph. prunifolia* has not the prominent, large kataphylls (budscales) at the base of the shoots, that *Ph. serratifolia* possesses. There will be budscales, I suppose, but only small ones judging from the scars.

2. The description is drawn from the Malesian specimens only.

4. Photinia davidiana (Decne) Cardot

Ph. davidiana (Decne) Cardot, Bull. Mus. Nat. Hist. Nat. Paris 25 (1919) 399; Stapf, Bot. Mag. 149 (1924) t. 9008. — *Stranvaesia davidiana* Decne, Nouv. Arch. Mus. Paris 10 (1874) 179; Rehder, J. Arn. Arb. 7 (1926) 29; Vidal, Adansonia 5 (1965) 232; Fl. Camb. Laos & Vietn. 6 (1968) 56. — Type: *David s.n.*, specimen from Tibet, not seen, except for a tracing in K.

Stranvaesia integrifolia Stapf, Hook. Ic. Pl. 23 (1894) t. 2295; Steen., Bull. Jard. Bot. Btzg. III, 13 (1934) 246. — *Ph. havilandii* Stapf, Bot. Mag. 149 (1924) t. 9008. — Type: *Haviland 1071K* (K, holo; BM).

Stranvaesia undulata Decne (1874) and *S. salicifolia* Hutch. (1920) are according to the general opinion to be considered synonymous to the present species. Vidal (1965) also enumerated S. *henryi* Diels (1905) and *Pyrus cavaleriei* Lév. (1912) as synonyms.

Treelets or shrubs, 2—4½ m high. Twigs, petioles and main nerves shortly hairy when young, glabrescent. Kataphylls probably present at base of shoots, not seen. *Leaves* reddish when young, red again before falling. Stipules on the base of petiole, narrowly triangular, up to 3 by ½ mm, midrib excentric, keeled inside and glandular on the keel, sparsely hairy, very early caducous. Petiole ½—1 cm long. *Leaf* blade elliptic to elliptic-oblong or slightly obovate or ovate, index 1¾—2½, 4—9 by 2—4 cm, base rounded to acute, apex

usually acute and more or less distinctly mucronate, sometimes shortly acuminate, margin entire; midrib slightly grooved above, prominent below, at least at base, nerves *c.* 7—9 pairs, often not easily distinguishable from stronger intermediate veins, more or less flat above, hardly prominent below as is the widely reticulate venation; very stiff and coriaceous, somewhat shiny above. *Inflorescence* a terminal compound raceme, ± pyramidal in shape, up to 4 cm long, with up to *c.* 8 laterals of the 1st order, these up to 3½ cm long, usually branched again and bearing up to 10 (but usually not more than 5) flowers, the lowermost laterals usually in the axils of leaves, the higher ones bracteate; all axes, including the up to 3 mm long pedicels, distinctly but shortly appressed-hairy. Bracts and bracteoles early caducous; bracts often 2- or 3-dentate at apex, up to 3 mm long; bracteoles 2, close to the flower, up to 2 mm long, margin glandular-serrate. *Hypanthium* ± campanulate, up to 2 mm high, only the basal half connate to the ovary, sparsely hairy outside, glabrous inside. Sepals triangular, 1—1½ by 1¾—2 mm, with rounded to pointed apex, glabrous outside, usually ciliolate and with few short hairs inside. Petals elliptic to broadly orbicular, insignificantly clawed, up to 4½ by 4 mm, white to pinkish, usually with some hairs at base inside, erect in anthesis. Stamens 17—20; filaments rather thick and short, up to 3 mm long, glabrous; anthers up to 1 mm long. Ovary semi-inferior, shortly but distinctly hairy on the dome-shaped free top, 4- or 5-celled, see remark 3; styles 4 or 5, up to 3½ mm, ± halfway connate, glabrous except the extreme base. *Fruit* (sub)globular, up to 8 by 8 mm (measured *in sicco*), red when ripe, free part of hypanthium and sepals closely appressed against the top; pericarpium sparsely hairy, with a thick and fleshy middle layer, *in sicco* still up to 2 mm thick, inner layer thin and bony. *Seeds* 1—5, ellipsoid to obovoid, *c.* 4 by 2 mm, testa firm, lightbrown; endosperm thin (or absent?); cotyledons planoconvex.

Distribution. China, Taiwan (if *Ph. niitakayamensis* Hay. is considered synonymous), North Vietnam, North Sumatra, Borneo (Mt. Kinabalu only).

Habitat. On Mt. Kinabalu the species has been collected at altitudes from 3050 up to more than 3900 m, on almost bare granitic rock and in subalpine shrubbery. On the continent it is known from lower altitudes. The Sumatran specimens are from subalpine scrub at altitudes of 2600 to more than 3000 metres.

SUMATRA. North. Mt. Leuser (Lösir): *Van Steenis 8668*; Goh Lembuh: *Van Steenis 8974, 9088*, see remark 3.

BORNEO. Sabah. Mt. Kinabalu: *Chew c.s. 760, Clemens 27112, 27827, 30290, 30291, 50866* and *51106, Flenley 155, Fuchs & Collenette 21431* and *21455, Gibbs 4206, Haviland 1071 K, Meijer SAN 29267, Poore H411, Smythies S 10635*.

Remarks. 1. The reasons for not keeping *Stranvaesia* apart from *Photinia* have been elaborated on p. 416—417.

2. There is no difference between the Kinabalu plants and the specimens from continental Asia, as Vidal (1965) rightly observed. The only character worth mentioning is that on Mt. Kinabalu the leaves are hard and thick, which is not the case in the continental specimens that I have seen, nor in the cultivated specimens. It may be an altitudinal effect.

3. Three Sumatran specimens were also placed in the present species. One of those, *Van Steenis 8668*, is a normal one which does not significantly differ from the Bornean plants. The two others, both from Goh Lembuh, deviate in two points. They have 3- or 4-celled ovaries instead of the 4- or 5-locular ones that are normal in the species, and the indumentum on the young twigs and leaves is much denser and remains longer than in

other specimens. The significance of this difference cannot yet be elucidated but for the time being I have chosen to identify the deviating specimens as *Ph. cf. davidiana.*

4. The description above is based on Bornean and Sumatran specimens only.

5. **Photinia nussia** (D. Don) Kalkm., *comb. nov.*

Pyrus nussia D. Don, Prod. Fl. Nepal. (1825) 237. — *Stranvaesia nussia* Decne, Nouv. Arch. Mus. Paris 10 (1874) 178; Vidal, Adansonia 5 (1965) 231, 577; Fl. Camb. Laos & Vietn. 6 (1968) 54; Fl. Thail. 2 (1970) 41. — L e c t o t y p e according to Vidal (1965): a *Hamilton* specimen from Nepal, not seen; paratype: *Wallich 658* (K-W, L).

Stranvaesia glaucescens Lindl. in Edw., Bot. Reg. 23 (1837) t. 1956; Decne, l.c.; Hook. *f.*, Fl. Brit. Ind. 2 (1878) 382. — T y p e: *Wallich 673* (K-W, holo; L).

Eriobotrya ambigua Merr., Philip. Bur. Gov. Lab. Publ. nr. 35 (1906) 19; Enum. Philip. 2 (1923) 226. — *Stranvaesia ambigua* Nakai, J. Arn. Arb. 5 (1924) 72. — T y p e: *Meyer FB 2796* (K, iso); paratypes: *Whitford 1155, 1168, 1307.*

Eriobotrya oblongifolia Merr. & Rolfe, Philip. J. Sc. 3 (1908) 102; Merr., Enum. Philip. 2 (1923) 226; Nakai, o.c. 70. — T y p e: *Mearns & Hutchinson FB 4680* (K, holo).

Other synonyms in Vidal (1965).

Trees of up to 10 m high. Twigs densely shortly woolly when young, glabrescent. Budscales (few seen) *c.* 4, early falling, the upper ones tripartite, *c.* 7 mm long. Stipules on extreme base of petiole, not very early caducous, narrowly triangular, 1½—6 by ½—¾ mm, long-hairy, with glandular margins. Petiole 1—2 cm, shortly woolly when young, glabrescent. *Leaf* blade oblong to oblong-lanceolate (rarely widest above the middle), index (2—)2¼—3½(—4½, see remark 3), 5—11 by 2—4 cm, base acute, apex acute to shortly acuminate, margin entire in lower half, shallowly crenate to serrate in upper part; midrib grooved above, prominent below, nerves *c.* 8—15 pairs, often as strong as and not distinguishable from large intermediary nerves, almost flat above, only slightly prominent below, venation widely reticulate, almost invisible above, slightly prominent below; both surfaces shortly woolly when very young, hairs soon vanishing, remaining longer along the midrib underneath but ultimately the leaves quite glabrous, shining above, more dull beneath, rather stiff when dry and then lightbrown below and darker brown above. *Inflorescence* a terminal compound raceme, with up to 12 primary branches, the lower ones of these in the axils of leaves (and sometimes compound again), the upper ones in axils of bracts, the entire inflorescence corymb-shaped, 4—6 cm long, the lower branches up to 6 cm long; all axes rather densely shortly woolly, including the up to 7 mm long pedicels. Floral bracts up to 6 mm long, hairy, glandular on margins; bracteoles 2, on the pedicel, usually close to the flower, *c.* 1 mm. *Hypanthium* obconoid, 1½—2½ mm high, the upper half free from the ovary, densely shortly woolly outside, glabrous inside. Sepals broadly triangular, 1—1¾ by 1½—2½ mm, woolly outside, more or less glabrous inside, persistent. Petals elliptic to ovate, 4—5½ by 3—3½ mm, including the up to ½ mm long claw, apex rounded, at base inside long hairy, erect during anthesis. Stamens 20; filaments up to 3 mm, glabrous; anthers ¾—1 mm long. Ovary semi-inferior, the free apex densely hairy, (4- or) 5-celled; styles (4 or) 5, up to 4½ mm, connate over *c.* half their length, with hairs at base. *Fruits* (not many seen) ± globular, up to 6 mm diam., upper part of hypanthium closely appressed against the bulging, dome-like, now practically glabrous top of the fruit; carpels often distinctly marked on the top of the fruit by means of shallow, radial grooves; pericarpium thin, dry, and brittle *(in sicco)*, practically glabrous, *Seeds* 1 or 2 per cell, no mature ones seen.

D i s t r i b u t i o n. Continental Asia (E. Himalaya, Assam, N. Burma, N. Thailand, N. Laos, and Yunnan) and Malesia (Philippines only).

Habitat. Few notes available. On the continent in evergreen forest types at altitudes between 500 and *c.* 1800 m. In the Philippines (mainly according to Merrill) between 800 and 2500 metres, in forest.

PHILIPPINES. Luzon. Mt. Nagapatan: *Ramos BS 33152*; Benguet: *Leaño FB 22916, Loher 2463, 5074, Merrill 724, Ramos BS 5586, Santos BS 31954*; Mt. Mariveles: *Meyer FB 2796, Whitford 1155, 1168, 1307*; Mt. Lumutan: *Ramos BS 42206, Ramos & Edaño BS 29653*; Mt. Tokduanbanoy: *Ramos & Edaño BS 48644*. — Mindanao. Mt. Malindang: *Mearns & Hutchinson FB 4680*.

Remarks. 1. The reasons for reducing *Stranvaesia* to *Photinia* have been elaborated on p. 416—417.

2. Vidal (1965) recognized the conspecificity of two species described (in *Eriobotrya*) from the Philippines with the continental *Stranvaesia nussia*. Although there seems to be a hiatus in the distributional area between Yunnan and Northern Laos on one side, and Luzon on the other, the material does not allow any other decision. The differences between continental specimens and Luzon ones are very slight and amount to unimportant — and overlapping — deviations in measurements of leaves, flowerparts, and fruits.

3. The one specimen seen from Mindanao, which is the type of *Eriobotrya oblongifolia*, differs from the Luzon material only in its narrow leaves with a leaf-index up to 4½ (in Luzon up to 3½). This is insufficient to keep the species apart. No other collections from Mindanao are mentioned in literature.

4. The description given above, was drawn from the Philippine material only.

EXCLUDED

Photinia urdanetensis Elmer, Leafl. Philip. Bot. 8 (1915) 2802. — Type: *Elmer 13694* (isotypes seen from BM and U). = **Syzygium spec.** (*Myrtaceae*).

2. ERIOBOTRYA

Eriobotrya Lindl., Trans. Linn. Soc. Lond. 13 (1821) 102; DC., Prod. 2 (1825) 631; Bl., Bijdr. 17 (1826) 1102; Hassk., Catal. (1844) 264 ('*Eriobotrys*'); Miq., Fl. Ind. Bat. 1, 1 (1855) 388; Baill., Hist. Pl. 1 (1869) 410, 476, *p.p.*; Decne, Nouv. Arch. Mus. Paris 10 (1874) 144; Hook. *f.*, Fl. Brit. Ind. 2 (1878) 370; Focke in E. & P., Nat. Pfl. Fam. 3, 3 (1888) 25; Cardot in Lec., Fl. Gén. I.-C. 2 (1920) 677; Ridl., Fl. Mal. Pen. 1 (1922) 680; Nakai, J. Arn. Arb. 5 (1924) 61; Backer & Bakh., Fl. Java 1 (1964) 512; Hutch., Gen. Flow. Pl. 1 (1964) 214; Vidal, Adansonia 5 (1965) 537; Fl. Camb. Laos & Vietn. 6 (1968) 60; Fl. Thail. 2 (1970) 42. — Type species: *E. japonica* (Thunb.) Lindl.

Unarmed trees or shrubs, evergreen. *Leaves* spirally arranged, petioled or subsessile, simple, dentate or less often entire, main lateral nerves terminating in the margins. Stipules free or intrapetiolarly connate. *Flowers* in terminal, usually woolly, panicle-shaped compound racemes, bisexual, 5-merous, bracteate. *Hypanthium* ± obconoid, elongate above the ovary. Sepals persistent. Petals clawed, more or less distinctly hairy at base inside. Stamens 15—40. Ovary semi-inferior to inferior, the hairy top of the connate carpels free from the hypanthium, 2- to 5-celled; styles as many as cells, usually connate at base; ovules 2 per cell, collateral, basal. *Fruit* a more or less fleshy or juicy 'berry', crowned by the persistent sepals; seeds rather few, large, testa thin, endosperm absent, embryo with thick cotyledons.

Distribution. About 20 species, from the Himalayan region to Japan and through Southeast Asia southwards to Sumatra and Borneo. Only one species indigenous in Malesia.

KEY TO THE MALESIAN SPECIES

1a. Leaves soon glabrate, practically glabrous when mature, with 7—10 pairs of nerves. Stipules free. Petiole 1½—2½ cm. Ovary semi-inferior, 2 (or 3)-celled. **1. E. bengalensis**

b. Leaves very tardily glabrescent below, still densely woolly when mature, with 10—22 pairs of nerves. Stipules intrapetiolarly cohering or connate to a 2-topped scale. Petiole up to 1 cm. Ovary inferior, 5-celled . . . . . **2. E. japonica**

1. **Eriobotrya bengalensis** (Roxb.) Hook. *f.*

E. bengalensis (Roxb.) Hook. *f.*, Fl. Brit. Ind. 2 (1878) 371; Cardot in Lec., Fl. Gén. I.-C. 2 (1920) 677; Ridl., Fl. Mal. Pen. 1 (1922) 681; Nakai, J. Arn. Arb. 5 (1924) 70; Vidal, Adansonia 5 (1965) 567; Fl. Camb. Laos & Vietn. 6 (1968) 75; Fl. Thail. 2 (1970) 43. — *Mespilus bengalensis* Roxb., Fl. Ind. 2 (1832) 510. — Lectotype proposed by Vidal (1965): *Wallich 668/2* (K, holo).

Alsodeia? grandis Miq., Fl. Ind. Bat., Suppl. 1 (1860) 391. — Type: *Teysmann 4023 HB*, from Muara Enim, S. Sumatra (U, holo; sterile).

Trees, up to 27 m high. Twigs densely hairy when young, rapidly glabrescent. Stipules on extreme base of petiole, triangular, up to *c.* 4 by 1 mm, ciliolate but glabrous on the surfaces, caducous. Petiole 1½—2½ cm, dark, woolly when young, glabrescent. *Leaf* blade oblong to oblong-lanceolate, index 2½—3¾, 6—17 by 2—6½ cm, base gradually tapering to the petiole, apex acute to shortly acuminate, margins shallowly serrate, the teeth glandular when young; midrib slightly elevated above, prominent below, nerves 7—10 pairs, ascending, often with one stronger sidenerve, the latter and the primary nerves themselves terminating in the marginal teeth, flat to slightly elevated above, prominent below, venation transverse, not or hardly elevated; more or less shining dark brown above, lighter and dull below when dry, mature leaves almost glabrous, young ones with a woolly indument mainly on midrib and bases of nerves. *Inflorescence* a terminal compound raceme with up to 12 lateral racemes under the terminal raceme, the lowermost laterals in the axils of leaves or reduced leaves (often almost entirely consisting of the stipules only), upper ones in axils of bracts, lateral racemes sometimes branched in the lower part of the inflorescence, branching from bracteoles rare, the whole panicle up to 14 cm long in anthesis, lower laterals up to 12 cm long; the very short peduncle and all other axes densely woolly. Bracts *c.* 3 by 1 mm, sometimes longer; bracteoles 2, close to the flower, *c.* 2 by ¾ mm; bracts and bracteoles ovate-oblong, hairy outside, persistent. Pedicel 2—3(—5) mm, densely hairy. *Hypanthium* obconoid, 1½—2½ by 2—3 mm, densely hairy outside, upper free half lined inside with a glabrous, radially folded disc. Sepals ± triangular, 2—2½ by 1—1½ mm, apex rounded, patent to reflexed during anthesis, densely hairy outside, sparsely hairy inside. Petals ovate to broadly obovate, 4—4½ by 2—4½ mm, shortly clawed, reflexed in anthesis, white, glabrous except some to many long hairs at base inside. Stamens *c.* 20; filaments up to 3 mm, glabrous; anthers 0.6—0.8 mm long. Ovary semi-inferior, long and densely hairy on top, 2 (or 3)-celled (see remark 2); styles 2, rarely 3, ± clavate, 2—2½ mm, shortly connate at base, densely long hairy in lower part. *Fruit* ± globular, 10—15 by 9—15 mm in a dry state, crowned by the subpersistent sepals, still more or less hairy; pericarpium woody, *c.* ¾ mm thick. *Seeds* 1 or 2 per fruit, large, with thin papery testa and large cotyledons.

Distribution. Southeast Asia from Eastern part of Himalayan region to Vietnam and West Malesia (Sumatra, Malaya, ?Bangka, Borneo).

Habitat. Belonging to the primary forest, rather many collections from limestone, in Malesia at low altitudes from sealevel up to more than 1500 m.

Collector's notes. According to the scarce notes the bark seems to be rough outside, the inner bark red.

SUMATRA. South. Lematang Ilir: *Boschproefstation (Thorenaar) 101, TB 648, T 877*; Muara Enim: *Dali bb 35535, Kostermans S 93, S 127, 12006, 12337, Teysmann 4023 HB*; Lematang Ulu: *Lambach 1280.* — East. Asahan: *Krukoff 4086.* Without locality: *Koorders 10665β.*

MALAYA. Perlis. Kaki Bukit: *Kiah SFN 35318.* — Perak: *Corner SFN 31485, Ridley 7912, 10311.* — Kelantan. Sungei Betis: *Henderson SFN 29691*; Gua Musang: *Unesco 466.* — Pahang: Fraser's Hill: *Kochummen Kep. FRI 2168, Stone 6278, Whitmore Kep. FRI 239*; Mt. Tahan: *Ridley 16021, Wray & Robinson 5486*; Cameron Highlands: *Nur 32859*, see remark 2. — Selangor. Bukit Tahin: *Whitmore s.n.* — Malacca. *Griffith s.n., Maingay 630/1405.* — Langkawi I. *Henderson SFN 29137, Robinson 6211.* — Penang I. *Nauen SFN 37674.*

BANGKA. Beccari collected a specimen (in BM) from a tree cultivated in the Botanic Garden at Bogor, and originating from Bangka. No wild specimens seen from this island.

BORNEO. Sarawak. Serian District: *Anderson S 20909, Ilias Paie S 28055.* — Indonesian Borneo. East Kutai: *Kostermans 5961.*

Remarks. 1. The description is drawn from the Malesian material only; this is more homogeneous than the Continental specimens on which Vidal based six formae.

2. The ovary in the present species is normally 2-celled, the 3-celled state is rare. Vidal (1965) also recorded 4-celled ovaries, which I did not see. In one specimen from Malaya, however, all four flowers I dissected had 5-celled ovaries (*Nur 32859*). So this character seems to be very variable.

2. Eriobotrya japonica (Thunb.) Lindl.

E. japonica (Thunb.) Lindl., Trans. Linn. Soc. Lond. 13 (1821) 102. — *Mespilus japonica* Thunb., Fl. Japon. (1784) 206. — Type: *Thunberg* (I.D.C. microfiche, nr. 11908) specimen from Japan.

Small tree with rough and rather stout twigs. Leaves ± crowded at the twig ends. Stipules intrapetiolar, cohering or distinctly connate to a 2-topped scale, up to 1 cm long. Petiole 4—10 mm long. *Leaf* blade oblong to lanceolate, index 2½—4, 12—28 by 3½—8 cm, shortly dentate in upper part, with 10—22 pairs of nerves, glabrous above (but woolly when very young), densely woolly below and very tardily glabrescent there. *Inflorescence* 15—20 cm long, branched, with a short peduncle which usually bears some 2-topped scales (reduced leaves, only the stipules left). *Flowers* very shortly pedicelled, bracteate and bracteolate, very hairy, rather large. Sepals persistent, petals white, remaining long after flowering. Ovary inferior or almost so, but the densely hairy top free from the hypanthium, 5-celled; styles 5, free or practically so, hairy at base. *Fruit* a globular to ovoid berry, up to 3 cm diam., skin smooth, woolly at base, yellow to orange, very juicy. *Seeds* 2 or 3, rather large, up to 1½ cm, with smooth brown testa.

Distribution. Native of China (and Japan?), now cultivated as a fruit-tree (*Loquat, Bibassier, Wollmispel*) and occasionally naturalized in many tropical, subtropical and warm-temperate countries.

In Java locally cultivated, especially at medium altitudes (Backer & Bakh., Fl. Java 1, 1964, 513). No records from Malaya and Singapore, except for a few specimens cultivated in Bot. Gard. Singapore. From Sumatra two specimens seen without any indication on the labels whether the trees were cultivated, escaped or seemingly wild. The specimens in question are: *Lörzing 17285* from Pematang Siantar, North Sumatra, alt. 400 m, and *Van Borssum Waalkes 2810* from Mt. Talang in West Sumatra, alt. 1200 m.

Remark. The description above was drawn from Malesian specimens, but ripe

fruits not being present on the latter, the description of the fruit was compiled from different sources in literature.

3. RHAPHIOLEPIS

Rhaphiolepis Lindl. *ex* Ker in Edwards, Bot. Reg. 6 (1820) t. 468 ('*Raphiolepis*'), *nom. et orthogr. cons.*; Lindl., Trans. Linn. Soc. Lond. 13 (1821) 105 ('*Raphiolepis*') ; DC., Prod. 2 (1825) 630; Poiret, Dict. Sc. Nat. 45 (1827) 314; Miq., Fl. Ind. Bat. 1, 1 (1855) 388; B. & H., Gen. Pl. 1 (1865) 627; Baill., Hist. Pl. 1 (1869) 412, 476 ('*Raphiolepis*'); Decne, Nouv. Arch. Mus. Paris 10 (1874) 132 ('*Raphiolepis*'); Focke in E. & P., Nat. Pfl. Fam. 3, 3 (1888) 25; Cardot in Lec., Fl. Gén. I.-C. 2 (1920) 680 ('*Raphiolepis*'); Nakai, J. Arn. Arb. 5 (1924) 61 ('*Raphiolepis*'); Backer & Bakh., Fl. Java 1 (1964) 512 ('*Raphiolepis*'); Hutch., Gen. Flow. Pl. 1 (1964) 215 ('*Raphiolepis*'); Vidal, Fl. Camb. Laos & Vietn. 6 (1968) 83; Fl. Thail. 2 (1970) 44. — Type species: *Rh. indica* (L.) Lindl. *ex* Ker.
Opa Lour. Fl. Coch. (1790) 308, *nom. rejic.*

Small trees or shrubs, unarmed, evergreen. *Leaves* spirally arranged, petioled, simple, with serrate, crenate or dentate margins or entire, main nerves not terminating in the margin. Stipules free, small, caducous. *Flowers* in terminal, usually hairy, compound racemes, rarely in simple racemes, bisexual, 5-merous, bracteate. *Hypanthium* ± obconoid, elongate above the ovary, the free part at inside covered with a glabrous disc. Sepals (and upper rim of hypanthium) caducous after anthesis. Petals clawed, contort. Stamens 15—20. Ovary inferior, 2-locular, top covered by the disc; styles 2, free or connate at base; ovules 2 per cell, collateral, basal. *Fruit* a dryish berry, globular to (ob)ovoid, with a distinct circular scar at apex, 1-seeded, sometimes 2-seeded; *seeds* large, testa thin but firm, endosperm absent, embryo with thick cotyledons.

Distribution. Probably only very few species (see remark 1) in Southeast and East Asia: S. China, Hainan, from Thailand to Vietnam, Japan, Taiwan, Philippines, Borneo. Two species often cultivated as ornamentals.

Remark. 1. Many species and varieties have been described in this genus and I am certain that most of them are bound to disappear into synonymy when a full revision of the genus is made. I have seen only few specimens from China, where the genus is well-represented, but from sufficient specimens from the rest of the area, from descriptions, and from keys published, I would predict that not more than three species will survive a revision. The differences, for example, between the continental-Asian *Rh. indica* and the Japanese *Rh. umbellata* (=*Rh. japonica*), both cultivated as ornamentals in Europe and North America, are extremely vague. A key like that in Bailey's Manual of cultivated plants (1949):

— Leaves rather sharp-serrate, acute or acuminate . . . . . *indica*
— Leaves remotely dentate to entire, mostly obtuse . . . . . *umbellata*

may be applicable in identifying cultivated specimens, but in discriminating plants of wild populations it can hardly be used.

Several species and varieties, accepted by e.g. Nakai (J. Arn. Arb. 5, 1924, 61—67) or Metcalf (Lingn. Sc. J. 18, 1939, 505—512) are based only on slight differences in vegetative characters of the kind that will be spoiled by the next two specimens that will be collected!

About the species from Borneo and the Philippines, which is accepted here, one cannot be certain, either. See remark 2 to that species, p. 435.

2. *Rh. umbellata* (Thunb.) Mak. seems not to be cultivated in Malesia, at least it is not mentioned in literature. In L there are three specimens, collected at the end of the last century and probably all from the same plant in the Botanic Garden at Bogor.

KEY TO THE MALESIAN SPECIES

See also remark 2 on p. 435

1a. Leaves densely ferruginous-woolly when young, glabrate, with a finely reticulate venation which is distinctly visible underneath. Flowers with a hypanthium up to 2½ mm long, less than half of it free from the ovary. . . . **1. Rh. philippinensis**

b. Leaves only slightly hairy when very young, soon quite glabrous (only rarely more densely hairy), with a more coarse venation which is not of a darker colour and consequently not so clearly distinguishable. Hypanthium at least 3 mm long, more than half of it free from the ovary . . . . . **2. Rh. indica**

1. Rhaphiolepis philippinensis (Vidal) Kalkm., *comb. nov.*

Eriobotrya philippinensis Vidal, Rev. Pl. Vasc. Filip. (1886) 123; Merr., Enum. Philip. 2 (1923) 226; Nakai, J. Arn. Arb. 5 (1924) 71; Vidal, Adansonia 5 (1965) 577, *in obs.* — S y n t y p e s: *Vidal 1350* (fl.; K) and *1353* (fr.; K).

Photinia luzonensis Merr., Philip. Bur. Gov. Lab. Publ. nr. 17 (1904) 18; Philip. J. Sc. 1 (1906) 60; 2 (1907) 276; Enum. Philip. 2 (1923) 226; Steenis, Bull. Jard. Bot. Btzg. III, 13 (1934) 242 (*'luzoniensis'*). — *Eriobotrya luzonensis* Nakai, o.c. 69 (*'luzoniensis'*); Vidal, o.c. 576, *in obs.* — T y p e: *Merrill 3223* (K, iso); paratype: *Merrill 3714* (BM, K).

Eriobotrya acuminatissima Nakai, o.c. 71; Vidal, o.c. 576, *in obs.* — T y p e: *Martelino & Edaño BS 35622* (A, holo, not seen; BM, K, L).

Small trees, up to c. 10 m. Twigs densely ferruginous-woolly when young, glabrescent. Stipules on base of petiole, free, triangular, 2½—4 by ¾—1½ mm, sparsely hairy, glabrescent, usually rather long persistent. Petiole ½—2½ cm, ferruginous-woolly when young, glabrescent. *Leaf* blade oblong or obovate-oblong to lanceolate, rarely elliptic, index (1.8—)2—4, 3—15 by 1½—5½ cm, base gradually tapering to the petiole or more rounded, apex acute to ± rounded and then usually acuminate, margin very rarely entire, mostly rather remotely to more densely serrate, dentate, or crenate, at least in the upper part, teeth glandular when young; midrib rather flat above, prominent below, nerves 7—12 pairs, only slightly prominent on both sides, often a smaller nerve of about the same strength between and parallel to two main nerves, venation finely reticulate, usually well visible by the darker colour below, flat above; young leaves ferruginous-woolly on lower surface and also on and near the midrib on upper surface, indumentum practically or entirely vanishing with age, *in sicco* the leaves usually darkbrown above, lighter brown underneath, coriaceous. *Inflorescence* a terminal compound raceme, with under the raceme on the main axis up to 8 unbranched lateral racemes, the lower of these often axillary to normal leaves, the upper ones in the axils of bracts which may be up to 1 cm long; whole panicle 2—7½ cm long, lowermost laterals up to 6 cm long, peduncle up to ½ cm long only, all axes including the 2—10 mm long pedicels densely ferruginous-woolly. Flower-bearing bracts triangular, *c.* 3 by 2 mm, hairy on both sides; bracteoles 2, close to the flower, 1½—2 by ½—1½ mm, hairy, especially outside. *Hypanthium* obconoid, 2—2½ by 2—2½ mm, the upper rim free from the ovary, densely hairy outside, on inside lined with a glabrous disc that also covers the top of the ovary. Sepals triangular, 1½—3½ by 1¼—2 mm, densely hairy outside, sparsely long-hairy inside. Petals elliptic to suborbicular, up to 6½ by 4½ mm, shortly clawed (*c.* ½ mm), glabrous or with few long hairs at base inside, reddish-white. Stamens 16—20; filaments up to 3½ mm long, glabrous; anthers ½—¾ mm, white with dark connective. Ovary inferior, 2-celled; styles 2, free, up to 4 mm long, sometimes glabrous but usually with sparse long hairs at very base. *Fruit* a 'berry', ovoid to subglobular, 6—9 by 4—9 mm (measured *in sicco*), with a more or less flattened

apex where the sepals have fallen off, dull dark purple; pericarpium according to a collector's note soft *in vivo*, but hard and woody-granular when dry. *Seeds* 1 or 2 per fruit, rather large, with thin but firm testa; endosperm absent; cotyledons thick.

Distribution. Philippines, Borneo.

Habitat. Notes scarce. In the Philippines the species is found in mossy forest and also on exposed ridges between 1200 and *c.* 2600 m altitude. One specimen (*Sulit PNH 12452*) was collected on a riverbank at only 350 m alt. In Sabah one specimen (*Mujin SAN 37848*) was collected in primary forest on ultrabasic soil at 850 m altitude, the other two specimens at 1500—1800 m.

Collector's notes. On the label of his nr. *PNH 12452* Sulit says that this is a very beautiful tree, suitable for ornamental planting. The white flowers were seen ½ km away.

PHILIPPINES. Batanes. Batan I.: *Ramos BS 80576*; Sabtang I.: *Ramos BS 79881*. — Luzon. Mt. Palimlim: *Ramos BS 33379*; Mt. Polis: *Celestinó PNH 7925, PNH 8027*; Mt. Nañgaoto: *Sulit PNH 7760*; Mt. Pauai: *Santos BS 31873*; Mt. Baudan: *Ramos & Edaño BS 40319*; Mt. Tabayoc: *Jacobs s.n.*; Mt. Pulog: *Jacobs 7226*; Mt. Naguliang: *Loher 2464*; Zambales Prov., Sta Cruz: *Vidal 1350, 1353, Wood FB 19739*; Mt. Umingan: *Ramos & Edaño BS 26443*; Mt. Mariveles: *Borden FB 2120, Elmer 6996, Merrill 790, 3223, 3714, Whitford 1161, 1189, Williams 418*; Montalban: *Loher 12040*. — Mindoro. Mt. Halcon: *Rabor PNH 20490*. — Palawan. Victoria Mts.: *Sulit PNH 12452*. — Panay. Mt. Salibongbong: *Martelino & Edaño BS 35622*. — Bohol. *Ramos 43210, 43231*.

BORNEO. Sabah. Mt. Silam: *Mujin SAN 37848*; Mt. Kinabalu: *Chew & Corner RSNB 4818, Clemens 35233*.

Remarks. 1. Vidal (1965) recognized that the three '*Eriobotrya*' species described from the Philippines, are to be transferred to *Rhaphiolepis* on the strength of the flower structure (top of the inferior ovary covered by the disc) and the caducous sepals. He did not, however, make the new combination(s).

2. As said in a remark under the genus description (p. 433), it seems very certain that several species and varieties discriminated by minor vegetative characters, cannot be upheld. A future monographer will have to consider where the limits of *Rh. indica* must be drawn and I do not exclude the possibility that the present species ultimately will fall within those limits. See also remark 3. For the time being I do not want to reduce the species, since I have not seen sufficient material of *Rh. indica* from S. China to build a satisfactory image of this species.

The differences between *Rh. indica* and *Rh. philippinensis* are mainly vegetative. The very young leaves of *Rh. indica* are subglabrous or have a slight haircover. Very rarely the indumentum is more dense, but I saw only one specimen (*Poilane 962* from S. Vietnam) with young leaves that could be described as ferruginous-woolly. The latter term, however, is always pertinent for the young leaves of *Rh. philippinensis*. In the nervation there are differences which are rather difficult to describe. The nerves are steeper in *Rh. indica* than in *Rh. philippinensis*, where they are sometimes almost perpendicular to the midrib. The reticulate venation is finer in *Rh. philippinensis* and usually also better visible on the lower surface than is the case in *Rh. indica*. The distinctness of the venation is caused by the darker and more contrasting colour, not by a greater prominence.

In the flowers there seems to be a difference in the shape and dimension of the hypanthium. In *Rh. philippinensis* this is wide and short, and the part connate with the ovary is relatively large, so that only a wider cup-like part remains free. In *Rh. indica* this free part is longer and narrower and the whole hypanthium larger.

3. The variation in shape and size of the leaves is rather wide, but continuous. The type specimens of *E. philippinensis* are less typical for the species than the types of *Ph. luzonensis*

and *E. acuminatissima* are, but still there is no reason for doubting their conspecificity. In *Vidal 1350* the leaves are wide (leaf index 1.8—2.5) and quite entire; they look like in some continental Asian specimens of *Rh. indica*, but their indumentum is dense and still present in old and mature leaves. The venation is not contrasted by a darker colour. The other syntype of *E. philippinensis*, *Vidal 1353*, has narrower leaves (index 2.5—3) which sometimes show a few marginal serrations.

4. The leaves of one Bornean specimen (*Chew & Corner RSNB 4818*) are thicker and harder than is usual in the species; identification is somewhat doubtful.

2. Rhaphiolepis indica (L.) Lindl. *ex* Ker

Rh. indica (L.) Lindl. *ex* Ker in Edwards, Bot. Reg. 6 (1820) t. 468; Hassk., Catal. (1844) 265; Backer & Bakh., Fl. Java 1 (1964) 512. — *Crataegus indica* L., Sp. Pl. (1753) 477. — Type: *sheet 643.11* in LINN, seen in I.D.C. microfiche.

Mespilus spiralis Bl., Bijdr. 17 (1826) 1102. — *Rhaphiolepis spiralis* G. Don, Gen. Hist. Dichlam. Pl. 2 (1832) 602. — Type: according to Blume a specimen *'ex regno Chinensi introducta'* in Java. Several specimens, probably all collected from one plant in the Botanic Garden of Bogor, are present in L. Sheet nr. *908.197—616* is representative and has been chosen as a lectotype. See remark 2.

Other synonyms in Vidal, Fl. Camb. Laos & Vietn. 6 (1968) 84.

Shrub or treelet. Vegetative and flowering shoots always with some kataphylls at base. Leaves more or less crowded, with some hairs when very young but soon quite glabrous. Stipules on base of petiole, free, small, caducous. Petiole up to ½ cm. *Leaf* blade oblong to obovate-oblong, index 2½—3, 3—7 by 1—2½ cm, base gradually narrowed, apex acute or more obtuse but then shortly acuminate, margin serrate, with *c.* 5 pairs of nerves, herbaceous to subcoriaceous. *Inflorescence* up to 13 cm long, branched, peduncle very short, axes practically glabrous. Pedicels mostly not longer than ½ cm. Bracts and bracteoles present. *Flowers* fragrant. Hypanthium 3—3½ mm high, sparsely hairy outside, upper half (or even more) free from the ovary. Sepals pointed-triangular, up to 5 by 1—1½ mm, hairy inside. Petals usually white, sometimes pinkish, up to 6 mm long. Ovary inferior, 2-celled; styles 2, loosely connate at base, glabrous. *Fruits* ± globular, *c.* 6 mm diameter, black when ripe.

Distribution. Continental Southeast Asia from Thailand to South China, also in Hainan and Taiwan. Cultivated as an ornamental in many countries, also in Java and maybe elsewhere in Malesia.

Habitat. In its home-countries in Southeast Asia the species occurs from sea-level up to *c.* 1300 m altitude, and it prefers probably the open types of evergreen forest.

Remarks. 1. The description given above is based on the cultivated specimens from Java. The variability within the species (in a wild state!) is much larger than thus indicated. The leaves may be up to 10(—16) cm long, with a leaf index of 2 to 4, the petiole may be as long as 3 cm, although this is of rare occurrence. The serration of the leaf margin varies from very sharp and distinct over a large part of the length to only shallow and blunt, at apex only. Some leaves may be entire and rarely this is the case with all leaves of a specimen. The young leaves are sometimes more distinctly hairy below but the indumentum always disappears very soon. The axes of the inflorescence are usually distinctly hairy during anthesis. The ripe fruits range from globular (most commonly) to obovoid, measured in sicco they may reach a diameter of 1 cm.

2. Blume's *Mespilus spiralis* was transferred by G. Don to *Rhaphiolepis* and recognized as belonging to *Rhaphiolepis indica* by Hasskarl. It was based on cultivated specimens with slightly deviating inflorescences. The raceme is simple and on the lower pedicels there are

many spirally arranged bracts (hence the epithet), while the pedicels in the upper region only bear the normal two bracteoles. Obviously these long (—3 cm) 'pedicels' represent branches first order, bearing only bracts but no flowers except the terminal one.

3. See also the remarks on p. 433 and p. 435.

4. MICROMELES

Micromeles Decne, Nouv. Arch. Mus. Paris 10 (1874) 168; Hedlund, Kongl. Sv. Vet.-Akad. Handl. 35, 1 (1901), *in obs.* p. 14; Schneid., Ill. Handb. Laubholzk. 1 (1906) 700. — *Pyrus* L. sect. *Micromeles* Hook. *f.*, Fl. Brit. Ind. 2 (1878) 377. — *Sorbus* L. sect. *Micromeles* Rehder, Manual Cult. Trees & Shrubs (1927) 382; ibid. 2nd. ed. (1940) 380; Yü & Kuan, Acta Phytotax. Sin. 8 (1963) 207, 221; Vidal, Fl. Camb. Laos & Vietn. 6 (1968) 24. — T y p e s p e c i e s: not yet indicated.

Included by several authors in *Sorbus* or in *Pyrus* sect. *Sorbus*, without being recognized as a separate taxon.

Unarmed trees or shrubs, deciduous. *Leaves* spirally arranged, petioled, simple, serrate to crenate, the main lateral nerves terminating in the margin. Stipules on and sometimes adnate to the petiole. *Flowers* in terminal, panicle-shaped compound racemes, bisexual, 5-merous, bracteate. *Hypanthium* ± obconoid, elongate above the ovary, the free part transversely rupturing after anthesis and falling with sepals and other flowerparts, the inside covered with a glabrous disc. Stamens *c.* 20. Ovary inferior, its apex covered by the hypanthial disc. 2- to 5-, most often 3-celled; styles (2 or) 3 (—5), usually connate at base; ovules 2 per cell. *Fruit* with a hard and dry, rather thick pericarpium, usually lenticellate, globular to pyriform, with a distinct circular scar at apex, with several flat *seeds*; testa rather thin, endosperm absent, embryo with flat cotyledons.

D i s t r i b u t i o n. Probably less than 15 species, in SE. and E. Asia, one species also in West Malesia.

Micromeles corymbifera (Miq.) Kalkm., *comb. nov.*

Vaccinium? corymbiferum Miq., Fl. Ind. Bat., Suppl. 1 (1861) 588. — T y p e: *Junghuhn s.n.* (Pl. Jungh. Ined. 1035) from Sipirok, Sumatra (U, holo; L). According to an annotation on the Utrecht sheet, Van Steenis established the identity as early as 1934 but never published it. In Sleumer's revision of *Vaccinium* (Blumea 11, 1961, 107) the name is placed under *'excluded'*, but Sleumer did not see the type.

Pyrus granulosa Bertoloni, Mem. Accad. Sc. Bologna II, 4 (1864) 312, pl. 3; Hook. *f.*, Fl. Brit. Ind. 2 (1878) 378; Cardot in Lec., Fl. Gén. I.-C. 2 (1920) 671; Ridl., Fl. Mal. Pen. 1 (1922) 680; Steenis, Bull. Jard. Bot. Btzg. III, 13 (1934) 242. — *Micromeles granulosa* Schneider, Ill. Handb. Laubholzk. 1 (1906) 700; Fedde Rep. 3 (1906) 151. — *Sorbus granulosa* Rehder in Sarg. Pl. Wils. 2 (1915) 274; Vidal, Fl. Camb. Laos & Vietn. 6 (1968) 26; Fl. Thail. 2 (1970) 36. — T y p e: *Hooker f. & Thomson*, specimen marked *'Pyrus c'* from Khasi Hills (K, holo; L, P, U). As pointed out by Rehder, Bertoloni interchanged the quotations of the specimens under this species and under *Pyrus verruculosa* (which is a synonym of *Pyrus pashia* D. Don).

Micromeles malayensis Ridl., J. Bot. 62 (1924) 296. — T y p e: *Nur 11241* from Fraser's Hill, Malaya (K, holo).

Photinia bartlettii Merr., Pap. Mich. Acad. Sc. 19 (1934) 155; Steenis, Bull. Jard. Bot. Btzg. III, 13 (1934) 242. — T y p e: *Bartlett 8662* from Sumatra (NY, holo, *n.v.*; L).

Other synonyms in Vidal (1968).

Trees, up to 30 m high, to shrubs, sometimes hemi-epiphytic, deciduous. Twigs, petioles, and leaf blades glabrous or with very few hairs, rarely (see remark 1) more densely hairy. Light-coloured lenticels present on twigs and inflorescences. Budscales up to *c.* 10, up to 12 mm long, fimbriate. Stipules on the petiole, bristle-like and very small, early falling and not or hardly leaving a scar, but sometimes and especially on the basal leaves of a shoot well-developed, adnate to the petiole and up to 6 by 1 mm. Petiole 1—3

cm, red *in vivo*, as are midrib and leaf margin. *Leaf* blade oblong to elliptic-oblong, rarely ovatish, index 1¾—2½, 7—13 by 4—7½ cm, base acute to attenuate, more rarely ± rounded, apex shortly acuminate to acute, margin shallowly serrate but usually the basal quarter entire; midrib slightly sunken above, prominent below, nerves 8—11 pairs, ± flat above, rather prominent below, venation transverse, not very prominent but visible, as is the finer reticulation; small, cylindrical, glandlike outgrowths sometimes present on the midrib above. *Inflorescence* a terminal compound raceme, branched up to the third order, up to 7 cm long, with up to 10 branches of the first order, the lower of these placed in axils of normal leaves and up to 5½ cm long; all axes, including the up to 5 mm long pedicels, usually quite glabrous, more rarely with some hairs, rarely with denser indumentum (see remark 1). Bracts caducous, up to 5 by ½ mm, with few hairs. *Flowers* normally 5-merous, fragrant. *Hypanthium* obconoid, often more or less abruptly widened in the upper part, 2—3 mm long, the upper 1 mm free from the ovary and after anthesis falling off, glabrous outside or with some hairs, covered by a glabrous disc inside. Sepals triangular, 1½—2½ by 1½—3 mm, obtuse, rarely acute, glabrous on both sides. Petals (broadly) elliptic or more ovate or obovate, 4½—6 by 3—4½ mm, rounded at apex, claw ½ mm or less, more or less distinctly concave, white, glabrous. Stamens 19—24; filaments up to 6 mm, white; anthers ¾—1 mm long, redbrown. Ovary inferior, apex covered by the disc, 2- to 4-, usually 3-celled; styles same number as cells, up to 5½ mm long, distinctly connate in the lower part, glabrous; ovules 2 per cell, ascending, not strictly collateral but ± superposed. *Fruit* globular to ellipsoid, sometimes more ovoid or obovoid, rarely distinctly pear-shaped (see remark 1), usually distinctly triangular in cross-section, with a large circular scar at the apex, normally the fruits still present on the twigs when the young flush appears, 9—16(—20) by 8—16 mm (see fig. 4); pericarpium brownish, always with corky lenticels and those often very distinct, the whole of the fruitwall very hard and woody, a fleshy layer apparently absent or with so many groups of sklereids that *in sicco* nothing is left of fleshiness. *Seeds* 2 per cell, filling the narrow locules, flat, up to 5 by 3½ mm, with a firm-membranous testa; endosperm absent; cotyledons flat.

Distribution. Continental Southeast Asia from Assam eastwards and southwards (Yunnan, Thailand, Laos, Cambodia, Vietnam) and in West Malesia (Malaya, Sumatra).

Habitat. The Malesian specimens were collected at altitudes of 1100—2500 metres, rarely higher (up to *c.* 3000 m). This agrees well with the altitudinal distribution on the continent (900—2000 m). One specimen from Perak *(King's coll. 8313)*, according to the label collected at *c.* 600—750 m, may be wrongly annotated. The plants grow in primary montane forest, rarely in the mossy forest, but also in more open and low, shrubby vegetations.

Collector's notes. Most of the collections are noted on the labels as trees or (straggling) shrubs, but often the plants are said to be epiphytic or climbing. According to Corner (Wayside Trees, 2nd ed. 1952, 529) the plant may start its life as an epiphyte, later sending down roots and becoming a real tree (not, however, strangling its host). It is thus one of the rather few examples of hemi-epiphytic plants (see Van Steenis, Fl. Mal. I, 4, 1948, xxix).

Only one collection *(Whitmore Kep. FRI 3329)* bears annotations about the bark of this tree. It is said to be brown and scaly, the scales being elongate. The inner bark is pink to redbrown, soft, and closely flecked with tiny darkbrown dashlike marks in tangential rows.

MALAYA. P e r a k. Thaiping: *King's coll. 8313.* — P a h a n g. Cameron Highlands: *Chew 952, Mead 14642, Ng Kep. FRI 5926, Whitmore Kep. FRI 862*; Mt. Benom: *Whitmore Kep. FRI 3329*; Fraser's Hill: *Burkill 2814, Burkill c.s. 2042, Corner SFN 26037, SFN 33243, Nur 11241, Shah & Noor 939*; Mt. Ulu Kali: *Whitmore Kep. FRI 12581*; Mt. Tahan: *Ridley 16030, Wray & Robinson 5520.*

SUMATRA. N o r t h. Burno Geredong: *Van Steenis 6530*; Goh Lembuh: *Van Steenis 8993*; Blang Kedjerèn to Mt. Leuser: *Van Steenis 8464*; Mt. Kemiri: *Van Steenis 9688*; Paja (near Blang Kedjerèn): *Van Steenis 10031*; Mt. Sibajak: *Bartlett 8657*, 8662, *Lörzing 14916, 15799*; Karo plateau, without loc.: *Lörzing 9088*; Sidikalang: *Alston 14919*; Toba: *Rahmat Si Boeea 10727*; Sipirok: *Junghuhn (1035).* — C e n t r a l. Mt. Talakmau: *Bünnemeijer 982*; Mt. Merapi: *Bünnemeijer 4690, 4867, Meijer 3466*; Mt. Sago: *Maradjo 96, Meijer 3619, 4797*; Mt. Singgalang: *Beccari 86, 192, 285, Meijer 5232*; Mt. Kerintji: *Jacobs 4378, Meijer 6169*; Mt. Tudjuh: *Jacobs 4502.* — S o u t h. Mt. Dempo: *Forbes 2375, 2376, De Voogd 1557*; Mt. Tanggamus: *Jacobs 8232*; Mt. Beragi: *Forbes 2050.*

R e m a r k s. 1. Vidal (1968, 1970) divided this species, under the name *Sorbus granulosa*, into three varieties, as follows:

Young leaves and inflorescences floccose-tomentose
  Fruits globose, up to 20 mm. . . . . var. *granulosa*
  Fruits pyriform or turbinate, 20—30 by 15—25 mm . . . . . var. *turbinata* Card.
Young leaves and inflorescences glabrous. . . . . var. *crenulata* (Geddes) Vidal

The assignment of the Malesian specimens to one or more of these varieties presents some difficulties. In specimens from Sumatra as well as from the Malay Peninsula the leaves and panicles are — with few exceptions noted below — either quite glabrous even when very young, or they are provided with a few, early vanishing hairs. The fruits are globular or ellipsoid, rarely ovoid or obovoid, and not longer than 20 mm. This seems to place them in var. *crenulata*, certainly not in var. *turbinata* (as stated by Vidal, 1970).

The character of the indumentum is, however, not so straight-forward. Some specimens from Malaya (i.c. *Ng. Kep. FRI 5926* and *Whitmore Kep. FRI 862*) show traces of a former densely woolly indumentum on the fruiting raceme and (less distinctly) on the leaves. From the Sumatran specimens only *Beccari 86* and *192*, and *Van Steenis 8464* do not fit in var. *crenulata*, having ferruginous-woolly, tardily glabrescent leaves and hairy inflorescences. The specimens mentioned would agree with var. '*granulosa*' *sensu* Vidal.

It is quite clear that the felt of hairs, apparent in the very young specimens of var. '*granulosa*', disappears not only very rapidly but also very thoroughly. This means that a trustworthy identification of a fruiting specimen is only rarely possible. For this reason I do not think it practical to distinguish the two varieties '*granulosa*' and *crenulata*, and I prefer to merge them into one variety, var. *corymbifera*. The specimens from Assam, Malaya and Sumatra have generally smaller fruits than those from Laos, Cambodia, and Vietnam, but there is a considerable overlap. See the scatter diagram.

Var. *turbinata* is another matter altogether. As illustrated by the diagram (fig. 4), it is possible to distinguish this variety by the shape and the dimensions of the fruits:

var. *turbinata:* fruits pyriform to obovoid, 20—32 by 13—23 mm, length/width 1.3—1.5;

var. *corymbifera:* fruits globular to ellipsoid, rarely ovoid or obovoid, 9—22 by 8—20 mm, length/width 0.9—1.3.

Whether var. *turbinata* does occur in Malesia, is not yet proven. I have seen only one specimen, *Van Steenis 10031* from Sumatra, which has pyriform fruits measuring 18—20 by 12—13 mm, and which in this respect agrees with var. *turbinata*. It has, however, glabrous inflorescences, contrary to the situation on the continent.

Summarizing, I have recognized all Sumatran and Malaysian material as belonging to the typical variety of the species and only the above-mentioned specimen *Van Steenis 10031* as '*cf. var. turbinata*'.

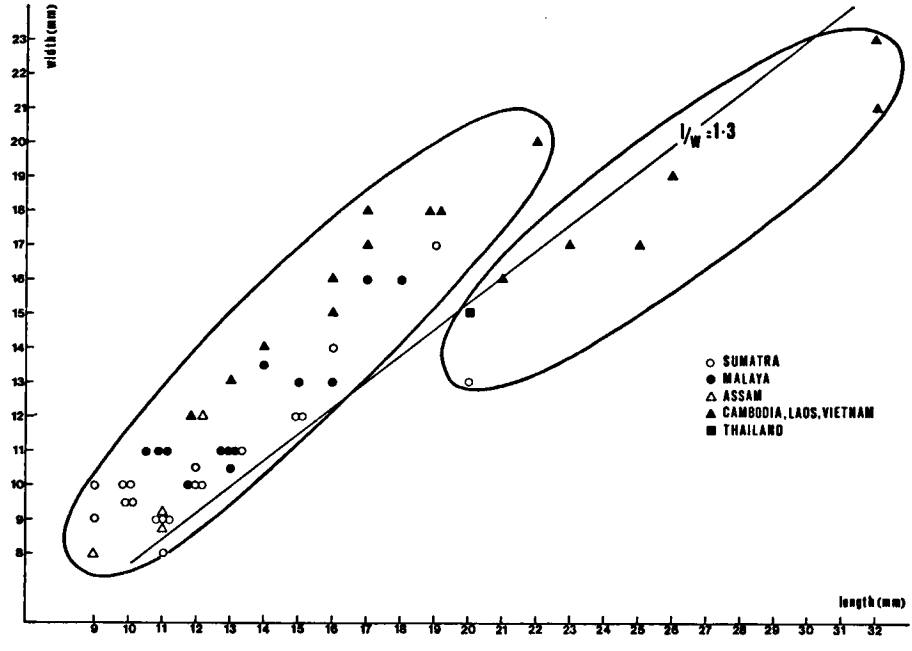


Fig. 4. *Micromeles corymbifera*. — Length and width of full-grown fruits; only the largest fruit present on each specimen is entered.

2. The description was drawn from the Malesian material only. Inclusion of specimens from the Asian continent would lead to certain changes as indicated in remark 1 (indumentum, fruits).

3. Very closely related is *Micromeles cuspidata* (Bertol.) Schneider, Ill. Handb. Laubholzk. 1 (1906) 700. This name is based on *Pyrus cuspidata* Bertol., Mem. Accad. Sc. Bologna II, 4 (1864) 311, pl. 1 (Type: *Hooker f. & Thomson*, specimen marked '*Pyrus (a)*' from Khasi Hills; K, holo; L, P). When *Micromeles* is considered not generically different from *Sorbus*, the name of the species cannot be *S. cuspidata*, since the latter epithet is preoccupied in *Sorbus*. Rehder (Pl. Wils. 2, 1915, 278) and Vidal (1968) used the name *S. verrucosa* (Decne) Rehder for it, although the basionym, *Micromeles verrucosa* Decne (1874) has the same type as *Pyrus cuspidata* Bertol. and is, consequently, superfluous and illegitimate.

Micromeles cuspidata differs from *M. corymbifera* in its smaller fruits (*c.* 4½—8 mm diam.) with a smooth pericarpium. The axes of the infrutescences are distinctly warty-lenticellate. It occurs in Assam (Khasi Hills) and according to Vidal (1968, 1970) also in Northern Thailand (Chiang Mai) and in North Vietnam (var. *subulata* Vidal).

Whether *Pyrus polycarpa* Hook. *f.* (Fl. Brit. Ind. 2, 1874, 378), transferred to *Sorbus* by Rehder (Pl. Wils, 2, 1915, 274), is a separate species indeed, seems very doubtful to me. The type specimens (*Hooker f. & Thomson*, Khasi, '*Pyrus (b)*' have unspotted fruits of 5—6 mm length on somewhat warted stalks; they might be referable to *M. cuspidata*.

5. PYRUS and 6. MALUS

Naturally it has often been tried to grow apples (*Malus sylvestris* (L.) Mill. ssp. *mitis* (Wallr.) Mansf.) and pears (*Pyrus communis* L. and *P. serotina* Rehd. var. *culta* Rehd. = *P sinensis auct.*) in the more elevated regions of Malesia. Generally the results have not been promising and the species mentioned above must be described as 'locally and on a small scale cultivated as fruit-trees'.

7. PYRACANTHA

This is the only genus of *Crataegeae* of which I have seen Malesian specimens. From Baguio—Bontoc road, Benguet, Mountain prov., Luzon, come *Mendoza PNH 20368* and *van Steenis 17923*, both collected on 30 November 1953, and on the labels indicated as 'planted' and 'assumed to be planted' respectively. A third specimen is *Steiner PHN 39575* (field nr. *1408*), the locality of which is given as Benguet and which may come from the same place as the other two. The three specimens represent a glabrous form of *Pyracantha angustifolia* (Franch.) Schneider, which is wild in Yunnan and is sometimes planted as an ornamental also in Europe and North America.

INDEX TO MALESIAN SPECIMENS CITED

Unnumbered specimens as a rule not entered.
Letter and number behind the colon indicate the number of the species in the present paper. E = *Eriobotrya*, M = *Micromeles*, P = *Photinia*, R = *Rhaphiolepis*.

Aban Gibot (SAN) 61781: P 3. Alston 14919: M. Anderson 83: P 1b; S 20909: E 1. Arens s.n.: P 1a.
Backer 9863: P 1b; 12583: P 1b; 37005: P 1a; 37332: P 1a. Bakhuizen van den Brink 587: P 1b. Bartlett 8657: M; 8662: M. Beccari 86: M; 192: M; 285: M; 299: P 1b. Blume 534: P 1b; 1846/1848: P 1b. Borden FB 2120: R 1. Boschproefstation (Thorenaar) 101: E 1; TB 648: E 1; T 877: E 1. Bünnemeijer 982: M; 4082: P 1b; 4690: M; 4867: M; 9718: P 1b. Burkill 2814: M. Burkill c.s. 2042: M.
Celestinó PNH 7925: R 1; PNH 8027: R 1. Celestinó c.s. PNH 4452: P 2. Chew 952: M. Chew c.s. 760: P 4. Chew & Corner RSNB 4818: R 1. Cinatti 278: P 1a. Clemens 27112: P 4; 27827: P 4; 30290: P 4; 30291: P 4; 35233: R 1; 50866: P 4; 51106: P 4. Coert 1011: P 1b. Corner SFN 26037: M; SFN 31485: E 1; SFN 33243: M.
Dali FRI bb 35535: E 1. Van Dillewijn 186: P 1a. Djamhari 292: P 1a. Docters van Leeuwen — Reijnvaan 12944: P 1b. Dorgelo 249: P 1a; 466: P 1b.
Elbert 246: P 1b; 991: P 1a; 1370: P 1a; 2221: P 1a; 2242: P 1a; 2345: P 1a. Elmer 6996: R 1.
Flenley 155: P 4. Forbes 920: P 1b; 955: P 1b; 960a: P 1b; 2050: M; 2375: M; 2376: M; 3588: P 1b; 3832: P 1a; 3845: P 1a; 3880a: P 1a. Friedberg 1159: P 1b. Fuchs & Collenette 21431: P 4; 21455: P 4.
Gibbs 4206: P 4.
Haviland 1071K: P 4. Henderson SFN 29137: E 1; SFN 29691: E 1. Hochreutiner 908: P 1a; 2420: P 1a. Horsfield 432: P 1b; 1135: P 1b.
Ilias Paie S 28055: E 1.
Jacobs 4363: P 2; 4378: M; 4491: P 1b; 4502: M; 4669: P 3; 7226: R 1; 7475: P 2; 8232: M; s.n.: R 1. Junghuhn 86: P 1b; 98: P 1a; 297: P 1b; 306: P 1b; 1035: M.
Kern 8370: P 1a. Kiah SFN 35318: E 1. King's coll. 8313: M. Kobus s.n.: P 1a. Kochummen Kep. FRI 2168: E 1. Kooper 1702: P 1b; 1705: P 1b. Koorders 6468β: P 1a; 6469β: P 1b; 10665β: E 1; 24463β: P 1b; 37735β: P 1a; 37736β: P 1a; 38030β: P 1a. Kostermans S 93: E 1; S 127: E 1; 5961: E 1; 6367 A: P 1b; 12006: E 1; 12337: E 1. Kostermans & Wirawan 593: P 1b; 983: P 1b. Krukoff 4086: E 1.
Lambach 1280: E 1. Leaño FB 22916: P 5. Loher 2463: P 5; 2464: R 1; 5074: P 5; 12040: R 1. Lörzing 9088: M; 14916: M; 15799: M.
Maingay 630/1405: E 1. Maradjo 96: M. Martelino & Edaño BS 35622: R 1. Mead 14642: M. Mearns & Hutchinson FB 4680: P 5. Mendoza PNH 20368; *Pyracantha*, see p. 441. Merrill 724; P 5; 790: R 1; 3223: R 1; 3714: R 1. Meijer 1669: P 1a; 3229: P 3; 3466: M; 3619: M; 3672: P 3; 4797: M; 5232: M; 5287: P 3; 6169: M; 7268: P 1b; SAN 29267: P 4. Meyer FB 2796: P 5. Monterie 5: P 1b. Mujin SAN 37848: R 1.
Nauen SFN 37674: E 1. Ng Kep. FRI 5926: M. Nur 11241: M; 32859: E 1.

Van Ooststroom 13347: P 1a; 13938: P 1b.
Poore H 411: P 4. Pulle 3036: P 1a.
Rabor PNH 20490: R 1. Rahmat Si Boeea 10727: M. Ramos BS 5586: P 5; BS 33152: P 5; 33379: R 1; BS 42206: P 5; 43210 R1; 43231: R 1; BS 79881: R 1; BS 80576: R 1. Ramos & Edaño BS 26443: R 1; BS 29653: P 5; BS 38908: P 2; BS 40259: P 2; BS 40319: R 1; BS 48644: P 5. Rant 2: P 1a. Reijnvaan 154: P 1a. Ridley 7912: E 1; 10311: E 1; 16021: E 1; 16030: M. Robinson & Kloss 7300: P 1b.
Santos BS 31650: P 2; BS 31873: R 1; BS 31954: P 5. Schiffner 2011: P 1b. Schmutz 1014: P 1b; 1571: P 1b; 1976: P 1a; 1977: P 1b. Shah & Noor 939: M. Smith s.n.: P 1a. Smythies S 10635: P 4. Van Steenis 3040: P 1b; 4067: P 1a; 6530: M; 8464: M; 8481: P 1b; 8668: P 4; 8974: P 4; 8993: M; 9088: P 4; 9688: M; 10031: M; 10797: P 1a; 17923: *Pyracantha*, see p. 441; 18451: P 1a. Steiner PNH 39575 (1408): *Pyracantha*, see p. 441. Stone 6278: E 1. Sulit PNH 7564: P 2; PNH 7671: P 2; PNH 7760: R 1; PNH 12452: R 1.
Teysmann 4023 HB: E 1. Thorenaar, see Boschproefstation.
Unesco 466: E 1.
Verheijen 792: P 1b; 1626/1627: P 1a; 2084/2085: P 1b; 2353: P 1b; 2589: P 1b; 2855: P 1b. Vidal 1350: R 1; 1353: R 1. De Voogd 1557: M; 2262: P 1a.
Whitford 1155: P 5; 1161: R 1; 1168: P 5; 1189: R 1; 1307: P 5. Whitmore Kep. FRI 239: E 1; Kep. FRI 862: M; Kep. FRI 3329: M; Kep. FRI 3337: P 1b; Kep. FRI 12581: M. Williams 418: R 1. Wood FB 19739: R 1. Wray & Robinson 5486: E 1; 5520: M.
Zollinger 1922: P 1a; 2965: P 1b.

INDEX TO THE SPECIES NAMES

Accepted names in roman, synonyms in *italics*, new combinations in **bold type**. Letters and numbers: see index to specimens.