A REVISION OF THE GENUS DILLENIA

by

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(Flora Malesiana, Leyden)

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CONTENTS

INTRODUCTION

The present paper is an extension of my revision of the Malaysian species of the genus *Dillenia* L. (*Wormia* Rottb. included) inserted in the revision of the *Dilleniaceae* in the Flora Malesiana ser. I, vol. 4, part 3, pp. 141—174, published in December 1951. A critical revision of the whole genus has never been published before; the unfortunate result of this has been that the delimitation of *Dillenia* and *Wormia*, usually as distinct genera, has been based on different characters by various authors. The extension of the revision for the Flora Malesiana so as to include the extra-malaysian species enabled me to study a number of species, the knowledge of which certainly confirmed me in my idea that the characters on which *Dillenia* and *Wormia* had been separated before are certainly not the primary characters, to be used in the taxonomic treatment of the genus.

All specimens and literature mentioned in this work have been examined by me, unless indicated otherwise; excepted are the specimens of the U. S. National Herbarium, of which I have only examined those collections, of which no duplicates were available from other herbaria. Particulars, not to be taken from the herbarium specimens themselves, such as habit, height, diameter, colour, etc., have been taken from the collectors' notes and, as far as reliable, from the literature, and are inserted in the descriptions; if there are contradictory data, they are discussed under the Notes.

A great amount of material, kindly lent by various herbaria to the Rijksherbarium, Leyden, made it possible to me to carry out this study. In the citation of the specimens these herbaria are indicated by the abbreviations, proposed by Lanjouw in Chronica Botanica 5, 1939, pp. 142—150; with a single addition (LAE) they are:

A	Arnold Arboretum Herbarium, Harvard University, Jamaica Plain, Mass..
BM	Department of Botany, British Museum (Natural History), London.
BR	Herbier du Jardin Botanique de l'État, Bruxelles.
BRI	Botanical Museum and Herbarium, Brisbane.
BRSL	Botanical Institute, Wroclaw (formerly Breslau).
BZ	Herbarium Bogoriense, Bogor, Java.
C	Universitetets Botaniske Museum, Copenhagen.
CAL	The Royal Botanic Garden and Herbarium, Calcutta.
CGE	Botanical Museum and Herbarium of the University, Cambridge (England).
DD	Forest Research Institute Herbarium, Dehra Dun.
E	Herbarium of the Royal Botanic Garden, Edinburgh.
FI	Erbario del Instituto Botanico dell' Università, Firenze.
G	Institut de Botanique Systématique de l'Université, Genève.
GH	Gray Herbarium, Harvard University, Cambridge, Mass..
GL	Botanical Department Herbarium, Glasgow.
GRO	Botanisch Laboratorium der Rijksuniversiteit, Afdeling Plantensystematiek, Groningen.

IFI	Herbarium of the Imperial Forestry Institute, Oxford.
K	Herbarium, Royal Botanic Gardens, Kew, Surrey.
L	Rijksherbarium, Leiden.
LAE	The Papua and New Guinea Herbarium, Lae.
LINN	Herbarium of the Linnean Society of London, London.
M	Botanische Anstalten, München.
MEL	Botanic Gardens and National Herbarium, Melbourne.
MICH	Herbarium of the University of Michigan, Ann Arbor, Mich..
MO	Herbarium of the Missouri Botanical Garden, St Louis, Mo..
NY	Herbarium of the New York Botanical Garden, New York, N. Y..
OXF	Oxford University Herbarium, Oxford.
P	Laboratoire de Phanérogamie du Muséum National d'Histoire Naturelle. Paris.
S	Naturhistoriska Riksmuseet, Stockholm.
SING	Herbarium of the Botanic Gardens, Singapore.
U	Botanisch Museum en Herbarium, Utrecht.
UC	University of California Herbarium, Berkeley, Calif..
UPS	Botaniska Museet, Uppsala.
US	United States National Herbarium, Washington, D. C..

I wish to express here my indebtedness to the directors and keepers of these herbaria for their valuable help in putting their specimens at my disposal.

A special word of thanks is due to the directors and staffs of those herbaria and libraries which I have personally visited, for the hospitality offered and assistance rendered to me during my stay, viz. at Brussels, Cambridge, Kew, London, Oxford, and Paris.

I am also highly indebted to the "Fonds Vollenhoven", which enabled me to visit Paris and Brussels, and to the British Council, which offered me a grant enabling me to visit the English herbaria mentioned above and made the arrangements for this visit.

My most sincere thanks are due to Prof. Dr H. J. Lam, Director of the Rijksherbarium, Leyden, for his support and for the hospitality shown to me in his institute, and to Prof. Dr C. G. G. J. van Steenis, director of the Foundation Flora Malesiana, Leyden, for the freedom he allowed me to extend my revision of the Malaysian species of *Dillenia* to the present monograph. To both of them and to the members of the staffs of the Rijksherbarium and the Flora Malesiana I feel greatly indebted. The figures are from the able hands of the draughtsman H. J. T. Tammel.

DILLENIA L. 1753

Syalita Rheede, Hort. Mal. 3, 1683, p. 39; Adans., Fam. d. Pl. 2, 1763, p. 364.

Dillenia L., Hort. Cliff., 1737, p. 221; L., Sp. Pl. 1, 1753, p. 535; L., Gen. Pl. ed. 5, 1754, p. 239; Thunb., Trans. Linn. Soc. 1, 1791, p. 198; DC., Syst. I, 1818, p. 435; DC., Prod. 1, 1824, p. 75; Buch.-Ham., Trans. Linn. Soc. Lond. 15, 1826, p. 99; G. Don, Gen. Hist. Dichl. Pl. 1, 1831, p. 77; Roxb., Fl. Ind. ed. Carey 2, 1832, p. 650; Wight & Arn., Prod. Fl. Pen. Ind. Or. 1, 1834, p. 5; Hook.f. & Thoms., Fl. Ind. 1, 1855, p. 69; Miq., Fl. Ind. Bat. 1, 2, 1859, p. 11; Miq., Fl. Ind. Bat. Suppl. 1, 1860, p. 152, 618, 619; Benth. & Hook.f., Gen. Pl. 1, 1862, p. 13; Drury, Handb. Ind. Fl. 1, 1864, p. 9; Baill., Adansonia 6, 1865—6, p. 281; Miq., Ann. Mus. Bot. Lugd. Bat. 4, 1868, p. 79; Baill., Hist. d. Pl. 1, 1867—9, p. 110; Hook.f. & Thoms., Fl. Br. Ind. 1, 1872, p. 36; Brandis, For. Fl. N.W. & C. India, 1874, p. 1; Kurz, For. Fl. Br. Burma 1, 1877, p. 18; Pierre, Fl. For. Cochinch. 1, 1879, pl. 5—14; Vidal, Sinops. Fam. & Gen. Pl. Len. Filip., 1883, p. 24; Martelli in Becc., Malesia 3, 1886, p. 154; King, J. As. Soc. Beng. 58, II, 1889, p. 366; Boerl., Handl. Fl. Ned. Ind. 1, 1890, p. 8; Watt, Dict. Econ. Prod. India 3, 1890, p. 112; Trimen, Handb. Fl. Ceyl. 1, 1893, p. 12; Koord. & Val., Bijdr. 1 Booms. Java, 1894, p. 160; Gilg in Engl. & Prantl, Nat. Pfl. Fam. 3, 6, 1895, p. 123; Pritzel, Bot. Jahrb. 24, 1897, p. 354; Brandis, Ind. Forester

26, 1900, p. 429; Gamble, Man. Ind. Timb. 2nd ed., 1902, p. 4; Duthie, Fl. Upp. Gang. Pl. 1, 1903, p. 20; Brandis, Ind. Trees, 1906, p. 3; Fin. & Gagnep., Bull. Soc. Bot. Fr. Mém. 4, 1906, p. 5; Moll & Janssonius, Mikrogr. Holz. Java Baumarten 1, 1906, p. 71; Fin. & Gagnep., Fl. Gén. Ind.-Ch. 1, 1907, p. 16; Ridl., J. Str. Br. R. A. S. 54, 1910, p. 7; Back., Schoolfl. Java, 1911, p. 10; Svedelius, Svensk Bot. Tidskr. 5, 1911, p. 152; Koord., Exk. Fl. Java 2, 1912, p. 601; Ridl., Saraw. Mus. J. 1, 1913, p. 70; Gamble, Fl. Pres. Madras 1, 1915, p. 7; Haines, Bot. Bihar & Orissa 2, 1921, p. 6; Merr., Bibl. En. Born. Pl., 1921, p. 382; Diels, Bot. Jahrb. 57, 1922, p. 436; Ridl., Fl. Mal. Pen. 1, 1922, p. 10; Merr., En. Philip. Fl. Pl. 3, 1923, p. 59; Parkinson, For. Fl. Andam. Isls, 1923, p. 71; Craib, Fl. Siam. En. 1, 1925, p. 21; Gilg & Werderm. in Engl. & Prantl, Nat. Pfl. Fam. 2nd ed., 21, 1925, p. 35; Foxworthy, Mal. For. Rec. 3, 1927, p. 147; Pears. & Brown, Comm. Timb. India 1, 1932, p. 1; Kanjilal, Kanjilal, & Das, Fl. Assam 1, 1934, p. 10; Burk., Dict. Econ. Prod. Mal. Pen., 1935, p. 808; Parkinson, Ind. Forester 61, 1935, p. 450; Gagnep., Suppl. Fl. Gén. Ind.-Ch. 1, 1938, p. 20; Corn., Gard. Bull. S. S. 10, 1939, p. 3; Corn., Wayside Trees Malaya, 1940, p. 203; Back., Bekn. Fl. Java (em. ed.) 4, 1942, fam. 80, p. 4; Masamune, En. Phan. Born., 1942, p. 462; Masamune, Fl. Kainantensis, 1943, p. 205; Heyne, Nutt. Pl. Indon., 1950, p. 1071; Hoogl., Fl. Mal. I, 4, 1951, p. 154.

Wormia Rottb., Nye Samml. Vidensk. Selsk. Skrift. 2, 1783, p. 531, non *Vormia* Adans., Fam. d. Pl. 2, 1763, p. 248, nec *Wormia* Vahl, Skrift. Nat. Selsk. Kjoeb. 6, 1810, p. 104; DC., Syst. 1, 1818, p. 433; DC., Prod. 1, 1824, p. 75; G. Don, Gen. Hist. Dichl. Pl. 1, 1831, p. 76; Hook.f. & Thoms., Fl. Ind. 1, 1855, p. 66; Miq., Fl. Ind. Bat. 1, 2, 1859, p. 10; Miq., Fl. Ind. Bat. Suppl. 1, 1860, p. 152, 618, 619; Benth. & Hook.f., Gen. Pl. 1, 1862, p. 13; Baill., Adansonia 6, 1865—6, p. 281; Miq., Ann. Mus. Bot. Lugd. Bat. 4, 1868, p. 76; Baill., Hist. d. Pl. 1, 1867—9, p. 112; Hook.f. & Thoms., Fl. Br. Ind. 1, 1872, p. 35; Vidal, Sinops. Fam. & Gen. Pl. Len. Filip., 1883, p. 24; King, J. As. Soc. Beng. 58, II, 1889, p. 364; Boerl., Handl. Fl. Ned. Ind. 1, 1890, p. 7; Koord. & Val., Bijdr. 1 Booms. Java, 1894, p. 167; Moll & Janssonius, Mikrogr. Holz. Java Baumarten 1, 1906, p. 69; Ridl., J. Str. Br. R. A. S. 54, 1910, p. 1; Back., Schoolfl. Java, 1911, p. 9; Svedelius, Svensk Bot. Tidskr. 5, 1911, p. 152; Koord., Exk. Fl. Java 2, 1912, p. 600; Ridl., Fl. Mal. Pen. 1, 1922, p. 7; Gilg & Werderm. in Engl. & Prantl, Nat. Pfl. Fam. 2nd ed., 21, 1925, p. 33; Burk., Dict. Econ. Prod. Mal. Pen., 1935, p. 2265; Corn., Gard. Bull. S. S. 10, 1939, p. 3; Corn., Wayside Trees Malaya, 1940, p. 205; A. C. Smith, J. Arn. Arb. 22, 1941, p. 498; Back., Bekn. Fl. Java (em. ed.) 4, 1942, fam. 80, p. 3.

Lenidia Du Petit-Thouars, Gen. Nov. Madag., 1806, p. 17; Poir., Encycl. Suppl. 3, 1813, p. 330; Poir., Dict. Sc. Nat. 25, 1822, p. 447.

Colbertia Salisb., Parad. Lond. 2, 1, 1807, sub t. 73, based on *Dillenia pentagyna* Roxb., not published here with specific epithet; DC., Syst. 1, 1818, p. 435; DC., Prod. 1, 1824, p. 75; G. Don, Gen. Hist. Dichl. Pl. 1, 1831, p. 77.

Capellia Bl., Bijdr. 1, 1825, p. 5; G. Don, Gen. Hist. Dichl. Pl. 1, 1831, p. 77; A. Gray, Bot. U. S. Expl. Exped. 1, 1854, p. 15.

Reifferscheidia Presl, Rel. Haenk. 2, 1836, p. 71; Benth. & Hook.f., Gen. Pl. 1, 1862, p. 13; Baill., Hist. d. Pl. 1, 1867—9, p. 114.

Capellenia Bl. ex Hassk., Cat. Hort. Bog. Alt., 1844, p. 178 (intended as correction for *Capellia*).

Neowormia Hutchins. & Summerh., Kew Bull. 1928, p. 388.

Type species: *Dillenia*: *D. indica* L. 1753, l. c.. — *Syalita*: *Syalita* Rheede 1683, l. c., = *Dillenia indica* L.. — *Wormia*: *W. triquetra* Rottb. 1783, l. c., = *Dillenia triquetra* (Rottb.) Gilg. — *Lenidia*: *L. madagascariensis* Poir. 1813, l. c., = *Dillenia triquetra* (Rottb.) Gilg. — *Colbertia*: *Dillenia pentagyna* Roxb. 1795. — *Capellia*: *C. multiflora* Bl. 1825, l. c., = *Dillenia excelsa* (Jack) Gilg. — *Reifferscheidia*: *R. speciosa* Presl 1836, l. c., = *Dillenia reifferscheidia* Villar. — *Neowormia*: *N. ferruginea* (Baill.) Hutchins. & Summerh. 1928, l. c., = *Dillenia ferruginea* (Baill.) Gilg.

Usually trees, some species only shrubs; evergreen or, less often, deciduous. Stilt-roots usually absent, in some species occasionally developed, in only 3 species constant (*D. eximia, D. reticulata,* and *D. borneensis*); buttresses often more or less distinct. Bark usually about reddish brown, peeling off in thin, often papery flakes. Branches in most species sympodial, branching from axil of uppermost leaf below inflorescence or solitary

flower, in some species monopodial with axillary or twig-borne flowers or inflorescences, in 2 species (*D. aurea* and *D. obovata*) branching from axil of bracts some distance below solitary flower. Leaf-scars either completely amplexicaul or clasping up to ca ¾ of branches. *Leaves* spirally arranged, simple, pinnately nerved with 4 to ca 90 nerves on either side, entire to distinctly dentate or undulate at margin; main venation about transverse between nerves, minor venation reticulate; sometimes 1(—3) secondary nerves directed downward from nerves near margin, ending in apex of smaller teeth than primary nerves; midrib, nerves, and veins usually prominent on both sides, most so beneath. Petiole channelled above, either with narrow to broad, often partly or wholly caducous, completely amplexicaul wings, in young leaf enclosing terminal bud, or without or with only narrow, not completely amplexicaul, persistent wings. Leaves of saplings and young trees generally larger than those of older branches, in some species distinctly different (cf. note on p. 12 and under *D. ferruginea*). *Flowers* in racemose inflorescences or solitary and terminal on leaf-bearing branches, solitary in axil of leaves, solitary or in few-(up to 7)-flowered fascicled inflorescences lateral on older, defoliate branches, or solitary and terminal on leafless branches with many bracts; distinctly pedicellate. Bracteoles usually inconspicuous or absent, sometimes large. Sepals (4—)5(—6), in some species 8—18, free, imbricate, permanent in fruit. Petals 5, only in one species (*D. fischeri*) sometimes 4 or 6, caducous, completely free, in some species corolla falling as a whole without spreading, in some species absent. Androecium consisting of ∞ stamens and, sometimes, a distinct group of ∞ staminodes, all free or staminodes slightly to distinctly coherent; distinct group of staminodes on outer or, in one species (*D. fagifolia*) only, on inner side of androecium; when no distinct staminodial group present often some of outermost stamens sterile, with transitions to inner fertile ones; stamens either all of about same length or in 2 more or less sharply separated groups of different length; anther basifixed; thecae linear or, rarely, oblong, opening either with pore at or near apex or with longitudinal slit. Carpels 4—20, arranged in one whorl around a broadly to narrowly conical protruding part of the receptacle, for the greater part free, coherent with each other along conical part of the receptacle, exceeding this cone so as to enclose a small cavity above it, which at least in a number of species has an open connection with the interior cavity of the carpels by means of a longitudinal slit between the upper parts of the margins of the carpel. Ovules 4 to ca 80 pro carpel, arranged in 2 marginal, adaxial placentae, each with a single or, in the case of many ovules, in the lower part with a double row; anatropous, apotropous, with 2 integuments. *Pseudocarps* consisting of gynoecium and calyx, when young gynoecium usually completely enclosed by enlarged sepals, rarely the apical part not fully enclosed; adult pseudocarps either dehiscent, the sepals and carpels spreading star-like, the carpels opening along the adaxial suture, often more or less coherent with the neighbouring one in the basal part of the suture, or indehiscent, the gynoecium enclosed by the usually strongly enlarged sepals; usually pro carpel only 1 or few seeds developed. Seeds arillate with fleshy to membranous aril, completely enclosing the seed to only a minute cup at the base, or exarillate but with rudimentary

aril in young state; seed-wall 3-layered, outer layer dark brown to black, containing tannine; endosperm abundant, containing proteine and oil; embryo minute.

History of the genus.

From a nomenclatural point of view the genus *Dillenia* was founded by Linnaeus (1753 & 1754) with one species, *D. indica,* which therefore is the nomenclatural type. The oldest pre-Linnean publication is that of Rheede (1683) who described "*Syalita*" from Malabar, on whose figure and description *D. indica* L. is practically wholly based. Linnaeus dedicated the genus to the botanist Dillenius as it excels among other genera by its flower and fruit like Dillenius among botanists (Critica Botanica, 1737, p. 80: "Dillenia flore et fructu omnium speciosissimo, ut Author inter Botanicos").

The genus *Wormia* was founded by Rottboell (1783) on a specimen from Ceylon; he did not compare his new genus with *Dillenia.* Thunberg (1791) described a number of new species of *Dillenia,* some of which are based on pre-Linnean publications, some on actual specimens; among the latter is *Dillenia dentata,* based on a specimen from Ceylon, which appears to be identic with *Wormia triquetra* Rottb.. Thunberg does not seem to have been aware of this. Vahl (1810) was the first to reduce *Wormia* to *Dillenia,* but he was not followed by later authors until Martelli (1886). The latter, in a revision of the *Dilleniaceae* from Beccari's collections from Malaysia, listed all species described under *Dillenia* and *Wormia* with the indication that they all should be brought under *Dillenia*; formally he failed, however, to make most of the new combinations, which have been ascribed to him by Durand & Jackson in the first Supplement of the Index Kewensis (1902). Gilg, in the first edition of the "Natürliche Pflanzenfamilien", also reduced *Wormia* to *Dillenia,* publishing some new combinations (1895). In the second edition, however, Gilg & Werdermann (1925) reestablished the genus *Wormia* on account of the presence of an aril.

Later synonyms, which have only occasionally been used, are: *Lenidia* Du Petit-Thouars (1806), used in a sense completely identic with that in which *Wormia* was understood; *Colbertia* Salisb. (1807), representing the deciduous, ramiflorous species; *Capellia* Bl. (1825), differing from *Wormia* by the structure of the androecium; *Reifferscheidia* Presl (1836), based on a species with a large number of sepals; and *Neowormia* Hutchins. & Summerh. (1928), considered by the authors to represent a form, intermediate between *Dillenia* and *Wormia,* differing in the structure of the androecium, the connate carpels, and the racemose inflorescences; of these differences only the first one holds, but it is to my idea insufficient for generic distinction.

Relationships.

The systematic position of the *Dilleniaceae* is generally accepted nowadays somewhere between the *Polycarpicae* and the *Parietales s. l.*. Most recent authors place it in the *Guttiferales* or *Theales* as first family, with as most important differential character within these orders the complete

or nearly complete apocarpy. Corner (J. Arn. Arb. 27, 1946, p. 423) has indicated that the character of the centrifugal stamens may be of systematic value; as to this character relationship to the *Parietales* (centrifugal stamens) is indicated in preference to that to the *Polycarpicae* (centripetal stamens except *Paeonia*, the systematic position of which, however, is disputable). For the Dilleniaceous genera *Tetracera* L. and *Hibbertia* Andr. the centrifugal development of the stamens is clearly indicated, for *Dillenia* Corner unfortunately studied a species where in the full-grown flower the stamens gradually diminish in size in centrifugal direction; the investigations should be repeated in a species where in the open flower all stamens are of about the same size.

Within the *Dilleniaceae* Gilg & Werdermann (1925) distinguish 4 tribes; to my mind a better subdivision would be obtained by the distinction of 2 subfamilies, the first, to be called *Tetraceroideae*, including their tribe *Tetracereae*, the second, to be called *Dillenioideae*, including their tribes *Hibbertieae*, *Acrotremeae*, and *Dillenieae*. Within the *Dillenioideae* the genera show reticulate relationships and may be arranged in different ways according to different principles.

The most primitive structure of the flower within the *Dillenioideae* is found in some species of *Hibbertia* with completely actinomorphic flowers with ∞ uniform stamens and ∞ carpels, the latter completely free on a flat receptacle. From this type the other types in *Hibbertia* and the other genera can be derived according to the following principles: reduction within the androecium, resulting in the formation of staminodes around, between, or inside the stamens (*Hibbertia, Dillenia*); one-sided reduction within the androecium (*Hibbertia, Schumacheria, Didesmandra*); reduction of the gynoecium, consisting in reduction of the number of carpels to a minimum of 1 (*Hibbertia*); coalescence of the filaments to 2 (*Schumacheria*) or 1 (*Didesmandra*) staminal groups, in the latter case the stamens are partly sterile; beginning syncarpy along the central axis (*Acrotrema, Dillenia*); and elevation of the central part of the receptacle to a cone between the carpels (*Dillenia*).

A remarkable character in the vegetative parts, of which the systematic value is uncertain, is found in the amplexicaul petiolar wings, which occur in *Acrotrema, Schumacheria, Didesmandra,* and a part of the species of *Dillenia.* The fact that a number of species of *Dillenia* do not show this character makes its value rather doubtful.

As to the floral structure, *Dillenia* shows the closest relationship to *Hibbertia* and *Acrotrema,* the distinctive character being the conical elevation of the central part of the receptacle in *Dillenia.* The inflorescences in *Dillenia* and *Acrotrema* are racemose, in *Hibbertia* cymose, but in all these genera single flowers are found in a number of species. As to the structure of the gynoecium the genus *Dillenia* may be considered the most advanced in the family, as to the structure of the androecium a number of species are advanced regarding differentiation (partly staminodial; innermost stamens longer than outer ones, forming a distinct group), but the whole genus is primitive in the actinomorphic androecium (this being zygomorphic in a number of species of *Hibbertia,* in *Schumacheria,* and in *Didesmandra*).

Relationships within the genus.

For the distinction of the subgeneric groups several characters have been used by different authors. It is impossible, however, to distinguish few larger groups which are characterised by more than one character; all characters which have been used for a subgeneric subdivision appear to be independent from each other. I have, therefore, refrained from the distinction of taxa below the generic rank which, if based on more than one character, would include each only few species. Nevertheless, the sequence of the species as adopted here reflects, as far as possible, my ideas about the relationships within the genus.

The main characters, on which I have arranged the species, are the structure of the leaf-base, the insertion of the inflorescence, and the structure of the androecium; the structure of the fruit and the presence or absence of an aril are, in my opinion, of minor importance and have not been used. As the primary character for the sequence I have chosen the amplexicaul versus non-amplexicaul base of the petiole; this character is constant in some other genera of the *Dilleniaceae* and its geographical distribution seems to indicate a closer relationship within the two groups, distinguished on it, than within the groups, distinguished on the structure of the androecium. The species with completely amplexicaul petiolar wings are found from Madagascar and Ceylon to Queensland and the Fiji Islands, but are missing in continental Asia except the Malay Peninsula, in the greatest part of Sumatra, in Java (except a species in W. Java which, however, is most probably introduced), and in the Lesser Sunda Islands. The species where the petiole has no amplexicaul wings are found in continental S E. Asia, and in Malaysia eastward to a line which mainly agrees with Wallace's line as modified by Merrill and Dickerson regarding the Philippines and by Zollinger regarding the Lesser Sunda Islands (cf. Flora Malesiana I, 1, 1951, p. LXXIII), with a few minor deviations in the Philippines and S. Celebes (fig. 1).

The insertion of the inflorescence has been used as a secondary character only in the group of species with non-amplexicaul base of the petiole; all species with amplexicaul petiolar wings have terminal inflorescences, only in *D. fischeri* together with axillary inflorescences. As tertiary character the structure of the androecium has been used; this will be discussed more extensively later on (p. 12).

The following enumeration of the species in the sequence adopted in this revision indicates the characters on which the sequence has been based in its major lines. Within the smaller groups reduction of the inflorescence from many-flowered to solitary flowers has been accepted as a general principle for the sequence, but it is impossible to use this character consistently.

A. Species with completely amplexicaul petiolar wings.

a. Stamens all alike; no distinct group of staminodes present.

1. *D. beccariana* Martelli; 2. *D. albiflos* (Ridl.) Hoogl.; 3. *D. celebica* Hoogl.; 4. *D. serrata* Thunb.; 5. *D. fischeri* Merr.; 6. *D. pteropoda* (Miq.) Hoogl.; 7. *D. triquetra* (Rottb.) Gilg; 8. *D. ovalifolia* Hoogl.; 9. *D. quercifolia* (Lane-Poole) Hoogl..

(species 10—17 inclusive all have, as far as known, the corolla falling off as a whole without spreading; cf. p. 12)

10. *D. schlechteri* Diels; 11. *D. montana* Diels; 12. *D. ingens* Burtt (corolla unknown);

13. *D. papuana* Martelli; 14. *D. crenata* (A. C. Smith) Hoogl.; 15. *D. salomonensis* (White) Hoogl.; 16. *D. insignis* (A. C. Smith) Hoogl..

b. Innermost stamens not reflexed outward over the outer ones; on the outer side of the androecium there is a distinct group of staminodes.

17. *D. biflora* (A. Gray) Martelli ex Dur. & Jacks.; 18. *D. ferruginea* (Baill.) Gilg.

c. Innermost stamens reflexed outward over the outer ones; no distinct group of staminodes present.

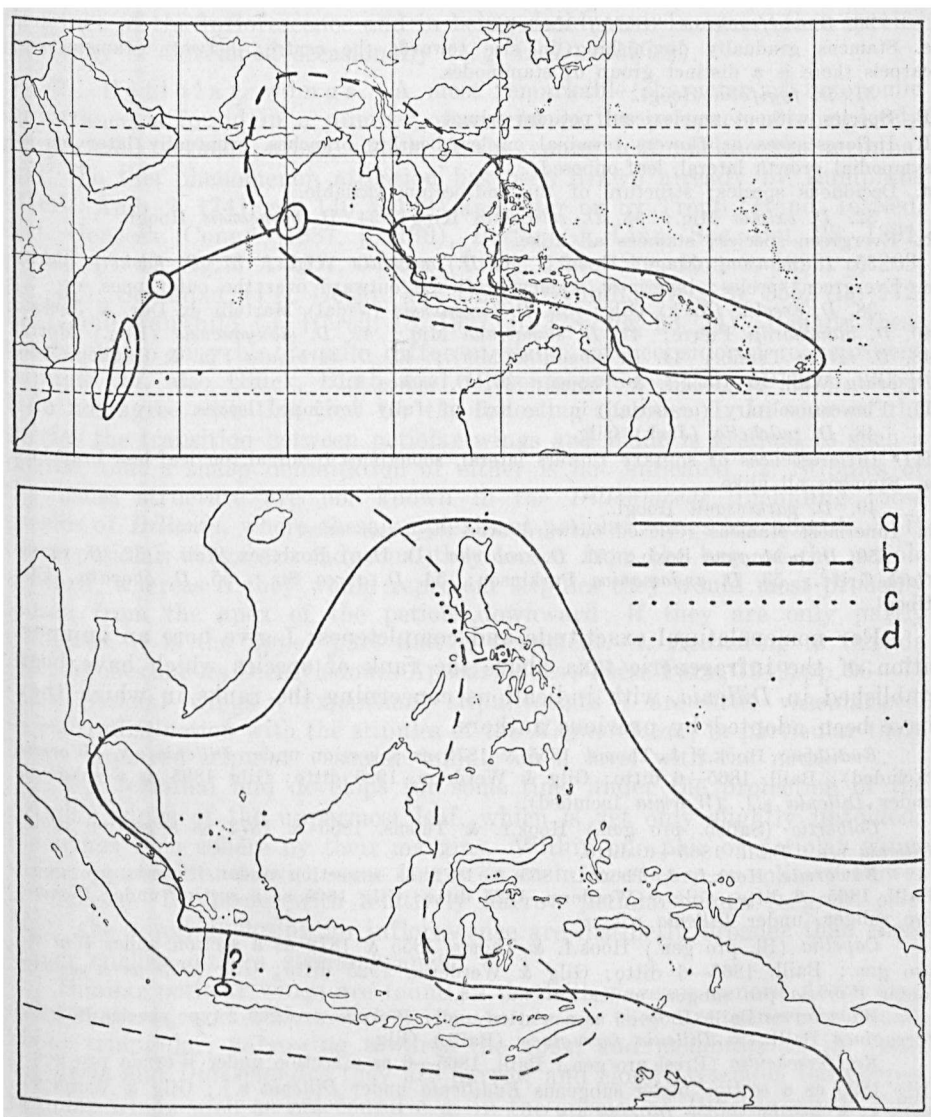


Fig. 1 — Area of the species with completely amplexicaul petiolar wings (a) and of those with non-amplexicaul petiole (b); c. northern continuation of Wallace's line as modified by Merrill & Dickerson; d. southern continuation of Wallace's line as modified by Zollinger. The occurrence of a species with completely amplexicaul petiolar wings in W. Java is probably due to introduction.

19. *D. alata* (DC.) Martelli; 20. *D. auriculata* Martelli; 21. *D. castaneifolia* (Miq.) Martelli ex Dur. & Jacks.; 22. *D. bolsteri* Merr.; 23. *D. diantha* Hoogl.; 24. *D. talaudensis* Hoogl.; 25. *D. ochreata* (Miq.) Teysm. & Binn. ex Martelli; 26. *D. megalantha* Merr.; 27. *D. philippinensis* Rolfe.

(28 & 29 have a larger number of sepals)

28. *D. marsupialis* Hoogl.; 29. *D. reifferscheidia* Villar.

d. Innermost stamens reflexed outward over the outer ones; on the outer side of the androecium there is a distinct group of staminodes.

30. *D. suffruticosa* (Griff.) Martelli.

e. Stamens gradually diminishing in size towards the centre; between stamens and carpels there is a distinct group of staminodes.

31. *D. fagifolia* Hoogl..

B. Species without amplexicaul petiolar wings.

I. Inflorescences or flowers terminal on leaf-bearing branches, eventually later on by sympodial growth lateral, leaf-opposed.

a. Deciduous species; structure of the androecium variable.

32. *D. eximia* Miq.; 33. *D. reticulata* King; 34. *D. borneensis* Hoogl..

b. Evergreen species; stamens all alike.

35. *D. mansoni* (Gage) Hoogl.; 36. *D. bracteata* Wight; 37. *D. hookeri* Pierre.

c. Evergreen species; innermost stamens reflexed outward over the outer ones.

38. *D. excelsa* (Jack) Gilg; 39. *D. luzoniensis* (Vidal) Martelli ex Dur. & Jacks.; 40. *D. blanchardii* Pierre; 41. *D. sumatrana* Miq.; 42. *D. sibuyanensis* (Elm.) Merr.; 43. *D. retusa* Thunb.; 44. *D. monantha* Merr.; 45. *D. turbinata* Fin. & Gagnep.; 46. *D. ovata* Wall. ex Hook.f. & Thoms.; 47. *D. indica* L..

II. Flowers solitary (or serial) in the axil of fully developed leaves.

48. *D. pulchella* (Jack) Gilg.

III. Inflorescences or solitary flowers lateral, sometimes terminal, on leaf-less branches.

a. Stamens all alike.

49. *D. parkinsonii* Hoogl..

b. Innermost stamens reflexed outward over the outer ones.

50. *D. pentagyna* Roxb.; 51. *D. scabrella* (D. Don) Roxb. ex Wall.; 52. *D. parviflora* Griff.; 53. *D. andamanica* Parkinson; 54. *D. aurea* Sm.; 55. *D. obovata* (Bl.) Hoogl..

For nomenclatural exactitude and completeness I give here an enumeration of the infrageneric taxa above the rank of species which have been published in *Dillenia*, with indications concerning the ranks in which they have been adopted by previous authors.

Eudillenia Hook.f. & Thoms. 1855 & 1872 as a section under *Dillenia* s.s. (*Wormia* excluded); Baill. 1865—6 ditto; Gilg & Werderm. 1925 ditto; Gilg 1895 as a subgenus under *Dillenia* s.l. (*Wormia* included).

Colbertia (Salisb. pro gen.) Hook.f. & Thoms. 1855 & 1872 as a section under *Dillenia* s.s.; Baill. 1865—6 ditto.

Euwormia Hook.f. & Thoms. 1855 & 1872 as a section under *Wormia* pro gen.; Baill. 1865—6 ditto; Gilg & Werderm. 1925 ditto; Gilg 1895 as a section under *Wormia* pro subgen. under *Dillenia* s.l..

Capellia (Bl. pro gen.) Hook.f. & Thoms. 1855 & 1872 as a section under *Wormia* pro gen.; Baill. 1865—6 ditto; Gilg & Werderm. 1925 ditto; Gilg 1895 as a section under *Wormia* pro subgen. under *Dillenia* s.l..

Wormiopsis Baill. 1865—6 as a section under *Wormia* pro gen.; type species *Wormia ferruginea* Baill., = *Dillenia ferruginea* (Baill.) Gilg.

Reifferscheidia (Presl pro gen.) Baill. 1865—6 as a section under *Wormia* pro gen.; Gilg 1895 as a section under subgenus *Eudillenia* under *Dillenia* s.l.; Gilg & Werderm. 1925 as a section under *Dillenia* s.s..

Wormia (Rottb. pro gen.) Gilg 1895 as a subgenus under *Dillenia* s.l..

Protodillenia Gilg 1895 as a section under subgenus *Eudillenia* under *Dillenia* s.l..

Fasciculatae Gilg 1895 as a subsection under section *Protodillenia*, subgenus *Eudillenia* under *Dillenia* s.l.; type species *Dillenia pentagyna* Roxb..

Grandiflorae Gilg 1895 as a subsection under section *Protodillenia*, subgenus

Eudillenia under *Dillenia* s.l.; type species *Dillenia indica* L..
Alatae Ridl. 1922 without indication of rank under *Wormia* pro gen..
Exalatae Ridl. 1922 ditto.

Morphological notes.

1. Stilt-roots occur constantly only in 3 species (*D. eximia, D. reticulata,* and *D. borneensis*), which are closely related also as regards structure of the inflorescence and in being deciduous. In some other species they may be developed occasionally (e. g. in *D. albiflos*).

2. Petiolar wings. A most remarkable character of taxonomic importance is found in a number of species in the presence of completely amplexicaul petiolar wings, which in the young leaf enclose the terminal bud. To this phenomenon attention has been drawn already by Rumphius (Herb. Amb. 2, 1741, pp. 140 & 142) and later on by Treub (Hand. 1e Ned. Nat. Geneesk. Congr., 1887, p. 130), Potter (J. Linn. Soc. Bot. 28, 1891, p. 346, pl. 47, fig. 5 A—D), Groom (Trans. Linn. Soc. Bot. 3, 1893, p. 263, fig. 32), Schimper (Pfl. Geogr. auf Oekol. Grundl., 1898, p. 355, fig. 172, 174), and Fairchild (J. Hered. 18, 1927, p. 328, fig. 23, 24). Usually these wings, which may be of quite different shape, are considered to represent stipules (cf. also Glück, Blatt- und Blütenmorphol. Stud., 1919, p. 205). I do not agree with this view for the following reasons: 1. In some of the species the transition between petiolar wings and blade is gradual to such a degree, that a sharp delimitation of either is not indicated. 2. Stipules of the usual structure are not known in the *Dilleniaceae,* including those species of *Dillenia,* where these amplexicaul petiolar wings are absent. 3. If these petiolar wings are caducous, they loosen from the base of the petiole upward, whereas if they would represent stipules they would most probably loosen from the apex of the petiole downward; if they are only partly caducous, it is the upper part that is persistent. 4. According to Ozenda (Recherches sur les Dicotylédones Apocarpiques; Thèse Paris, 1949, pp. 96—7) these petiolar wings ("expansions stipuliformes") are little vascularised, in contradistinction with the stipules of the *Magnoliaceae*; in particular there is no unpaired stipular vascular bundle on a level with the node.

The terminal bud develops for some time under the protection of the petiolar wings of the uppermost leaf, which is yet only slightly unfolded; the wings then cohere by their margins. Within one pair of petiolar wings thus a young branch with some leaves or an inflorescence or solitary flower is enclosed. In species with relatively narrow petiolar wings (e. g. *D. celebica*) the wings enclosing an inflorescence are distinctly broader than those which enclose only a sterile branch.

Similar petiolar wings are found in the Dilleniaceous genera *Acrotrema, Schumacheria,* and *Didesmandra.* In *Acrotrema* they are generally broad, about triangular, narrowing towards the apex, and membranous, in *Schumacheria* and *Didesmandra* they are narrow and closely resemble the narrow petiolar wings such as are found e. g. in the species of *Dillenia* where these are not amplexicaul.

3. Vernation. The young leaves are folded upward along the nerves and downward along a line exactly in the middle between two nerves. This line is still visible in fully developed leaves in some species,

most distinctly in *D. ovalifolia*. Near the midrib it is curved downward and it ends at the midrib in the axil of the lower one of the two nerves.

4. Heterophylly. In some species a distinct heterophylly is developed between the leaves of the older branches, which also bear the inflorescences, and those of the saplings and young trees. The most striking example is *D. ferruginea*, where the differences are found in the shape and size of the leaf and in the indument. The leaves of saplings and young trees are glabrous above, very sparsely and shortly strigose beneath, those of the older branches are densely and shortly tomentose above, densely hirsute beneath, with an indument of a rusty brown colour. In the leaves of saplings and young trees the transition between the base of the blade and the petiolar wings is gradual, a sharp delimitation of either is not indicated; in the leaves of the older branches the petiolar wings gradually narrow towards the base of the blade and here exists a sharp delimitation of either, indicated also by differences in nervation (cf. fig. 5, p. 48).

In *D. pentagyna* a similar heterophylly exists, but there is not a similar difference in the indument. It should be noted that *D. ferruginea* belongs to the species with completely amplexicaul petiolar wings, whereas the petiolar wings in *D. pentagyna* are non-amplexicaul. The petiolar wings of the leaves of saplings and young trees of *D. pentagyna* give the impression of being completely amplexicaul, but the scars they leave on the branches are non-amplexicaul and the impression is only caused by the more or less auriculiform base of the wings.

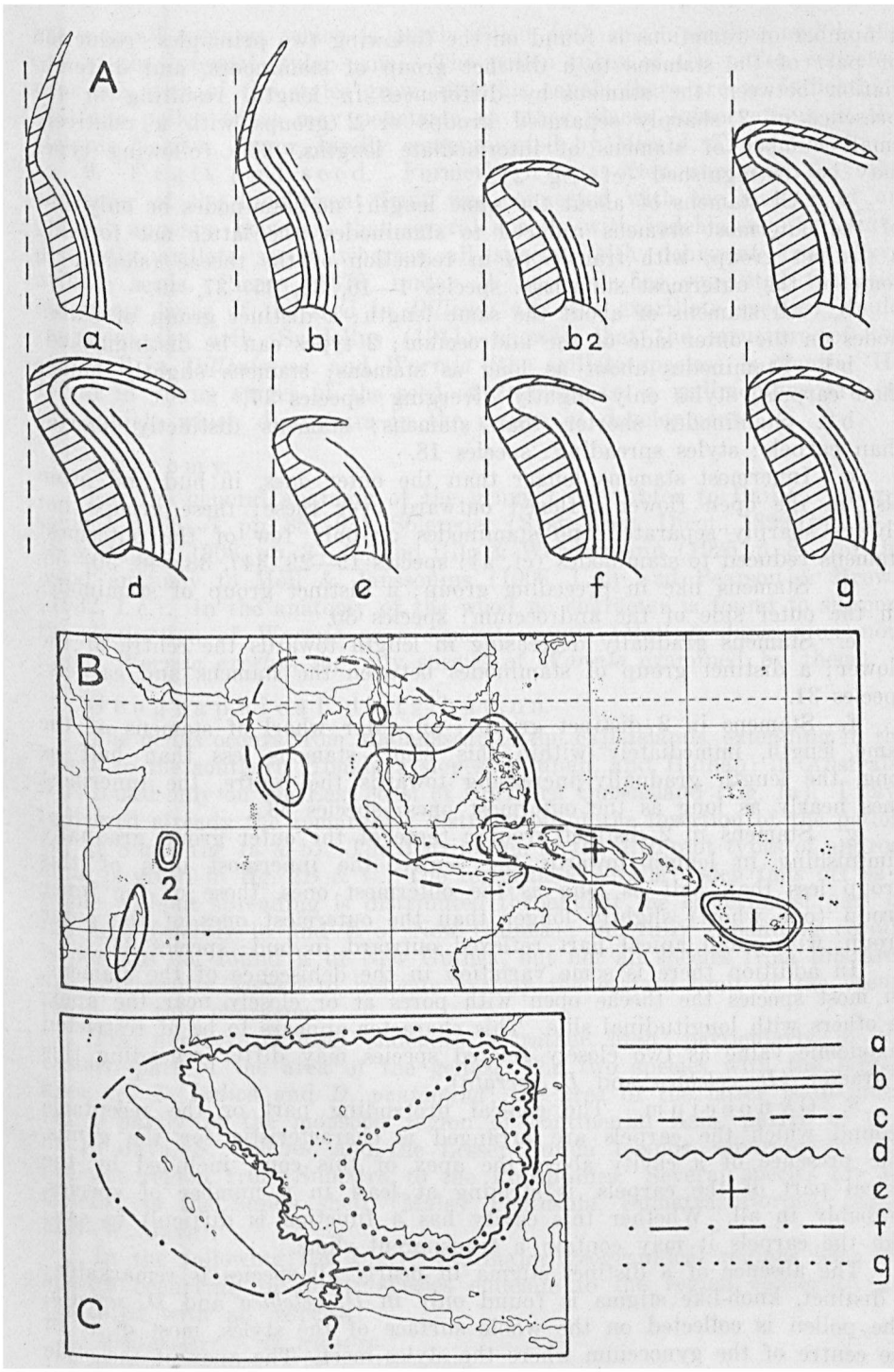
A third species, where the heterophylly is observed, is *D. pteropoda*, but it is developed here to a still lesser degree; this species again belongs to the group of species with completely amplexicaul petiolar wings.

5. Inflorescence. The inflorescences of *Dillenia* are racemose. A simple raceme is found in a number of species. This may be reduced to a solitary flower, sometimes with an articulation indicating the transition from peduncle to pedicel, but usually with a pedicel without such an articulation. Or there is a composed raceme, in which case the branches take the place of the second flower and sometimes one or more flowers above this one. Branching for the second time is found only, and even here rarely, in *D. albiflos*, in which species the inflorescence has up to 4 branches which are in itself simple racemes.

6. Corolla. The corolla usually consists of 5 free petals, which fall off within half a day after the flower has opened. In some species, however, the corolla is absent (*D. celebica, D. serrata, D. eximia*). 4 or 6 petals are occasionally found in *D. fischeri*. In one species I have seen double flowers (*D. castaneifolia*). In a number of species in the eastern-most part of the area of the genus the corolla falls as a whole without spreading; after the corolla has fallen the stamens and styles exceed the calyx, where only a small opening is left at the apex (fig. 4).

7. Androecium. The structure of the androecium is one of the major characters for the identification of the species. As to this character

Fig. 2 — A. a—g. Schemata of the different types of androecium; the letters are the same as used in the text (cf. p. 14); B & C. distribution of these different types; the occurrence of type d in W. Java is probably due to introduction.


A
a
b1
b2
c
d
e
f
g
B
0
0
2
1
C
?
a
b
c
d
e
f
g

a number of variations is found on the following two principles: reduction of part of the stamens to a distinct group of staminodes, and differentiation between the stamens by differences in length, resulting in the presence of 2 sharply separated groups or 2 groups with a relatively small number of stamens of intermediate lengths. The following types may be distinguished (cf. fig. 2):

a. All stamens of about the same length; no staminodes or only few of the outermost stamens reduced to staminodes, the latter not forming a distinct group, with transitions in reduction of the thecae (shorter in some of the outermost stamens): species 1—16, 32, 35—37, 49.

b. All stamens of about the same length; a distinct group of staminodes on the outer side of the androecium; 2 types can be distinguished:

b 1. Staminodes about as long as stamens; stamens slightly longer than carpels; styles only slightly diverging: species 17.

b 2. Staminodes shorter than stamens; stamens distinctly shorter than carpels; styles spreading: species 18.

c. Innermost stamens longer than the outer ones, in bud and often also in the open flower reflexed outward over these; these groups not always sharply separated; no staminodes or only few of the outermost stamens reduced to staminodes (cf. a): species 19—29, 34?, 38—48, 50—55.

d. Stamens like in preceding group; a distinct group of staminodes on the outer side of the androecium: species 30.

e. Stamens gradually decreasing in length towards the centre of the flower; a distinct group of staminodes between the stamens and carpels: species 31.

f. Stamens in 2 distinct groups: an outer whorl of stamens of the same length, immediately within this whorl stamens less than half as long, the length gradually increasing towards the centre, the innermost ones nearly as long as the outermost ones: species 33.

g. Stamens in 2 distinct groups: those of the outer group gradually diminishing in length towards the centre, the innermost ones of this group less than half as long as the outermost ones, those of the inner group (one whorl) slightly longer than the outermost ones of the outer group, with small apical part reflexed outward in bud: species 34.

In addition there is some variation in the dehiscence of the stamens. In most species the thecae open with pores at or closely near the apex, in others with longitudinal slits. This character appears to be of restricted taxonomic value as two closely related species may differ regarding this character (*D. celebica* and *D. serrata*).

8. Gynoecium. The conical protruding part or the receptacle around which the carpels are arranged is characteristic for the genus. The presence of a cavity above the apex of this cone, included by the apical part of the carpels, is striking at least in a number of species, probably in all. Whether this cavity has a function is difficult to say; like the carpels it may contain a transparent slime.

The absence of a distinct stigma in nearly all species is remarkable; a distinct, knob-like stigma is found only in *D. celebica* and *D. serrata*. The pollen is collected on the whole surface of the styles, most of it in the centre of the gynoecium where the styles meet. The apex of the style

has a small opening, which is partly filled with small papillae and is the end of the internal stylar canal. The pollen tubes of the pollen collected near the apex of the styles grow into this canal; there are no indications that the pollen tubes may penetrate at other places (observations in the Botanic Garden, Bogor, kindly communicated by Miss J. T. de Vries).

9. Fruit and seed. Formerly it was often supposed that the character of the indehiscent fruit was connected with the absence of an aril; it appears, however, that several species with indehiscent fruit have distinctly arillate seeds, whereas all species with dehiscent fruit have arillate seeds. Pierre (1879, under *D. hookeri*) has suggested that the outermost layer of the seed in *Dillenia* s.s. (the exarillate species) would represent the aril. Svedelius (1911) showed that the structure of the seed-wall in *Dillenia* s.s. and *Wormia* (the arillate species) is identic. He found in young stages of the seed of *Dillenia* s.s. a rudimentary aril on the funicle which disappears in the course of development.

Anatomy.

For the general anatomy of the genus I may refer to Baillon (Adansonia 7, 1866—7, pp. 88—93), Solereder (Syst. Anat. Dicot., 1899, pp. 23—28 & Suppl., 1908, pp. 3—4), and Gilg & Werdermann (1925, p. 8), for the wood anatomy to Moll & Janssonius (1906, l. c.) and Pearson & Brown (1932, l. c.). In the anatomy of the wood no character is found to support the distinction of *Wormia* as a separate genus (Moll & Janssonius, note under *Wormia excelsa*, the only species of *Wormia* examined by them).

Geographical distribution.

The genus occurs from Madagascar to the Fiji Islands, extending in the North to the southern Himalaya slopes, Yunnan, and Hainan; in Australia it is found only on the East coast of Northern Queensland (fig. 1a). I have indicated already the remarkable distribution of the insertion of the petiole (cf. p. 8 and fig. 1a & b). The distribution of the different types of androecium is given in fig. 2B & C. The remarkable corolla which falls off as a whole without spreading is distributed throughout the easternmost part of the area (mainly in and E of New Guinea); the fully expanding corolla is perhaps not found E of New Guinea, but not all species from this area are sufficiently known to indicate exactly the eastern limit of the occurrence of this character.

The number of local endemics is rather high, particularly in the eastern part of the area of the genus. The two species with the largest area are *D. indica* and *D. pentagyna*; the area of the latter is disjunct, being partly in the monsoon region of continental Asia, partly in that of E. Java, S. Celebes, and the Lesser Sunda Islands, separated by the everwet region from Sumatra to the Philippines. Several species are restricted to the Sunda shelf (Malay Peninsula, Sumatra, Borneo, partly also W. Java).

In the following list I give the major geographical regions with the species occurring in them; species endemic to the region concerned are indicated with an asterisk:

Madagascar: 7. *D. triquetra.*
Seychelle Islands: *18. *D. ferruginea.*

Ceylon: 7. *D. triquetra*, *43. *D. retusa*, 47. *D. indica*.
India (Pakistan included, Burma excluded): *36. *D. bracteata*, 47. *D. indica*, 50. *D. pentagyna*, 51. *D. scabrella*, 54. *D. aurea*.
Burma: *35. *D. mansoni*, 47. *D. indica*, *49. *D. parkinsonii*, 50. *D. pentagyna*, 51. *D. scabrella*, 52. *D. parviflora*, 54. *D. aurea*, 55. *D. obovata*.
China: 45. *D. turbinata*, 47. *D. indica*, 50. *D. pentagyna*.
Siam: 32. *D. eximia*, 37. *D. hookeri*, 38. *D. excelsa*, 46. *D. ovata*, 47. *D. indica*, 50. *D. pentagyna*, 52. *D. parviflora*, 54. *D. aurea*, 55. *D. obovata*.
Indo-China: 37. *D. hookeri*, *40. *D. blanchardii*, 45. *D. turbinata*, 46. *D. ovata*, 47. *D. indica*, 50. *D. pentagyna*, 51. *D. scabrella*, 55. *D. obovata*.
Andaman and Nicobar Islands: 50. *D. pentagyna*, *53. *D. andamanica*.
Sumatra: 30. *D. suffruticosa*, 32. *D. eximia*, 33. *D. reticulata*, 38. *D. excelsa*, 41. *D. sumatrana*, 46. *D. ovata*, 47. *D. indica*, 48. *D. pulchella*, 55. *D. obovata*.
Malay Peninsula: *2. *D. albiflos*, 30. *D. suffruticosa*, 32. *D. eximia*, 33. *D. reticulata*, 38. *D. excelsa*, 41. *D. sumatrana*, 46. *D. ovata*, 47. *D. indica*, 48. *D. pulchella*, 55. *D. obovata*.
Java: ?30. *D. suffruticosa* (introduced only?), 38. *D. excelsa*, 47. *D. indica*, 50. *D. pentagyna*, 55. *D. obovata*.
Lesser Sunda Islands: 13. *D. papuana*, 50. *D. pentagyna*.
Borneo: *1. *D. beccariana*, 30. *D. suffruticosa*, 32. *D. eximia*, 33. *D. reticulata*, *34. *D. borneensis*, 38. *D. excelsa*, 41. *D. sumatrana*, 47. *D. indica*, 48. *D. pulchella*.
Philippines: *5. *D. fischeri*, 6. *D. pteropoda*, *22. *D. bolsteri*, *23. *D. diantha*, *26. *D. megalantha*, *27. *D. philippinensis*, *28. *D. marsupialis*, *29. *D. reifferscheidia*, 38. *D. excelsa*, *39. *D. luzoniensis*, *42. *D. sibuyanensis*, *44. *D. monantha*.
Celebes: *3. *D. celebica*, *4. *D. serrata*, *25. *D. ochrcata*, 50. *D. pentagyna*.
Moluccas: 6. *D. pteropoda*, 8. *D. ovalifolia*, *24. *D. talaudensis*.
New Guinea: 8. *D. ovalifolia*, *9. *D. quercifolia*, 10. *D. schlechteri*, *11. *D. montana*, 13. *D. papuana*, 19. *D. alata*, *20. *D. auriculata*, *21. *D. castaneifolia*.
Bismarck Archipelago: 10. *D. schlechteri*.
Australia: 19. *D. alata*.
Solomon Islands: *12. *D. ingens*, *14. *D. crenata*, *15. *D. salomonensis*, *16. *D. insignis*.
New Hebrides: 17. *D. biflora*.
Fiji Islands: 17. *D. biflora*.

Ecology.

Most of the species are found in everwet tropical forests, several with a pronounced preference to temporarily flooded habitat. Some species are more or less confined to savannahs (*D. hookeri*, *D. alata*), others are typically confined to regions with a dry period (e. g. *D. pentagyna*, where the disjunction of its area perfectly tallies with a more or less pronounced monsoon-climate). The character of being evergreen or deciduous does not follow exactly the climatic conditions, as some deciduous species are found in or even confined to everwet regions and some evergreen species extend their area to the periodically dry regions.

Most species occur in the tropical zone proper, i. e. below ca 1000 m, but some are occasionally found at higher altitudes, up to ca 2000 m. One species until now is known only from above 1000 m (*D. montana*).

Dispersal of the seeds occurs usually by animals. The larger, indehiscent fruits are eaten by mammals, whereas the arillate seeds of the species with dehiscent fruits are eaten by birds. Transport by water is a means of dispersal in *D. indica*, though this species is also dispersed by mammals (e. g. elephants).

Pollination may be effectuated by insects, but this is insufficiently known.

Vernacular names.

Practically all vernacular names, cited under the species, have been noted from herbarium labels. For the species occurring in India, however, the number of vernacular names cited in the literature is several times as large as the number of those noted on herbarium labels. For this area the vernacular names cited in this revision are a selection, taken from reliable sources in the literature, and besides giving some names of historical importance.

The Malay name "*simpur*" (*sempur, sempoh*) is used in western Malaysia for various species, often with an epithet, which usually is not specific. In the same way in the Philippines "*katmon*" is used for various species.

Uses.

The wood of *Dillenia* is generally of low value because of its short durability. Nevertheless it is sometimes used in house-building for interior purposes; it has a fine colour which makes its use for furniture attractive.

The large indehiscent fruit of some species is eaten either cooked or uncooked in jellies and curries; the taste is usually somewhat acid.

As ornamental trees or shrubs in tropical areas some species are suitable; as such *D. indica, D. ovata, D. philippinensis,* and *D. suffruticosa* are best known.

Miscellaneous notes.

1. In the citation of the literature a single asterisk indicates that the publication contains an uncoloured figure; a double asterisk indicates a coloured one.

2. The type specimens for the accepted name and for the synonyms are cited after the literature. The location of the holotype and eventually of the isotypes is indicated; if the holotype is lost (e. g. for specimens formerly preserved in the Berlin and Manila herbaria) a lectotype from the original material or, if not present, a neotype has been indicated for the accepted names only, not for the synonyms. If no holotype had been indicated in the original description, a lectoholotype has been chosen, for accepted names as well as for synonyms.

3. The sequence of the specimens studied, cited under each species, is based on geographical units. Some larger geographical units are distinguished (each in a separate paragraph) and within these, smaller units; for the latter I have followed local revisions or floras, e. g. Craib for Siam, the Flore Générale for Indo-China, Flora Malesiana Ser. I, Vol. 1 for Malaysia. Within these smallest units the sequence, as far as possible, is chronological.

4. In the lists of specimens the abbreviation *fl.* indicates that the specimen was in bud or in flower, *fr.* that the specimen was in young to ripe fruit; if not indicated or, sometimes, indicated with *veg.*, the specimen collected had no flowers or fruits at all. Not necessarily all duplicate specimens are complete.

5. Besides, the following abbreviations are found under the collectors in the citation of the specimens:

BNB Forest Department British North Borneo.
BS Bureau of Science, Manila.
CF Conservator of Forests (Forest Institute, Kepong, Selangor).
FB Forestry Bureau, Manila.
HB Herbarium Bogoriense.
NGF New Guinea Forces (or Forests?).
NIFS Netherlands Indies Forest Service (Forest Research Institute, Buitenzorg (now Bogor), Java); Ja: Java series, bb: series bossen buitengewesten (islands outside Java).
PB Piante Bornense (Beccari).
PNH Philippine National Herbarium, Manila.
PP Piante Papuane (Beccari).
PS Piante Sumatrane (Beccari).
SF Singapore Field number series.

Key to the species

1. Petiole with completely amplexicaul wings, in young leaf enclosing terminal bud, later on often partly or wholly caducous; leaf-scars consequently completely amplexicaul 2
Petiole at most with narrow, non-amplexicaul wings; leaf-scars clasping up to ¾ of branches, never completely amplexicaul 32
2. All stamens about equal, of about same length, slightly curved to nearly straight in bud, at most few staminodes on outer side of androecium, not forming a distinctly separated group 3
Stamens of different shape, either partly staminodial or innermost ones distinctly longer than outer ones and in bud reflexed outward over the latter, the two groups not always sharply separated 18
3. Petiolar wings more or less distinctly constricted below blade 4
No sharp delimitation of blade against petiolar wings present . **6. D. pteropoda**
4. Petiolar wings wholly persistent, in older leaves torn loose from base of blade and near base of petiole, but not caducous 5
Petiolar wings wholly or partly caducous along sharply fixed lines . . . 6
5. Inflorescences always unbranched; flowers ca 6½ cm across, yellow; carpels with 1½—2 mm long, rigid hairs . . . . . **1. D. beccariana**
Inflorescences usually branched; flowers ca 5 cm across, white; carpels with 0.4—0.7 mm long, rigid hairs . . . . . **2. D. albiflos**
6. Upper part of the petiolar wings persistent, lower part caducous 7
Petiolar wings wholly caducous 9
7. Flowers solitary; stamens ca 900, ca 7 mm long . . . . **8. D. ovalifolia**
Flowers in 2—5-flowered inflorescences; stamens up to ca 100, ca 25 mm long 8
8. Carpels 8—10, densely hairy; leaves with 5—8 nerves on either side of midrib **16. D. insignis**
Carpels 5, glabrous; leaves with 9—14 nerves on either side of midrib **15. D. salomonensis**
9. Flowers apetalous; styles with distinct, knoblike stigma 10
Flowers with (caducous!) petals; styles acute at apex, without distinct, knoblike stigma 11
10. Petiolar wings linear to lanceolate; number of carpels ca 11 . . **3. D. celebica**
Petiolar wings half-obcordiform; number of carpels ca 18—19 . . **4. D. serrata**
11. Stamens obtuse at apex, never with long, distinct acumen 12
Stamens at apex with 1—2 mm long acumen . . . . . **13. D. papuana**
12. Petiolar wings lanceolate to linear; leaves with up to 22, usually much less, nerves on either side of midrib 13
Petiolar wings broadly obovate; leaves large, with 22—30 nerves on either side of midrib . . . . . **12. D. ingens**
13. Plants densely villose in younger parts; carpels 8—9 . . . **11. D. montana**
Plants glabrous to densely sericeous in younger parts; if slightly villose carpels 4—7 14
14. Inflorescences partly terminal, partly lateral, axillary; number of petals and sepals 4—6, usually 5 . . . . . **5. D. fischeri**

Inflorescences all terminal; number of sepals and petals in all flowers 5 . . 15
15. Inflorescences 3—20-flowered; carpels 4—5(—7); corolla fully spreading before falling; fruit indehiscent; species from Madagascar and Ceylon . . **7. D. triquetra**
Inflorescences 2—6-flowered; carpels 6—11; corolla as far as known falling as a whole without spreading; fruit as far as known dehiscent; species from New Guinea and the Pacific Islands 16
16. Sepals glabrous or sparsely and very shortly hirsute outside 17
Sepals densely shortly hirsute outside with yellow to dark orange hairs **14. D. crenata**
17. Leaves elliptic, with 6—9 nerves on either side of midrib; sepals ca 15 × 12 mm **9. D. quercifolia**
Leaves ovate, with 13—21 nerves on either side of midrib; sepals ca 25 × 22 mm **10. D. schlechteri**
18. Androecium with distinct group of at least 50 staminodes, either on outer or on inner side 19
Androecium with at most small number of staminodes on outer side, these not forming distinct group from stamens but with transitions to the latter . . 22
19. Staminodes on outer side of androecium 20
Stamens gradually decreasing in size towards centre of flower; on inner side of androecium distinct group of staminodes present . . . . **31. D. fagifolia**
20. Stamens all of about same length, only slightly curved in bud 21
Innermost stamens longer than outer ones, with apical part reflexed outward in bud over the latter . . . . . **30. D. suffruticosa**
21. Stamens about as long as or longer than carpels; thecae opening with terminal pore; inflorescences few-flowered (2—6); corolla falling as a whole without spreading . . . . . **17. D. biflora**
Stamens distinctly shorter than carpels; thecae opening with longitudinal lateral slit; inflorescences many-flowered (ca 10—20); corolla fully spreading **18. D. ferruginea**
22. Sepals 5(—6) 23
Sepals at least 8, up to 17 31
23. Petiolar wings elliptic to nearly linear, at apex not or hardly exceeding insertion to petiole 24
Petiolar wings obovate, at apex distinctly exceeding insertion to petiole . . 29
24. Petiolar wings wholly caducous, at most small auricle persistent at apex . 25
Upper part of petiolar wings persistent . . . . . **19. D. alata**
25. Petiolar wings elliptic-oblong; flowers large, more than 10 cm across; carpels 10—12 . . . . . **27. D. philippinensis**
Petiolar wings lanceolate to linear; flowers smaller, ca 10 cm across or, usually, less; carpels 5—10 26
26. Leaves elliptic to oblong, subcoriaceous, 5—8-nerved; stylar canal and apical part of carpels hirsute inside . . . . . **23. D. diantha**
Leaves elliptic-oblong to lanceolate, not or less coriaceous, 6—20-nerved; stylar canal and apical part of carpels glabrous inside 27
27. Apex of leaves acuminate; plants often rami- and cauliflorous; flowers whitish **22. D. bolsteri**
Apex of leaves obtuse to acute; plants never rami- or cauliflorous; flowers yellow 28
28. Leaves glabrous, 6—12-nerved; usually small auricle from petiolar wings persistent near base of blade . . . . . **20. D. auriculata**
Leaves, at least when young, strigose on nerves beneath, 8—20-nerved; petiolar wings completely caducous . . . . . **21. D. castaneifolia**
29. Carpels 6—9 . . . . . **25. D. ochreata**
Carpels 14—16 30
30. Flowers solitary, large (ca 20 cm across); petiolar wings rounded at apex **26. D. megalantha**
Flowers in 2—3-flowered inflorescences, much smaller; petiolar wings obtuse, mucronate at apex . . . . . **24. D. talaudensis**
31. Sepals 8—9, not much differing in size . . . . . **28. D. marsupialis**
Sepals 11—17, distinctly increasing in size towards centre of flower **29. D. reifferscheidia**

32. Inflorescences or solitary flowers terminal on branches bearing normal leaves, later on often lateral, leaf-opposed on consequently sympodial branches . . 33
Flowers either axillary on leaf-bearing or, less often, leafless branches or in fasciculate inflorescences on older, defoliate branches in axils of leaf-scars, or terminal on short branches bearing only number of bracts at base . . . 48
33. Deciduous trees with stilt-roots; inflorescences appearing with leaves, often immediately at base with 2 or 3 branches, the whole forming a loose cluster . 34
Evergreen trees without stilt-roots; inflorescences only very rarely branched immediately at base; flowers either solitary or in racemose inflorescences . 36
34. Carpels 4—6; flowers apetalous; stamens all of about same length . **32. D. eximia**
Carpels 7—10; flowers with (caducous!) petals; stamens in 2 distinct groups . 35
35. Petiole densely sericeous above, nearly glabrous beneath; carpels 7—8 **34. D. borneensis**
Petiole more densely hairy beneath than above; carpels 9—10 . **33. D. reticulata**
36. Stamens all of about same length, only slightly curved in bud 37
Innermost stamens distinctly longer than outer ones, with apical part reflexed outward over the latter 39
37. Flowers in 2—9-flowered racemes; pedicel without or with 1—2 small bracteoles; leaves not densely velutinous beneath 38
Flowers solitary, rarely two together at same level; pedicel with 3 large verticillate bracteoles; leaves densely velutinous beneath . . . . **37. D. hookeri**
38. Young branches densely tomentose-hirsute; leaves retuse or rounded to obtuse at apex; number of stamens ca 230 . . . . . **36. D. bracteata**
Young branches glabrous; leaves acute at apex; number of stamens ca 85 **35. D. mansoni**
39. Stamens of outer group gradually increasing in size towards centre of flower, outer group not sharply distinct from inner one 40
Stamens of outer group all of approximately same length, outer group sharply distinct from inner one 42
40. Sepals completely glabrous outside; carpels 4—5; flowers ca 10 cm across; fruit dehiscent . . . . . **44. D. monantha**
Sepals hairy outside; carpels 5—7; flowers ca 6—8 cm across; fruit probably always indehiscent 41
41. Nerves curving upward, not reaching margin; flowers yellow; ovules 12—15 **40. D. blanchardii**
Nerves slightly curving upward, ending in margin; flowers white; ovules 22—34 **43. D. retusa**
42. Number of carpels 5—12 43
Number of carpels 14—20 . . . . . **47. D. indica**
43. Leaves narrowly obovate to oblanceolate, about 3 times as long as broad, small (up to 6, rarely 9 cm long) . . . . . **42. D. sibuyanensis**
Leaves oblong to oval, about 1½—2(—2½) times as long as broad, much larger 44
44. Inflorescences (3—)5—30-flowered, though not always all flowers present at the same time; fruits dehiscent 45
Flowers solitary or inflorescences 2(—4)-flowered; fruits indehiscent . . 46
45. Inflorescences racemose, simple racemes or composed, only slightly zigzag, with restricted growth, never lateral on defoliate branches; number of stamens of outer group ca 300, of inner group ca 25—35 . . . . . **38. D. excelsa**
Inflorescences always simple racemes, distinctly zigzag, long-growing, older ones on defoliate branches opposite to leaf-scars; number of stamens of outer group ca 120, of inner group ca 50 . . . . . **39. D. luzoniensis**
46. Leaves oblong, ca 2—2½ times as long as broad; flowers ca 6 cm across; connective in stamens of inner group of equal breadth for whole length **41. D. sumatrana**
Leaves ovate, obovate, or oval, ca 1½—2 times as long as broad; flowers ca 10—16 cm across; connective in stamens of inner group gradually broadening towards base 47
47. Flowers in 2—4-flowered racemes, ca 10—13 cm across; leaves obovate **45. D. turbinata**
Flowers solitary, ca 16 cm across; leaves ovate to oval . . . **46. D. ovata**
48. Evergreen species with axillary flowers on leaf-bearing branches or few-flowered racemes in axil of leaf-scars on young branches . . . . **48. D. pulchella**

Deciduous species with flowers or inflorescences on older, leafless branches; flowers solitary or in few-flowered fascicles 49
49. All stamens of about same length . . . . . **49. D. parkinsonii**
Stamens in two distinct groups, innermost ones much longer than outer ones, with apical part reflexed outward over the latter in bud 50
50. Thecae opening with longitudinal slit; flowers up to ca 5 cm across . . . 51
Thecae opening with apical pore; flowers ca 10—12 cm across 53
51. Sepals densely sericeous outside . . . . . **52. D. parviflora**
Sepals glabrous on both sides 52
52. Pedicels without bracteoles . . . . . **50. D. pentagyna**
At least part of the pedicels with caducous bracteoles . . . **51. D. scabrella**
53. Outer sepals ca 15 × 12 mm, inner ones ca 18 × 14 mm; stamens of outer group ca 7 mm long . . . . . **53. D. andamanica**
Outer sepals at least 25 × 18 mm, inner ones at least 30 × 20 mm; stamens of outer group at least 10 mm long 54
54. Adult leaves obovate-oblong, abruptly and often unequally narrowed into 3—6½ cm long petiole; flowers ca 10—12 cm across; pedicel ca 5—12 cm long, rarely shorter . . . . . **54. D. aurea**
Adult leaves obovate, gradually narrowed into 1.3—4 cm long petiole; flowers ca 14—16 cm across; pedicel up to 4, rarely 5 cm long . . . **55. D. obovata**

1. Dillenia beccariana Martelli 1886

Dillenia beccariana Martelli in Becc., Malesia 3, 1886, p. 158; Merr., Bibl. Enum. Born. Pl., 1921, p. 382; Hoogl., Fl. Mal. I, 4, 1951, p. 158.

Wormia beccariana (Martelli) Ridl., Saraw. Mus. J. 1, 1913, p. 71.

Type specimen: Beccari PB 134, Kuching, Sarawak, July 1865; lectoholotype in FI, isotypes in BM, BZ, G, K, M, P, S.

Small evergreen trees, up to 6 m high. Branches sympodial, younger ones ca 3—4 mm thick, hirsute to densely hirsute, most densely so in axil of leaves or leaf-scars, glabrescent. Leaf-scars amplexicaul, for about $^1/_3$ single line, bent downward in centre of leaf-opposed side, for about $^2/_3$ semi-lunular, emarginate above, with ca 17 leaf-traces near lower margin. *Leaves* oblong to narrowly obovate, 18—30(—45) × 8—12(—16) cm, with (18—)20—25(—30) nerves on either side; obtuse, often more or less acuminate at apex, rounded to obtuse at base, for $1^1/_2$—2 mm connected with petiolar wings; margin slightly to manifestly dentate, nerves rather straight, curving upward near margin, ending in apex of teeth; glabrous to sparsely hirsute on intervenium, densely hirsute on midrib, less densely so on basal part of nerves above, hirsute, most densely so on midrib, nerves, and veins beneath. Petiole 3—6 cm, glabrous above, more or less densely hirsute beneath, with amplexicaul wings; wings lanceolate, 4—9 mm broad near base, gradually narrowing to $1^1/_2$—2 mm at apex, in young leaves connected with base of blade, in older leaves torn loose here and near base of petiole, persistent, glabrous above, more or less densely hirsute beneath. *Inflorescences* terminal, racemes, up to 20-flowered, up to 60 cm; axis more or less distinctly zigzag, ca 3—2 mm thick, hirsute; bracts caducous, sessile, ovate, 8—20 × 6—12 mm, acute at apex, rounded at base, glabrous above, hirsute beneath. *Flowers* ca $6^1/_2$ cm across. Pedicel 7—12 mm, ca $1^1/_2$ mm thick, thickened to 2 mm at apex, hirsute, without or with 1 very small bracteole. Sepals 5, oval to ovate, 2 outermost ones slightly smaller (ca 17 × 14 mm) than 3 innermost ones (ca 20 × 15 mm), glabrous inside, appressed-sericeous outside, most densely so in central part, densely ciliate at margin. Petals 5, yellow, obovate, ca 33 × 22 mm, rounded at apex, narrowed towards base. Stamens ca 130, slightly curved

in bud, all of about same length (outermost ones only slightly shorter), 11—13 mm; filament flattened, $1^1/_2$—3 mm long, 0.4—0.6 mm broad; anther ca 0.5—0.7 mm broad, obtuse at apex; thecae linear, opening with pore near apex on outer side. Carpels 5—6, arranged around conical receptacle, with conical part about half as high as carpels, lanceolate, ca 8—10 × 2 mm, each with ca 20 ovules; styles spreading, cylindric, ca 5 mm long, ca 0.4 mm thick at base, channelled above; carpels and base of styles densely covered with rigid, $1^1/_2$—2 mm long, glossy yellow, upward directed hairs. *Pseudocarps* dehiscent, carpels probably only slightly spreading; also when unripe sepals not completely enclosing gynoecium; carpels ca 25 × 16 mm, each with 1—3 seeds. Seeds obovoid, curved, ca $4 \times 2^1/_2$ mm; aril 0.2—0.4 mm long, membranous.

Borneo: Sarawak: Kuching, *Beccari PB 134*, fl. July 1865 (BM, BZ, FI, G, K, M, P, S); Bantin, Batan-Lupar Prov., *Beccari PB 497*, fl. & fr. Sept. 1865 (FI, K); Kuching, *Beccari PB 3076*, fl. Jan. 1867 (FI, K, P); Tegora, *Haviland 2047*, fl. Dec. 1892 (K); Kuching, *Omar 367*, fr. Jan. 1924 (BZ, K, SING); Mt Singghai, *Nat. Coll. 5282*, fl. Feb. 1927 (NY, UC).

Distribution. Borneo; Sarawak only.

Ecology. At low altitude.

Vernacular names. *Petasi, Simpor,* or *Simpor delaki.*

Uses. Used for construction purposes.

Notes. 1. The colour of the petals has been noted by Haviland only.

2. The species is closely related to *D. albiflos* from the Malay Peninsula; cf. p. 23.

2. Dillenia albiflos (Ridl. 1910) Hoogl. 1951

Wormia albiflos Ridl., J. Str. Br. R. A. S. 54, 1910, p. 6; Ridl., Fl. Mal. Pen. 1, 1922, p. 9.

Wormia beccariana Auct. non (Martelli) Ridl.; Corn., Gard. Bull. S. S. 10, 1939, p. 4; Corn., Wayside Trees Malaya, 1940, p. 205.

Dillenia albiflos (Ridl.) Hoogl., Fl. Mal. I, 4, 1951, p. 158.

Type specimen: Ridley 11053, Tebing Tinggi, Johore, Nov. 1901; holotype in SING, isotype in K.

Large evergreen shrubs or trees, up to 17 m high, rarely with few stilt-roots. Bark red. Branches sympodial, younger ones 4—7 mm thick, sparsely to densely hirsute with $^1/_2$—1 mm long hairs, glabrescent, indument above leaf-scars and particularly near axillary buds semi-permanent. Leaf-scars amplexicaul, for about $^1/_3$ single line, for about $^2/_3$ semi-lunular, slightly emarginate above, with ca 20 leaf-traces spreaded mainly in central part. *Leaves* elliptic to oblong, (17—)20—30(—40) × ($7^1/_2$—)9—15(—20) cm, with (13—)20—30(—35) nerves on either side; rounded to acute, often slightly acuminate at apex, rounded to obtuse at base, for 1—2 mm connected with petiolar wings; margin slightly undulate to manifestly dentate, nerves rather straight, curving upward near margin, ending in apex of teeth or otherwise in margin; nearly glabrous to sparsely hirsute, most densely so on midrib above, sparsely to slightly hirsute, most densely so on midrib and nerves beneath. Petiole $2^1/_2$—4 cm, glabrous above, sparsely to densely hirsute beneath, with amplexicaul wings; wings lanceolate, 5—11 mm broad near base, gradually narrowing to 1—2 mm at apex, in young leaves connected with base of blade, in older leaves

torn loose here and near base of petiole, persistent, glabrous above, sparsely to densely hirsute beneath. *Inflorescences* terminal, sometimes 2 together, racemose, rarely simple racemes, usually having lateral branches at place of second flower and often second, rarely third branch at some place higher up, 12—30-flowered, up to 50 cm; axes only slightly zigzag, ca 5—$2^1/_2$ mm thick, hirsute; bracts caducous, sessile, ovate, 7—18 × 5—11 mm, acute at apex, rounded at base, glabrous above, densely hirsute beneath. *Flowers* ca 5 cm across. Pedicel 5—20 mm, $1^1/_2$—2 mm thick, thickened to 2—4 mm at apex, hirsute, without bracteoles. Sepals 5, ovate, 2 outermost ones slightly smaller (ca 15 × 12 mm) than 3 innermost ones (ca 20 × 14 mm), densely appressed-sericeous outside, hairs on 3 innermost ones directed upward, on 2 outermost ones more spreading, all densely ciliate at margin. Petals 5, pale cream white, obovate, ca 20 × 13 mm, rounded at apex, narrowed towards base. Stamens ca 160, slightly curved in bud, all of about same length (outermost ones only slightly shorter), $5^1/_2$—8 mm; filament flattened, ca 1—$1^1/_2$ mm long, 0.4—0.6 mm broad; anther ca 0.5—0.7 mm broad, acuminate at apex; thecae linear, opening with pore near apex on outer side. Carpels 5—6, arranged around conical receptacle with conical part about half as high as carpels, lanceolate, ca $4^1/_2 \times 1^1/_2$ mm, each with ca 10 ovules; styles spreading, cylindric, slightly flattened, ca 5 mm long, ca 0.5 mm broad near base, 0.2 mm near apex, channelled above; carpels and base of styles rather densely covered with rigid, 0.4—0.7 mm long, silky, upward directed hairs. *Pseudocarps* dehiscent, sepals enlarged to 25 × 15 mm; carpels ca 10 × 12 mm, each with 1—2 seeds. Seeds reniform, ca 4 × 3 mm, minutely echinate; aril ca 1 mm long, membranous.

Malay Peninsula: Johore: Tebing Tinggi, *Ridley 11053*, fl. Nov. 1901 (K, SING); Kluang, *Holttum SF 9359*, fl. Nov. 1922 (A, BM, CAL, K, SING, UC); ibidem, *Watson CF 6062*, fl. July 1923 (IFI); Mawai, *Corner*, Nov. 1934 (SING); Kota Tinggi, *Corner*, fl. Feb. 1935 (SING); ibidem, *Corner SF 29300*, fl. Apr. 1935 (A, BM, BZ, IFI, K, SING); Sungai Kayu Ara, *Corner SF 29369*, fl. May 1935 (A, BZ, IFI, K, SING); Sungai Kaya, *Kiah SF 32016*, fl. Oct. 1936 (K, L, SING); Sungai Sedili, *Ngadiman SF 36850*, fl. July 1939 (SING); Bukit Tinjau Laut, *Corner SF 37059*, fl. Aug. 1939 (A, BZ, SING); Ayer Hitam road, *Corner*, Oct. 1941 (SING); Kota Tinggi, *Sinclair SF 38934*, July 1950 (L).

Cultivated: Singapore: from Gunung Panti, *Nur*, fl. Nov. 1946 (SING); Gardens Jungle, *Kiah SF 38310*, fl. Dec. 1948 (BM, L, SING).

Distribution. Malay Peninsula; SE. Johore only.

Ecology. In swampy forests, lowland hillside forests, and secondary forests. According to Corner (1940) flowering twice a year, after each spell of dry weather; flowers have been collected in most months, without indication of any periodicity.

Notes. 1. Corner indicates (field-note) that the bigger trees have bigger leaves, in contrast to what is usually found in *Dillenia* and most other tree genera.

2. From the closely related *D. beccariana* the present species differs by the usually composed inflorescence, the slightly smaller flowers (which character is indicated in the dimensions of all floral parts), the distinctly (also relatively) shorter indument of the carpels, and the colour of the petals. Corner (1940), who reduced *D. albiflos* to *D. beccariana*, points

out the remarkable distribution (SE. Malay Peninsula and Sarawak) which is found in more taxa; his remark still holds, as the two species are certainly closely related to each other and rather isolated within the genus.

3. Dillenia celebica Hoogl. spec. nov.

Dillenia celebica Hoogl., Fl. Mal. I, 4, 1951, p. 159, descr. angl..

Type specimen: Kjellberg 2226, Beao (Towuti), Celebes, 30 Aug. 1929; holotype in S, isotype in BZ.

Descriptio typi: Rami novelli glabri; cicatrices amplexicaules. Folia elliptico-oblonga, 9—13 × 4$^1/_2$—7$^1/_2$ cm, 12—15-nervata, apice obtusa, subacuminata, basi obtusa, margine subundulata. Petiolus 4—6 cm, alatus alis anguste lanceolatis, amplexicaulibus, caducis. Inflorescentiae uni- vel biflores, terminales. Alabastra subglobosa, ca 1$^1/_2$ cm diam., pedicello 2—3 cm. Sepala 5, ovalia, 21—25 × 16—19 mm, intus glabra, extus sericea, margine ciliata. Petala desunt. Stamina ca 300, conformia, ca 6—7 mm longa. Carpella 11, oblonga, ca 8 × 3$^1/_2$ mm, glabra, 3—4-ovulata, stylis recurvatis ca 7 mm longis, stigmate pulvinato.

Fig. 3 c—e, p. 29.

Evergreen trees, up to ca 30 m high, 50 cm thick, with small buttresses. Bark greyish brown, slightly flaky in large plates; heartwood greyish red. Branches sympodial, younger ones ca 2 mm thick, glabrous to rather densely strigose or hirsute, most densely so above leaf-scars, glabrescent, later on often with many lenticels. Leaf-scars amplexicaul, for about $^2/_3$—$^3/_4$ single line, for about $^1/_3$—$^1/_4$ rather highly semi-lunular with ca 13 leaf-traces near lower margin. *Leaves* elliptic-oblong, (9—)13—18(—21) × (4$^1/_2$—)6—10(—12) cm, with (12—)15—20(—23) nerves on either side; obtuse to acute, often slightly acuminate at apex, rounded to obtuse at base, not connected with petiolar wings; margin undulate to dentate, nerves rather straight, curving upward near margin, usually closely following margin, not ending in it, less often ending in apex of teeth; glabrous above, glabrous on intervenium, glabrous to rather sparsely strigose-hirsute on nerves and midrib beneath. Petiole (4—)5—7(—8) cm, glabrous above, glabrous to rather sparsely strigose-hirsute beneath, with amplexicaul wings; wings linear to lanceolate, 2—5(—10) mm broad, slightly auriculate at apex, glabrous above, glabrous to rather densely strigose-hirsute beneath, wholly caducous. *Inflorescences* terminal, 1—5-flowered racemes, up to 5 cm and probably longer; axis 1$^1/_2$—1 mm thick, nearly glabrous to rather densely hirsute, indument denser towards apex, without bracts. *Flowers* apetalous, ca 4$^1/_2$ cm across. Pedicel 2—3 cm, ca 1 mm thick, thickened to 2 mm at apex, slightly to densely hirsute, indument denser towards apex, without bracteoles. Sepals 5, oval, ca 21—25 × 16—19 mm, glabrous inside, rather densely to densely sericeous, 5 in bud covered margins glabrous for breadth of ca 1 mm outside, finely ciliate at margin. Petals absent. Stamens ca 300, slightly curved in bud, all of about same length, 6—7 mm; filament 2$^1/_2$—3$^1/_2$ mm long, ca 0.3 mm broad; anther ca 0.6 mm broad, obtuse or slightly emarginate at apex; thecae linear, opening with longitudinal, lateral slit. Carpels ca 11, arranged around conical receptacle, oblong, ca 8 × 3$^1/_2$ mm, glabrous, each with 3—4 ovules; styles spreading, cylindric, ca 7 mm long, ca 0.7 mm thick

near base, 0.4 mm at apex, with knob-like stigma, ca 0.8 mm diam., 0.3 mm thick. *Pseudocarps* unknown.

Celebes: N. Pen.: Manado, *Riedel IIB 5899*, fl. (BZ, CAL, U); Ratahan, *Koorders 19382β*, March 1895 (BZ, K); Tondano, near Klabat, *NIFS bb 13755*, fl. Apr. 1929 (BZ, L). — SE. Pen.: Beao, Lake Towuti, *Kjellberg 2226*, fl. Aug. 1929 (BZ, S); ibidem, *Kjellberg 2226a*, Aug. 1929 (S).

Distribution. Celebes; known only from the eastern part of the North Peninsula and the region of Lake Towuti.

Ecology. In forest (*NIFS*) and on lake-shore (*Kjellberg*); these collections were made at ca 300 m altitude.

Vernacular names. *Njèher* (Ratahan), *Rerer* (Tonsean language, Klabat).

Uses. Used in house-building (*NIFS*).

Note. The species is closely related to *D. serrata*, from which it differs by the smaller flowers, the smaller number of carpels, and the shape of the petiolar wings; the two species have in common the absence of petals and the presence of a distinct, knob-like stigma, which is found in no other species of *Dillenia*.

4. Dillenia serrata Thunb. 1791

? Songium *Rumph., Herb. Amb. 2, 1741, p. 140, t. 45.
Sangius *Rumph., Herb. Amb. 2, 1741, p. 142, t. 46.
? Dillenia elliptica Thunb., Trans. Linn. Soc. 1, 1791, p. 200; DC., Syst. 1, 1818, p. 437; DC., Prod. 1, 1824, p. 76; Martelli in Becc., Malesia 3, 1886, p. 161; Merr., Int. Rumph. Herb. Amb., 1917, p. 367; Heyne, Nutt. Pl. Indon., 1950, p. 1071.
Dillenia serrata Thunb., Trans. Linn. Soc. 1, 1791, p. 201; DC., Syst. 1, 1818, p. 437; DC., Prod. 1, 1824, p. 76; Miq., Fl. Ind. Bat. 1, 2, 1859, p. 685; Merr., Int. Rumph. Herb. Amb., 1917, p. 368; Hoogl., Fl. Mal. I, 4, 1951, p. 158.
Type specimens: *Dillenia elliptica:* Rumphius, l.c., t. 45. — *Dillenia serrata:* Rumphius, l.c., t. 46.

Evergreen trees, up to ca 30 m high, ca 70 cm thick, with up to 16 m bole. Bark reddish grey, smooth, thinly scaling off; sapwood white, heartwood reddish brown. Branches sympodial, younger ones ca 4—5 mm thick, glabrous to densely sericeously strigose-hirsute, most densely so above leaf-scars, glabrescent. Leaf-scars amplexicaul, for about $^2/_3$ single line, for $^1/_3$ rather highly triangular with straight upper and rounded lower margin, with ca 15 leaf-traces near lower margin and in central part. *Leaves* oblong to lanceolate, (20—)25—35(—45) × (8—)10—14(—19) cm, with (16—)20—28(—35) nerves on either side; rounded to acute at apex, acute to obtuse at base, slightly decurrent, not connected with petiolar wings; margin dentate to nearly entire, nerves rather straight, either slightly curving upward near margin and ending in it directly, with strong vein upward along margin, or more strongly curving upward and not ending in margin, with strong vein ending in margin; glabrous above, glabrous on intervenium, glabrous to rather sparsely strigose-hirsute on nerves and midrib beneath. Petiole $2^1/_2$—$6^1/_2$ cm, glabrous above, glabrous to slightly sericeously hirsute beneath, with amplexicaul wings; wings half-obcordiform, at base 5—8, near apex 15—30 mm broad, glabrous above, glabrous to densely sericeously hirsute beneath, wholly caducous.

Inflorescences terminal, 2—6-flowered racemes, up to 15 cm; axis straight to rather tortuous, 4—2 mm thick, sparsely to densely sericeously hirsute; bracts caducous, lanceolate, up to 14 × 4 mm, glabrous above, sparsely to densely sericeously hirsute beneath. *Flowers* apetalous, yellow, ca $7^1/_2$ cm across. Pedicel 4—25 mm, $1^1/_2$—$2^1/_2$ mm thick, thickened to $3^1/_2$—5 mm at apex, sparsely to densely sericeously hirsute, without bracteoles. Sepals 5, oval, ca 40 × 25 mm, glabrous inside, densely sericeous, 5 in bud covered margins glabrous for breadth of 2—4 mm outside, not ciliate at margin. Petals absent. Stamens ca 750, slightly curved in bud, all of about same length (innermost ones gradually only slightly longer), 9—11 mm; filament $3^1/_2$—4 mm long, ca 0.4 mm broad; anther ca 0.6—0.7 mm broad, emarginate at apex; thecae linear, opening with apical pore. Carpels ca 18—19, arranged around rather broad conical receptacle, oblong, ca $4^1/_2 \times 1^1/_2$ mm, glabrous, each with 5—9 ovules; styles for ca 4 mm parallel, then spreading, filamentous, ca 8 mm long, ca 0.8 mm thick near base, narrowing to 0.4 mm at apex, with knob-like stigma, ca 1 mm diam., 0.4 mm thick. *Pseudocarps* indehiscent, yellow or yellowish green, appressed-globular, ca 6 cm diam., $3^1/_2$ cm high including enclosing sepals; sepals at apex somewhat divergent, leaving upper part of carpels uncovered, up to ca $6^1/_2 \times 5^1/_2$ cm, at base up to 3 mm thick; carpels yellow, more or less fleshy, ca 25 × 16 mm, up to 5-seeded. Seeds obovoid, ca $4 \times 2^1/_2$ mm, black with reticulate surface, exarillate.

Celebes: Gulf of Bone, *Weber*, fl. (L). — N. Pen.: Palaleh, *van Andel*, fr. Dec. 1913 (BZ); Kwandang, near Titidu, *NIFS bb 7505*, fl. Sept. 1924 (BZ, L); Bal. Mangandon, near Buroko, *NIFS bb 13747*, July 1929 (BZ, L). — C. Cel.: G. Padang Kadjang, *Rachmat 834*, fl. 1913 (BZ); Malili, near Usu, *Waturandang 46 (Cel. III-39)*, fl. Nov. 1931 (BZ, L); ibidem, *Waturandang 147 (Cel. III-39)*, fl. Jan. 1932 (BZ); near Malili, *Waturandang 10 (Cel. IV-89)*, fl. & fr. Apr. 1932 (BZ); ibidem, *Reppie 160 (Cel. IV-155)*, fl. Apr. 1934 (BZ). — SW. Pen.: Palopo, near Padangalipan, *NIFS bb 13540*, Apr. 1929 (BZ). — SE. Pen.: Lepo-Lepo near Kendari, *Beccari*, fl. July 1874 (FI, K); Kendari, *Kjellberg 579*, fl. March 1929 (BZ, S). — Muna Isl.: Muna, *Ilam L 7*, fr. (BZ); near Wangkoli, *NIFS bb 3924*, fl. Aug. 1922 (BZ, L); near Wasalangka, *NIFS bb 21129*, Aug. 1936 (BZ, K); ibidem, *NIFS bb 21131*, Aug. 1936 (A, BZ, L). — Buton Isl.: Kabungka, *Kjellberg 194*, fr. Feb. 1929 (BZ, S).

Distribution. Celebes.

Ecology. In primary and old secondary forest, from sea-level to ca 100 m altitude.

Vernacular names. *Dengen* (Buginese), *Dengilo* (Gorontalese), *Déngi wua* (Tobela language, To Padoë), *Dongi* (Tobela language, To Koronsië; Kaidipangese), *Dongi bolusu* (Tobela language, To Koronsië), *Soni(h)* (Munanese), *Wuadengi* (Tobela language, To Padoë).

Uses. The wood is used for planks, posts, and ledgers. According to Rumphius it is not durable. The fruits are edible (Rumphius).

Notes. 1. *Dillenia serrata* Thunb. is wholly based on *Sangius* Rumph.; the description and plate exactly match the present species. Rumphius already compared the species with *Dillenia* (Sangius, "quae Dilleniae quoque species est"); Linnaeus reduced it to *D. indica* (Sp. Pl. ed. 2, 1762, p. 754).

2. *Dillenia elliptica* Thunb. is wholly based on *Songium* Rumph.. The plate does not exactly match the present species, as the flowers are figured solitary; they are described as 2—3 together. As the figure of

Sangius is better and both binomials have been published at the same time whereas nobody has yet reduced one to the other, I prefer to retain *Dillenia serrata* as the correct name for the species.

3. The species is closely related to *D. celebica* (cf. p. 25).

5. Dillenia fischeri Merr. 1915

Dillenia fischeri Merr., Philip. J. Sc. Bot. 9, 1914, p. 518 (issued 1915); Merr., En. Philip. Fl. Pl. 3, 1923, p. 60; Hoogl., Fl. Mal. I, 4, 1951, p. 161.

Wormia fischeri (Merr.) Gilg & Werderm. in Engl. & Prantl, Nat. Pfl. Fam. ed. 2, 21, 1925, p. 35.

Type specimen: Miranda FB 20534, Butuan subprovince, Mindanao, Sept. 1913; lectoholotype (isotype) in P, isotypes in BM, K, US.

Evergreen trees, up to ca 20 m high. Branches sympodial, younger ones ca $1^1/_2$ mm thick, sparsely hirsute, reddish brown, glabrescent, greyish when older. Leaf-scars amplexicaul, for about $^2/_3$ single line, for about $^1/_3$ subfalcate with ca 7 leaf-traces in lower part. *Leaves* coriaceous, elliptic-oblong to oblanceolate, $6^1/_2$—14×2.8—$6^1/_2$ cm, with 7—11 nerves on either side; rounded at apex, obtuse to rounded at base, not connected with petiolar wings; margin nearly entire to dentate, mainly in upper part of leaf, nerves curving upward, branching ca 1—2 mm from margin, one branch towards margin, one in apical direction along margin, ultimately connecting with next nerve near its branching; shining, glabrous above, very sparsely strigose, soon glabrescent beneath. Petiole $1^1/_2$—3 cm, glabrous above, sparsely strigose-hirsute beneath, with amplexicaul wings; wings linear-lanceolate, ca 1 mm broad, narrowing towards apex, glabrous above, slightly strigose-hirsute beneath, wholly caducous. *Inflorescences* terminal on leaf-bearing or lateral in axil of leaf-scar on older branches, 2—4(—6)-flowered simple or, sometimes, composed racemes; axis up to 5 cm long, ca $1^1/_2$ mm thick, strigose-hirsute; bracts caducous, sessile, lanceolate, ca 12×4 mm, glabrous above, sparsely strigose-hirsute beneath. *Flowers* ca 6 cm across. Pedicel 3—6 cm, ca 1 mm thick, thickened to $1^1/_2$ mm at apex, strigose-hirsute, without bracteoles. Sepals 4—6, usually 5, obovate, 2 (when 4) or 3 outermost ones smaller (ca 13×8 mm) than 2 or 3 innermost ones (ca 16×12 mm), glabrous inside, sparsely strigose-hirsute outside, sparsely ciliate at margin, mainly near apex. Petals as many as sepals, white, obovate, ca 3×1.4 mm, rounded at apex, narrowed towards base. Stamens ca 120—160, slightly curved in bud, all of about same length, though slightly decreasing in size towards centre, outermost ones ca 9, innermost ones ca 7 mm; filament flattened, of outermost stamens ca $6^1/_2$ mm long, gradually decreasing to 3 mm in innermost ones, ca 0.2 mm broad; anther ca 0.6—0.7 mm broad, rounded at apex; thecae linear, opening with pore near apex on outer side. Carpels 4—6, usually 5, arranged around rather narrow conical receptacle, oblong, ca $7 \times 2^1/_2$ mm, glabrous, each with 8—10 ovules; styles recurved, 5—8 mm long, 1—$1^1/_2$ mm thick at base, gradually narrowing to 0.3 mm at apex, channelled above. *Pseudocarps* unknown.

Philippines: Mindanao: Butuan Subprov., *Miranda FB 20534*, fl. Sept. 1913 (BM, K, P, US); ibidem, *Ponce FB 20500*, fl. Sept. 1913 (BM, L, NY, US).

Distribution. Philippines, known only from Mindanao, Butuan Subprovince.

Ecology. In semi-open forests at low altitude.

6. Dillenia pteropoda (Miq. 1868) Hoogl. 1951

Wormia pteropoda Miq., Ann. Mus. Bot. Lugd. Bat. 4, 1868, p. 77.

Dillenia papyracea Merr., Philip. J. Sc. Bot. 9, 1915, p. 520; Merr., En. Philip. Fl. Pl. 3, 1923, p 61.

Dillenia megalophylla Merr., Philip. J. Sc. 14, 1919, p. 421; Merr., En. Philip. Fl. Pl. 3, 1923, p. 60.

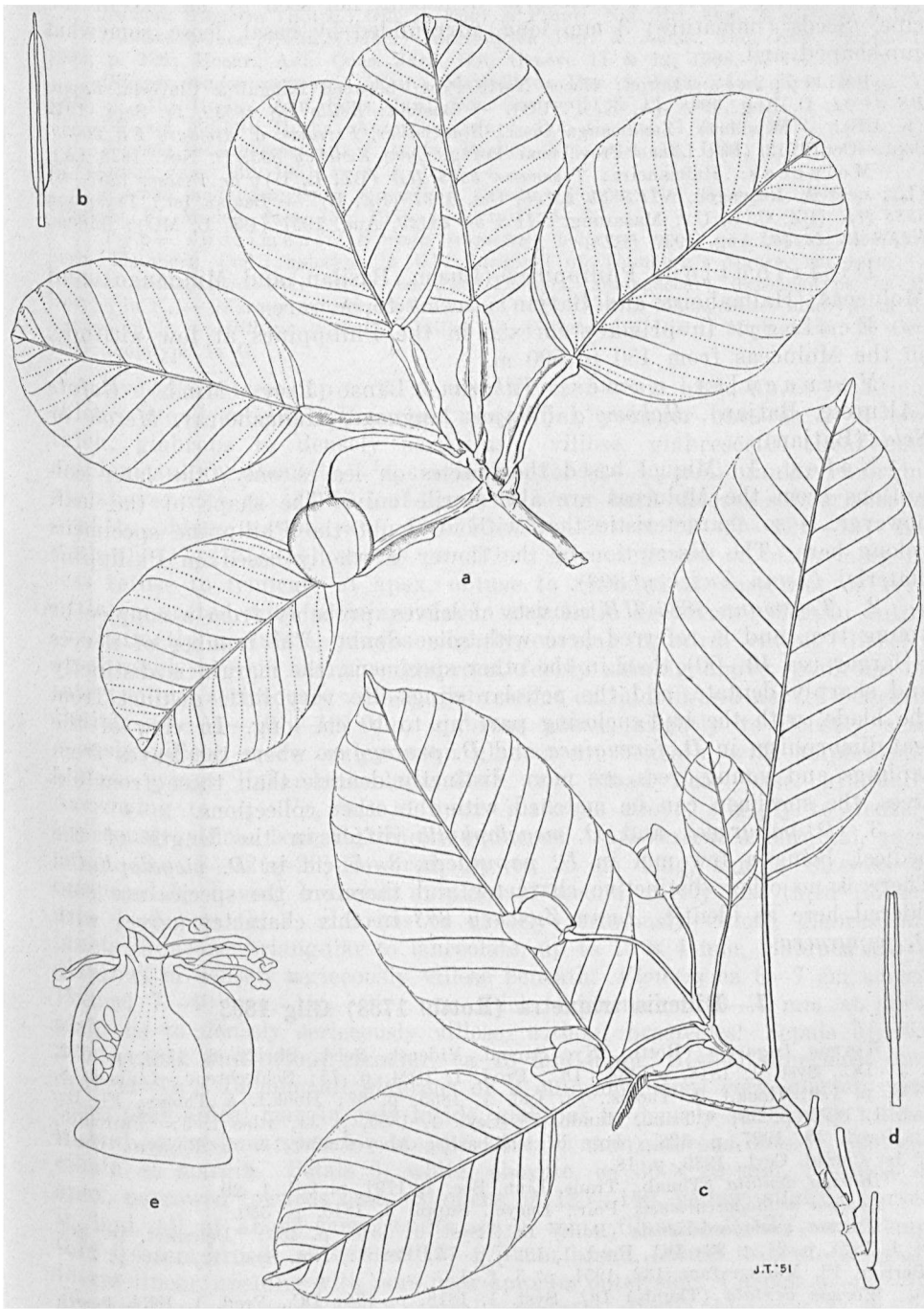
Wormia papyracea (Merr.) Gilg & Werderm. in Engl. & Prantl, Nat. Pfl. Fam. ed. 2, 21, 1925, p. 35.

Dillenia pteropoda (Miq.) Hoogl., Fl. Mal. I, 4, 1951, p. 158.

Type specimens: *Wormia pteropoda:* Teysmann 5535 HB, Halmaheira; holotype in U, isotypes in BZ, L. — *Dillenia papyracea:* Reillo BS 16339, Basilan, Sept. 1912; isotypes in K, US. — *Dillenia megalophylla:* Ramos BS 33034, Bangui to Claveria, Ilocos Norte Prov., Luzon, Aug. 1918; isotypes in A, K, P, US.

Evergreen trees, up to 40 m high, 1.25 m thick, with up to 27 m bole. Bark red-orange, peeling off in plates. Branches sympodial, younger ones ca 5—7 mm thick, sparsely strigose, glabrescent. Leaf-scars amplexicaul, for about $^1/_{10}$ single line, for $^9/_{10}$ subfalcate with ∞ (> 50) small leaf-traces in upper half. *Leaves* subcoriaceous, elliptic, (23—)30—60(—100) × (11—)16—35(—60) cm, with (15—)18—20(—23) nerves on either side; rounded to obtuse at apex, acute to obtuse at base, decurring into petiolar wings; margin entire to slightly undulate-dentate, nerves ending in apex of teeth, often also 1—3 secondary nerves directed downward near end of nerves, ending in apex of slightly smaller teeth; glabrous, slightly shining on both sides; midrib sharply prominent beneath, up to 8 mm thick. Petiole 5—10 cm, with amplexicaul wings; wings 7—25 mm broad, nervation of blade continuing, but less marked on wings, glabrous above, glabrous to rather softly pubescent beneath, often caducous, loosening irregularly from base of blade. *Inflorescences* terminal, 4—7-flowered racemes, up to 40 cm long; axis ca 5—3 mm thick, velvety to nearly glabrous; bracts caducous, sessile, triangular, 6—9 × 3—4 mm. *Flowers* ca 10—12 cm across. Pedicel 5—50 mm, ca $2^1/_2$ mm thick, thickened to 5 mm at apex, without bracteoles. Sepals 5, oval, 2 outermost ones slightly smaller (ca 25 × 20 mm) than 3 innermost ones (ca 33 × 22 mm), glabrous inside, slightly to densely velvety with $^1/_2$—1 mm long hairs outside, sparsely ciliate at margin. Petals 5, white, obovate, 45—50 × 30—32 mm, rounded at apex, narrowed towards base. Stamens ca 700, slightly curved in bud, all of about same length, 14—18 mm; filament 5—8 mm long, 0.3—0.8 mm broad; anther ca 0.7—1.0 mm broad, obtuse or slightly emarginate at apex; thecae linear, opening with pore near apex on outer side; on outer side of androecium few staminodes, linear, 4—5 mm long. Carpels ca 10, arranged around conical receptacle, lanceolate, ca 10 × $3^1/_2$ mm, glabrous, each with ca 25 ovules; styles spreading, 8—10 mm long, 1 mm broad near

Fig. 3 — a, b. *Dillenia ovalifolia* Hoogl. (p. 33); a. branch with flowerbud, × ½; b. stamen, × 5; both after type specimen; c, d, e. *Dillenia celebica* Hoogl. (p. 24); c. branch with inflorescence and leaves, flowers in bud, × ½; d. stamen, × 5; e. gynoecium, longitudinal section, × 3; all after type specimen.


b
a
d
e
c
J.T.'51

base, channelled above. *Pseudocarps* dehiscent, not seen by me except unripe. Seeds (immature) 3 mm long, surrounded by basal, loose, somewhat cup-shaped aril.

Philippines: Luzon: Ilocos Norte Prov., between Bangui & Claveria, *Ramos BS 33034*, fl. Aug. 1948 (A, K, P, US). — Basilan: *Reillo BS 16339*, fr. Sept. 1912 (K, US). — Mindanao: Zamboanga Distr., *Stadtmiller, Ferraris, & Almagro FB 20099*, Sept.—Oct. 1912 (P); Lanao Prov., near Porog, *Lynn Zwickey 803*, fl. Nov. 1938 (A).

Moluccas: Halmaheira: *Teysmann 5535 IIB* (BZ, L, U); *de Vriese*, 1857—61 (L); near A. Lebengon, *NIFS bb 23750*, Oct. 1937 (BZ, L). — Batjan Isl.: *Teysmann 5886 IIB* (BZ, CAL, U); Masurung, *NIFS bb 23129*, Aug. 1937 (BZ, L, MO); ibidem, *NIFS bb 23146*, Aug. 1937 (BZ).

Distribution. Philippines (Luzon, Basilan, and Mindanao) and Moluccas (Halmaheira and Batjan); seems to be rare.

Ecology. In primary forests, in the Philippines at low altitude, in the Moluccas from 150 to 500 m.

Vernacular names. *Tukoran* (Lanao Prov., Mind.), *Gofote* (Alfurese, Batjan), *Hokowoto* (Wajoli language, Halmaheira), *Merah* or *Sela* (Batjan).

Notes. 1. Miquel based the species on leaves only; the later collections from the Moluccas are also sterile only. The shape of the leaf, however, is so characteristic that without doubt the Philippine specimens belong here. The description of the flower is wholly based on Philippine material (*Lynn Zwickey 803*).

2. *Teysmann 5886 IIB* consists of leaves, probably from a coppice or young tree, and is referred here with some doubt. The number of nerves is larger (ca 40—50) than in the other specimens, the margin is distinctly and sharply dentate, and the petiolar wings are very little distinct from the blade, with the bud-enclosing part up to 10 cm long. In view of the leaf-dimorphism in *D. ferruginea* and *D. pentagyna*, where the leaves from saplings and young trees are more distinctly dentate than those from old trees, the specimen can be matched with the other collections.

3. *D. papyracea* and *D. megalophylla* differ in the length of the pedicel, being a few mm in *D. papyracea*, 3—5 cm in *D. megalophylla*. There is no other distinctive character and therefore the species are considered here as identic. *Lynn Zwickey 803* in this character agrees with *D. papyracea*.

7. Dillenia triquetra (Rottb. 1783) Gilg 1893

Wormia triquetra *Rottb., Nye Samml. Vidensk. Selsk. Skrift. 2, 1783, p. 532, t. 3; DC., Syst. 1, 1818, p. 434; DC., Prod. 1, 1824, p. 75; Schlechtend., Linnaea 8, 1833, p. 179; Hook.f. & Thoms., Fl. Ind. 1, 1855, p. 67; Hook.f. & Thoms., Fl. Br. Ind. 1, 1872, p. 35; **Trim., Handb. Fl. Ceyl. 1, 1893, p. 11, atlas t. 3; *Fairchild, J. Hered. 18, 1927, p. 328 (photo of leaf-base); Abeyesundere & de Rosayro, Draft of 1st Checkl. Ceyl., 1939, p. 18.

Dillenia dentata *Thunb., Trans. Linn. Soc. 1, 1791, p. 201, t. 20.

Lenidia madagascariensis Poir., Encycl. Suppl. 3, 1813, p. 330.

Wormia madagascariensis (Poir.) DC., Syst. 1, 1818, p. 433; *Delessert, Ic. Sel. Pl. 1, 1821, p. 21, t. 82; DC., Prod. 1, 1824, p. 75; Perrier, Not. Syst. 12, 1946, p. 210; *Perrier, Fl. Madag. fam. 132, 1951, p. 3, f. 1.

Wormia dentata (Thunb.) DC., Syst. 1, 1818, p. 434; DC., Prod. 1, 1824, p. 75.

Lenidia dentata (Thunb.) Poir., Dict. Sc. Nat. 25, 1822, p. 448.

Lenidia triquetra (Rottb.) Poir., Dict. Sc. Nat. 25, 1822, p. 448.

Wormia artocarpifolia Baker, J. Linn. Soc. Bot. 20, 1883, p. 88.
Dillenia triquetra (Rottb.) Gilg in Engl. & Prantl, Nat. Pfl. Fam. 3, 6, 1893, p. 123.
Dillenia artocarpifolia (Baker) Martelli ex Dur. & Jacks., Ind. Kew. Suppl. 1, 1902, p. 136; Hochr., Ann. Cons. Jard. Bot. Genève 11 & 12, 1908, p. 70.
Dillenia madagascariensis (Poir.) Martelli ex Dur. & Jacks., Ind. Kew. Suppl. 1, 1902, p. 136; Hochr., Ann. Cons. Jard. Bot. Genève 11 & 12, 1908, p. 70.
Dillenia guillotii Hochr., Ann. Cons. Jard. Bot. Genève 11 & 12, 1908, p. 70.
Wormia madagascariensis f. typica Perrier, Not. Syst. 12, 1946, p. 211; *Perrier, Fl. Madag. fam. 132, 1951, p. 4, f. 1: 1—4.
Wormia madagascariensis f. guillotii (Hochr.) Perrier, Not. Syst. 12, 1946, p. 211; *Perrier, Fl. Madag. fam. 132, 1951, p. 6, f. 1: 5—6.

Type specimens: *Wormia triquetra:* holotype in C. — *Dillenia dentata:* herb. Thunberg, Ceil.; holotype in UPS, original of Thunberg's figure, not seen. — *Lenidia madagascariensis:* Herb. du Petit-Thouars, Madagascar; lectoholotype in P, isotype in K. — *Wormia artocarpifolia:* Baron 1596, Central Madagascar: holotype in K, isotype in P. — *Dillenia guillotii:* Guillot 53, Vatomandry Distr., Madagascar, 25 Oct. 1903; holotype in G.

Evergreen trees, up to 20 m, usually ca 5—8 m high, up to ca 30 cm thick. Wood reddish. Branches sympodial, younger ones ca 2—4 mm thick, glabrous to densely sericeously villose, glabrescent. Leaf-scars amplexicaul, for about $^2/_3$—$^1/_2$ single line, for $^1/_3$—$^1/_2$ semi-lunular, emarginate above, with ca 11—13 leaf-traces in lower half. *Leaves* subcoriaceous, oval to oblong or obovate, (6—)10—20(—30) × (4—)7—12(—19) cm, with (5—)7—12(—14) nerves on either side; rounded or often more or less retuse to truncate at apex, obtuse to rounded at base, not or very little connected with petiolar wings, very little decurrent; margin entire to distinctly undulate, nerves slightly curving upward, ending directly or through vein in margin; glabrous, feebly shining above, glabrous on intervenium, sericeously villose, glabrescent on midrib and nerves beneath. Petiole (3—)4—10(—13) cm, glabrous above, slightly to densely sericeously villose, more or less soon glabrescent beneath, with amplexicaul wings; wings linear-lanceolate, 3—8 mm broad near base, gradually narrowing to $^1/_2$—$1^1/_2$ mm at apex, glabrous above, slightly to densely sericeously villose beneath, wholly caducous. *Inflorescences* terminal, racemose, (3—)5—12(—20)-flowered, up to 25 cm long, simple racemes or composed by having branches at place of second, rarely also third flower; axis 4—2 mm thick, glabrous to densely sericeously villose, glabrescent; bracts caducous, triangular to lanceolate, up to 15 × 4 mm, glabrous above, glabrous to densely sericeously villose beneath. *Flowers* ca 6—7 cm across. Pedicel 7—40 mm, $1^1/_2$—$2^1/_2$ mm thick, thickened to 3—4 mm at apex, glabrous to densely sericeously villose, without bracteoles. Sepals 5(—6), 2 outermost ones about circular, ca 13 mm diam., 3(—4) innermost ones oval, ca 17 × 13 mm, all glabrous or 2 outermost ones very sparsely sericeous near apical margin only inside, glabrous to densely sericeously villose, in bud covered margins for breadth of ca 5 mm glabrous outside, sparsely ciliate at margin. Petals 5, white, obovate, ca 30 × 20 mm, rounded at apex, narrowed towards base. Stamens ca 125—140, yellow, slightly curved in bud, all of about same length, ca 8 mm; filament 2—$2^1/_2$ mm long, 0.2—0.4 mm broad; anther ca 0.5—0.7 mm broad, obtuse to acute at apex; thecae linear, opening with pore near apex on outer side. Carpels 4—5(—7), arranged around rather broad conical receptacle, elliptic-oblong, ca 3—$3^1/_2$ × $1^1/_2$—2 mm, glabrous, each with 7—12 ovules; styles parallel to slightly

spreading, filamentous, 6—8 mm long, ca 0.3—0.4 mm thick at base, ca 0.1 mm near apex. *Pseudocarps* indehiscent, oval, up to ca 25 × 20 mm including enclosing sepals which are ca 25—30 × 16—20 mm; carpels ca 10 × 6 mm, each with 1—2 seeds. Seeds obovoid, ca 5 × 3 mm, dark glossy brown, enclosed by membranous aril.

Madagascar: *herb. Lamarck*, fl. (P); *du Petit-Thouars*, fl. (BM, K, P); *Commerson*, fr. (P); Tacca Souhra, *Bojer*, fl. (C); near Nosy-Vé, *Chapelier*, fl. (P); Fort Dauphin, *Cloisel 93*, fl. (P); ibidem, *Scott Elliot 2469*, fr. May (E); ibidem, *Scott Elliot 2823*, fl. June (BM, E, K); Sasifour, *Boivin*, Apr. & Nov. 1831 (P); Sainte Marie, *Boivin*, fl. 1847—52 (P); Lac Nosy-Vé, *Humblot 536*, fl. & fr. Sept. 1882 (K, P); Central Madagascar, *Baron 1596*, fl. (K, P); ibidem, *Baron 2625* (K, P); ibidem, *Baron 5985*, fl. March 1891 (K, P); Vatomandry Distr., *Guillot 53*, fr. Oct. 1903 (G); Mananjary, *d'Alleizette 40*, fl. March 1906 (L); ibidem, *Geay 7235, 7261, 7344, 8043*, fl. & fr. March—Apr. 1909 (P); near mouth of Matitana, *Perrier de la Bathie 10127*, fl. Oct. 1911 (P); near Vatomandry, *Perrier de la Bathie 14098*, fl. Sept. 1911 (P); forêt de Campina (East Coast), *Louvel 238*, fl. Nov. 1923 (P); near Ambodiriana, W of Tamatave, *Perrier de la Bathie 17409*, fl. Dec. 1925 (P); Vondrozo, Farafangana Prov., *Decary 5253*, fl. Sept. 1926 (P); near Fort Dauphin, *Decary 10934 & 11056*, fl. Nov. 1932 (P).

Ceylon: *herb. Burman*, fl. & fr. (C, L); *Champion*, fl. (CGE, GL); *herb. Houttuyn*, fl. (G); *König*, fl. & fr. (BM, C, L); *herb. van Royen*, fl. & fr. (L, LINN); *Rostrup 120*, fl. & fr. (C); *Thwaites CP 1013*, fl. & fr. (BM, CAL, CGE, G, K, NY); *Walker*, fl. (G, K, OX); *Walker 1020*, fl. (E, P); *Wight 12*, fl. (E); Peradeniya, *Macrae 301*, fl. Feb. (CGE, K); fl. 1831 (K); March 1836 (NY); *Wight 7*, fl. March 1836 (E); *Kelaart*, fl. & fr. 1841 (G); *Wight*, fl. March 1849 (E); *Talmy 66*, fl. 1868 (P); Peradeniya, *Gamble 18745*, fl. Apr. 1887 (K); Delalure, *Simpson 8942*, fl. Nov. 1931 (IFI); Sinharaja, *Baker 2002*, fr. Aug. 1936 (BM).

Cultivated: Ceylon, Bot. Gard. Peradeniya: *Serell*, fl. 1844 (K); *Pearson 962*, fl. 1897 (CGE); *Pitch*, fl. May 1922 (A); *Director of Agriculture*, fl. March 1925 (IFI); *Fairchild 1079 & 1080*, fl. Jan. 1926 (UC). — Bot. Gard. Calcutta: *Pierre*, fl. & fr. 1883 (P). — Bot. Gard. Bogor: sub no IV-G-50, fl. and fr. (BZ, K, L).

Without data: material in C, E, GL, L, MEL, S, U.

Distribution. Madagascar, only in the eastern part, and Ceylon; localities in Ceylon according to Trimen: Ambagamuwa, Pusselawa, Colombo, Kurawita Korale.

Ecology. In forests at low altitude, in Ceylon ascending to ca 1000 m. In Madagascar flowering throughout the year, in Ceylon only from December to May.

Vernacular names. Madagascar: *Avi-hi-avi, Bararak(y), Bararaté, Bararha, Rabaraba.* Ceylon: *Diyapara, Supara* (Singhalese).

Notes. 1. The two forms, distinguished by Perrier de la Bathie, differ mainly in the indument on the outer side of the sepals. I have not retained these forms as distinct taxa, as to my idea too many intermediate specimens are found. In Madagascar the glabrous form (*f. typica*) mainly occurs behind the littoral zone on more or less humid or sheltered habitat, the sericeous form (*f. guillotii*) in the littoral forest or on dryer places, exposed to severe sea-winds. I could not find out whether a similar ecological difference exists in Ceylon, where the two types are less distinct then in Madagascar. The type of the species belongs to the glabrous form.

2. Though they are geographically widely separated, I have not been able to find differences between the Ceylon and the Madagascar specimens, which justify the distinction of two species. The specimens from Ceylon

have generally larger leaves and longer inflorescences, but in all essential details the specimens are strikingly similar.

8. Dillenia ovalifolia Hoogl. spec. nov.

Dillenia alata (DC.) Martelli in Becc., Malesia 3, 1886, p. 157, quoad descr., non *Wormia alata* DC..

Dillenia ovalifolia Hoogl., Fl. Mal. I, 4, 1951, p. 159, descr. angl..

Type specimen: NIFS bb 30343, Isl. Japen near New Guinea, 3 Aug. 1939; holotype in L, isotype in BZ.

Descriptio typi: Rami novelli glabri; cicatrices amplexicaules. Folia subcoriacea, ovalia, 7—13 × 6—9$^1/_2$ cm, 8—11-nervata, apice et basi rotundata, glabra, supra lucida. Petiolus 4$^1/_2$—6 cm, alatus alis amplexicaulibus, partim caducis. Flores solitarii, terminales, mox laterales, oppositifolii. Alabastra subglobosa, ca 2 cm diam., pedicello 5$^1/_2$—6$^1/_2$ cm. Sepala 5, 2 exteriora 25—28 mm longa, 19—20 mm lata, 3 interiora 35—40 mm longa, 20—22 mm lata, basi ad 4 mm crassa, glabra, margine ciliata. Petala 5, in alabastro ad 25 mm longa, 18 mm lata. Stamina ca 900, conformia, 5—6 mm longa, apice acuminata. Carpella 7, glabra, lanceolata, ca 9 × 2$^1/_2$ mm, ca 8-ovulata, stylis recurvatis ca 13 mm longis.

Fig. 3 a—b, p. 29.

Evergreen trees, up to 30 m high, 60 cm thick. Branches sympodial, younger ones 4—6 mm thick, glabrous or rather densely shortly sericeous, glabrescent. Leaf-scars amplexicaul, for about $^2/_3$ single line, for $^1/_3$ semi-lunular with ca 11—15 leaf-traces below middle. *Leaves* rather coriaceous, oval to nearly orbicular, 7—27 × 6—22 cm, with 8—13 nerves on either side; rounded at apex and base, base not connected with petiolar wings; margin slightly undulate, nerves rather straight, often slightly curving upward near margin, ending in margin; glabrous on both sides or rather densely shortly sericeous on basal part of midrib and lower nerves beneath; inconspicuous line present, most distinct in young leaves, in middle between nerves coming from axil of lower one, indicating line along which leaf is folded in bud. Petiole 4$^1/_2$—10 cm, glabrous above, glabrous or rather densely shortly sericeous beneath, with amplexicaul wings; wings broadly linear, 5—10 mm broad, with rounded auriculate apex, auricles coherent with each other above petiole, extending slightly (ca 1 mm) above blade, glabrous above, glabrous or densely shortly sericeous beneath, partly caducous, for whole breadth at base, upper $^2/_3$—$^1/_4$ part wholly persistent, persistent part gradually narrowing towards base; petiole bearing at attachment horseshoe-shaped cushion. *Flowers* solitary, terminal, soon lateral, leaf-opposed, more than 6 cm across. Pedicel 5$^1/_2$—7 cm, in transverse section triangular with 1 rounded and 2 sharp ribs, rounded one directed towards base of branch; at base 3—7 mm broad, 2—4 mm thick, at apex about terete, 5—6 mm thick; glabrous or densely shortly sericeous. Sepals 5, oval, 2 outermost ones 25—28 × 19—20 mm, 3 innermost ones 35—40 × 20—22 mm, glabrous inside, glabrous or densely shortly sericeous with in bud covered lateral margins glabrous outside, shortly ciliate at margin. Petals 5, white, obovate, in bud up to 25 × 18 mm, rounded at apex, narrowed towards base. Stamens ca 900, slightly curved in bud, all of about same length, ca 5—7 mm; filament 1—1$^1/_2$ mm long, 0.3 mm broad; anther ca 0.6 mm broad, long-acuminate at apex, connective exceeding thecae with 0.7—0.8 mm long, at base 0.2 mm broad acumen;

thecae linear, opening with apical pore. Carpels 7—8, arranged around rather broad conical receptacle, lanceolate, ca 9 × $2^1/_2$ mm, glabrous, each with ca 8 ovules; styles spreading, ca 13 mm long, ca 1 mm thick at base, acute at apex. *Pseudocarps* dehiscent; carpels ca 17 × 10 mm, each with 0—1 seed. Seeds obovoid, ca 5 × $3^1/_2$ mm, brown, at hilum black, enclosed by 3 mm long, membranous aril.

var. ovalifolia

Plants glabrous in all parts.

New Guinea: Japen Isl.: Ansus, *Beccari*, fl. Apr. 1875 (FI); *NIFS bb 30333*, fl. Aug. 1939 (BZ, L); *NIFS bb 30343*, fl. Aug. 1939 (BZ, L).

var. sericea Hoogl. var. nov.

Dillenia ovalifolia var. sericea Hoogl., Fl. Mal. I, 4, 1951, p. 159, descr. angl..

Type specimen: de Haan 1715, Halmaheira, Nucifera, Weda Distr., 25 Aug. 1949; holotype in L, isotypes in A, BRI, BM, BZ, C, CAL, G, K, NY, P, SING (not all isotypes seen by me).

Descriptio typi: Rami novelli et pedicelli, petioli et alae petiolares subtus, folia in parte basali costae mediae et nervorum basalium subtus, sepala extus breviter sericea.

Plants shortly sericeous on young branches and pedicels, on lower side of petiole and petiolar wings, on basal part of midrib and lower nerves beneath, and on outer side of sepals.

Moluccas: Morotai: G. Sangawo, *Main & Aden 984*, fl. & fr. May 1949 (BZ, L); G. Paré, *Main & Aden 1304*, fl. May 1949 (BZ, L). — Halmaheira: Nucifera, Weda Distr., *de Haan 1715*, fl. & fr. Aug. 1949 (BZ, L).

Distribution. *Var. ovalifolia* only in Japen Island, *var. sericea* only in the Moluccas (Halmaheira and Morotai).

Ecology. All collections were made in primary forest, in Japen and Morotai at 800—1000 m, in Halmaheira at 2 m altitude.

Vernacular names. Japen Isl.: *Karu ai* and *Wadajouw* (Ambai).

Note. The specimens belonging to *var. sericea* differ from those of *var. ovalifolia*, besides by the indument, by having a smaller part of the petiolar wings persistent. It is impossible to decide from the few collections whether these two characters are always connected with each other.

9. Dillenia quercifolia (White & Francis ex Lane-Poole 1925) Hoogl. 1951

Wormia quercifolia White & Francis ex Lane-Poole, Rep. For. Res. Terr. Papua & New Guinea, 1925, p. 116; *White & Francis, Proc. Roy. Soc. Queensl. 38, 1926, p. 242, f. 9 (issued 1927).

Dillenia quercifolia (White & Francis ex Lane-Poole) Hoogl., Fl. Mal. I, 4, 1951, p. 161.

Type specimen: Lane-Poole 226, Papua, mainland opposite Samarai, N. Div., Aug. 1922; holotype in BRI, isotypes in A, K, L.

Large evergreen trees, up to ca 35 m high, 120 cm thick, with up to 28 m bole. Bark yellow to reddish brown or red, peeling off in papery flakes. Wood pale yellow to rose brown. Branches sympodial, younger ones ca $2^1/_2$ mm thick, glabrous. Leaf-scars amplexicaul, for about $^1/_2$ single line, for $^1/_2$ triangular with ca 15 leaf-traces in central part. *Leaves* oval, 8—15 × $4^1/_2$—12 cm, with 6—9 nerves on either side; obtuse to rounded, minutely acuminate at apex, obtuse to rounded at base;

margin more or less undulate, nerves rather straight, curving upward near margin, not ending in it; wholly glabrous. Petiole 3—4 cm, glabrous, with amplexicaul wings; wings lanceolate, 3—7 mm broad, glabrous, with rounded apex not exceeding its insertion to petiole, wholly caducous. *Inflorescences* terminal, 2—4-flowered racemes, up to ca 5 mm long, with tortuous axis; axis ca 2—$1^1/_2$ mm thick, glabrous, without bracts. *Flowers* ca 4—5 cm across (estimated). Pedicel 1.2—1.8 cm, ca 1 mm thick, thickened to ca 2 mm at apex, glabrous, without bracteoles. Sepals 5, oval, ca 12—16 × 10—13 mm, glabrous inside, very shortly hirsute outside, not ciliate at margin. Petals 5, not known from open flowers. Stamens ca 60, slightly curved in bud, all of about same length, ca 10 mm; filament ca 6 mm long, 0.3 mm broad; anther 0.6—1.0 mm broad, broadest in outermost stamens, obtuse at apex; thecae linear-lanceolate, opening with apical pore. Carpels 7—10, usually 8, arranged around rather broad conical receptacle, oblong, ca 5 × 2 mm, glabrous, each with 8—9 ovules; styles spreading, cylindric, ca 7 mm long, at base 0.5, near apex 0.2 mm thick. *Pseudocarps* unknown.

New Guinea: *de Zeeuw 30*, fl. 1942 (MEL); *de Zeeuw*, fl. Apr. 1943 (MEL). — Papua: mainland opposite Samarai (Hydrographers Range), *Lane-Poole 226*, fl. about Aug. 1922 (A, BRI, K, L).

Distribution. Southeast New Guinea.

Vernacular names. *Lalagi* (Buna & Binandele) according to Lane-Poole.

10. Dillenia schlechteri Diels 1922

Dillenia alata var. macrophylla Laut., Bot. Jahrb. 45, 1911, p. 362.
Dillenia macrophylla (Laut.) Diels, Bot. Jahrb. 57, 1922, p. 437.
Dillenia schlechteri Diels, Bot. Jahrb. 57, 1922, p. 438; Hoogl., Fl. Mal. I, 4, 1951, p. 161.
Wormia schlechteri (Diels) Gilg & Werderm. in Engl. & Prantl, Nat. Pfl. Fam. ed. 2, 21, 1925, p. 35.
Wormia macrophylla (Laut.) Gilg & Werderm. in Engl. & Prantl, Nat. Pfl. Fam. ed. 2, 21, 1925, p. 35.
Wormia nitida A. C. Smith, J. Arn. Arb. 22, 1941, p. 499.

Type specimens: *Dillenia alata var. macrophylla:* Peekel 134, Nabumai, Neu Mecklenburg (New Ireland); probably lost. — *Dillenia schlechteri:* Schlechter 18622, Kaiser Wilhelmsland, Bismarckgebirge, 2 Nov. 1908; lectoholotype (isotype) in P. — *Wormia nitida:* Brass 5282, Papua, Mafulu (Centr. Div.), 16 Oct. 1933; holotype in A, isotypes in BRI, BZ, L, NY.

Large evergreen trees, up to 50 m high, 2 m thick, with buttresses to 3 m tall, 1 m long. Bark bright reddish brown, flaky; wood reddish brown, hard and heavy. Branches sympodial, younger ones ca 4 mm thick, sparsely to rather densely hirsute, glabrescent. Leaf-scars amplexicaul, for about $^3/_5$ single line, for $^2/_5$ cordiform with rounded downward directed apex, with 15—25 leaf-traces near lower margin and in central part. *Leaves* ovate to broadly ovate, 11—30 × $7^1/_2$—21 cm, with (13—)15—21 nerves on either side; rounded at apex, rounded, slightly cordate at base, not connected with petiolar wings; margin slightly undulate, nerves rather straight, curving upward near margin, not ending in it; glabrous above, shortly hirsute with rather rigid hairs to glabrous on intervenium, sparsely shortly hirsute to strigose on nerves and midrib, with hairy

domatia in axil of nerves beneath. Petiole 4—9 cm, glabrous above, slightly shortly strigose to hirsute beneath, with amplexicaul wings; wings lanceolate to narrowly lanceolate, ca 4—8 mm broad, narrowed towards apex and base, glabrous above, rather densely hirsute beneath, wholly caducous. *Inflorescences* terminal, 2—6-flowered racemes, up to 7 cm long, with nearly straight axis; axis 3—2 mm thick, slightly hirsute to glabrous, without bracts. *Flowers* probably never quite expanding, sepals only slightly diverging in anthesis, petals falling off without spreading. Pedicel $1^1/_2$—4 cm, ca 2 mm thick, thickened to ca $3^1/_2$ mm at apex, sparsely hirsute to glabrous, without bracteoles. Sepals 5, about circular, 2 outermost ones only slightly smaller (ca 22 × 22 mm) than 3 innermost ones (ca 30 × 27 mm), glabrous on both sides, not ciliate at margin. Petals 5, bright yellow, obovate, probably cucullate when falling, ca 33 × 28 mm, rounded at apex, narrowed towards base. Stamens ca 100, slightly curved in bud, all of about same length, 14—17 mm; filament 6—10 mm long, 0.6—1.2 mm broad; anther 0.8—1.3 mm broad, obtuse at apex; thecae deep salmon, linear, opening with apical pore. Carpels 8—11, arranged around conical receptacle, lanceolate, ca 8—9 × 2—$2^1/_2$ mm, glabrous, each with ca 14—18 ovules; styles slightly spreading, 10—12 mm long, cylindric, ca 0.2—0.3 mm thick near base. *Pseudocarps* dehiscent, sepals enlarged to ca 35 × 30 mm; carpels ca 25 × 18 mm, 1-seeded. Seeds obovoid, ca 4 × 3 mm, dark brown, enclosed by $2^1/_2$ mm long, membranous aril.

New Guinea: Papua: Dilava, *White 547*, fl. July—Aug. 1918 (BRI); Mafulu (Centr. Div.), *Brass 5282*, fl. & fr. Oct. 1933 (A, BRI, BZ, L, NY); Boridi, *Carr 13052*, fl. and fr. Sept. 1935 (BM, L, SING); Lala Riv., *Carr 15990*, March 1936 (SING). — Terr. of New Guinea: Bismarck Mts, *Schlechter 18622*, fl. Nov. 1908 (P).

Bismarck Archipelago: New Ireland: Ugana, Zelet Mts, *Peekel 117*, fl. & fr. May 1938 (BZ).

Distribution. E. New Guinea and New Ireland.

Ecology. In New Guinea in forests above 1000 m (1300—1700 m), in New Ireland in primary forest at low altitude.

Vernacular names. *Manaya* (Kuni language, Mafulu); *Muorava* (Dilava).

Uses. According to *Brass 5282* the wood is durable and used for housebuilding.

Notes. 1. Of the two binomials published simultaneously for the species by Diels *D. schlechteri* has been chosen as only for this name a type-specimen is available. *D. macrophylla* is reduced here on account of the specimen from New Ireland, collected later by Peekel not far from the type locality, which specimen in all essential characters agrees with the short original description of *D. alata var. macrophylla* and the later additions by Diels.

2. The species is closely related to *D. papuana* and differs by the absence of the acumen at the apex of the stamen and the straight axis of the inflorescence. From most specimens of *D. papuana* it differs besides by the shape of the petiolar wings, but this character does not seem to be constant in the latter species.

11. Dillenia montana Diels 1922

Dillenia montana Diels, Bot. Jahrb. 57, 1922, p. 437; Hoogl., Fl. Mal. I, 4, 1951, p. 161.

Wormia montana (Diels) Gilg & Werderm. in Engl. & Prantl, Nat. Pfl. Fam. ed. 2, 21, 1925, p. 35.

Type specimen: Ledermann 11037, Sepik region, Hunstein-Spitze, Feb. 1913; probably lost; L. S. Smith NGF 1026, Aiyura, Terr. of New Guinea, Oct. 1944; neo-holotype in L, isotype in LAE.

Evergreen trees, up to ca 35 m high, 40 cm thick, with up to 15 m bole. Bark reddish brown, peeling off in thin papery flakes; heartwood yellowish brown, rapidly getting dark brown. Branches sympodial, younger ones ca 3 mm thick, densely villose, glabrescent. Leaf-scars amplexicaul, for about $^1/_2$—$^2/_3$ single line, for $^1/_2$—$^1/_3$ semi-lunular with ca 11 leaf-traces near lower margin. *Leaves* oval to ovate-elliptic, (7—)11—21 × (3$^1/_2$—)7—17$^1/_2$ cm, with 9—14 nerves on either side; rounded, slightly acuminate at apex, rounded at base, not connected with petiolar wings; margin dentate, nerves rather straight, slightly curving upward near margin, ending in apex of teeth, often 1 or 2 secondary nerves near margin, directed downward, ending in apex of smaller teeth; sparsely villose, soon glabrescent above, more densely villose beneath with dense-hairy domatia in axil of nerves. Petiole 2$^1/_2$—7 cm, glabrous above, densely villose, glabrescent beneath, with amplexicaul wings; wings linear-oblong, up to 6 mm broad, apex exceeding insertion to petiole for ca 8 mm, glabrous above, densely villose beneath, wholly caducous. *Inflorescences* terminal, 2-flowered racemes, up to 6 cm long; axis 6—3 mm thick, densely villose, without bracts. *Flowers* incompletely known. Pedicel 8—25 mm, ca 3—4 mm thick, thickened to 5—7 mm at apex, densely villose, without bracteoles. Sepals 5, ovate, 2 outermost ones distinctly shorter (ca 30 × 30 mm) than 3 innermost ones (ca 35 × 30 mm), glabrous inside, 2 outermost ones slightly villose-hirsute, glabrescent, 2 innermost ones glabrous, third on one side glabrous, on other side and central part villose-hirsute, glabrescent outside, innermost ones ciliate at margin where outer side glabrous. Petals 5, yellow, obovate, in bud up to 30 × 17 mm. Stamens ca 90, slightly curved in bud, all of about same length, ca 20 mm; filament ca 9 mm long, flattened, 0.4—0.6 mm broad at apex, 0.6—1.0 mm at base; anther ca 1 mm broad, emarginate at apex with 0.1—0.2 mm deep, obtuse incision; thecae linear, opening with apical pore. Carpels 8—9, arranged around narrow conical receptacle, lanceolate, ca 18 × 4 mm, glabrous, each with 13—14 ovules; styles in lower part parallel, near apex spreading, ca 9 mm long, at base ca 1 mm, at apex 0.3 mm thick, channelled above. *Pseudocarps* unknown.

New Guinea: Terr. of New Guinea: Aiyura area, *L. S. Smith NGF 1026*, fl. Oct. 1944 (L, LAE); Aiyura, Central Highlands, *Womersley NGF 3380*, fl. Nov. 1950 (BZ, L, LAE).

Distribution. NE. New Guinea (Central Highlands and Hunstein Range).

Ecology. Collected at about 1350 and 2000 m altitude.

Vernacular names. *Burra* (Arona), *Warawaka* (Aiyura).

Notes. 1. The identification of the specimens cited with the species as described by Diels is based wholly on the original description,

as no type material seems to be existant any longer. The original description of *D. montana*, though incomplete, exactly matches the specimens. The type collection (*Ledermann 11037*) was from the Hunstein Range at 1350 m altitude; the colour of the petals was noted only in this collection. Further the description is wholly based on the actual specimens examined.

2. The species is certainly closely related to *D. schlechteri* and differs from this species by the villose indument and the larger flowers. Unfortunately of both species only very scanty material is available.

12. Dillenia ingens Burtt 1935

Dillenia ingens Burtt, Kew Bull. 1935, p. 299.
Wormia ingens (Burtt) A. C. Smith, J. Arn. Arb. 22, 1941, p. 501.
Type specimen: Waterhouse B 510, Bougainville, Aug. 1931; holotype in K, isotype in A.

Evergreen, few-branched trees, up to 25 m high, 50 cm thick, without buttresses. Bark rufous-brown, peeling off in small thick flakes, leaving a dippled surface. Sapwood straw-coloured, up to 10 cm wide; heartwood reddish brown, moderately hard. Branches sympodial, younger ones 7—8 mm thick, densely villose, glabrescent. Leaf-scars amplexicaul, for about $^1/_5$ single line, for $^4/_5$ broadly triangular with rounded, downward directed apex, with ca 40 leaf-traces in lower half, arranged in ca 20 in row parallel to lower margin and ca 20 spreaded above these. *Leaves* elliptic-oblong, 50—100 × 25—50 cm, with 22—30 nerves on either side; rounded to obtuse at apex and base, shortly decurrent, not connected with petiolar wings; margin entire to slightly undulate-dentate, nerves ending in or 1—5 mm from margin, in upper part of leaf bifurcate, upper fork ending in margin, in lower part nerves near margin strongly curved upward with short branch towards margin; dark green with broad pale stripe along centre of midrib, glabrous above, hirsute, most densely so on midrib and nerves beneath. Petiole 3—6 cm, glabrous above, densely hirsute beneath, with amplexicaul wings; wings broadly obovate, 7—8 × 5—6 cm, rounded at apex, with entire to slightly undulate margin, glabrous above, glabrous to densely villose with up to 3 mm long hairs beneath, wholly caducous. *Inflorescences* terminal, 3—6-flowered, up to 12 cm long racemes; axis tortuous, 6—3 mm thick, slightly to densely (especially near base) villose; bracts caducous. *Flowers* incompletely known. Pedicel $^1/_2$—3 cm, 3—4 mm thick, only slightly thickened at apex, slightly villose, without bracteoles. Sepals 5, obovate, $4^1/_2$—5 × 4—$4^1/_2$ cm, glabrous on both sides, not ciliate at margin. Petals unknown. Stamens ca 300, slightly curved in bud, all of about same length, 28—33 mm; filament 18—23 mm long; anthers ca 1.2 mm broad, obtuse at apex; thecae linear, opening with apical pore. Carpels 10, arranged around rather broad sharply conical receptacle, oblong, ca 20 × 5 mm, glabrous, each with ca 20 ovules; styles spreading, cylindric, ca 15 mm long, 0.4—0.3 mm thick, channelled above. *Pseudocarps* dehiscent; sepals enlarged to ca 6 × 5 cm, red; carpels 30 × 16 mm. Seeds unknown.

Solomon Islands: Chiefly New Georgia, *officers of H.M.S. Penguin*, fr. 1894—5 (K); Kugumaru, Buin, Bougainville Isl., *Kajewski 1973*, fr. July 1930 (A, BRI, BZ, G); Siwai, Bougainville Isl., *Waterhouse B 510*, fr. Aug. 1931 (A, K);

Garona, Ysabel Isl., *Brass 8353*, fr. Dec. 1932 (BM, BRI, BZ, G, L); near Keli Riv., Vanganu Isl., New Georgia group, *Walker & White BSIP 146*, fr. Sept. 1945 (A, BRI, K).

Distribution. Solomon Islands.

Ecology. Lowland rain-forest, up to 150 m altitude. Leaves and fruits are eaten by possums; this may be a means of dispersal of the seeds.

Vernacular names. *Aukaba* (Bougainville Isl.); *Nakomo, Randovusukara, Raurau* (Vanganu Isl.).

Notes. 1. It is possible that the petals fall without spreading as e.g. in *D. papuana* and as described on p. 12, as the present species is found in the area, where species with normally spreading corolla have not (yet?) been found.

2. The species is strongly characterized by the large flowers and leaves.

13. Dillenia papuana Martelli 1886

Dillenia papuana Martelli in Becc., Malesia 3, 1886, p. 156; *Hoogl., Fl. Mal. I, 4, 1951, p. 159, fig. 8, 9.

Wormia pteropoda Auct. non Miq.; Boerl., Cat. Bog., 1899, p. 5; Dakkus, Bull. Hard. Bot. Btzg Suppl. 1, 1930, p. 296.

Dillenia calothyrsa Diels, Bot. Jahrb. 57, 1922, p. 437.

Wormia calothyrsa (Diels) Gilg & Werderm. in Engl. & Prantl, Nat. Pfl. Fam. ed. 2, 21, 1925, p. 35.

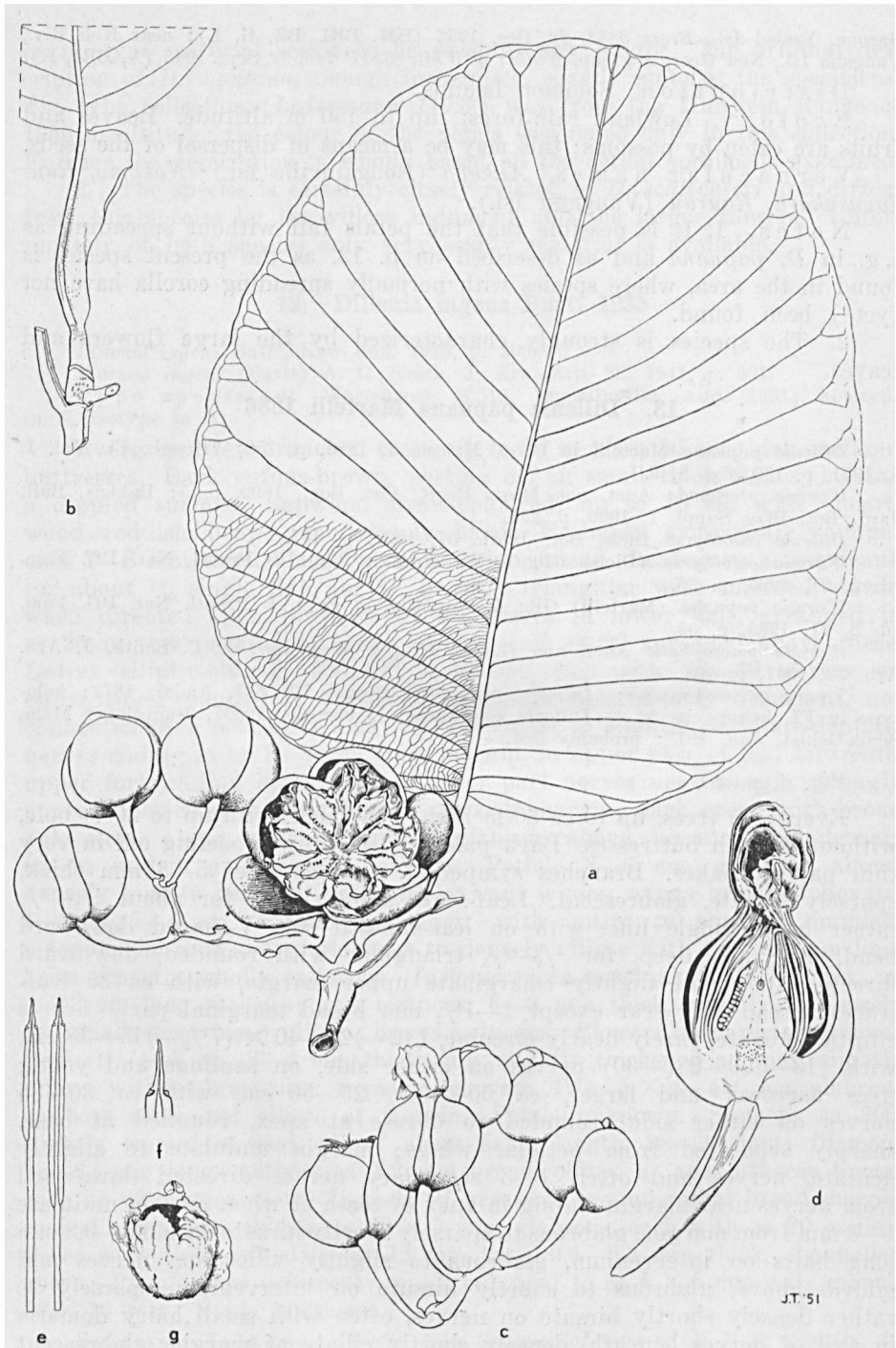
Wormia papuana (Martelli) Gilg & Werderm. in Engl. & Prantl, Nat. Pfl. Fam. ed. 2, 21, 1925, p. 35.

Wormia macrophylla Auct. non (Laut.) Gilg & Werderm.; A. C. Smith, J. Arn. Arb. 22, 1941, p. 498.

Type specimens: *Dillenia papuana:* Beccari PP 647, Andai, 1872; holotype in FI, isotype in A. — *Dillenia calothyrsa:* Ledermann 10557, Hauptlager Malu, Sepik-Gebiet, Jan. 1913; probably lost.

Fig. 4, p. 40.

Evergreen trees, up to ca 30 m high, 1 m thick, with up to 20 m bole, without or with buttresses. Bark pale reddish brown, peeling off in very thin papery flakes. Branches sympodial, younger ones 5—8 mm thick, sparsely hirsute, glabrescent. Leaf-scars amplexicaul, for about $^1/_2$—$^2/_3$ rather broad single line, with on leaf-opposed side V-shaped downward bend, 3—8 mm deep, for $^1/_2$—$^1/_3$ triangular with rounded, downward directed apex and slightly emarginate upper margin, with ca 25 leaf-traces spread over scar except 1—$1^1/_2$ mm broad marginal part. *Leaves* elliptic to ovate, rarely nearly circular, (12—)25—40 × ($7^1/_2$—)15—35 cm, with (13—)20—25(—30) nerves on either side, on saplings and young trees narrower and larger, ca 50—100 × 25—50 cm, with ca 30—35 nerves on either side; rounded to obtuse at apex, rounded at base, sharply separated from petiolar wings; margin undulate to slightly dentate, nerves and often 1—3 secondary nerves directed downward from nerves near margin ending in apex of teeth or when margin undulate 1—3 mm from margin; glabrous to sparsely shortly hirsute with 0.2—0.8 mm long hairs on intervenium, glabrous to slightly villose on nerves and midrib above, glabrous to shortly hirsute on intervenium, sparsely to rather densely shortly hirsute on nerves, often with small hairy domatia in axil of nerves beneath, densely shortly ciliate at margin, glabrescent on older leaves. Petiole 4—8 cm, on saplings and young trees up to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10 cm, with amplexicaul wings; wings half-obcordiform, 6—10 mm broad at base, up to 35 mm near apex, rarely oblong to lanceolate, 5—10 mm broad, glabrous above, sparsely hirsute to villose beneath, wholly caducous. *Inflorescences* terminal, 4—7-flowered racemes, up to 8 cm long, with tortuous axis; axis red, glabrous, 4—2 mm thick, without bracts. *Flowers* probably never quite expanding, sepals only slightly diverging in anthesis, petals falling off without spreading. Pedicel $2^1/_2$—4 cm, $1^1/_2$—3 mm thick, thickened at apex up to 6 mm, glabrous, without bracteoles. Sepals 5, circular to oval, ca 30—40 × 25—40 mm, glabrous on both sides, ciliate at margin. Petals 5, yellow, obovate, cucullate when falling, ca 25—45 × 12—25 mm, rounded at apex, narrowed towards base. Stamens ca 185—250, slightly curved in bud, all of about same length, 13—24 mm long; filament yellow, 6—15 mm long, 0.5—1.4 mm broad; anther ca 0.8—1.2 mm broad, at apex with 1—2 mm long, at base 0.3—0.5 mm broad acumen; thecae red, linear, opening with apical pore. Carpels 10—15, arranged around narrow conical receptacle, lanceolate, ca 10—15 × 2—3 mm, glabrous, each with ca 25 ovules; styles slightly spreading, 11—15 mm long, cylindric, 0.4—0.7 mm thick at base, channelled above. *Pseudocarps* dehiscent; carpels 25—35 × 16—24 mm, each with 0—1 seeds. Seeds obovoid, ca 6 × 5 mm, black, enclosed by rather thick fleshy aril.

Lesser Sunda Islands: Tanimbar Isls: P. Jamdena, between Ilgnei & Otimmer, *Buwalda 4291* = *NIFS bb 24305*, fr. March 1938 (A, BZ, L, SING).

New Guinea: Dutch W. New Guinea (Vogelkop): Andai, *Beccari PP 647*, fl. & fr. Aug. 1872 (A, FI); Kofo Anggi (Arfak), *Mayr 239*, fl. June 1928 (BZ); Babo, *NIFS bb 22293*, March 1937 (A, BZ, L); Manokwari, Ransiki, Warsuwi, *NIFS bb 33318*, fl. July 1948 (BZ, K, L); Manokwari, dessa Momir, *NIFS bb 33464*, Aug. 1948 (L); ibidem, *NIFS bb 33541*, fl. Sept. 1948 (BZ, L). — Dutch N. New Guinea: Meervlakte, *Feuilletau de Bruyn 200*, fl. Sept. 1914 (BZ, L); Meervlakte, Motor Bivak, Rouffaer Riv., *Docters van Leeuwen 11079*, fr. Nov. 1926 (BZ, L); near Prauwen Bivak, *Lam 1003*, fl. Sept. 1929 (BZ, K, L, U); Hollandia, Bernhard Bivak, *NIFS bb 25653*, fl. July 1938 (A, BZ, L, SING); Bernhard Camp, Idenburgh Riv., *Brass 14114*, fl. Apr. 1939 (A, L). — Dutch S. New Guinea: Lorentz Riv., *NIFS bb 22124*, Jan. 1937 (BZ); Mimika, Aëndua (Uta), *NIFS bb 32918*, July 1941 (BZ, L). — Terr. of New Guinea: Lae, Morobe Distr., *Ingram NGF 960*, fl. (L); ibidem, *NGF 3286* (L); Sepik Riv. above Frieda Riv., *Womersley NGF 3760*, Sept. 1949 (L); Sepik Riv. near Yellow Riv., *Womersley NGF 3926*, fl. Oct. 1949 (L). — Schouten Isls: Biak Isl., *NIFS bb 30755*, Sept. 1939 (BZ, L). — Japen Isl.: S. Memperawaja near Serui, *Aet & Idjan 804*, fl. Sept. 1939 (BZ, L). — Aru Isls: Giabu-lengan, *Beccari*, May 1873 (FI); P. Wamar, Galgamona, Durdjela, *NIFS bb 15054*, Feb. 1931 (BZ, L); Dasinamalau, P. Watubakar, *NIFS bb 25300*, May 1938 (A, BZ, L).

Cultivated: Cult. Hort. Bog. no IV. G. 11 from Aru Isls (BZ); Buitenzorg, cultivated on native premises, *Bakhuizen van den Brink 8203*, Apr. 1940, young tree (BZ, L, SING).

Distribution. Lesser Sunda Islands (Tanimbar Islands only), New Guinea, and adjacent islands (some of the islands in the Geelvink Bay and Aru Islands).

Fig. 4 — *Dillenia papuana* Martelli (p. 39); a. fruiting branch with one fullgrown leaf, infrutescence, and terminal bud, × $^2/_5$; b. leafbase and petiole with amplexicaul petiolar wings, from young leaf, × $^2/_5$; c. inflorescence, the first flower with the corolla already fallen off, the second with the corolla partly protruding, × $^2/_5$; d. longitudinal section through the flower shortly before the corolla falls, slightly reduced; e. stamens, × 2; f. apex of the stamen, × 4; g. arillate seed, × 2; all after specimens from cultivation in the Botanic Garden, Bogor (IV. G. 11a).

Ecology. In primary forests, often in temporarily flooded, but also in permanently dry situations, generally at low altitude, once collected at ca 2000 m altitude (*Mayr 239*). A photograph of the most typical habitat has been published in Flora Malesiana I, 4, 1951, p. 160, f. 9.

Vernacular names. Tanimbar Isls: *Kamjemeje*. New Guinea: *Airabumarai* (Papuan, Modan; Babo), *Jaô* (Tarie language; Aenduna), *Kiep* (Atam language; Manokwari), *Majonga* (Manikiong language; Manokwari), *Mekawir* (Papuan, Manowee; Lorentz River). Schouten Isls: *Asur* (Bosnick; Biak Isl.). Aru Isls: *Kaigabar* (Arunese; P. Wamar), *Kumera* (Arunese, P. Watubakar), *Merah perempuan* (Malay, P. Wamar).

Notes. 1. The size of the flowers is very variable, as can be seen in the description in the wide range covered by the dimensions of the floral parts. A large-flowered specimen is e. g. the tree in the Botanic Garden at Bogor or *NIFS bb 33318*, a small-flowered one *Aet & Idjan 804*; several collections are intermediate as to this character.

2. In most specimens the petiolar wings are half-obcordiform, in some they are narrower and then oblong to lanceolate, e. g. in *Aet & Idjan 804* and *NIFS bb 22124*. I could not find a constant additional character in other parts.

14. Dillenia crenata (A. C. Smith 1941) Hoogl. comb. nov.

Wormia crenata A. C. Smith, J. Arn. Arb. 22, 1941, p. 498.

Type specimen: Brass 3418, Tatamba, Ysabel Isl., Solomon Isls, 4 Jan. 1933; holotype in A, isotypes in BRI, BZ, G, L, SING.

Large evergreen trees, up to ca 30 m high, with straight bole with buttresses and spreading branches. Bark pale to reddish brown, peeling off in thin flakes. Wood yellowish or brown. Branches sympodial, younger ones ca $2^1/_2$—4 mm thick, glabrous to rather densely shortly villose-strigose, glabrescent. Leaf-scars amplexicaul, for about $^2/_3$ single line, for $^1/_3$ highly triangular with rounded downward directed apex, with ca 15—19 leaf-traces spreaded in lower half. *Leaves* oval to ovate, (6—)10—18(—22) × ($4^1/_2$—)8—15(—18) cm, with (6—)9—14 nerves on either side; rounded with ca $^1/_2$ mm long broad acumen at apex, rounded at base, decurrent, not connected with petiolar wings; margin undulate to dentate, most so in apical part of leaf, nerves rather straight, curving upward near margin, not ending in it, with small vein ending in apex of teeth, often with 1(—3) rather strong secondary nerves ending in apex of smaller teeth; glabrous on both sides. Petiole $3^1/_2$—$7^1/_2$ cm, glabrous, with amplexicaul wings; wings linear-lanceolate, 4—9 mm broad, rounded at apex, apex exceeding insertion to petiole for 2—8 mm, wholly caducous. *Inflorescences* terminal, later lateral, leaf-opposed, 2(—3)-flowered racemes, up to ca 6 cm long; axis ca 4—2 mm thick, glabrous to densely shortly hirsute with yellow to dark-orange hairs, without bracts or apical flower sometimes enclosed by caducous bract; bract conduplicate, up to ca 20 mm long, 2 × 10—12 mm broad, glabrous above, sparsely shortly strigose, locally densely shortly hirsute with deep-orange hairs beneath. *Flowers* probably never quite expanding, sepals only slightly diverging in anthesis, petals falling off without spreading. Pedicel of lower 1(—2)

flowers ca 5—10 mm, of upper flower 0—6 mm, ca 2—3 mm thick, thickened to ca 5 mm at apex, densely hirsute with orange hairs, without bracteoles. Sepals 5, 2 outermost ones transverse-oval, ca 20 × 25 mm, 3 innermost ones about circular, ca 20 mm diam., densely shortly hirsute, most densely so on centre of 2 outermost ones, with yellowish to deep red hairs outside, ciliate at margin. Petals 5, yellow or white, obovate, cucullate when falling, ca 4 × 2 mm, rounded at apex, narrowed towards base. Stamens ca 140, slightly curved in bud, all of about same length, ca 12—15 mm; filament 7—10 mm long, 0.5—0.8 mm broad; anther ca 1.0 mm broad, obtuse to truncate at apex; thecae linear, opening with apical pore. Carpels 6—8, arranged around conical receptacle, ovate, ca 6 × $2^1/_2$ mm, glabrous, each with ca 12 ovules; styles about parallel, ca 12 mm long, ca 0.5 mm thick at base, 0.1 mm near apex. *Pseudocarps* dehiscent, sepals enlarged to ca 30 × 20 mm; carpels ca 20 × 16 mm, each with 0—1 seeds. Seeds obovoid, ca 5 × $3^1/_2$ mm, dark brown, enclosed by membranous aril.

Solomon Islands: Baela, Florida, *Comins 291,* fr. (K); Ysabel Isl., *le Guillou (Voyage de l'Astrolabe et de la Zélée),* fl. 1841 (P); Ulawa, *Brass 2957,* fr. Oct. 1932 (A, BRI, BZ, L); Ysabel Isl., Kakatio, *Brass 3242,* fl. Dec. 1932 (A, BM, BRI, BZ, L); Ysabel Isl., Tatamba, *Brass 3418,* fl. Jan. 1933 (A, BRI, BZ, G, L, SING).

Distribution. Solomon Islands.

Ecology. Rain-forest, from 50 to 900 m altitude.

Vernacular names. *Kepe* (Ysabel Isl.).

Notes. 1. The colour of the indument of the axis of the inflorescences, of the pedicels, and of the outer side of the sepals in dried specimens is yellowish to deep orange; if wet it turns to magenta. On field-labels yellow as well as orange and red have been noted.

2. According to *Comins 291* (information from natives) the fruit never ripens and the species can only be propagated by cuttings. According to *Brass 2957* the lower part of the trunk often gives rise to numerous erect coppice shoots.

15. Dillenia salomonensis (White 1950) Hoogl. comb. nov.

Wormia salomonensis C. T. White, J. Arn. Arb. 31, 1950, p. 98.

Type specimen: Walker & White BSIP 145a, New Georgia, near Munda, 3 Oct. 1945; holotype in BRI, isotypes in A, K, L.

Evergreen trees, ca 36 m high, 70 cm thick, with plank-like buttresses. Bark rufous-brown, peeling off in small thick flakes leaving a dippled surface. Sapwood yellowish to pinkish brown, ca 5 mm thick; heartwood reddish brown. Branches sympodial, younger ones ca 3—4 mm thick, sparsely shortly sericeous, glabrescent. Leaf-scars amplexicaul, for about $^3/_5$ single line, for $^2/_5$ semi-lunular with ca 13 leaf-traces partly near lower margin, a few above these. *Leaves* subcoriaceous, oblong 9—25 × $3^1/_2$—11 cm, with 9—14 nerves on either side; obtuse to acute at apex and base, base for 1—$1^1/_2$ mm connected with petiolar wings; margin slightly undulate, nerves rather straight, curving upward near margin, not ending in it; glabrous above, very sparsely shortly sericeous, very soon glabrescent beneath. Petiole 3—7 cm, glabrous above, sericeous like blade beneath, with amplexicaul wings; wings linear-lanceolate, 2—4 mm

broad, glabrous above, sericeous like petiole beneath, upper part (about $^2/_3$—$^3/_4$) persistent, lower part caducous, transition between these parts rather sudden; petiole at insertion with horseshoe-shaped cushion. *Inflorescences* terminal, 3—5-flowered racemes, up to ca 3 cm long, first flower attached immediately at foot; axis ca $1^1/_2$—2 mm thick, sericeous at foot like younger branches, higher up glabrous, without bracts. *Flowers* probably never quite expanding, sepals only slightly diverging in anthesis, petals falling off without spreading. Pedicel $1^1/_2$—$2^1/_2$ cm, ca 1—$1^1/_2$ mm thick, thickened to 2 mm at apex, sericeous at foot like axis of inflorescence in basal flower, glabrous in others, without bracteoles. Sepals 5, 2 outermost ones slightly smaller (ca 15 × 10 mm) than 3 innermost ones (ca 20 × 14 mm); glabrous inside, very sparsely shortly sericeous outside, outermost ones red, innermost ones yellow in upper, red in lower part. Petals 5, deep cream coloured, obovate, cucullate when falling, ca 3 × $1^1/_2$ cm, rounded at apex, narrowed towards base. Stamens ca 65, slightly curved in bud, all of about same length, ca 25 mm; filament ca 15 mm long, ca 0.5 mm broad at base, 0.3 mm from 5 mm upward; anther ca 0.8 mm broad, acute at apex; thecae linear, opening with apical pore. Carpels 5, arranged around narrow cuneate receptacle, lanceolate ca 7 × 2 mm, densely shortly hirsute with ca 0.2 mm long hairs outside, near cuneate part of receptacle with up to 0.6 mm long, more rigid hairs, each with ca 12 ovules; inner side of wall of carpels and basal part of stylar canal densely hirsute with ca 0.5 mm long hairs; styles only very slightly diverging, ca 10 mm long, channelled, hirsute on lower 3 mm above, further glabrous. *Pseudocarps* unknown.

Solomon Islands: New Georgia, Vanganu Isl., near Keli Riv., *Walker & White BSIP 145*, Sept. 1945 (A, BRI, K); New Georgia, near Munda, *Walker & White BSIP 145a*, fl. Oct. 1945 (A, BRI, K, L).

Distribution. Solomon Islands.

Ecology. Common in lowland rain-forest.

Vernacular names. *Mundo* (M.); *Kapuchu* (Mar.); *Sembere* (Rend.).

Uses. A moderately hard and moderately heavy timber, suitable for interior finishing and slice-cut veneers.

16. Dillenia insignis (A. C. Smith 1941) Hoogl. comb. nov.

Wormia insignis A. C. Smith, J. Arn. Arb. 22, 1941, p. 500.

Type specimen: Kajewski 1740, Kupei Gold Field, Bougainville, 18 Apr. 1930; holotype in A, isotypes in BRI, BZ, C, G, L, P, S, SING.

Evergreen trees, up to 30 m high. Branches sympodial, younger ones ca $1^1/_2$—$2^1/_2$ mm thick, glabrous to sparsely hirsute with $^1/_2$ mm long hairs, particularly from axil of leaves upward, glabrescent, leaf-bearing parts smooth, very dark brown in dried specimens, older parts with faint longitudinal fissures. Leaf-scars amplexicaul, for about $^3/_4$ single line, for $^1/_4$ broadly subfalcate with ca 7 leaf-traces in lower part. *Leaves* longly petiolate, oval, ($4^1/_2$—)6—9(—10) × ($3^1/_2$—)$4^1/_2$—6(—$6^1/_2$) cm, with (5—)7—8 nerves on either side; rounded to obtuse at apex, rounded at base, for $1^1/_2$—2 mm connected with petiolar wings; margin entire to slightly undulate, with nerves distinctly curving upward and ending

close to margin; shining above, slightly less so beneath, glabrous on both sides. Petiole 3—6 cm, glabrous, with amplexicaul wings; wings oblanceolate, 5—9 mm broad, narrowing near base of blade to $1^1/_2$—2 mm, rounded at apex, partly caducous, permanent part at base of petiole $1^1/_2$—2 mm broad, above about $^1/_5$ of length of petiole wings wholly persistent, separation between both parts rather sharp; petiole bearing at attachment, most conspicuously in older leaves, horseshoe-shaped cushion. *Inflorescences* terminal, 2-flowered, flowers on ca 5 mm long common axis; axis 3—2 mm thick, hirsute, without bracts. *Flowers* probably never quite expanding, sepals only slightly diverging in anthesis, petals falling off without spreading. Pedicel 4—5 cm, $1^1/_2$—2 mm thick, thickened to $2^1/_2$—3 mm at apex, hirsute, one without bracteoles, one with 2 caducous bracteoles. Sepals 5, in open flower forming cup-shaped calyx, broadly circular to oval, 2 outermost ones ca 24 × 22 mm, 3 innermost ones ca 30 × 25 mm, glabrous inside, rather densely shortly sericeous with slightly distant hairs outside, ciliate at margin. Petals 5, apricot to dark pink, obovate, 40—45 × 30—32 mm, cucullate when falling, rounded at apex, narrowed towards base. Stamens ca 95, light brown, slightly curved in bud, all of about same length, 25—28 mm; filament linear, 17—20 mm long, 0.8—1.0 mm broad; anther ca 1.0 mm broad, obtuse at apex; thecae linear, 8—10 mm long, opening with apical pore. Carpels 8—10, arranged around conical receptacle, distinctly coherent with each other in lower adaxial part, lanceolate, ca 12 × 5 mm, densely silky hairy with $^1/_2$—1 mm long rigid hairs, each with ca 20 ovules; styles slightly diverging, light green, cylindric, 12—15 mm long, ca $^1/_2$ mm thick, channelled above. *Pseudocarps* unknown.

Solomon Islands: Kupei Gold Field, Bougainville Isl., *Kajewski 1740*, fl. Apr. 1930 (A, BRI, BZ, C, G, L, P, S, SING).

Distribution. Solomon Islands.

Ecology. Rain-forest at 1000 m altitude.

17. Dillenia biflora (A. Gray 1854) Martelli ex Dur. & Jacks. 1902

Capellia biflora *A. Gray, Bot. U. S. Expl. Exped. 1, 1854, p. 15, t. 1.
Capellia membranifolia A. Gray, Bot. U. S. Expl. Exped. 1, 1854, p. 15.
Wormia biflora (A. Gray) Seem., Fl. Vit., 1865, p. 3.
Wormia membranifolia (A. Gray) Seem., Fl. Vit., 1865, p. 4.
Dillenia biflora (A. Gray) Martelli ex Dur. & Jacks., Ind. Kew. Suppl. 1, 1902, p. 136; Guill., J. Arn. Arb. 12, 1931, p. 222; Guill., Ann. Mus. Col. Mars. 6me Série, 5/6, 1948, p. 36.
Dillenia membranifolia (A. Gray) Martelli ex Dur. & Jacks., Ind. Kew. Suppl. 1, 1902, p. 136.
Dillenia neoebudica Guill., J. Arn. Arb. 12, 1931, p. 222; Guill., Ann. Mus. Col. Mars. 6me Série, 5/6, 1948, p. 36.

Type specimens: *Capellia biflora:* U. S. S. Pac. Expl. Exped. 1838—42, Feejee Isls, Ovalau; holotype in GH, isotypes in P, US. — *Capellia membranifolia:* U. S. S. Pac. Expl. Exped. 1838—42, Feejee Isls, Ovalau; holotype in GH, isotypes in NY, US. — *Dillenia neoebudica:* Kajewski 323, Dillona Bay, Erromanga, New Hebrides, 29 May 1928; lectoholotype in P, isotypes in A, BRI, K, NY.

Evergreen trees or large shrubs, up to ca 15, usually up to ca 7 m high with spreading branches. Branches sympodial, younger ones ca 3—5 mm thick, glabrous to rather densely strigose or densely strigose-

hirsute, glabrescent. Leaf-scars amplexicaul, for about $^1/_2$ single line, for $^1/_2$ semi-lunular with ca 15 leaf-traces slightly below middle. *Leaves* ovate to elliptic-oblong, rarely obovate, (13—)18—40(—50) × (6—)9—18(—25) cm, with 13—17(—23) nerves on either side; acute to rounded at apex, obtuse at base, decurring into petiolar wings; margin dentate to nearly entire, nerves straight, ending in apex of teeth, often with 1—2 downward directed rather strong secondary nerves near margin, ending in apex of smaller teeth; glabrous to sparsely shortly hirsute above, glabrous to rather densely shortly hirsute beneath. Petiole ca 2—8 cm, with amplexicaul wings; wings not sharply separated from blade, 5—15(—25) mm broad, nervation of blade continuing, but less marked on wings, wings and part of blade below line where both sides cohere in young leaf of different (in dried specimens darker) colour; wings glabrous above, glabrous to rather densely shortly hirsute beneath, caducous on rather old leaves, loosening along petiole upward and from base of blade along transverse, rather irregular line, indicated already before loosening by slightly thickened wall. *Inflorescences* terminal, later lateral, leaf-opposed, 2(—6)-flowered racemes, up to ca 10 cm long; axis ca 4—2 mm thick, glabrous to rather densely strigose-hirsute, glabrescent, without or with (not in first flower) bracts; bracts caducous, sessile, lanceolate, up to ca 25 × 8 mm. *Flowers* probably never quite expanding, sepals only slightly diverging in anthesis, petals falling off without spreading. Pedicel 5—20 mm, $2^1/_2$—3 mm thick, thickened to 5 mm at apex, glabrous to rather densely strigose-hirsute, glabrescent, without bracteoles. Sepals 5, 2 outermost ones transverse-oval, ca 25 × 30 mm, 3 innermost ones oval, ca 30 × 25 mm, glabrous inside, glabrous to rather densely villose-hirsute outside, slightly ciliate at margin. Petals 5, yellow or white, obovate, cucullate when falling, ca 4—5 × 2—$2^1/_2$ cm, rounded at apex, narrowed towards base. Staminodes, on outer side of androecium, ca 300 (estimated), linear-filamentous, thin, ca 10—15 mm long, 0.1—0.2 mm broad, coherent with each other. Stamens ca 200, innermost ones ca 20 mm, outermost ones ca 17 mm long, all with apical part (ca 3 mm) irregularly curved in bud and flower; filament ca 15—17 mm long, ca 0.3—0.5 mm broad, up to 0.8 mm at base in innermost stamens; anther up to ca 4 mm long, ca 1.0 mm broad, slightly emarginate at apex, in outermost stamens ca 0.7 mm long, sometimes with only single theca; thecae linear, opening with apical pore. Carpels 5—10, usually ca 8, arranged around very broad, low-conical receptacle, conical part ca $^1/_3$ as high as length of carpels; carpels ovate, ca 5 × $2^1/_2$ mm, glabrous, each with 12—15 ovules; styles about parallel to slightly divergent in open flower, spreading in bud, ca 12—15 mm long, ca $1^1/_2$ mm thick at base, 0.2 mm near apex. *Pseudocarps* unknown to me.

New Hebrides: Lenakel, Tanna, *Kajewski 132*, fl. March 1928 (A, K, NY, P); Dillona Bay, Erromanga, *Kajewski 323*, fl. May 1928 (A, BRI, K, NY, P); West coast, Anciyum Isl., *Wilson 965*, fl. Sept. 1929 (A, BRI, BZ, K, NY, P); Hog Harbour, *Baker 286*, fl. Jan. 1934 (BM).

Fiji Islands: *Seemann 2*, fl. July 1860 (BM, K, MEL, P); *Horne*, 1877—8 (K); *Williams* (K); *Jeoward 89*, fl. Oct. 1894 (K). — Vanua Levu: Lambasa, *Greenwood 521*, fl. Sept. 1922 (K); Upper Ndama Riv. Vall., *A. C. Smith 1696*, fl. Apr. 1934 (BZ, GH, K, NY, S, UC); Wainikoro (N. side), *Greenwood 596*, fl. Jan. 1935 (K); Savathuru Mtn near Valethi, *Degener & Ordonez 13839*, fr. Dec. 1940 (A, K, NY). —

Viti Levu: near Suva, *Sykes 71*, fr. Dec. (IFI); Korukelevu, *Parks 10291*, fl. (UC); Korumbamba, *Parks 20095*, fl. May 1927 (UC); Tamavua woods near Suva, *Gillespie 2182*, fl. Aug. 1927 (GH, K, NY, UC); Naitasiri Prov., near Nasinu, *Gillespie 3529*, fl. Oct. 1927 (UC); Waidoi, *Nielsen 224*, fl. Jan. 1928 (C); Nandarivatu, *Tothill 2*, fl. 1929 (K); Suva, *Tothill 41*, 1929 (K); Naitasiri Prov., near Colo, *Parham 100*, fl. Oct. 1932 (BM); Tholo North, Sovutawambu near Nandarivatu, *Degener 14654*, fl. March 1941 (A); Rewasa near Vaileka, *Degener 15523*, fl. May—June 1941 (A, NY); Naitasari Prov., near Nasinu, *Greenwood 1120*, fl. June 1945 (A). — Ovalau: *U. S. S. Pac. Expl. Exped.*, fl. 1838—42 (GH, P, US); *idem*, veg. (GH, NY, US); Levuka, *Parks 20497*, fl. June 1927 (UC).

Distribution. New Hebrides (only known from the southern islands) and Fiji Islands.

Ecology. In the New Hebrides the species was collected in rain-forest at low altitude (up to 400 m), in the Fiji Islands in wet shrubby pasture, in mangrove swamp, in forest, and in moist ravines, from sea-level up to 800 m altitude. A distinct periodicity in flowering is not indicated by the available data.

Vernacular names. New Hebrides: *Net hul* (Erromanga); *Nejul* (Aneityum); *Ta voni* (Hog Harbour). Fiji Isls: *Kulukulu* (Vanua Levu); *Kukulava, Kukulova, Kukuluva, Ta voli* (Viti Levu).

Uses. "Bark used by natives by maceration with water for medicine of mother of new-born child" (*Kajewski 323*).

Notes. 1. The specimens from the New Hebrides differ from those from the Fiji Islands by having relatively longer petioles with narrower wings; I could not find any difference in the flowers. To my idea, therefore, the distinction of two species, as has been proposed by Guillaumin, is not justified.

2. I am not sure about the colour of the petals. From the New Hebrides as well as from the Fiji Islands both yellow and white have been indicated on the field labels. The present species is the only one in the genus in which both colours are found.

3. Though distinctly different, the structure of the androecium strongly reminds to that found in *D. ferruginea* from the Seychelle Islands. It is remarkable, that these types are found at respectively the easternmost limit of the area of the genus and near the westernmost limit. On the other hand the present species in the structure of the corolla shows affinity to some species from New Guinea and the Solomon Islands, which have a different type of androecium.

18. Dillenia ferruginea (Baill. 1865—6) Gilg 1893.

Wormia ferruginea Baill., Adansonia 6, 1865—6, p. 268; Baill., Adansonia 7, 1866—7, p. 434; *Wright, Trans. Roy. Ir. Acad. 24, 1871, p. 573, t. 27; Baker, Fl. Maur. & Seych., 1877, p. 2; *Diels, Wiss. Ergebn. Deut. Tiefsee-Exped. Valdivia 1898—99, 2, 1, 1922, p. 448, f. 24.

Dillenia ferruginea (Baill.) Gilg in Engl. & Prantl, Nat. Pfl. Fam. 3, 6, 1893, p. 125.

Neowormia ferruginea (Baill.) Hutch. & Summerh., Kew Bull. 1928, p. 388.

Type specimen: Boivin, Mahé, Seychelle Islands, lectoholotype in P.

Fig. 5, p. 48.

Evergreen trees. Branches sympodial, younger ones ca 4 mm thick, densely ferrugineously hirsute with up to 5 mm long hairs, glabrescent,

on young trees and saplings glabrous. Leaf-scars amplexicaul, for about $^1/_2$ single line, for $^1/_2$ highly triangular with ca 13 leaf-traces near lower margin. *Leaves* elliptic-oblong, ca 20—40 × 11—20 cm, with (35—)40—46 (—52) nerves on either side; rounded to obtuse at apex, rounded, slightly cordate at base, not connected with petiolar wings; margin slightly undulate, nerves rather straight, slightly curving upward near margin, ending in margin; densely shortly tomentose, glabrescent above, densely shortly tomentose on intervenium, densely hirsute with up to ca 5 mm long hairs on midrib and nerves beneath. Petiole $3^1/_2$—10 cm, densely shortly tomentose above, densely hirsute like midrib beneath, conduplicate,

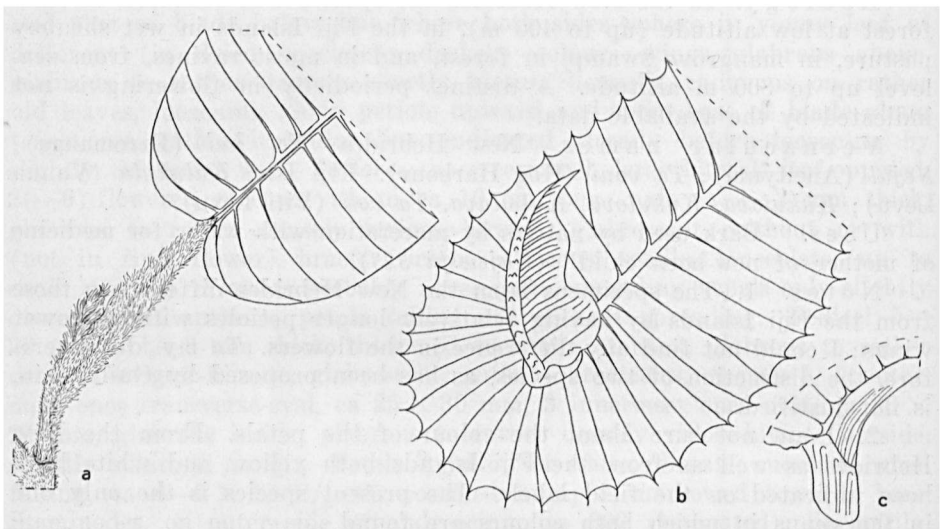


Fig. 5 — *Dillenia ferruginea* (Baill.) Gilg (p. 47); a. leafbase and petiole with amplexicaul wings, just opening and showing the apical shoot, from an older branch, usually bearing inflorescences (actual size of the blade 35 × 20 cm, of the petiole 8 cm); b. leafbase from a young tree, with a very young leaf at the apex of the shoot (actual size of the blade 80 × 25 cm); c. same as b, seen from below; all × ½, based on sketches made after nature by J. N. Milsum, F. L. S..

with amplexicaul wings; wings linear-lanceolate, at base up to 7 mm broad, at apex ca 1 mm broad, densely shortly tomentose above, densely hirsute beneath. On saplings and young trees blade and winged petiole not sharply separated, leaves up to 65-nerved, up to 90 × 25 cm, obtuse to acute at apex, with undulate margin in upper part, dentate in lower part, in young leaf with spinish teeth, glabrous above, very sparsely shortly strigose beneath, deep red coloured. *Inflorescences* terminal, later lateral, leaf-opposed, up to 25 cm long racemes, up to 18-flowered, lower flowers fallen off on older inflorescences, of each inflorescence only 1 or 2 flowers ripening to fruits; axis 4—2 mm thick, densely hirsute like younger branches, first internode up to 9 cm long; bracts caducous, ovate, ca 10 × $7^1/_2$ mm, densely short-tomentose above, densely hirsute beneath. *Flowers* ca 5 cm across. Pedicel ca 1—2 cm, $1^1/_2$—2 mm thick, thickened to 4—

5 mm at apex, densely hirsute like axis of inflorescence, without bracteoles. Sepals ca 8—11, 2 outermost ones circular to transverse-oval, ca 10 × 10—13 mm, glabrous inside, densely ferrugineously hirsute with 0.3—3 mm long hairs outside, hairs on central part generally longer than those on marginal parts, 6—9 innermost ones oval, 15—17 × 12—14 mm, glabrous inside, densely ferrugineously hirsute with hairs more appressed than in outermost sepals, with 2—3 mm broad glabrous margins outside, all ciliate at margin. Petals 5, whitish, obovate, ca 2 × 1½ cm, rounded at apex, narrowed towards base. Stamens and staminodes together ca 450—490, staminodes on outer side, outermost ones ca 0.8 mm long, wholly sterile, gradually longer towards centre of flower with no sharp distinction between staminodes and stamens, innermost stamens ca 4.0 mm long; filament 1.4—2.0 mm long, ca 0.3 mm broad; anther ca 0.6 mm broad, slightly emarginate at apex; thecae linear-oblong, opening with longitudinal, lateral slit, with undulate margin. Carpels (6—)8(—10), arranged around very broad shortly conical receptacle, elliptic, ca 5 × 2½ mm, glabrous, each with ca 10—18 ovules; styles spreading, ca 5 mm long, flattened, ca 0.5 mm broad, channelled above. *Pseudocarps* unknown to me.

Seychelle Islands: fl. (P); *Blackburn*, fl. (K); Mahé, *Boivin*, fl. & sapling (P); behind the Trois Frères Mts, *Bouton*, fl. (K); *Perrillé & Wright* (P); *Wright*, fl. (BM); *Perrillé*, fl. & fr. 1841 (K, P); *Bernier*, fl. 1846 (P); Borbonie, *Boivin*, fl. 1854 (MEL); *Horne 340*, fl. Sept. 1871 (K); Mahé, *Schimper 106*, sapling March 1899 (UPS); Mt Harrison, *Schimper*, sapling March 1899 (K); Cascade Estate, *Thomasset*, 1901 (K); Mahé, *Thomasset 203*, fl. Feb. 1905 (K); Mahé, *d'Alleizette*, fl. Dec. 1906 (L); Mahé, *Thomasset (Sealark Exped.)*, fl. Apr. 1908 (K); Silhouette, *Standley Gardiner (Sealark Exped.)*, fl. Aug. 1909 (K); Cascade, Mahé, *Standley Gardiner (Sealark Exped.)*, fl. and sapling 1908 (K); Mahé, *Thomasset (Sealark Exped.)*, fl. (K); Cascade Forest, *Thomasset (Sealark Exped.)*, fl. (K); Mahé, *Thomasset*, sapling 1912 (K); Trois Frères, Mahé, *Osborne-Day 238*, fl. Oct. 1936 (BM).

Distribution. Seychelle Islands, on several of the islands (Mahé, Praslin, and others). The species was a common tree of the mountains of the Seychelle group but is much reduced in numbers; it is being replanted on Crown Lands (J. N. Milsum in litt.).

Ecology. Mountainsides; the altitude has been noted only in 2 cases, being 700 and 850 m. From the data above a distinct flowering-time can not be indicated; the species was collected in flower in March, April, Sept., and Oct..

Vernacular names. *Bois marré blanc, Bois rouge,* and *Capucin* (Fr.).

Uses. A hardwood timber tree.

Notes. 1. Bernier's collection bears the indication Madagascar, but this is probably due to an error, as has been noted already by Baillon in herb..

2. The peculiar heterophylly has been discussed already in the introductory part (p. 12). The sketches, on which fig. 5 has been based, were kindly send to me by Mr J. N. Milsum, Director of Agriculture, who made these sketches in the field in September 1950 on my request.

19. Dillenia alata (DC. 1818) Martelli 1886

Wormia alata R. Br. ex DC., Syst. 1, 1818, p. 434; DC., Prod. 1, 1824, p. 75; Benth., Fl. Austr. 1, 1863, p. 16; Miq., Ann. Mus. Bot. Lugd. Bat. 4, 1868, p. 78;

F. v. M., Fragm. Phytogr. Austr. 7, 1871, p. 124; F. M. Bail., Synops. Queensl. Fl., 1883, p. 3; F. M. Bail., Queensl. Woods, 1886, p. 1 & 1888, p. 7; Maiden, Usef. Native Pl. Austr., 1889, p. 614; F. M. Bail., Queensl. Fl. 1, 1899, p. 10; *Banks & Soland., Ill. Bot. Capt. Cook's Voy. 1, 1900, p. 5, t. 1; **F. M. Bail., Compr. Cat. Queensl. Pl., 1909, p. 18, pl. 2; *Brass, J. Arn. Arb. 19, 1938, pl. 222 (photo of habitat).

Dillenia alata Banks ex DC., Syst. 1, 1818, p. 434, in syn.; (DC.) Martelli in Becc., Malesia 3, 1886, p. 157, descr. excl.; Hoogl., Fl. Mal. I, 4, 1951, p. 164.

Lenidia alata (DC.) Poir., Dict. Sc. Nat. 25, 1822, p. 448.

Wormia apetala *Gaud. in Freyc., Voy., Bot., 1826, p. 476, t. 99.

Dillenia apetala (Gaud.) Martelli ex Dur. & Jacks., Ind. Kew. Suppl. 1, 1906, p. 136.

Type specimens: *Wormia alata:* Banks, New S. Wales, Endeavour Riv., Point Look Out; holotype in BM, isotypes in E, P. — *Wormia apetala:* Gaudichaud, Uranie 1817—20, marais maritimes de Rawak, Vaigiou; holotype in P, isotype in G.

Evergreen trees, up to 20 m high, 60 cm thick. Bark reddish to dark reddish brown, peeling off in thin papery flakes. Branches crooked, sympodial, younger ones 2—2$^1/_2$ mm thick, glabrous to sparsely strigose-hirsute, glabrescent. Leaf-scars amplexicaul, for about $^1/_2$ single line, for $^1/_2$ V-shaped with ca 13 leaf-traces above middle in row parallel to upper margin. *Leaves* oval to ovate, (5—)8—16(—35) × (3$^1/_2$—)5—10(—20) cm, with (5—)9—12(—17) nerves on either side; rounded at apex and base, base for 2—3 mm connected with petiolar wings; margin entire, slightly recurved, nerves curving upward, not reaching margin; glabrous on both sides, shining, dark green above, duller, much lighter green beneath. Petiole 2$^1/_2$—4 cm, glabrous, with amplexicaul wings; wings linear-lanceolate, 2—6 mm broad, narrowing towards base of blade, glabrous above, glabrous to sparsely strigose-hirsute beneath, partly caducous, on the lower $^1/_2$—$^3/_5$ of petiole for ca $^1/_2$ mm breadth, above this for whole breadth persistent. *Inflorescences* terminal, 2—4-flowered racemes, up to 12 cm long; axis glabrous, 1$^1/_2$—2 mm thick, without bracts. *Flowers* ca 7$^1/_2$ cm across. Pedicel 1$^1/_2$—2 cm, 1—1$^1/_2$ mm thick, thickened to 3 mm at apex, glabrous, without bracteoles. Sepals 5, 2 outermost ones circular, ca 13 × 13 mm, 3 innermost ones oval-ovate, ca 20 × 15 mm, glabrous on both sides, ciliate at margin. Petals 5, yellow, obovate, ca 40 × 25 mm, rounded at apex, narrowed towards base. Stamens in 2 distinct groups, those of outer group (ca 100) slightly curved in bud, 7—8 mm long, those of inner group (ca 18) with apical part reflexed outward in bud, 11—13 mm long; filament of stamens of outer group 2—5, of those of inner group 1—2$^1/_2$ mm long, all 0.3—0.6 mm broad; anther 0.6—0.8 mm broad, obtuse at apex; thecae linear, opening with pore near apex on inner side. Carpels 6—8, arranged around rather broad conical receptacle, deep crimson, oblong, ca 10 × 4 mm, glabrous, each with ca 8 ovules; styles spreading, red, filamentous, ca 14 mm long, 0.4 mm thick. *Pseudocarps* dehiscent; carpels ca 18—20 × 10—14 mm, each with 0—3 seeds. Seeds obovoid, ca 4 × 3 mm, black with reticulate surface, enclosed by waxy-white, membranous aril.

New Guinea: Dutch S. New Guinea: *Zippelius 98/1,* fl. (L, U); Sungei Merauke, *Jaheri,* fl. Apr. 1901 (BZ); Kwalamul near Okaba, *Branderhorst 37,* fl. Aug. 1907 (BZ, K, L); near Merauke, *Versteeg 1928,* fl. Nov. 1907 (BZ, L, U); bivouac Amman hazin, *Anta 185,* fl. Aug. 1941 (BZ, L). — Terr. of Papua: Baxter's Riv., *McFarlane,* fr. (MEL); Wuroi, Oriomo Riv., Western Div., *Brass 5713,* fl. & fr. Jan. 1934 (A, BM, BRI, BZ, L, NY); Lake Daviumbu, Middle Fly Riv., *Brass 7571,* fl. Aug. 1936 (A, L). — Waigeo Isl.: Rawak, *Gaudichaud,* fl. 1818—9 (G, P).

Australia: Queensland, Endeavour Riv. (SING); *92* (MEL); Cape York, *Daemel*, fl. & fr. (BM, K, MEL); Rockingham Bay, *Dallachy*, fl. (MEL); Princess Charlotte Bay, *Hann Northern Exped. 163*, fl. (BRI); Cape York, *Hill 117*, fl. (K); *Rowan*, fl. (MEL); Cook Distr., Skardon Riv., *Whitehouse*, fl. (BRI); Endeavour Riv., Point Look Out, *Banks & Solander*, fl. 1770 (BM, E, P); Endeavour Riv., *Cunningham 206*, fl. July 1819 (BM, BRI, K, MEL); Cape York, *McGillavray 418*, fl. Oct. 1848 (K); Rockingham Bay, *Dallachy*, fl. Jan.—Feb. 1864 (MEL); Cape York, *Gull*, fr. Dec. 1867 (MEL); Fitzroy Isl., *Walter 35*, fr. 1871 (MEL); Cooktown & Daintree Riv., *Fitzalan*, fl. & fr. 1876 (MEL); *Bouel*, fl. Jan. 1881 (MEL); Trinity Bay, *Karsten*, fl. Feb. 1881 (MEL); Endeavour Riv., *Persietz*, fl. 1882 (MEL); ibidem, *Persietz 16*, 1884 (MEL); Cape York, *Hartmann*, fl. & fr. 1885 (MEL); *Lea*, fl. June—July 1886 (BM); Endeavour Riv., *Armit 13*, fl. & fr. 1886 (BRI); Mosman's Riv., *Sayer*, fl. 1886 (MEL); Cardwell, *Fristedt*, fl. June 1889 (S); *Johnson*, fl. 1889 (MEL); Cairns, *Betche*, Aug. 1901 (MEL); Moa Isl., *Bick 77*, fl. May 1911 (BRI); Cairns, *Kenny*, fr. Dec. 1911 (BRI); Herberton, *Hamilton*, fr. Jan. 1912 (BRI); Johnstone Riv., *Ladbrook*, fl. Oct. 1917 (BRI); Cairns, *Pekrie*, fl. Oct. 1928 (BRI); Cape York Pen., *Thomson 35*, fr. 1930 (BRI); Port Douglas, *Brass 2381*, fl. Jan. 1932 (A); Cairns, *Mauritzon*, fr. Dec. 1936 (S); Port Douglas, *Brass & White 146*, fl. Sept. 1937 (A, BRI); Bramston Beach, near Babinda, Cooke Distr., *Machenas*, fl. Oct. 1949 (BRI).

Cultivated: Hongkong, Botanic Garden, *Hance 22255*, fl. June 1883 (BM).

Locality unknown: *no 976.5* (LINN).

Distribution. Waigeo Island, S. New Guinea, and Queensland (E. coast only).

Ecology. In New Guinea in savannah forests; the only indication on the habitat in Queensland I was able to find was "in locis aquosis litori marino vicinis" (v. Mueller 1871, l. c.).

Vernacular names. *Eh* (Dutch S. New Guinea, *Anta 185*); *Bloodwood* (near Cairns, *Karsten*).

Uses. The wood, which has a pretty dark red colour, is easy to work and is used for furniture.

Note. The species was first described by De Candolle (1818 l. c.) under the name *Wormia alata*, already given by R. Brown in ms., with mention of the unpublished name *Dillenia alata* Banks as a synonym. According to the Rules of Nomenclature this is not a valid publication of this name. The first valid transfer to *Dillenia* was effected by Martelli (1886), who, however, mentioned a specimen of *D. ovalifolia*.

20. Dillenia auriculata Martelli 1886

Dillenia auriculata Martelli in Becc., Malesia 3, 1886, p. 159; Hoogl., Fl. Mal. I, 4, 1951, p. 165.

Wormia auriculata (Martelli) Gilg & Werderm. in Engl. & Prantl, Nat. Pfl. Fam. ed. 2, 21, 1925, p. 35; A. C. Smith, J. Arn. Arb. 22, 1941, p. 501.

Type specimen: Beccari PP 341; Ramoi, 8 June 1872; holotype in FI.

Slender evergreen trees, up to 30 m high. Bark reddish brown, flaky. Branches sympodial, younger ones ca $1^1/_2$ mm thick, glabrous to sparsely strigose, glabrescent. Leaf-scars amplexicaul, for about $^2/_5$—$^1/_2$ a single line, for $^3/_5$—$^1/_2$ semi-lunular with ca 9—11 leaf-traces somewhat below middle. Leaves oblong, (4—)7—16(—21) × (1.7—)3—7(—9) cm, with (6—)8—12 nerves on either side; rounded-obtuse to acute at apex, rounded to obtuse at base, slightly coherent with petiolar wings; margin entire to slightly undulate, nerves curving upward, anastomising with next one, sometimes with vein towards margin; glabrous above, glabrous except sometimes developed hairy domatia in axil of nerves beneath. Petiole

$1^1/_2$—5 cm, glabrous, with amplexicaul wings; wings linear-lanceolate, up to 7 mm broad, gradually narrowing towards apex, glabrous above, glabrous to sparsely strigose beneath, caducous except often small upper part, up to 5 mm long, remaining as 2 auricles below blade. *Inflorescences* terminal, 1—3-flowered racemes, up to 11 cm long; axis 3—2 mm thick, glabrous to sparsely strigose, without or with caducous bracts; bracts sessile, lanceolate, up to 15 × 4 mm. *Flowers* ca 8—10 cm across. Pedicel $1^1/_2$—4 cm, ca $1^1/_2$ mm thick, thickened to 3 mm at apex, glabrous to sparsely strigose, without bracteoles. Sepals 5, 2 outermost ones only slightly concave, broadly oval, ca 17—19 × 15—17 mm, 3 innermost ones more distinctly concave, oval, ca 25—30 × 20—24 mm, glabrous inside, glabrous to sparsely strigose outside, shortly ciliate at margin. Petals 5, yellow, narrowly obovate, ca 40 × 16 mm, rounded at apex, narrowed towards base. Stamens in 2 distinct groups, those of outer group (ca 225) slightly curved in bud, 8—10 mm long, those of inner group (ca 25—30) with apical part reflexed outward in bud, ca 18 mm long; filament 2—5 mm long, 0.2—0.5 mm broad; anther 0.8—1.0 mm broad, obtuse at apex; thecae linear, those of stamens of outer group opening with apical pores, of stamens of inner group with pores near apex on outer side. Carpels 6—10, arranged around conical receptacle, red, oblong, ca 8 × 3 mm, glabrous, each with 8—11 ovules; styles spreading, red, linear, ca 16 mm long, at base 0.8 mm broad, channelled above. *Pseudocarps* unknown.

New Guinea: Dutch W. New Guinea (Vogelkop): Ramoi, *Beccari PP 341*, fl. June 1872 (FI); Sorong, near Kadamak, *Pleyte 511*, fl. Aug. 1948 (BZ, L). — Papua: Fly Riv., 528 mile camp, *Brass 6821*, fl. May 1936 (A, L); Fly Riv., Palmer Riv., *Brass 7275*, fl. July 1936 (A, L). — Terr. of New Guinea: along Jemur Riv., *Schlechter 20007*, fl. Sept. 1909 (BR, K, P, UC); *NGF 2771* (BRI).

Distribution. New Guinea.

Ecology. In dense forest along rivers or on ridges, at low altitudes.

21. Dillenia castaneifolia (Miq. 1868) Martelli ex Dur. & Jacks. 1902

Wormia castaneifolia Miq., Ann. Mus. Bot. Lugd. Bat. 4, 1868, p. 78; Martelli in Becc., Malesia 3, 1886, p. 164 (*castaneaefolia*); Hook.f. & Jacks., Ind. Kew. 2, 1895, p. 1233 (*castanaefolia*).

Wormia macdonaldi F. v. M., Viet. Natural. 2, 1886, p. 146; F. v. M., Bot. Centr. Bl. 26, 1886, p. 114.

Dillenia misorensis Martelli in Becc., Malesia 3, 1886, p. 160.

Dillenia albertisiana Martelli in Becc., Malesia 3, 1886, p. 161.

Wormia longepetiolata Warb., Bot. Jahrb. 13, 1891, p. 378.

Dillenia pedunculata Schum. & Laut., Fl. Deut. Schutzgeb. Südsee, 1901, p. 445.

Dillenia castaneifolia (Miq.) Martelli ex Dur. & Jacks., Ind. Kew. Suppl. 1, 1902, p. 136 (*castaneaefolia*); Diels, Bot. Jahrb. 57, 1922, p. 438; Hoogl., Fl. Mal. I, 4, 1951, p. 165.

Dillenia macdonaldi (F. v. M.) Martelli ex Dur. & Jacks., Ind. Kew. Suppl. 1, 1902, p. 136.

Wormia hirta Ridl., Trans. Linn. Soc. Bot. 9, 1916, p. 13.

Dillenia longepetiolata (Warb.) Diels, Bot. Jahrb. 57, 1922, p. 436.

Dillenia hirta (Ridl.) Diels, Bot. Jahrb. 57, 1922, p. 436.

Dillenia castaneifolia var. dolichobotrys Diels, Bot. Jahrb. 57, 1922, p. 439.

Wormia misorensis (Martelli) Gilg & Werderm. in Engl. & Prantl, Nat. Pfl. Fam. ed. 2, 21, 1925, p. 35.

Dillenia alata var. macrophylla Auct. non Laut.; Lane-Poole, Rep. For. Res. Papua, 1925, p. 116.

Type specimens: *Wormia castaneifolia:* Zippelius 121/0, Nova Guinea; holotype in L, isotype in U. — *Wormia macdonaldi:* Bacuerlen, Strickland River; not seen, according to Mr Jessup (in litt.) not in MEL. — *Dillenia misorensis:* Beccari PP, Geelvink Bay, Korido on Misori, May 1875; holotype in FI. — *Dillenia albertisiana:* d'Albertis, Fly River, 1877; holotype in FI. — *Wormia longepetiolata:* Warburg 20073, Deutsch Neu-Guinea; isotype in A. — *Dillenia pedunculata:* I have seen none of the specimens cited by Schum. & Laut., probably all are lost. — *Wormia hirta:* Kloss (Wollaston Exped.), Canoe Camp, 5 Dec. 1912; holotype in BM, isotypes in K, SING. — *Dillenia castaneifolia var. dolichobotrys:* Schlechter 18910, Kaiser Wilhelmsland, Wälder der Saugeti-Etappe, 2 Dec. 1908; isotypes in A, G, K, L, NY, S.

Evergreen trees, up to 20 (or 40?) m high, 50 cm thick. Heartwood light brown. Branches sympodial, younger ones $1^1/_2$—3 mm thick, glabrous to hirsute, glabrescent. Leaf-scars amplexicaul, for about $^1/_2$ single line, for $^1/_2$ semi-lunular to subfalcate, slightly emarginate in upper margin, with ca 13 leaf-traces in lower part. *Leaves* oblong, less often elliptic-oblong, (8—)13—20(—30) × (3—)$6^1/_2$—12(—18) cm, with (8—)10—16 (—20) nerves on either side; acute to rounded at apex and base, for breadth of 1—4 mm connected with petiolar wings; margin entire to slightly dentate, nerves curving upward, either ending in apex of teeth or not reaching margin, with vein towards margin; glabrous to sparsely villose, most densely so along midrib above, sparsely strigose on nerves and midrib, often soon glabrescent, glabrous on intervenium beneath. Petiole $1^1/_2$—6 cm, glabrous above, glabrous to hirsute beneath, with amplexicaul wings; wings lanceolate, 4—7 mm broad, glabrous above, glabrous to hirsute beneath, wholly caducous. *Inflorescences* terminal, 1—6-flowered racemes, up to 30 cm long; axis $1^1/_2$—3(—6) mm thick, glabrous to slightly hirsute, without bracts. *Flowers* $6^1/_2$—9 cm across. Pedicel 5—20 mm, $1^1/_2$—$2^1/_2$ mm thick, thickened to $2^1/_2$—4 mm at apex, glabrous to hirsute, without bracteoles. Sepals 5, yellowish green, often with some red, 2 outermost ones oval to circular, ca 15 × 12—15 mm, 3 innermost ones obovate, 20—30 × 15—18 mm, glabrous inside, glabrous to sparsely villose outside, ciliate at margin. Petals 5, deep lemon yellow, obovate, 4—5 × $2^1/_2$—3 mm, rounded at apex, narrowed towards base. Stamens in 2 distinct groups, those of outer group (ca 250—300) slightly curved in bud, $6^1/_2$—8 mm long, those of inner group (ca 23—35) with apical part reflexed outward in bud, 11—14 mm long; outside outer stamens often some (up to 25) staminodes, linear, 5—10 mm long, 0.2—0.3 mm broad; filament 2—6 mm long, ca 0.3 mm broad; anther 0.7—0.9 mm broad, obtuse, slightly emarginate at apex; thecae linear, opening with pore near apex on inner side in stamens of outer group, on outer side in those of inner group. Carpels 8—10, arranged around conical receptacle, red, lanceolate, ca 6—7 × $1^1/_2$—2 mm, glabrous, each with (4—)6—12(—15) ovules; styles spreading, white or yellowish red, cylindric, 9—11 mm long, 0.5 mm thick at base, narrowing to 0.2 mm at apex, slightly flattened to channelled above. *Pseudocarps* dehiscent, when ripe sepals carmine red, enlarged to 30—40 × 17—20 mm; carpels 15 × 10 mm, each with 0—1 seed. Seeds obovoid, ca 4 × $3^1/_2$ mm, enclosed by membranous aril.

New Guinea: *Zippelius 121/0,* fr. (L, U); *Kanehira 1836,* fr. Aug. 1932 (NY). — Dutch W. New Guinea (Vogelkop): Manokwari, *Herre 371,* fl. Jan. 1929 (NY); ibidem, *Nielsen 835,* fl. July 1929 (C); near Rauna, *NIFS bb 22535,* fl. & fr. Apr. 1937 (A, BZ, L); Manokwari, *Kostermans 2852,* fl. July 1948 (BZ, L); Sorong,

near Klamono, *Pleyte 618*, fl. Aug. 1948 (BZ, L). — Dutch N. New Guinea: Begown Riv., *Gjellerup 208*, fl. & fr. June 1910 (BRSL, BZ, K, L, U); Mamberamo, Pioniersbivak, *Thomsen 631*, fl. Apr. 1914 (BZ, K, L); Mamberamo, *Thomsen 814*, fl. Aug. 1914 (BZ, K, L, U); ibidem, *Feuilletau de Bruyn 72*, fl. Sept. 1914 (L); Otke Riv., *Lam 477*, fl. & fr. June 1920 (BZ, K, L); Pioniersbivak, *Lam 485*, fl. & fr. June 1920 (BZ, L); Albatros Bivak, *Docters van Leeuwen 9152*, fl. Aug. 1926 (BZ, L); Rouffaer Riv., *Docters van Leeuwen 9713*, fl. Aug. 1926 (BZ, L); Motorbivak, *Docters van Leeuwen 11127*, fl. Nov. 1926 (BZ, L); Albatros Bivak, *Docters van Leeuwen 11221*, fl. & fr. Nov. 1926 (BZ, L); Bernhard Camp, Idenburg Riv., *Brass 14035*, fr. Apr. 1939 (A, L); near Berap (Nimburan), *NIFS bb 28988*, fl. Aug. 1939 (A, BZ, L, SING); near Nunguaku, *NIFS bb 30605*, Sept. 1939 (A, BZ, L, SING). — Dutch S. New Guinea: *Versteeg 1175*, fl. May 1907 (BZ); Canoe Camp, *Kloss*, fl. Dec. 1912 (BM, K, SING); Najaja, near Uta, *Aet 327*, fl. June 1941 (BZ, L); ibidem, *Aet 344*, fl. June 1941 (BZ, L). — Terr. of Papua: Fly Riv., *d'Albertis*, fr. 1876 (MEL); ibidem, *d'Albertis*, fl. 1877 (FI). — Terr. of New Guinea: Sepik Riv., *Bateson 14*, fl. (K); Sigar, *Warburg 20073*, fl. (A); Kaulo Riv., *Schlechter 16994*, fl. & fr. Dec. 1907 (P, SING, UC); Saugeti-Etappe, *Schlechter 18910*, fl. Dec. 1908 (A, G, K, L, NY, S); Sepik, *Ledermann 6752*, 1912—13 (E, K, SING); Ramu, *Lane-Poole 631*, Feb. 1924 (BRI); Sepik Riv., near Tsenap, *Herre 298*, fl. & fr. May 1929 (BZ, NY); May Riv., *Herre 308*, fl. May 1929 (BZ, L, NY); August Riv., Sepik Distr., *Womersley NGF 3823*, fr. Sept. 1949 (L); Sepik Riv. near Yellow Riv., *Womersley NGF 3850*, fl. Sept. 1949 (L). — Schouten Isls: Korido, Misori, *Beccari PP*, fl. May 1875 (FI). — Japen Isl.: Fèrèrèfi near Serui, *Aet & Idjan 336*, fl. Aug. 1939 (BZ, L).

Distribution. New Guinea and some of the islands in the Geelvink Bay (Japen, Korido).

Ecology. Dense forests, usually on riversides, sometimes in swamps, at low altitudes (up to 200 m).

Vernacular names. *Oesang* and *Wesang* (Nimburan).

Note. The species is very variable as to size of the leaves and length of the inflorescences. Distinct groups which justify the distinction of separate species or lower taxa are not found as many intermediates occur.

22. Dillenia bolsteri Merr. 1912

Dillenia bolsteri Merr., Philip. J. Sc. Bot. 7, 1912, p. 305; Merr., En. Philip. Fl. Pl. 3, 1923, p. 59; Hoogl., Fl. Mal. I, 4, 1951, p. 165.

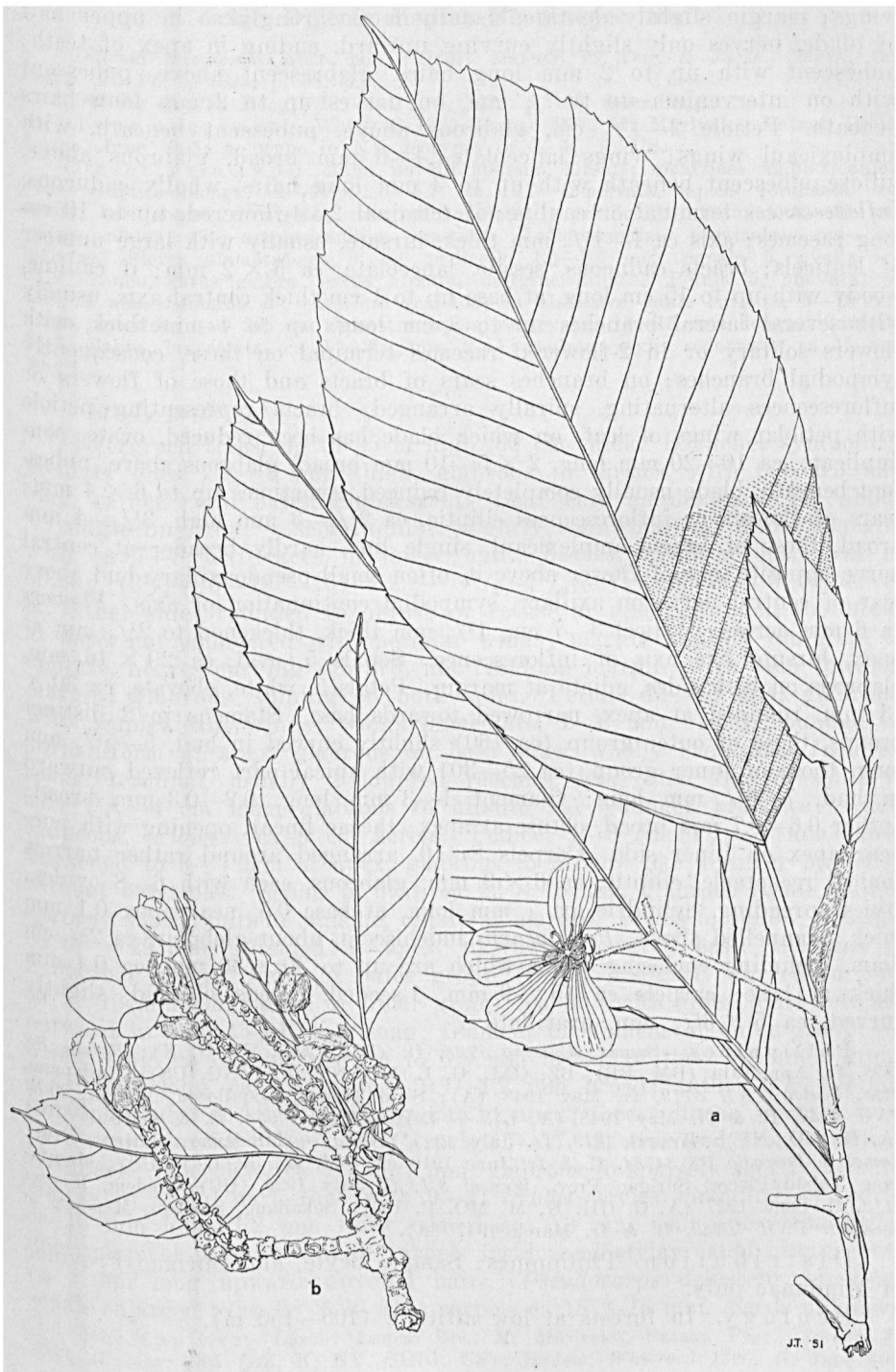
Dillenia cauliflora Merr., Philip. J. Sc. Bot. 9, 1914, p. 517 (issued 1915); Merr., En. Philip. Fl. Pl. 3, 1923, p. 60.

Type specimens: *Dillenia bolsteri:* Bolster 311, Surigao, Surigao Prov., Mindanao, Philippines, Apr. 1906; probably lost; Ramos & Pascasio BS 34784, Surigao Prov., Mindanao, June 1919; neoholotype in L, isotypes in A, BM, BZ, K, P, US. — *Dillenia cauliflora:* Ramos BS 1695, Samar, Apr. 1914; isotypes in BM, BRI, BZ, CAL, G, L, MO, NY, P, SING, US.

Fig. 6, p. 55.

Evergreen trees, up to 20 m high. Branches sympodial, younger ones ca $2^1/_2$ mm thick, sparsely pubescent, glabrescent. Leaf-scars amplexicaul, for about $^1/_2$ single line, for $^1/_2$ rather high, rounded at lower, slightly emarginate at upper margin, with ca 13 leaf-traces in lower half. *Leaves* elliptic-oblong or ovate, (8—)12—24(—30) × (3.3—)5—10(—$12^1/_2$) cm, with (13—)15—18(—22) nerves on either side; acuminate with ca 1 cm long acumen at apex, acute to obtuse at base, not connected with petiolar

Fig. 6 — *Dillenia bolsteri* Merr. (p. 54); a. branch with terminal inflorescence, × ½; b. cauline inflorescence with some poorly developed leaves, × ½; a after *Wenzel 3112*, b after *Sulit PNH 6144*.


a
b
J.T. '51

wings; margin slightly dentate, usually most strongly so in upper half of blade, nerves only slightly curving upward, ending in apex of teeth; pubescent with up to 2 mm long hairs, glabrescent above, pubescent with on intervenium up to $^1/_2$ mm, on nerves up to 2 mm long hairs beneath. Petiole 2—$4^1/_2$ cm, glabrous above, pubescent beneath, with amplexicaul wings; wings lanceolate, 4—6 mm broad, glabrous above, villose-pubescent beneath with up to 3 mm long hairs, wholly caducous. *Inflorescences* terminal or cauline; if terminal 2—4-flowered, up to 10 cm long racemes; axis ca 1—$1^1/_2$ mm thick, hirsute, usually with large number of lenticels; bracts caducous, sessile, lanceolate, ca 5 × 2 mm; if cauline, woody with up to 15 cm long, at base up to 1 cm thick central axis, usually with several lateral branches up to 8 cm long, up to 4 mm thick, with flowers solitary or in 2-flowered racemes terminal on these, consequently sympodial branches; on branches scars of bracts and those of flowers or inflorescences alternating, spirally arranged; bracts representing petiole with petiolar wings of leaf, on which blade has been reduced, ovate, conduplicate, ca 10—20 mm long, 2 × 5—10 mm broad, glabrous above, pubescent beneath, blade usually completely reduced, sometimes up to 6 × 4 mm; scars of flowers or inflorescences elliptic, ca $2^1/_2$—3 mm high, $3^1/_2$—4 mm broad, those of bracts amplexicaul, single line, hardly broader at central nerve opposite scar of flower above it, often small pseudoaxillary bud above scar of central nerve on axillary, sympodial continuation of axis. *Flowers* ca 6 mm across. Pedicel 3—7 cm, $1^1/_2$ mm thick, thickened to $2^1/_2$ mm at apex, hirsute like axis of inflorescence. Sepals 5, oval, ca 20 × 16 mm, glabrous on both sides, ciliate at margin. Petals 5, white, obovate, ca 30 × 13 mm, rounded at apex, narrowed towards base. Stamens in 2 distinct groups, those of outer group (ca 160) slightly curved in bud, 5—$5^1/_2$ mm long, those of inner group (ca 25—30) with apical part reflexed outward in bud, 7—$8^1/_2$ mm long; filament 1—3 mm long, 0.2—0.3 mm broad; anther 0.6—0.7 mm broad, obtuse at apex; thecae linear, opening with pore near apex on inner side. Carpels 8—10, arranged around rather narrow conical receptacle, elliptic, ca 6 × 3 mm, glabrous, each with 6—8 ovules; styles spreading, cylindric, ca 7 mm long, at base 0.5, near apex 0.1 mm thick, channelled above. *Pseudocarps* indehiscent, about globular, ca $2^1/_2$ cm diam. including enclosing sepals which are up to 30 × 30 mm, ca 0.4 mm thick at base; carpels ca 15 × 9 mm, 1-seeded. Seeds obovoid, slightly curved, ca 5 × $3^1/_2$ mm, exarillate.

Philippines: Samar: *Cuming 1728*, fl. (BM, CGE, FI, G, K); *Ramos BS 1695*, fr. Apr. 1914 (BM, BRI, BZ, CAL, G, L, MO, NY, P, SING, US); Kadapnan, Oras, *Castro PNH 5719*, fr. May 1948 (A); Sitio Tinane, Loquilocon, Wright, *Sulit PNH 6144*, fl. & fr. May 1948 (A, L). — Leyte: *Wenzel 954*, fl. & fr. July 1914 (A, G, MO, NY); *Wenzel 1419*, fr. July 1915 (BM). — Mindanao: Surigao Prov., *Ramos & Pascasio BS 34784*, fl. & fr. June 1919 (A, BM, BZ, K, L, P, US); Mamfayang Tubud Placer, Surigao Prov., *Wenzel 3 J*, fl. July 1926 (UC); ibidem, *Wenzel 3112*, fl. Sept. 1927 (A, G, GH, K, M, MO, P, UC); Sukailang, Surigao, *Mendozo & Convocar PNH 10289*, fl. & fr. March 1947 (A).

Distribution. Philippines; Samar, Leyte, and Surigao Province of Mindanao only.

Ecology. In forests at low altitude (100—150 m).

23. Dillenia diantha Hoogl. spec. nov.

Dillenia luzoniensis Auct. non (Vidal) Martelli ex Dur. & Jacks.; Merr., En. Philip. Fl. Pl. 3, 1923, p. 60, p.p..

Dillenia diantha Hoogl., Fl. Mal. I, 4, 1951, p. 165, descr. angl..

Type specimen: Whitford 1320, Lamao Riv., Mt Mariveles, Bataan Prov., Luzon, June 1905; holotype in NY, isotypes in G, K, P, US.

Descriptio typi: Rami novelli sparsim hirsuti; cicatrices amplexicaules. Folia elliptico-oblonga, 4—10 × 2.8—5.7 cm, 11—12-nervata, apice rotundata vel obtusa, basi obtusa, decurrente, margine undulata; supra lucida. Petiolus 15—25 mm longus, alatus alis amplexicaulibus, caducis. Inflorescentiae terminales, uni- vel biflorae. Flores diametro ca 9 cm, pedicello 1.3—2.0 cm. Sepala 5, ovalia, ca 22 × 15 mm, intus glabra, extus hirsuta, margine ciliata. Petala 5, obovata, ca 45 × 29 mm. Stamina ∞, exteriora (ca 155) in alabastro paulo curvata, 9—10 mm longa, interiora (ca 20) in alabastro apice recurvata, 13—15 mm longa. Carpella 8—9, glabra, lanceolata, ca 9 × 2½ mm, 9—11-ovulata, stylis recurvatis ca 15 mm longis.

Fig. 7, p. 58.

Evergreen trees, up to 25 m high, 60 cm thick. Branches sympodial, younger ones 1½—2 mm thick, glabrous to hirsute with 0.3—0.5 mm long, rather rigid hairs, glabrescent. Leaf-scars amplexicaul, for about ½ single line, for ½ semi-lunular, slightly emarginate at upper margin, with ca 7—9 leaf-traces in lower half. *Leaves* subcoriaceous, oval to oblong, (3½—)6—12(—16) × (2.2—)4½—7½(—11) cm, with 5—8 nerves on either side; rounded to obtuse or retuse at apex, rounded to obtuse at base, not connected with petiolar wings; margin slightly undulate to dentate, nerves curving upward, not reaching margin, with vein towards margin; glabrous, shining on both sides. Petiole 15—40 mm, glabrous, with amplexicaul wings; wings lanceolate, 1—2 mm broad, rounded or auriculiform at apex, glabrous on both sides, wholly caducous. *Inflorescences* terminal, usually 2-flowered racemes, less often flowers solitary; axis 1½—4 cm long, glabrous to hirsute like younger branches; bracts caducous. *Flowers* ca 9 cm across. Pedicel 1—5 cm, 1½—2 mm thick, thickened to 3—4 mm at apex, glabrous to hirsute like younger branches, without bracteoles. Sepals 5, oval, ca 22 × 15 mm, glabrous inside, rather sparsely shortly hirsute outside, ciliate at margin. Petals 5, yellow, obovate, ca 45 × 29 mm, rounded at apex, narrowed towards base. Stamens in 2 distinct groups, those of outer group (ca 155) slightly curved in bud, ca 9—10 mm long, those of inner group (ca 20) with apical part reflexed outward in bud, 13—15 mm long; filament of stamens of outer group 4—6 mm long, ca 0.5, at base up to 0.8 mm broad, of those of inner group 7—10 mm long, ca 0.5, at base 0.7—1.2 mm broad; anther 0.7—1.0 mm broad, rounded to slightly emarginate at apex; thecae linear, opening with pore near apex on outer side. Carpels (5—)7—9, arranged around conical receptacle, lanceolate, ca 9 × 2½ mm, glabrous to sparsely shortly hirsute, mainly in apical part, each with 9—11 ovules; styles spreading, cylindric, ca 15 mm long, 1.2 mm thick near base, 0.3 mm near apex, channelled above; apical part of wall of carpels inside and stylar canal hirsute with ca 1 mm long upward directed hairs. *Pseudocarps* dehiscent, enclosing sepals enlarged to ca 28 × 20 mm; carpels ca 18 × 16 mm. Seeds unknown.

Philippines: Luzon: Lamao Riv., Mt Mariveles, Bataan Prov., *Borden FB 3063*, fl. May 1905 (BZ, K, NY, SING, US); ibidem, *Whitford 1320*, fl. June 1905

(G, K, NY, P, US); Paningtingan, Montalban, Rizal Prov., *Loher 13239*, fr. (UC); Balacbac, Rizal Prov., *Loher 14940*, fl. June 1912 (A, M, UC); Claveria, Cagayan Prov., *Lizardo FB 30566*, fl. Feb. 1928 (SING, UC); Kinatakutan, Tayabas Prov., *Oro FB 30799*, fr. Feb. 1929 (NY, SING); Bangui, Ilocos Norte Prov., *Paraiso FB 31262*, fr. Aug. 1930 (NY).

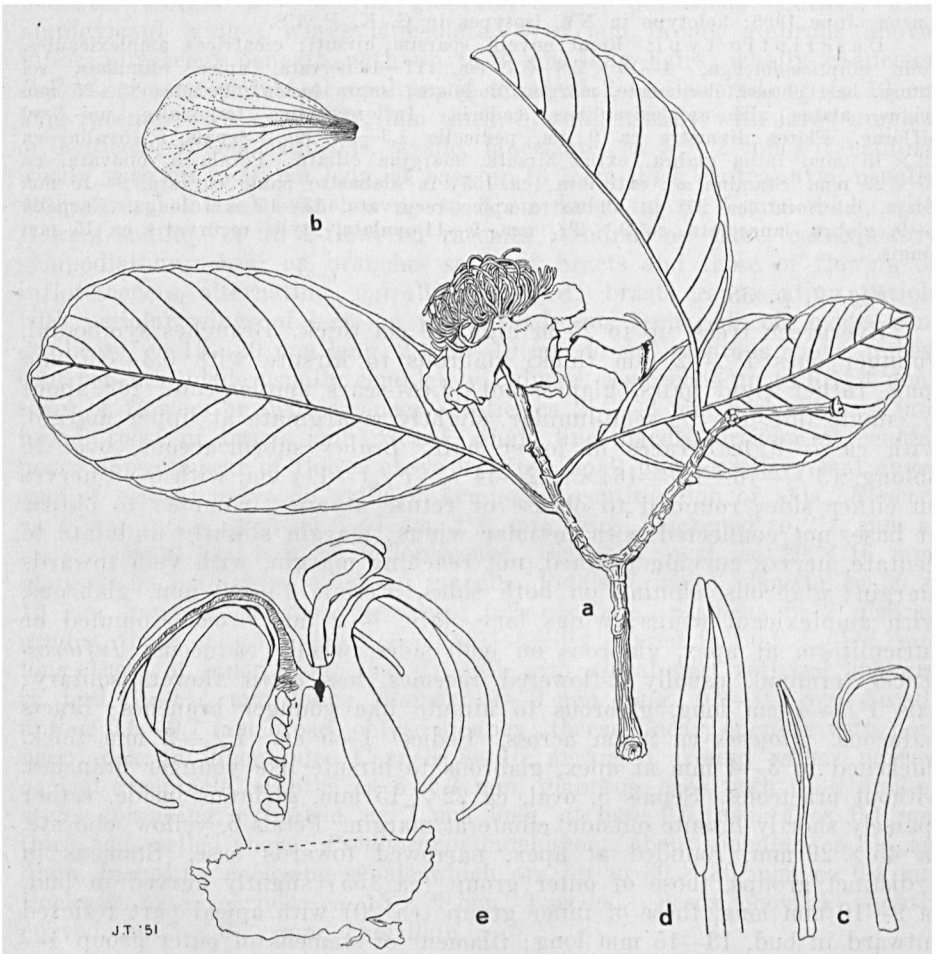


Fig. 7 — *Dillenia diantha* Hoogl. (p. 57); a. flowering branch, flower with petals already fallen off, × ²/₃; b. petal, × ²/₃; c. stamens from outer (left) and inner group, × 3; d. anther from stamen of outer group, × 8; e. gynoecium, longitudinal section, × 3; all after type specimen.

Distribution. Philippines, Luzon only.

Ecology. In forests at low altitude, up to 400 m.

Vernacular names. *Banacao* (Ibn.). Of the vernacular names mentioned by Merrill (1923) under *D. luzoniensis* the following may be attributed to the present species: *Katmón* (Is., Sbl., Tag.), *Magatali* (Ibn.), *Malakatmón* (Sbl., Tag.), *Malaliring* (Neg.), *Pangilinon* (Sbl.), *Paninggi-non* (Sbl.), and *Pamamalíen* (Pang.).

Uses. Timber used for house construction as beams, flooring, etc. (*Lizardo*).

Note. The species in habit of the leaf closely resembles *D. luzoniensis* and *D. monandra* from which it is immediately distinguished by the amplexicaul petiolar wings and, later on, leaf-scars. Merrill (1923) included a number of specimens of the present species under *D. luzoniensis*.

24. Dillenia talaudensis Hoogl. spec. nov.

Dillenia talaudensis Hoogl. Fl. Mal. I, 4, 1951, p. 164, descr. angl..

Type specimen: Lam 3072, Salibabu, Talaud Isls, 21 May 1926; holotype in L, isotype in BZ.

Descriptio typi: Rami novelli glabri; cicatrices amplexicaules. Folia elliptica, 20—30 × 14—21 cm, 18—20-nervata, apice obtusa vel rotundata, minute acuminata, basi rotundata, margine minute dentata. Petiolus $3^1/_2$—5 cm, alis amplexicaulibus, obovatis, usque ad 12 mm latis, apice obtusa insertionem excedente, caducis. Inflorescentiae bi- vel triflores, terminales. Alabastra subglobosa, ca $1^1/_2$ cm diam., pedicello 7—10 mm longo. Sepala 5, 2 exteriora suborbicularia, ca 21 × 19 mm, 3 interiora ovalia, ca 30 × 22 mm, glabra. Petala 5, in alabastro usque ad 22 × 15 mm. Stamina ∞, exteriora (ca 240) in alabastro ca 6 mm longa, paulo curvata, interiora (ca 80) in alabastro ca 11 mm longa, apice recurvata. Carpella 14, glabra, lanceolata, in alabastro ca 5 × 1.3 mm, 8—11-ovulata, stylis recurvatis ca 11 mm longis.

Fig. 8 a—d, p. 67.

Small evergreen trees, ca 8 m high, 11 cm thick. Branches sympodial, younger ones 3—4 mm thick, glabrous, older ones with rather numerous lenticels. Leaf-scars amplexicaul, for about $^1/_2$—$^3/_5$ single line, for $^1/_2$—$^2/_5$ rather highly semi-lunular, nearly triangular, with rounded angles, with ca 9 leaf-traces in lower half. *Leaves* elliptic to ovate, 20—30 × 14—21 cm, with 18—20 nerves on either side; obtuse to rounded, slightly acuminate with ca $^1/_2$ cm long acumen at apex, rounded at base, very slightly decurrent, not connected with petiolar wings; margin slightly dentate, nerves slightly curving upward, ending in apex of teeth; glabrous on both sides. Petiole $3^1/_2$—5 cm, glabrous, with amplexicaul wings; wings obovate, near base ca 4, near apex ca 12 mm broad, apex exceeding insertion to petiole for ca 5 mm, ending in mucronate acumen, wholly caducous. *Inflorescences* terminal, 2—3-flowered racemes, 10—12 cm long; axis ca 3 mm thick, glabrous, without bracts. *Flowers* only known in bud and as unripe fruit. Pedicel 7—10 mm, ca $2^1/_2$—3 mm thick, thickened to 5 mm at apex, glabrous, without bracteoles. Sepals 5, 2 outermost ones about circular, 20—22 × 18—20 mm, 3 innermost ones oval, 28—30 × 22—23 mm, glabrous on both sides, ciliate at margin. Petals 5, obovate, in bud up to 22 × 15 mm, rounded at apex, narrowed towards base. Stamens in 2 distinct groups, those of outer group (ca 240) slightly curved in bud, ca 6 mm long in bud, 10—11 mm in young fruit, those of inner group (ca 80) with apical part reflexed outward in bud, ca 11 mm long in bud, 18—20 mm in young fruit; filament 1—3 mm long, in stamens of outer group 0.2—0.4 mm broad, in those of inner group 0.4—0.6 mm broad; anther ca 0.5—0.8 mm broad, slightly mucronate at apex; thecae linear, those of stamens of outer group opening with apical pore, those of stamens of inner group opening with pore near apex on outer side. Carpels 14, arranged around rather narrow conical receptacle, lanceolate,

ca 5 × 1.3 mm in bud, 12 × 5$^1/_2$ mm in young fruit, glabrous, each with 8—11 ovules; styles spreading, cylindric, channelled above, ca 11 mm long in bud, ca 20 mm in young fruit, near base ca 0.5 mm, near apex ca 0.1 mm thick. *Pseudocarps* only known unripe, sepals then up to 40 × 25 mm.

Moluccas: Talaud Isls: Salibabu Isl., S of Lirung, *Lam 3072*, fl. & fr. May 1926 (BZ, L).

Distribution. Moluccas, known only from Salibabu Island (Talaud Islands).

Ecology. On the type-locality common in secondary forest.

Vernacular name. *Luaran'a* (Talaurese).

Uses. The fruits are eaten uncooked.

25. Dillenia ochreata (Miq. 1868) Teysm. & Binn. ex Martelli 1886

Dillenia ochreata Teysm. & Binn., Cat. Hort. Bot. Bog., 1866, p. 178, nomen nudum; Martelli in Becc., Malesia 3, 1886, p. 166; Heyne, Nutt. Pl. Indon., 1950, p. 1072; Hoogl., Fl. Mal. I, 4, 1951, p. 164.

Wormia ochreata **Miq., Ann. Mus. Bot. Lugd. Bat. 4, 1868, p. 77, t. 1; Koord., Meded. Plantent. 19, 1898, p. 327.

Type specimen: Forsten, in the forests near Likupang, Celebes, 10 Sept. 1860; lectoholotype in L.

Evergreen trees, up to ca 15 m high, 35 cm thick, with up to 6 m bole. Branches sympodial, younger ones 1—2 mm thick, hirsute with 1—2 mm long, rather rigid hairs, glabrescent. Leaf-scars amplexicaul, for about $^2/_3$ single line, for $^1/_3$ triangular with rounded downward directed apex, with ca 9 leaf-traces somewhat below middle. *Leaves* ovate or elliptic-oblong, (5—)10—20(—26) × (1.8—)4$^1/_2$—10(—14) cm, with (12—)15—18 nerves on either side; acute, often slightly acuminate, to obtuse at apex, rounded to acute at base, very slightly decurrent, not connected with petiolar wings; margin slightly dentate to nearly entire, nerves nearly straight, only slightly curving upward ca 1—2 cm from margin, ending in apex of teeth; glabrous on both sides. Petiole 16—20 (—24) mm, glabrous, with amplexicaul wings; wings half-obcordiform, 16—18 mm long, 13—15 mm broad, with entire margin, glabrous on both sides, wholly caducous. *Flowers* solitary, terminal, ca 6—8 cm across. Pedicel 2$^1/_2$—5(—7) cm, ca 1$^1/_2$—3 mm thick, thickened to 3—5 mm at apex, hirsute like younger branches, without bracteoles or 1 bracteole ca 1 cm below the flower; bracteole with ca 10 mm long petiole and conduplicate blade ca 6 × 4 mm. Sepals 5, about circular, 2 outermost ones ca 20, 3 innermost ones ca 25 mm diam., glabrous on both sides, not or sparsely ciliate at margin. Petals 5, yellow, obovate, ca 40 × 35 mm, rounded at apex, narrowed towards base. Stamens ca 165, in 2 not sharply separated groups; outermost ones slightly curved in bud, 7$^1/_2$—8 mm long, innermost ones with apical part reflexed outward in bud, ca 11—12 mm long; filament 2—3 mm long; anther ca 0.7—0.8 mm broad, slightly acuminate at apex; thecae linear, opening with apical pore. Carpels 6—9, arranged around cuneate receptacle, oblong, ca 7 × 2$^1/_2$ mm, glabrous, each with 8 ovules; styles slightly spreading, ca 7 mm long, ca 0.8 mm thick near base, 0.2 mm near apex, channelled above. *Pseudocarps* indehiscent, pale green, about globular, ca 32 mm diam., 26 mm high including enclosing sepals which are ca 40 × 35 mm, ca 2 mm thick at base; carpels very

slightly spirally twisted, thinly fleshy, ca 15 × 12 mm, 0—1-seeded. Seeds obovoid, ca 5 × 4 mm, very finely densely echinate with $^1/_2$ mm long spines, enclosed by 10 mm long rather fleshy aril.

Celebes: N. Pen.: Manado, fl. (K, L); Tondano (L); *Teysmann & de Vriese*, fl. & fr. 1860 (CAL, K, L, MEL, S); near Likupang, *Forsten*, fr. Sept. 1860 (L); Manado, *5324 HB* (BZ, U); ibidem, *5330 HB*, fl. (BZ, CAL, U); ibidem, *5847 HB*, fl. (BZ, U); ibidem, *Riedel*, fl. & fr. (L); near Semboki, *Koorders 16709β* (BZ); Lulumbulan Forest near Paluu-uru, *Koorders 16710β*, Apr. 1895 (BZ, K, L); near Ratatotok, *Koorders 16711β*, fr. (BZ); Makalongso Forest, Tondano, *Koorders 16712β*, fl. & fr. Jan. 1895 (BZ, L); Kajuwatu, *Koorders 16713β*, Jan. 1895 (BZ); Panamarangan Mts, Kakas, *Koorders 16714β*, fr. Jan. 1895 (BZ, K, L); near Negatei, *NIFS bb 7528*, fl. Oct. 1924 (BZ); Kinalusan, *NIFS bb 12657*, fl. Aug. 1928 (BZ); Tonsealama, *Wisse 97*, fl. & fr. Dec. 1932 (BZ, WAG); Amurang, near Pinaling, *NIFS bb 17563*, fr. June 1933 (A, BZ, L); Boalemo, near Popaja, *NIFS bb 18085*, fr. Dec. 1933 (A, BZ).

Cultivated: Bot. Gard. Bogor (from Manado): *Kurz*, fl. & fr. (BZ, CAL, K); *Beccari*, fl. (FI); *Beccari*, fl. 1876 (FI); no IV-G-36, fl. (BZ, L); no IV-G-36a, fl. & fr. (BZ, CAL, K, L).

Distribution. Celebes, Minahasa only.

Ecology. In primary forests up to 800 m altitude.

Vernacular names. *Dengilo maluo* (Gorontalese), *Kelemur* (Alfurese), *Marerer* (Tompokewan), *Ngeher, Rerer.*

26. Dillenia megalantha Merr. 1914

Dillenia megalantha Merr., Philip. J. Sc. Bot. 9, 1914, p. 519 (exact date of publication 20. III. 1915); Brown, Minor Prod. Philip. For. 2, 1921, p. 338; Wester, Philip. Agric. Rev. 14, 1921, p. 242; Merr., En. Philip. Fl. Pl. 3, 1923, p. 60; Hoogl., Fl. Mal. I, 4, 1951, p. 163.

Dillenia mindanaensis Elm., Leafl. Philip. Bot. 7, 1915, p. 2611 (exact date of publication 27. III. 1915); *Wester, Philip. Agric. Rev. 14, 1921, p. 287, t. 27b (photo of fruit); Merr., En. Philip. Fl. Pl. 3, 1923, p. 60.

Wormia megalantha (Merr.) Gilg & Werderm. in Engl. & Prantl, Nat. Pfl. Fam. ed. 2, 21, 1925, p. 35.

Type specimens: *Dillenia megalantha:* Ramos BS 17581, Samar, March—April 1914; lectoholotype (isotype) in BM, isotypes in K, P, US. — *Dillenia mindanaensis:* Elmer 11883, Todaya (Mt Apo), Distr. of Davao, Mindanao, Sept. 1909; isotypes in A, BM, BZ, CAL, E, FI, G, K, L, MO, NY, US.

Evergreen trees, up to 20 (40?) m high, 40 (or more?) cm thick. Bark brown and grey mottled, peeling off in small thin plates. Branches sympodial, younger ones 5—8 mm thick, glabrous to densely hirsute, most densely so in axil of leaves, slightly less densely above amplexicaul scars, glabrescent. Leaf-scars amplexicaul, for about $^1/_2$ up to 2 mm broad line with up to 10 scars of vascular bundles, for $^1/_2$ semi-lunular with rounded edges, with ca 17 leaf-traces in central part, leaving free margin of ca $1^1/_2$ mm breadth. *Leaves* oblong to oblanceolate, (20—)25—70(—100) × (6—)8—25(—35) cm, with (18—)25—35(—40) nerves on either side; acute, often slightly acuminate with up to 1 cm long acumen at apex, rounded at base, shortly decurrent, not connected with petiolar wings; margin manifestly dentate, nerves very slightly curving upward, ending in apex of teeth; slightly shining above, dull beneath, glabrous on both sides. Petiole $2^1/_2$—5(—$7^1/_2$) cm, glabrous above, glabrous to slightly hirsute beneath, with amplexicaul wings; wings obovate, $2^1/_2$—5(—10) cm long, $1^1/_2$—3(—6) cm broad, rounded at apex, glabrous above, glabrous

to densely hirsute beneath, wholly caducous. *Flowers* solitary, terminal, ca 20 cm across. Pedicel 4—8(—12?) cm long, 3—5 mm thick, slightly thickened to 5—6 mm at apex, glabrous to densely hirsute like younger branches, without bracteoles. Sepals 5(—6), yellowish green, oval, 3 outermost ones ca 25 × 20 mm, 2(—3) innermost ones ca 40 × 30 mm, glabrous on both sides, ciliate at margin. Petals 5, yellow, elliptic-obovate, $9^1/_2$—$10^1/_2$ × 7—8 cm, rounded at apex. Stamens in 2 distinct groups, those of outer group (ca 600) slightly curved in bud, 10—12 mm long, those of inner group (ca 100) with apical part reflexed outward in bud, 17—25 mm long; outside outer stamens ca 15 filamentous staminodes, 6—14 mm long; filament of stamens of outer group 3—5 mm long, 0.3—0.4 mm broad, of those of inner group 5—12 mm long, 0.5—0.8 mm broad; anther 0.7—0.8 mm broad, rounded to (rarely) manifestly acuminate at apex; thecae linear, opening with pore near apex, in stamens of outer group on inner side, in those of inner group on outer side. Carpels ca 14—16, arranged around rather broad conical receptacle, lanceolate, ca 10 × 3 mm, glabrous, each with ca 25 ovules; styles spreading, flattened, ca 22 mm long, ca 0.9—1.2 mm broad at base, 0.3 mm near apex. *Pseudocarps* indehiscent, about globular, ca 5 (—$7^1/_2$?) cm diam. including enclosing sepals which are ca 7 × 5 cm, at base up to ca 8 mm thick; carpels ca 25 × 11 mm, each with 0—1 seed. Seeds obovoid, ca 6 × 4 mm, dark brown, dull, finely shortly echinate, enclosed by 8 mm long membranous aril.

Philippines: *Vidal 2025*, fl. (K); *Curran FB 10712*, June 1908 (US). — Luzon: Zueban, Tayabas Prov., *Vidal 941*, fr. (FI, K, L); Sorsogon, Albay Prov., *Vidal 2024*, fl. (K); Quinatacutan, Tayabas Prov., *Foxworthy & Ramos BS 13167*, fr. March 1911 (BM, US); Bulusan Volcano, Sorsogon Prov., *Ramos BS 23685*, fr. Sept. 1915 (A, BM, P, US); Irosin (Mt Bulusan), Sorsogon Prov., *Elmer 15408*, fr. Dec. 1915 (A, BM, BZ, C, CAL, FI, G, GH, K, L, MO, NY, P, S, U, UC, US); Mt Tulaog, Tayabas Prov., *Ramos & Edaño BS 29145*, fr. May 1917 (BZ, MO, US); Umiray, Tayabas Prov., *Ramos & Edaño BS 28959*, fl. & fr. May—June 1917 (A, US). — Samar: *Ramos BS 17581*, fl. March—Apr. 1914 (BM, K, P, US); Catubig Riv., *Ramos BS 24483*, fr. Feb.—March 1916 (K, P, US); Sitio Kansulaban, *Concord, Sulit, & Colese PNH 6377*, fl. May 1948 (A). — Mindanao: Todaya (Mt Apo), Davao Distr., *Elmer 11883*, fr. Sept. 1909 (A, BM, BZ, CAL, E, FI, G, K, L, MO, NY, US); Zamboanga Distr., *Merrill BS 8062*, fr. Nov.—Dec. 1911 (P); Cabadbaran (Mt Urdaneta), Agusan Prov., *Elmer 13888*, fr. Sept. 1912 (A, BM, BZ, CAL, E, FI, G, GH, K, L, NY, U, UC, US); Mt Tubuan, Zamboanga Distr., *Ramos & Edaño BS 36629*, fr. Oct. 1919 (A, BM, P); Malangas, Zamboanga Distr., *Ramos & Edaño BS 37254*, fr. Oct.—Nov. 1919 (BRI, GH); ibidem, *Ramos & Edaño BS 37445*, Oct.—Nov. 1919 (K, P); Dinagat, Surigao, *Ramos & Convocar BS 34085*, fr. May 1931 (NY); Mt Kabatuan, Surigao Prov., *Mendoza & Convocar PNH 10316*, fl. March 1949 (A).

Distribution. Philippines; Luzon, Samar, and Mindanao.

Ecology. In primary forests, up to 1000 m altitude, often on riverbanks.

Vernacular names. *Kalambóg* (Bag.), *Katmón* (Bag., Bik., S. L. Bis.), *Katmón-bayani* (Tag.), *Lumbóg* (Sub.), *Paláli* (Sub.).

Uses. The fruit is eaten.

27. Dillenia philippinensis Rolfe 1884

Catmon Kamel, Descr. Frut. et Arb. Luz., 1704, p. 56.

Dillenia indica Auct. non L.; Blanco, Fl. Filip., 1837, p. 472; Villar, Nov. App., 1880, p. 3.

Dillenia speciosa Auct. non Thunb.; Blanco, Fl. Filip. ed. 2, 1845, p. 329 & **ed. 3, 2, 1878, p. 244, Atl. t. 199.

Dillenia philippinensis Rolfe, J. Linn. Soc. Bot. 21, 1884, p. 307; Vidal, Rev. Pl. Vasc. Filip., 1886, p. 37; Merr., Govt Lab. Publ. Philip. 27, 1905, p. 15; Merr., Fl. Manila, 1912, p. 331; *Wester, Philip. Agric. Rev. 8, 1915, p. 104, t. 7a (photo of fruit); Merr., Sp. Blanc., 1918, p. 263; *Brown, Minor Prod. Philip. For. 2, 1921, p. 338, f. 62, 63 & 3, 1921, p. 212; Merr., En. Philip. Fl. Pl. 3, 1923, p. 61; Quisumb., Medic. Pl. Philip., 1951, p. 613; Hoogl., Fl. Mal. I, 4, 1951, p. 164.

Dillenia catmon Elm., Leafl. Philip. Bot. 7, 1915, p. 2610; Merr., En. Philip. Fl. Pl. 3, 1923, p. 59.

Type specimens: *Dillenia philippinensis:* Vidal 4, Prov. Ilo-ilo, Panay Isl.; holotype in K (indicated as type by Rolfe in herb.), isotypes in FI, L. — *Dillenia catmon:* Elmer 13564, Cabadbaran (Mt Urdaneta), Agusan Prov., Mindanao, Aug. 1912; isotypes in A, BM, BZ, C, CAL, E, FI, G, GH, K, L, MO, NY, P, U, US.

Evergreen trees, up to 17 m high, 60 cm thick, with rather lowly attached crown. Bark reddish brown, peeling off in thin irregular plates; heartwood nearly incarnate to very dark, nearly black in centre. Branches sympodial, younger ones 2—2$^1/_2$ mm thick, glabrous to hirsute with 1$^1/_2$—2 mm long hairs or rather densely shortly hirsute with 0.2—0.6 mm long hairs, most densely so above leaf-scars, glabrescent. Leaf-scars amplexicaul, for about $^2/_3$ single line, for $^1/_3$ semi-lunular to rounded-triangular with ca 7 leaf-traces in lower half parallel to lower margin and ca 3 in upper half. *Leaves* chartaceous, ovate or elliptic to oblong or lanceolate, (6$^1/_2$—)10—16(—27) × (5—)7—12(—17) cm, with (8—)10—15(—18) nerves on either side; rounded to obtuse, often slightly acuminate at apex, rounded to obtuse at base, sharply separated from petiolar wings; margin slightly dentate or undulate, nerves ending in apex of teeth or otherwise in margin; rather dull, dark green, glabrous or sparsely shortly hirsute, most densely so on midrib, above, dull, much lighter green, glabrous or sparsely shortly hirsute on intervenium, glabrous to sparsely hirsute or rather densely shortly hirsute on nerves and midrib beneath. Petiole 3$^1/_2$—5 cm, glabrous above, glabrous to hirsute or rather densely shortly hirsute beneath, with amplexicaul wings; wings half-elliptic to half-oblong, 3—12 mm broad, with rounded apex and base and entire margin, at apex not or, rarely, slightly exceeding its insertion to petiole, glabrous above, glabrous to hirsute or shortly hirsute beneath, wholly caducous. *Inflorescences* terminal, 1—2(—3)-flowered racemes, 5—15 cm long; axis 3—4 mm thick, glabrous to hirsute or shortly hirsute like younger branches, often ending with short (up to 3 mm long) sterile apex, without bracts. *Flowers* 10—12$^1/_2$ cm across. Pedicel $^1/_2$—4 cm, 2—3 mm thick, thickened to 3—4 mm at apex, glabrous to hirsute or shortly hirsute like axis of inflorescence, without bracteoles or with a small leaflet just below flower; leaflet ca 10 × 4 mm with 4 mm long petiole or up to twice as large. Sepals 5, circular to elliptic, 2 outermost ones slightly smaller and relatively broader (ca 18 × 18 mm) than 3 innermost ones (ca 20—25 × 17—20 mm), glabrous inside, glabrous to densely hirsute or shortly hirsute outside, sparsely ciliate at margin. Petals 5, white, obovate, ca 60 × 40 mm, rounded at apex, narrowed towards base. Stamens in 2 distinct groups, those of outer group (ca 230) yellowish white, slightly curved in bud, ca 11 mm long, those of inner group (ca 40) purplish, with apical part reflexed outward in bud, ca 15—23 mm long, in general thicker than those

of outer group; filament $2^1/_2$—5 mm long, ca 0.5 mm broad; anther ca 0.8 mm broad, obtusely acuminate at apex; thecae linear, opening with apical pore. Carpels 10—12, arranged around narrow conical receptacle, lanceolate, ca 7—9 × $2^1/_2$—3 mm, glabrous, each with 10—12 ovules; styles spreading, linear, ca 17 mm long, 0.6 mm broad near base, acute at apex. *Pseudocarps* indehiscent, depressed-globose, ca 5—6 cm diam., 4—5 cm high including enclosing sepals, which are only slightly fleshy; carpels slightly spirally twisted, fleshy, ca 20 × 13 mm, 0—4-seeded. Seeds obovoid, ca 5 × 3 mm, black, very finely echinate, at base enclosed by appressed, ca 2 mm long membranous aril.

var. philippinensis

Synonyms same as for the species.

Indument generally sparse or absent.

Philippines: Mindoro: Baco, *Merrill 1185,* fr. Jan. 1903 (US); Pola, *Merrill 2206,* fl. March 1903 (K, NY, US); Abonabon, *Merrill 2182,* fl. May 1903 (K, US); Baco Riv., *McGregor 147,* fl. March—Apr. 1905 (K, NY, US); *Merritt FB 9687,* fr. Feb.—Apr. 1908 (SING); *Lambert & Brunson 39,* fl. 1945 (US). — Babuyan Isls: Camiguin Isl., *Fénix BS 4146,* fr. June—July 1907 (NY). — Luzon: *Poivre (Herb. Jussieu),* fl. (P); Manila, *Gaudichaud 283,* fl. Nov. 1836 (P); ibidem, *Gaudichaud,* Dec. 1836 (G); Albay Prov., *Cuming 930,* fl. (FI); *Lobb,* fl. (K); Sorsogon, Albay Prov., *Vidal 2022,* fl. (K); ibidem, *Vidal 2023,* fl. (K); Morong Distr., *Vidal 2036,* fl. (K); Mt Isarag, S. Camarines Prov., *Vidal 2037,* fl. (K); Sitio Munang, Morong Prov., *Loher 16,* fl. (CAL, K, US); Rio Puray, Manila, *Loher 18,* fr. Dec. 1890 (K); Rio Puray, Montalban, *Loher 19,* fl. May 1891 (K); Bosoboso, Morong Prov., *Loher 17,* fl. Oct. 1891 (K); Pasacao, S. Camarines Prov., *Ahern 54,* fl. (BZ, NY, US); Mariveles, *Ahern 78,* fr. (NY); ibidem, *Ahern 781,* fl. Jan. 1902 (BZ, CAL, NY, US); Baler, Principe Prov., *Merrill 1002,* Aug. 1902 (K, NY, US); Antipolo, Rizal Prov., *Merrill 1656,* fl. March 1903 (K, NY, US); Pagbalao, Tayabas Prov., *Merrill 1918,* fl. Apr. 1903 (K, US); Bosoboso, Rizal Prov., *Merrill 2827,* fl. July 1903 (BM, US); Lagumanoc, Tayabas Prov., *Ware FB 20,* Sept. 1903 (NY, US); Botolan, Zambales Prov., *Merrill 2947,* fl. Nov. 1903 (BM, K, NY, US); Lamao Riv., Mt Mariveles, Bataan Prov., *Williams 658,* fr. March 1904 (K, NY, US); Sablan, Benguet Prov., *Elmer 6127,* fl. Apr. 1904 (G, K, NY, P, US); Antipolo, Rizal Prov., *Ahern's Coll. 101,* fl. May 1904 (US); Lamao Riv., Mt Mariveles, Bataan Prov., *Borden FB 1259,* June 1904 (BM, BZ, K, NY, SING, US); Antimonan, Tayabas Prov., *Whitford 646,* fl. Aug.—Sept. 1904 (K, P, US); Sablan, Benguet Prov., *Williams 2003,* fl. Nov. 1904 (NY, US); Rizal Prov., *Ahern's Coll. FB 2973,* fl. Apr. 1905 (BZ, K, NY, SING, US); Rizal Prov., *Foxworthy BS 102,* fl. & fr. Jan. 1906 (BZ, MO, NY, US); Cavinti, Laguna, *Loher 6765,* fl. Feb. 1906 (K, M); Sorsogon Prov., *Bridges FB 5163,* fr. Aug. 1906 (SING); Baguio, Benguet Prov., *Elmer 8927,* fl. March 1907 (BZ, E, FI, G, K, L, NY); Cavite & Batangas Provs, *Curran FB 7685,* fr. Oct. 1907 (MO, P); Pangasinan Prov., *Ramos 4958,* fr. Dec. 1907 (GH); Mauban, Tayabas Prov., *Curran FB 10192,* fr. March 1908 (BZ); Tayabas Prov., *Curran FB 10755,* fl. March 1908 (BZ, CAL, L); Cagayan Prov., *Darling FB 14815,* fr. March 1909 (BM); Cagayan Prov., *Klemme FB 18617,* fl. Apr. 1909 (CAL); Laguna Prov., *Curran FB 19283,* fl. Feb. 1910 (L, P); Laguna Prov., *Bartolomé 69,* fl. Apr. 1910 (MICH); Sablang, Benguet Prov., *Fénix BS 12645,* fl. & fr. Nov.—Dec. 1910 (BZ, L, P); Nueva Ecija Prov., *Alvarez FB 22169,* fl. Dec. 1910 (CAL); Rizal Prov., *Ramos 1082,* fr. Aug. 1911 (FI, G, M, U, US); Cagayan Prov., *Wood FB 12997,* fl. Jan. 1912 (BM, K, US); Mt Oriud, Montalban, Rizal Prov., *Loher,* fl. Apr. 1912 (UC); Mt Maquiling, Laguna Prov., *Serviñas BS 16921,* Nov. 1912 (BRI, US); ibidem, *Cenabre,* fl. March 1913 (MICH); Antipolo, Rizal prov., *Ramos (Merrill, Species Blancoanae) 598,* fr. Jan. 1914 (A, BM, BZ, CAL, GH, K, L, MO, NY, P); Mt Maquiling, Laguna Prov., *Quisumbing 7970,* fl. Feb. 1914 (MICH); Bataan Prov., *Diaz & Alambra BS 22812,* fr. Aug. 1914 (A, BZ, GH, US); Cagayan Prov., *Velasco FB 23289,* fr. Sept.—Oct. 1914 (A, BZ, CAL, SING); Tayabas Prov., *Manuel FB 23485,* fl. Jan. 1915 (US); Paningtingan, Rizal Prov., *Loher,* fl. March 1915 (UC); Irosin (Mt Bulusan), Sorsogon Prov., *Elmer 15041,* fr. Nov. 1915 (A, BM, BZ, C, CAL, G, GH, K, L, MO, NY, P, S, U, UC, US); Ilocos Norte Prov., *Paraiso FB 25081,*

fr. Feb. 1916 (A); Burgos, Ilocos Norte Prov., *Ramos BS 27332,* fl. Feb.—March 1917 (A, BM, BRI); Apayao Subprov., *Fénix BS 28210,* fr. May 1917 (GH, MO, US); Los Baños, Mt Maquiling, Laguna Prov., *Elmer 17605,* fl. June—July 1917 (A, BM, BZ, C, CAL, FI, G, GH, K, L, MO, NY, P, S, U, UC, US); Mt San Isidro, Labrador, Pangasinan Prov., *Fénix BS 29999,* fl. Nov. 1917 (A, BM); Paracale, Camarines Prov., *Ramos & Edaño BS 33518,* fr. Nov.—Dec. 1918 (A, BM); ibidem, *Ramos & Edaño BS 33527,* fl. Nov.—Dec. 1918 (BZ, L); Zambales Prov., *Elgincolin FB 27839,* fr. Jan. 1920 (A, BM); Antipolo, Rizal Prov., *Ramos BS 42013,* fl. Feb. 1923 (A, BM, BRI, DD, G, MEL, SING, UC); Anuling, Zambales Prov., *Ramos & Edaño BS 44636,* fr. Dec. 1924 (DD, UC); Kulap Riv., Casiguran, Tayabas Prov., *Ramos & Edaño BS 45486,* fl. June 1925 (C, UC); Sa Lernando, La Union Prov., *Lete 86,* fr. Apr. 1927 (L); Sitis Melalinta, Mt Maquiling, Laguna Prov., *Sulit PNH 6978,* fl. Apr. 1947 (A); Cementi Riv., Baler, Tayabas, Quezon Prov., *Quisumbing PNH 2428,* fl. May 1947 (A); Mt Pinatubo-Villar, Zambales Prov., *Fox PNH 4766,* fl. Sept. 1948 (A); Mt Kaunayan, Baler, Quezon Prov., *Quisumbing PNH 8059,* fl. Feb. 1949 (A). — Polillo: Karlagan, NE. Polillo Isl., *Fox PNH 8966,* fl. (A). — Leyte: Palo, *Elmer 7149,* fl. Jan. 1906 (A, BZ, E, FI, G, K, NY); *Wenzel 402,* fl. Feb. 1916 (A, BM, GH, MO); *Wenzel 1685,* fl. March 1916 (A, BM, GH, MO). — Cebu: *Espinosa FB 6417,* fr. Sept. 1906 (MO). — Panay: Ilo-ilo Prov., *Vidal 4,* fl. (FI, K, L); Guimaras Isl., *Gamill FB 263,* fr. Jan. 1904 (BM, NY, US); Mt Timbaban, Capiz Prov., *Edaño BS 42382,* fl. & fr. May 1923 (SING); Agraman Riv., Capiz Prov., *Edaño BS 45980,* fl. Oct. 1925 (BM, UC). — Sulu Isls: Tawatawi, *Ramos & Edaño BS 44038,* fl. & fr. Aug. 1924 (NY, S, UC). — Basilan: *Hallier 4432,* fl. Jan. 1904 (L); *Hutchinson FB 6108,* fr. July—Aug. 1906 (BZ, SING); *Miranda FB 18972,* fl. Oct. 1912 (BM, K, P, SING, US). — Mindanao: Davao, *Montano 137,* Sept. 1880 (P); Simulao Riv., *Montano 206,* fl. Dec. 1880 (P); *Burke 1,* fl. 1882 (K); *Ahern 308,* fr. (BZ, US); Sindangan Bay, *Mearns 199 & 200,* fl. Feb. 1904 (US); San Ramon, Zamboanga Prov., *Hallier 4432b,* fl. Feb. 1904 (L, NY); Davao, Davao Distr., *Copeland 508,* fr. March 1904 (US); Sax Riv., Zamboanga Prov., *Williams 2309,* fl. Feb. 1905 (GH, K, NY, US); Santa Cruz, Davao Prov., *Williams 2906,* fl. & fr. June 1905 (NY, US); Surigao Prov., *Bolster 400,* fl. Sept. 1906 (UC); Todaya, Mt Apo, Davao Distr., *Elmer 10532,* fl. & fr. May 1909 (A, BM, BZ, E, FI, G, K, L, MO, NY, U, US); Surigao Prov., *Ramos & Pascasio BS 34770,* fl. June 1909 (A, P, UC); Dapitan, Misamis Prov., *Piper BS 79,* fl. Apr. 1911 (BM); Cabadbaran (Mt Urdaneta), Agusan Prov., *Elmer 13564,* fl. Aug. 1912 (A, BM, BZ, C, CAL, E, FI, G, GH, K, L, MO, NY, P, U, US); Misamis Prov., *Miranda FB 17961,* fr. Jan.—Febr. 1913 (US); Mahilucot Riv., Bukidnon Subprov., *Ramos & Edaño BS 38653,* fr. June—July 1920 (A); Davao Prov., *Elumir FB 28257,* fr. Nov. 1920 (BM); Mt Apo, Davao Prov., *Clemens BS 15744,* fl. June 1924 (UC); Mainit Lake, Surigao Prov., *Wenzel 2640,* fl. May 1927 (A, BZ, G, GH, K, M, MO, UC); ibidem, *Ramos & Concovar BS 33388,* fl. March—Apr. 1931 (NY); Catalnan, Davao, *Kanehira 2493,* fr. (NY); near Malabang, Lanao Prov., *Lynn Zwickey 128,* fl. Sept. 1938 (A); Mt Katanglad, Bukidnon Prov., *Sulit PNH 10103,* fl. & fr. March 1949 (A).

Cultivated: Serdang Exper. Stat., Selangor (from Manila): *Brown,* fr. Sept. 1939 (SING); *Brown,* fl. Feb. 1940 (SING).

var. pubifolia Merr. 1923

Dillenia philippinensis var. pubifolia Merr., En. Philip. Fl. Pl. 3, 1923, p. 61.

Type specimen: I have seen none of the specimens cited by Merr., probably all are lost; Siriban FB 30393, San Mariano, Isabella Prov., Luzon, Apr. 1926; neoholotype in NY, isotype in BM, K, UC, US.

Differs from *var. philippinensis* by short-hirsute indument on younger branches, lower side of leaves and petioles, axes of inflorescences, pedicels, and outer side of sepals.

Philippines: Luzon: Cagayan Prov., *Bernardo FB 15206,* fl. May—June 1912 (P); San Mariano, Isabella Prov., *Siriban FB 30393,* fl. Apr. 1926 (BM, K, NY, UC, US); Penablanca, Cagayan Prov., *Ramos & Edaño BS 46530,* fr. Apr. 1926 (NY, UC). — Mindanao: Surigao Prov., *Ahern,* fr. 1901 (US); Malangas, Zamboanga Distr., *Ramos & Edaño BS 36824,* fr. Oct.—Nov. 1919 (SING).

Distribution. Philippines, found in most islands from the Babuyan Islands to the Sulu Islands; not found in Palawan and the Calamianes. *Var. pubifolia* is known only from Luzon and Mindanao.

Ecology. Common in forests at low and medium altitudes, rarely up to 1800 m (*Sulit PNH 10103*) & 2000 m (*Bartolomé 69*).

Vernacular names. *Balale* (Ibn.), *Bihis* (Ig.), *Biskan* (Ig.), *Bolobayáuak* (P. Bis.), *Cachuchio* (C. Bis.), *Dingin* (Sbl.), *Kalambúgui* (Lan.), *Kambúg* (Sul.); *Katmón* (Tag., Pamp., Bis., Bik., Mbo., Sul., Mag.), *Kalambók* (Bag.), *Kulambúg* (Bag., Buk.), *Ngingir* (Lan.), *Palagao* (Klg.), *Paláli* (Ilk., Ibn., Sub., Pang., Tag.), *Palále* (Ibn.), *Pamamalien* (Pang.).

Uses. The fruit is eaten fresh; the taste is not particularly good but owing to its acid juicy character it is refreshing. An excellent sauce or jam is made from it and it is also used for flavoring fish. A red dye is obtained from the bark. The acid juice of the fruit, mixed with sugar, is used as a cough cure; it is also used for cleansing the hair.

Notes. 1. The differences between the varieties are only very slight; as I have seen no intermediates, I have retained them.

2. *Dillenia catmon* differs from the typical form by the more dense indument on the outer side of the sepals. As to this character I have seen intermediate forms; I do not think, therefore, that it should be retained, not even as a variety.

28. Dillenia marsupialis Hoogl. spec. nov.

Dillenia ochreata Auct. non (Miq.) Teysm. & Binn. ex Martelli; Merr., En. Philip. Fl. Pl. 3, 1923, p. 61.

Dillenia marsupialis Hoogl., Fl. Mal. I, 4, 1951, p. 162, descr. angl..

Type specimen: Ramos & Edaño BS 75247, Catanduanes, 10 Nov. 1928; holotype in NY, isotypes in CAL, SING, UC.

Descriptio typi: Rami novelli glabri; cicatrices amplexicaules. Folia elliptico-oblonga, $12^1/_2$—$19 \times 5^1/_2$—9 cm, 13—16-nervata, apice acuminata, basi acuta decurrente, margine plus minusve undulata; glabra. Petiolus 2—4 cm, glaber, alis amplexicaulibus suborbicularibus caducis. Flores solitarii, terminales, pedicello 3—$4^1/_2$ cm, unibracteolato; bracteola ca $^1/_2$ cm infra florem inserta, linearis, ca 20 mm longa, 2 mm lata. Specimen typicum in fructu tantum. Fructus indehiscens, ca 5 cm diametro. Sepala usque ad 8 cm longa, 5 cm lata. Stamina exteriora ca 10 mm, interiora ca 20 mm longa, non longitudinis intermediae. Carpella ca 25 mm longa, 12 mm lata, ca 10-ovulata, 1—2-seminata. Semina reniformia, ca 6×4 mm, arillo membranaceo ca 6 mm longo.

Fig. 8 e, p. 67.

Small evergreen trees. Branches sympodial, younger ones ca 3 mm thick, glabrous, sometimes hirsute immediately above leaf-scar. Leaf-scars amplexicaul, for about $^3/_5$ single line, for $^2/_5$ rounded-triangular with ca 11 leaf-traces, partly along line slightly above lower margin, partly about centre of scar. *Leaves* elliptic to oblong, (8—)12—20(—28) × ($4^1/_2$—)$5^1/_2$—10(—$12^1/_2$) cm, with (10—)13—16(—18) nerves on either side; rounded or obtuse, more or less distinctly acuminate at apex, obtuse to acute at base; margin nearly entire to distinctly dentate, nerves slightly curving upward, ending in apex of teeth, sometimes between 2 nerves one distinct near midrib, gradually disappearing into venation; glabrous. Petiole $1^1/_2$—4 cm, glabrous, with amplexicaul wings; wings nearly circular to obovate, cohering with petiole for $^1/_3$ of length of

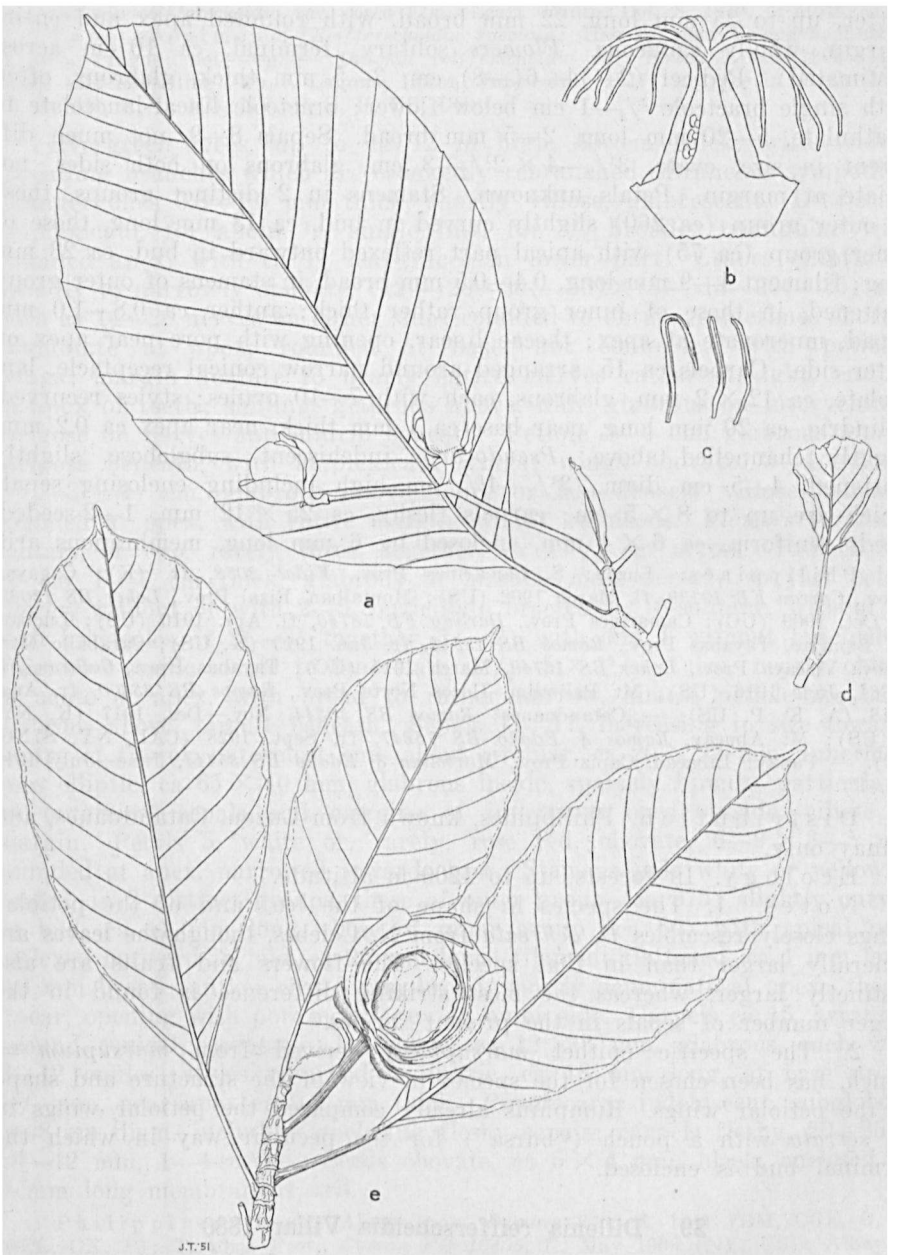


Fig. 8 — a, b, c, d. *Dillenia talaudensis* Hoogl. (p. 59); a. branch with young infrutescence, × 2/5; b. gynoecium, longitudinal section, from a rather old bud, × 2½; c. stamens from a rather old bud, × 2½; d. young leaf with the petiolar wings still present, × 2/5; all after type specimen; e. *Dillenia marsupialis* Hoogl. (p. 66), fruiting branch with fruit in longitudinal section, × 2/5; after type specimen.

latter, up to 35 mm long, 22 mm broad, with rounded apex and entire margin, wholly caducous. *Flowers* solitary, terminal, ca 10 cm across (estimated). Pedicel (2—)4—6(—8) cm, 3—5 mm thick, glabrous, often with single bracteole $^1/_2$—1 cm below flower; bracteole linear-lanceolate to spathulate, 5—20 mm long, 2—5 mm broad. Sepals 8—9, not much different in size, ovate, $3^1/_2$—$4 \times 2^1/_2$—3 cm, glabrous on both sides, not ciliate at margin. Petals unknown. Stamens in 2 distinct groups, those of outer group (ca 260) slightly curved in bud, ca 13 mm long, those of inner group (ca 75) with apical part reflexed outward in bud, ca 23 mm long; filament 4—9 mm long, 0.4—0.5 mm broad, in stamens of outer group flattened, in those of inner group rather thick; anther ca 0.8—1.0 mm broad, mucronate at apex; thecae linear, opening with pore near apex on outer side. Carpels ca 15, arranged around narrow conical receptacle, lanceolate, ca 12×2 mm, glabrous, each with 7—10 ovules; styles recurved, cylindric, ca 20 mm long, near base ca 1 mm thick, near apex ca 0.2 mm, slightly channelled above. *Pseudocarps* indehiscent, subglobose, slightly flattened, 4—5 cm diam., $3^1/_2$—$4^1/_2$ cm high including enclosing sepals which are up to 8×5 cm; carpels fleshy, ca 25×12 mm, 1—2-seeded. Seeds reniform, ca 6×4 mm, enclosed by 6 mm long, membranous aril.

Philippines: Luzon: S. Camarines Prov., *Vidal 2038*, fr. (K); Cagayan Prov., *Curran FB 17199*, fl. March 1902 (US); Montalban, Rizal Prov., *Loher BS 12069*, fl. Oct. 1909 (UC); Camarines Prov., *Darling FB 18740*, fl. Apr. 1910 (US); Lucban, Mt Banajao, Tayabas Prov., *Ramos BS 19512*, fr. Jan. 1913 (K, US); Caraballo Mtn, Nueva Vizcaya Prov., *Loher BS 13749*, March 1915 (UC); Tayabas Prov., *Calliran FB 25661*, June 1916 (US); Mt Palimlim, Ilocos Norte Prov., *Ramos BS 33300*, fr. Aug. 1918 (A, K, P, US). — Catanduanes: *Ramos BS 30344*, Nov.—Dec. 1917 (K, NY, P, US); Mt Abucay, *Ramos & Edaño BS 75247*, fr. Sept. 1928 (CAL, NY, SING, UC). — Panay: Libacao, Capiz Prov., *Martelino & Edaño BS 35444*, June—July 1919 (A, P).

Distribution. Philippines, known from Luzon, Catanduanes, and Panay only.

Ecology. In forests, up to 1200 m altitude.

Notes. 1. The species in shape of the leaf and of the petiolar wings closely resembles *D. ochreata* from N. Celebes, though the leaves are generally larger than in that species. The flowers and fruits are also distinctly larger, whereas the most striking difference is found in the larger number of sepals in the present species.

2. The specific epithet *marsupialis*, derived from *marsupium* = pouch, has been chosen for the species in view of the structure and shape of the petiolar wings. Rumphius already compared the petiolar wings in *D. serrata* with a pouch ("bursa") for the peculiar way in which the terminal bud is enclosed.

29. Dillenia reifferscheidia Villar 1880

Reifferscheidia speciosa *Presl, Rel. Haenk. 2, 1836, p. 74, t. 62.

Dillenia reifferscheidia Villar, Nov. App., 1880, p. 3, based on *Reifferscheidia speciosa* Presl; **Blanco, Fl. Filip. ed. 3, 1880, t. 344; Vidal, Rev. Pl. Vasc. Filip., 1886, p. 38; Brown, Minor Prod. Philip. For. 2, 1921, p. 339; Merr., En. Philip. Fl. Pl. 3, 1923, p. 61; Hoogl., Fl. Mal. I, 4, 1951, p. 162.

Dillenia speciosa (Presl) Gilg in Engl. & Prantl, Nat. Pfl. Fam. 3, 6, 1893, p. 124; non Thunb. 1791.

Dillenia reifferscheidia var. rosea Elm., Leafl. Philip. Bot. 8, 1919, p. 3079.

Type specimens: *Reifferscheidia speciosa:* Haenke, near Sorsogon, Luzon; in herb. Prague; not seen. — *Dillenia reifferscheidia var. rosea:* Elmer 18025, Los Baños (Mt Maquiling), Prov. Laguna, Luzon, June—July 1917; isotypes in A, C, CAL, FI, G, GH, K, L, MO, NY, P, S, U, UC, US.

Evergreen trees, up to ca 12 m high, 60 cm thick, with widely spreading branches which are crookedly rebranched. Branches sympodial, younger ones 0.8—1.0 mm thick, shortly villose, glabrescent. Leaf-scars amplexicaul, for about $^1/_3$ single line, for $^2/_3$ broadly triangular with rounded apex, with ca 11 leaf-traces in lower part. *Leaves* elliptic or broadly to narrowly obovate, (12—)20—30(—50) × (8—)13—20(—35) cm, with ca 14—20 nerves on either side; rounded to obtuse, sometimes shortly acuminate at apex, rounded at base, not connected with petiolar wings; margin dentate to nearly entire, nerves rather straight, ending in apex of teeth; shining, glabrous above, dull, glabrous on intervenium, strigose on nerves and midrib beneath. Petiole 3—4 cm, glabrous above, strigose beneath, with amplexicaul wings; wings obovate, 3—4(—5) × $2^1/_2$—3(—4) cm, glabrous above, more or less densely villose beneath, rounded at apex, with entire margin, wholly caducous. *Flowers* terminal, solitary or two, rarely three, together, ca $17^1/_2$ cm across. Pedicel 3—10 cm, 5—7 cm thick, glabrous to hirsute, most densely so just below flower, without or with 2—5 verticillate bracteoles; if solitary, without or with bracteoles, if 2(—3) together, 1(—2) with and 1 without bracteoles; bracteoles sessile, ovate to lanceolate, $2^1/_2$—5 × $1^1/_2$—1 cm, nearly obtuse to acute at apex, with broad to rather narrow, almost petiole-like base, glabrous above, hirsute beneath. Sepals 11—17, increasing in size towards centre of flower, outermost ones about circular, ca 20 × 22 mm, innermost ones elliptic, ca 65 × 40 mm, glabrous inside, sparsely hirsute, particularly on outermost sepals and margins of innermore ones outside, ciliate at margin. Petals 5, white or, rarely, rose red, obovate, 6—9 × 3—5 cm, rounded at apex, narrowed towards base. Stamens pale white or yellowish tinged, in 2 distinct groups, those of outer group (ca 375) slightly curved in bud, ca 11 mm long, those of inner group (ca 60) with apical part reflexed outward in bud, ca 25 mm long; filament flattened, ca 1 mm long, 0.3 mm broad; anther ca 0.8 mm broad, shortly acuminate at apex; thecae linear, opening with pore near apex on outer side. Carpels ca 15, arranged around conical receptacle, lanceolate, ca 12 × 3 mm, glabrous, each with 9—12 ovules; styles recurved, cylindric, ca 18 mm long, at base up to $1^1/_2$ mm, near apex ca 0.2 mm thick. *Pseudocarps* indehiscent, subglobose, 5—8 cm diam. including enclosing fleshy sepals; carpels fleshy, 20—25 × 10—12 mm, 1—4-seeded. Seeds obovate, ca 5 × 4 mm, black, enclosed by 9 mm long membranous aril.

Philippines. Luzon: Albay Prov., *Cuming 930*, fl. 1841 (BM, CGE, G, K, MEL, OX, P); Tayabas Prov., *Curran FB 10405*, fl. May 1908 (NY, US); Albay — Sorsogon, *Curran FB 10608*, fl. June 1908 (K, US); Cagayan Prov., *Curran FB 17196*, March 1909 (US); Rizal Prov., *Ramos BS 13627*, fr. Aug. 1911 (BM, BZ, CAL, E, K, L, P, US); Mt Maquiling, Laguna Prov., *Villamil FB 23345*, fr. Nov.—Dec. 1914 (A, US); Sorsogon Prov., *Ramos BS 23354*, fl. & fr. July—Aug. 1915 (A, BM, BRI, BZ, CAL, GH, K, L, MO, NY, P, SING, US); San Antonio, Laguna Prov., *Ramos BS 23807*, fl. Oct. 1915 (A, P, US); Irosin, Mt Bulusan, Sorsogon Prov., *Elmer 15619*, Dec. 1915 (A, BM, BZ, CAL, G, GH, K, L, MO, NY, P, UC, US); Mt Tulaog,

Tayabas Prov., *Ramos & Edaño BS 29122*, fr. May 1917 (A, US); Los Baños, Mt Maquiling, Laguna Prov., *Elmer 18025*, fr. June—July 1917 (A, C, CAL, FI, G, GH, K, L, MO, NY, P, S, U, UC, US); ibidem, *Elmer 18045*, fr. June—July 1917 (A, BM, BZ, C, CAL, FI, G, GH, K, L, MO, NY, P, S, U, UC, US); Makiling Nat. Park, Laguna Prov., *Sulit PNH 8209*, fl. May 1947 (A); Bulusan Water Lake, Mt Bulusan, Sorsogon Prov., *Sulit PNH 3660*, fl. July 1947 (A). — Catanduanes: *Ramos BS 30497*, fr. Nov.—Dec. 1917 (A, US); Mt Pagmasuso, *Ramos & Edaño BS 75107*, fr. July—Sept. 1928 (CAL, NY, SING). — Negros: *Tarrosa FB 15165*, Sept. 1909 (K); Mt Canlaon, *Curran FB 17405*, fl. Sept. 1909 (US). — Panay: Leon, *Vidal 2039* (K); Agsabay, Capiz Prov., *Edaño BS 46097*, fr. Nov. 1925 (NY, UC); Pilar, Capiz Prov., S. slope Upao Mtn, *Paniza PNH 9407*, fr. July 1947 (A). — Mindanao: Mt Mayo, Davao Prov., *Ramos & Edaño BS 49429*, fl. & fr. May 1927 (SING, UC); Tubud Placer, Surigao, *Wenzel 3M*, fr. June 1927 (UC).

Distribution. Philippines, from Luzon to Mindanao.

Ecology. In primary and secondary forests, up to 1000 m altitude, particularly in the more humid regions.

Vernacular names. *Baláli* (Bik.), *Katmón* (Tag., P. Bis.), *Katmón kadlagan* (Bik.), *Katmón kalabáu* (Tag.), *Paláli* (Bik.).

Uses. The fruit makes a good preserve.

Note. *D. reifferscheidia var. rosea* is characterized only by the colour of the petals, these being rose red in this variety, white in *var. reifferscheidia*; the type specimen of *var. rosea* was collected in a forest where the other trees all had white flowers. The latter seems to be the usual state of the species. As it is impossible to distinguish the variety in dried specimens, I have taken in this treatment *var. rosea* together with *var. reifferscheidia*.

30. Dillenia suffruticosa (Griff. 1854) Martelli 1886

Wormia suffruticosa Griff., Not. 4, 1854, p. 706 & *Ic. Pl. As., 1854, t. 649; Hook.f. & Thoms., Fl. Br. Ind. 1, 1872, p. 35; Villar, Nov. App., 1880, p. 347; King, J. As. Soc. Beng. 58, II, 1889, p. 364; Ridl, J. Str. Br. R. A. S. 54, 1910, p. 5; Back., Schoolfl. Java, 1911, p. 10; Koord., Exk. Fl. Java 2, 1912, p. 601; **Blaauw, Trop. nat. in schetsen en kleuren, 1913, p. 17, t. 12; Ridl., Fl. Mal. Pen. 1, 1922, p. 8; Burk., Dict. Econ. Prod. Mal. Pen., 1935, p. 2265; Corn., Gard. Bull. S. S. 10, 1939, p. 9; *Corn., Wayside Trees Malaya, 1940, p. 207, pl. 53; Back., Bekn. Fl. Java (em. ed.) 4, 1942, fam. 80, p. 4.

Wormia excelsa Auct. non Jack; Hook.f. & Thoms., Fl. Ind. 1, 1855, p. 67.

Wormia subsessilis Miq., Fl. Ind. Bat. Suppl., 1860, p. 619; Teysm. & Binn., J. Bot. Néerl. 1, 1861, p. 364; **Miq., Ann. Mus. Bot. Lugd. Bat. 1, 1864, p. 315, t. 9; Miq., Ann. Mus. Bot. Lugd. Bat. 4, 1868, p. 77; Ridl., J. Str. Br. R. A. S. 54, 1910, p. 4; Ridl., Saraw. Mus. J. 1, 1913, p. 71; *Ridl., Fl. Mal. Pen. 1, 1922, p. 7.

Wormia revoluta Teysm. & Binn., J. Bot. Néerl. 1, 1861, p. 364, in syn.

Wormia burbidgei **Hook.f., Bot. Mag., 1880, t. 6531.

Dillenia suffruticosa (Griff.) Martelli in Becc., Malesia 3, 1886, p. 163; Fin. & Gagnep., Bull. Soc. Bot. Fr. Mém. 4, 1906, p. 10; Merr., Bibl. En. Born. Pl., 1921, p. 384; de Wit, Bull. Bot. Gard. Btzg III, 18, 1949, p. 208; *Hoogl., Fl. Mal. I, 4, 1951, p. 162.

Dillenia burbidgei (Hook.f.) Gilg in Engl. & Prantl, Nat. Pfl. Fam. 3, 6, 1893, p. 123.

Wormia subsessilis var. borneensis Ridl., J. Str. Br. R. A. S. 54, 1910, p. 6.

Dillenia suffruticosa var. borneensis (Ridl.) Ridl., Saraw. Mus. J. 1, 1913, p. 71; Merr., Bibl. En. Born. Pl., 1921, p. 384.

Type specimens: *Wormia suffruticosa*: Griffith Kew Distr. 55, Malacca, 1845; holotype in K, isotypes in C, CGE, FI, GH, K, L, M, NY, P. — *Wormia subsessilis:* Teysmann 3203 HB, Banka; holotype in U, isotypes in BZ, CAL, K, L, MEL. — *Wormia burbidgei:* Burbidge, Borneo, 1877—8; holotype in K. — *Wormia subsessilis var. borneensis:* Hewitt, Kuching, 1909; holotype in SING, isotype in K.

Large shrubs or small trees, evergreen, up to 10 m high, with stout, brown trunk, often forming thickets. Branches sympodial, younger ones ca 3 mm thick, glabrous to densely villose with 2—3 mm long hairs, more or less glabrescent. Leaf-scars amplexicaul, for about $^1/_2$ single line, for $^1/_2$ subfalcate with ca 20 leaf-traces near lower margin. *Leaves* elliptic to ovate, (10—)15—25(—45) × (5—)8—12(—26) cm, with (7—)12—20 (—27) nerves on either side; rounded to obtuse at apex, obtuse at base, decurring into petiolar wings; margin entire to dentate or doubly dentate, nerves ending in apex of teeth, in larger leaves often 1—3 rather strong secondary nerves directed downward near margin, ending in apex of smaller teeth; glabrous, rarely slightly villose on intervenium in younger leaves only above, slightly to densely villose on nerves, on both sides along midrib (continuing on petiole), and along line which delimits bud-enclosing part of leaf-base beneath. Petiole 2—6 cm, with amplexicaul wings; wings 4—10(—15) mm broad, nervation of blade continuing, but less marked, on wings, wings and base of blade below line where both sides cohere in young leaf of different colour (darker when dry); wings usually persistent. *Inflorescences* terminal, (4—)6—10(—18)-flowered, up to 30 cm long, simple racemes or composed by having lateral branch at place of second, sometimes also third flower; axis ca 3 mm thick, glabrous to, particularly when young, densely villose; bracts caducous, triangular, 6—15 × 3—5 mm. *Flowers* 8—12 cm across. Pedicel 0.8—3 cm long, 2—3 mm thick, thickened to 3—4 mm at apex, without bracteoles. Sepals 5, obovate, 15—22 × 8—12 mm, glabrous inside, glabrous to rather densely villose outside. Petals 5, bright yellow, obovate, 40—50 × 25—30 mm, rounded at apex, narrowed towards base. Androecium with distinct group of staminodes on outer side. Staminodes ca 100, linear, ca 4—6 × 0.3 mm, yellow, obtuse at apex. Stamens ca 175, outermost ones slightly curved in bud, ca 8 mm long, innermost ones with apical part reflexed outward in bud, ca 13 mm long, with stamens of intermediate lengths between; filament of outermost stamens ca $3^1/_2$, of innermost ones ca 2 mm long; anther ca 0.5 mm broad, obtuse at apex; thecae linear, opening with pore near apex on outer side. Carpels 5—8, usually 7, arranged around sharp conical receptacle, light green, elliptic, ca 5 × 2 mm, glabrous, each with 7—10 ovules; styles spreading, filamentous, ca 10 mm long, 0.5 mm thick, yellowish white. *Pseudocarps* dehiscent, when ripe sepals enlarged to 18—25 × 10—15 mm; carpels red, 20—25 × 10—16 mm, each with 1—4 seeds. Seeds obovoid, ca 3 × 2 mm, brown or black, enclosed by scarlet, membranous aril.

Sumatra: Palembang: Pladju, *Polak 140*, fl. & fr. Oct. 1930 (BZ). — Banka: *Horsfield*, fl. (BM); *Kurz 425*, fl. (K); Baturusak, *Amand*, fl. June 1858 (U); *Ploem*, fl. & fr. (L); Djebus, *Berkhout 72*, fl. Aug. 1886 (BZ); *Berkhout* (BZ); G. Menumbing, near Muntok, *Bünnemeyer 1351*, fl. & fr. Oct. 1917 (BZ, L); Bakem, Sungai Liat, *Bünnemeyer 1731*, fl. Oct. 1917 (BZ); Sungai Lajang, Sungai Liat, *Bünnemeyer 1807*, fl. & fr. Oct. 1917 (BZ, L); Sungai Liat, Rebo, *Bünnemeyer 2510*, fl. Nov. 1917 (BZ); near Pangkalpinang-Belinju, *Huitema 24*, fl. 1932 (BZ); Bakit, Belinju, *Coert 1630*, fl. Sept. 1941 (L). — Billiton: *Riedel*, fl. (FI); S of Manggar, *Ham 32*, fr. March 1907 (BZ). — Riouw-Lingga Arch.: Pulau Tudjuh, Ajer Suar, *Bünnemeyer 5966*, fl. & fr. May 1919 (BZ, L); Sungai Tanda, Pulau Lingga, *Bünnemeyer 6933*, fl. July 1919 (BZ).

Malay Peninsula: *Walker 224*, fr. (GL, P); Sungai Iwong, *Goodenough*,

fl. May 1892 (BM). — Perak: Maxwell's Hill, Taiping, *Henderson SF 10014*, fl. & fr. 1922 (SING); Taiping, *Henderson SF 10358*, fr. Jan. 1923 (SING); Tinmines, Taiping, *Haniff SF 13120*, March 1924 (SING). — Pahang: Balok, *Yeop CF 3616*, fr. Jan. 1920 (K, SING). — Selangor: Rawang Distr., *Goodenough 10470*, fl. March 1899 (SING); Garcona Kuala Lumpur, *Kalong CF 17479*, fl. Aug. 1929 (SING); *Franck 1115*, fl. & fr. Sept. 1937 (C); Tinmines, Kanching, *Nur SF 34430*, fl. & fr. Nov. 1937 (MO, SING). — Negri Sembilan: Seremban, *Alvins 1783*, fr. July 1885 (SING). — Malacca: fr. (SING); *Gaudichaud 26*, fl. & fr. Feb. 1837 (G, P); *Cuming 2358*, fl. 1840 (BM, CGE, K); *Delessert*, fl. & fr. 1840 (G); Ayer Panas, *Griffith (Herb. E. I. Comp. 55)*, fl. & fr. 1845 (C, CGE, FI, GH, K, L, M, NY, P); *Griffith*, fr. (CAL); *Maingay 1020 (Kew Distr. 4)*, fl. 1865—6 (K); *Maingay 1020A (Kew Distr. 4)*, fl. May 1868 (CAL, K, L); *Alvins*, fl. & fr. (SING); Bukit Bruang, *Holmberg 719*, fl. & fr. Apr. 1891 (MEL, SING); *Hervey*, fl. 1891 (BM, CAL, SING); *Hervey*, fl. & fr. Apr. 1893 (CAL, P); *Hervey*, fr. (A). — Johore: Pinyerong, *Ridley*, fr. May 1889 (SING); Pulau Tekong, *Ridley 3966*, fl. 1890 (SING); *Ridley*, fl. 1890 (BM); Kuala Sedili Besar, *Feilding*, fl. 1892 (SING); Sedili Kechik, *Yeob CF 5832*, fl. & fr. July 1921 (SING); Mawai, Sedili, *Corner SF 21189*, fl. & fr. May 1932 (K, NY, SING); Sungai Sedili, *Corner SF 32984*, fl. & fr. May 1937 (L, SING); Sungai Sedili, near Mawai, *Corner SF 33546 & 33547*, fl. & fr. June 1937 (L, SING). — Pulau Penang: *Delessert*, fl. & fr. 1835 (G). — Singapore: *Thomson 10*, fl. (K, P); *Lobb 329*, fl. (CGE, FI, G, GH, GL, K, MEL, OX); *Anderson 2*, fl. Oct. 1861 (CAL, MEL); *Kurz 2961*, fl. (CAL); *Maingay 2624A (Kew Distr. 4)*, fl. & fr. 1867 (BM); *Maingay 2624 (Kew Distr. 4)*, fl. 1867—8 (K); *Kuntze 6094*, fl. Oct. 1875 (NY); *Hullett 61*, fl. 1884 (K); *Haviland* (CAL); Jurong, *Ridley 435*, fl. Oct. 1889 (CAL, SING); *Ridley*, fl. 1890 (UC); Tangkei, *Ridley*, fl. & fr. Jan. 1905 (MO); *Ridley*, fl. & fr. (CAL, SING); Pulau Ubin, *Ridley*, fl. (SING).

Java: W. Java: *Ploem*, fl. (L); Regantang, *Boerlage*, fr. June 1888 (L); Warung Manga, Kedunghalang, *Boerlage 157*, fr. Oct. 1888 (L); Buitenzorg, *Boerlage*, fl. & fr. Dec. 1888 (L); ibidem, *Hallier 2a*, fl. & fr. Apr. 1893 (BZ); Djasinga, *Backer 9903*, fl. Nov. 1913 (BZ); ibidem, *Backer 10056*, fl. & fr. Nov. 1913 (BZ); E of Depok, *Backer 23168*, fl. Jan. 1918 (BZ); S of Djasinga, *Backer 26022*, fr. 1918 (BZ); E of Depok, *Backer 26285*, fl. Oct. 1918 (BZ); Depok, *Bakhuizen van den Brink Jr 890*, fl. & fr. Nov. 1921 (BZ, CAL, G, K, L, P, SING); Tegal Sapi, *Bakhuizen van den Brink Jr 1568*, Aug. 1922 (BZ); Djambu near Leuwiliang, *Bakhuizen van den Brink 7830*, fl. & fr. Aug. 1931 (BZ, K, L, U); Tendjoleat near Bunar, *de Voogd 5*, fl. Oct. 1940 (BZ); Land Bolang near Bunar, *van Steenis 12681*, fl. Nov. 1941 (BZ); Parung Pandjang, *Broekhuizen 15*, fl. & fr. Dec. 1944 (BZ); ibidem, *Broekhuizen 9*, Feb. 1945 (BZ, L); ibidem, *Broekhuizen*, fr. Feb. 1945 (BZ).

Borneo: (CAL, U); *Korthals*, fl. & fr. (CAL, K, L, MEL, S); *U.S.S. Pac. Expl. Exped. 1838—42*, fl. (NY); *Burbidge*, fl. (K). — NW. Borneo: Kuching, *Beccari PB 175 & 192*, fl. & fr. July 1865 (FI, K, P); Brunei, *Beccari PB 4067*, fl. Aug. 1867 (FI); Rajang, Sibu, *Haviland = 2100*, fl. Nov. 1892 (UC); near Kuching, *Haviland 2100*, fl. & fr. Dec. 1892 (K); ibidem, *Haviland & Hose = 2160*, fl. & fr. Oct. 1894 (BM, BZ, CAL, CGE, GH, K, L, P); Kuching, *Ridley*, fr. Aug. 1899 (SING); Sarawak, *Nat. Coll. 557*, fl. (A); Kapit, Upper Rajang Riv., *Clemens 21167*, fl. May 1929 (A, BZ, K, MO, NY). — W. Borneo: *Chaper*, fr. (P); Sintang, *Langlassé 68*, fl. June 1894 (P); ibidem, *Langlassé 87*, fl. June 1894 (G, P); Acr Itam N of Pontianak, *Polak 680*, fl. Oct. 1940 (BZ, L); Pontianak, *Enoh 290*, fl. Sept. 1948 (BZ, K, L). — S. and SE. Borneo: Martapura, *Korthals*, fl. (L); Pulau Lampei, *Korthals*, fl. & fr. (L); Tewingan near Martapura, *Labohm 1180*, fl. June 1918 (BZ); Asem near Pleihari, *Labohm 1956*, fl. May 1919 (BZ); Rantau, Antasan Mastam, *Dachlan 17*, fl. Aug. 1922 (BZ). — E. and NE. Borneo: Sungai Bontanan, Bontang, *Rutten 417*, fr. March 1911 (BZ, U); Sungai Berbas, Bontang, *Rutten 496*, fl. & fr. May 1911 (U); Tikung, *Amdjah 917*, fl. & fr. Nov. 1912 (BZ, L, UC); *Amdjah 1017*, fl. 1912 (BZ); near Sadjan Riv., Bulongan, *Rutten 88*, fr. 1914 (U). — Br. N. Borneo: Kudat, *Frazer 120*, fl. June 1885 (K); Sandakan, *Creagh*, fl. Apr. 1895 (K); Kinabalu Region, *Gibbs 2930*, fl. 1910 (BM); Sandakan, *Clemens 9504*, fl. Dec. 1915 (A); *Wood 458*, fl. May—Aug. 1917 (K); *Yates 56*, fr. Oct. 1917 (A, US); Sandakan & Vicin., *Wood 794*, fl. & fr. Feb.—March 1920 (A, BZ, L, US); Sandakan, Myburgh Prov., *Elmer 20104*, fl. & fr. Oct.—Dec. 1921 (A, BM, BZ, C, CAL, K, L, M, MO, NY, P, S, SING, U, UC); Kg Mengalong, Weston, *Suleiman BNB 2221*, fr. Apr. 1932

(BZ, IFI, K); Talaga, *Balajadia BNB 2561*, fl. Aug. 1932 (A, BZ, IFI, K); Mt Kalawat, Kinabalu, *Clemens 51317*, fl. Jan. 1934 (BM); Kabili For. Res., Sandakan, *Puasa BNB 4846*, fl. & fr. June 1935 (SING); Jambongan Isl., *Cabiling BNB 3776*, fl. (UC); Tiaggau Riv., *Keith BNB 9091*, fl. June 1938 (SING); Marudu, Kudat, Kitaku For. Res., *Austin BNB A 1182*, fl. Feb. 1948 (SING); Elopura, Sandakan, *Anthony BNB A 788*, fr. March 1948 (SING); ibidem, *Kadir BNB A 901*, fl. Dec. 1948 (SING); ibidem, *Kadir BNB A 2691*, fl. & fr. (L). — Banguey Isl.: *Castro & Melegrito 1502*, fl. Sept. 1923 (A, UC, US). — Labuan: *Low 192*, fl. & fr. 1867 (FI); *Treacher*, 1880 (S). — Anambas & Natuna Isls: near Genting, Sedanau Isl., *van Steenis 1055*, fr. Apr. 1928 (BZ, L).

Philippines: *Loher 20*, fl. (K). — Luzon: Mt Makiling, Laguna Prov., *Quisumbing*, fr. Sept. 1925 (UC).

Cultivated: Bot. Gard. Bogor (origin: Banka): *Teysmann*, fl. & fr. 1860 (L); *Kurz 425*, fl. (CAL); *Kurz*, fl. 1863 (P); *Teysmann*, fr. 1867 (L); *Beccari*, fl. 1876 (FI); *Boerlage*, fl. (L); no IV-G-18, fl. Nov. 1889 (BZ); *Janse*, 1899 (GRO); no IV-G-18, fr. 1903 (GH, NY, US); *van Harreveld*, fl. & fr. Sept. 1907 (GRO, L); *Backer*, fl. 1908 (BZ); fl. & fr. Apr. 1912 (BZ); no IV-G-18a, fr. 1916 (BZ); *Fevrell & Heide*, fl. & fr. Dec. 1921 (S). — Kultuurtuin Bogor: fl. & fr. (U); *Giesenhagen*, fl. Feb. 1900 (M); no A-III-738, *Idris*, fl. & fr. May 1924 (WAG). — Victoria Garden, Bombay: *Land*, fl. Dec. 1935 (CAL). — Jamaica: Castleton Distr. (escape from Bot. Gard.), *Harris 10889*, fl. March 1910 (K, NY, U). — Public Gardens, Kuala Lumpur: *Strugnell CF 12622*, fl. Jan. 1927 (SING). — Manila: Manila Gardens, *Quisumbing BS 84737*, fl. (NY); *Fénix 92*, fl. & fr. Apr. 1938 (A); College of Agric., Laguna, *Sulit PNH 6977*, fl. & fr. Dec. 1947 (A). — Panama Canal Zone Exper. Gard.: *Wetmore & Abbe 228*, fl. Jan. 1932 (A). — Bot. Gard., Penang: *Nur*, fl. Sept. 1918 (SING). — Bot. Gard., Peradeniya: *Fairchild & Dorsett 262*, fl. Feb. 1926 (UC). — Royal Lakes Gard., Rangoon: *Parkinson 14029*, fl. March 1932 (DD); *Parkinson 14455*, fl. June 1932 (DD). — School Gard., Semarang: *Docters van Leeuwen-Reynvaan*, fl. June 1910 (BZ). — Sierra Leone: *Lane-Poole 118bis*, fl. June 1912 (K). — Bot. Gard., Singapore: fl. (A); *Hullett*, fl. & fr. Aug. 1885 (SING); *Curtis*, fl. Sept. 1900 (SING); *Sargent*, fl. Oct. 1903 (A); Lawn T, *Nur*, fl. Aug. 1918 (UC); *Nur*, fl. May 1919 (UC); Lakeside, *Nur*, fl. & fr. Aug. 1920 (CAL, SING, UC); Arboretum, *Nur*, fl. June 1924 (SING); *Kiah*, fl. May 1929 (IFI); Lawn G, *Nur*, fl. Oct. 1929 (BRI, BZ, SING); *Clemens 22502*, fl. & fr. Nov. 1929 (NY, P); *Furtado SF 34822*, fl. Feb. & Sept. 1938 (A, DD, IFI, L, SING). — Bot. Gard., Trinidad: *Broadway*, fl. May 1927 (IFI).

Distribution. Sumatra, Malay Peninsula, Riouw and Lingga Archipelagos, Banka, Billiton, Borneo, W. Java, Philippines. From Sumatra the species is known only from Palembang. The two collections from the Philippines may represent cultivated or naturalized specimens; I strongly suspect the species not to be indigenous in the Philippines. De Wit (1949) has pointed out that the species would be indigenous in Java. I do not agree with him for the following reasons: The first collecting of the species outside the Botanic Garden was done in 1888, i. e. about 30 years after its introduction. The first collections are all close near Bogor and later collections gradually come to farther distances. It is difficult to understand that a species like the present one with large and conspicuous flowers would have escaped the attention of earlier collectors, particularly as it flowers throughout the whole year in Bogor.

Ecology. In marshes, along streams, and on the margin of forests, sometimes immediately behind the mangrove, up to 500 m altitude Flowering continuously, each flower open for one day only; between the flowers of one raceme a difference in flowering-time of about 3—4 days. The fruit ripens after 36 days (Corner, 1940); the arillate seeds are eaten by birds, what may be a means of dispersal.

Vernacular names. Sumatra: *Sempur ajor, S. rawah* (Palem-

bang); *Simpong, Kaju sipur* (Riouw and Lingga Arch.); *Kembang masimpur (mesimpur), Minipor, Simpur, Simpor prampuan, Sipor* (Banka); *Simpur* (Billiton). Malay Peninsula: *Champurna, Simpoh ayer* (= water simpoh), *S. gajah* (= elephant or big s.), *S. pasir, S. paya* (= marsh s.). Borneo: *Simpur* (Mal., SE. Borneo), *Simpor ayer* (Mal., Br. N. Borneo), *Simpor bini* (Mal., Brunei), *Simpor rimba* (Kedayan, Br. N. Borneo), *Tämbakau* (Tengara, Br. N. Borneo).

Uses. Because of its beautiful foliage and abundant flowering the species is often planted as an ornamental shrub.

Notes. 1. *Wormia suffruticosa* and *W. subsessilis* differ only in the indument of the lower side of the leaves and petioles, this being villose in *W. suffruticosa*, glabrous in *W. subsessilis*. As several intermediates are known, the distinction of two separate taxa does not appear to be justified.

2. *Wormia subsessilis var. borneensis* differs from the other specimens by the large leaves and the different colour of the pseudocarp, this being white. As to the latter difference, I do not think it to be of any importance, whereas as to the other characters the pseudocarps in the type specimen of *var. borneensis* agree with those in other specimens. As to the size of the leaves, these are really large in the specimen cited, but intermediates as to size are found in a number of collections.

31. Dillenia fagifolia Hoogl. spec. nov.

Dillenia fagifolia Hoogl., Fl. Mal. I, 4, 1951, p. 162, descr. angl..

Type specimen: L. S. Smith NGF 1229, near Aitape, New Guinea, Jan. 1945; holotype in L.

Descriptio typi: Rami novelli hirsuti; cicatrices amplexicaules. Folia elliptica, 12½—16 × 8—10 cm, 17—19-nervata, apice obtusa, basi obtusa vel rotundata, margine integra vel minime undulata. Petiolus 5—5½ cm longus, alatus alis amplexicaulibus caducis. Inflorescentia terminalis, 6-flora. Flores in alabastro tantum, pedunculo usque ad 1.2 cm longo. Sepala 5, exterius 22 × 25 mm. Petala 5. Stamina ∞, exteriora (ca 60) 5—2½ mm longa, longitudine centripetaliter deminuente, apice acuminata acumine 0.3 mm longa; interiora (ca 90) sterilia, ca 1 mm longa. Carpella 12, glabra, elliptico-oblonga, ca 2 × 1 mm, 12—14-ovulata, stylo 1 mm longo.

Fig. 9 a—d, p. 81.

Large evergreen trees, ca 42 m high, 1 m thick, with ca 24 m bole, with branched buttresses and chanelled to ca 3.3 m height. Bark reddish brown, peeling off in papery scales; wood pinkish or pale red brown. Branches sympodial, younger ones ca 4 mm thick, hirsute, glabrescent. Leaf-scars amplexicaul, for about ½ single line, for ½ triangular with ca 20 leaf-traces in central part. *Leaves* elliptic, 12½—16 × 8—10 cm, with 17—19 nerves on either side; obtuse at apex, obtuse to rounded at base; margin entire to very slightly undulate, nerves rather straight, slightly curving upward near margin, bifurcate at ca ½ cm from margin, upward directed fork anastomising with downward directed one of next nerve; shortly hirsute with 0.2—0.5 mm long hairs above, more densely hirsute with thinner hairs, up to 1½ mm long, beneath. Petiole 5—5½ cm, glabrous above, hirsute beneath, with amplexicaul wings; wings broadly linear, 7—8 mm broad, with rounded apex slightly exceeding insertion

to petiole, glabrous above, hirsute beneath, wholly caducous. *Inflorescences* terminal, 6-flowered racemes, ca 6 cm long, with tortuous axis; axis $2^1/_2$—$1^1/_2$ mm thick, more densely hirsute than younger branches, without bracts. *Flowers* known only from buds. Pedicel up to 12 mm long, $1^1/_2$ mm thick, thickened to $2^1/_2$ mm at apex, hirsute like axis of inflorescence, without bracteoles. Sepals 5, outermost one ca 22 × 25 mm, enclosing about $^3/_4$ of bud, glabrous inside, hirsute outside, ciliate at margin; 4 inner ones smaller, but probably not fully developed. Petals 5. Stamens ca 60, strongly curved inward in bud, gradually decreasing in size towards centre of flower, 5—$2^1/_2$ mm long; filament $1^1/_2$—1 mm long, 0.5—0.3 mm broad; anther ca 0.6—0.4 mm broad, acuminate at apex; thecae linear. Staminodes within stamens ca 90, oblong, ca 1 mm long, 0.2 mm broad. Carpels 12, arranged around very broad conical (possibly narrower in older flower) receptacle, elliptic-oblong, ca 2 × 1 mm, glabrous, each with 12—14 ovules; styles spreading, ca 1 mm long. *Pseudocarps* unknown.

New Guinea: Terr. of New Guinea: a few miles SE of Tadji airstrip near Aitape, *L. S. Smith NGF 1229*, fl. Jan. 1945 (L).

Distribution. New Guinea, near Aitape.

Ecology. The type locality is at about 10 m altitude.

Vernacular names. *Ainedin* (But near Wewak).

Note. Though the type collection has only buds in a probably very young stage I have described the species as new as the structure of the androecium is so striking, that confusion with any other known species is impossible. This type of androecium has not been observed in any other *Dillenia*, whereas the differences cannot be explained as due to the age of the buds. In all other species the innermost stamens are about equally or further developed than the outermore ones already in very young stages.

32. Dillenia eximia Miq. 1860

Dillenia eximia Miq., Fl. Ind. Bat. Suppl., 1860, p. 620; Miq., Ann. Mus. Bot. Lugd. Bat. 4, 1868, p. 79; Merr., Bibl. En. Born. Pl., 1921, p. 383; Hoogl., Fl. Mal. I, 4, 1951, p. 166.

Dillenia crassisepala Martelli in Becc., Malesia 3, 1886, p. 156; Merr., Bibl. En. Born. Pl., 1921, p. 383.

Wormia scortechinii King, J. As. Soc. Beng. 58, II, 1889, p. 365.

Wormia kunstleri King, J. As. Soc. Beng. 58, II, 1889, p. 366.

Dillenia scortechinii (King) Ridl., J. Str. Br. R. A. S. 54, 1910, p. 7; Ridl., Fl. Mal. Pen. 1, 1922, p. 12.

Type specimens: *Dillenia eximia:* Teysmann 4402 HB, Kebang, Lampongs, Sumatra; holotype in U, isotypes in BZ, CAL, L. — *Dillenia crassisepala:* Beccari PB 2554, Mt Mattang, Sarawak, Sept. 1866; holotype in FI. — *Wormia scortechinii:* Scortechini 1864, Bujong, Malacca, March 1883; holotype in CAL, isotypes in BM, FI, K, L, SING, UC. — *Wormia kunstleri:* Kunstler 5905, Goping, Larut, Perak, April 1884; holotype in CAL, isotypes in K, SING.

Large deciduous trees, up to 40 m high, 70 cm thick, with up to 30 m straight bole and large buttresses, passing into stilt-roots up to 3 m high, 10 cm thick and running out to 5—6 m; crown dense, broad. Bark reddish, brownish, or greyish, smooth, not flaky, up to 12 mm thick. Sapwood and heartwood light yellow. Branches sympodial, younger ones 3—4 mm thick, densely shortly rigidly hirsute, glabrescent, when older with longitudinal fissures. Leaf-scars clasping about $^1/_2$ of branch, broadly

subfalcate with ca 13 leaf-traces about middle. *Leaves* elliptic to obovate, (10—)15—25(—35) × (6—)9—15(—18) cm, with (14—)18—28(—35) nerves on either side, on young trees and saplings much longer and relatively narrower, 35—75 × 13—25 cm, ca 45—80-nerved; rounded to obtuse, rarely somewhat acuminate at apex, obtuse to somewhat cordate at base; margin entire to undulate-dentate, nerves rather straight, ending in margin, often with small tuft of hairs at apex; glossy, shortly hirsute, glabrescent on intervenium, slightly to densely shortly hirsute on nerves, densely shortly hirsute on midrib above, sparsely to rather densely hirsute on intervenium, strigose-hirsute on nerves and midrib beneath. Petiole 3—7, on young trees and saplings up to 17 cm, glabrous above, densely shortly hirsute or strigose-hirsute beneath, more or less densely ciliate at margin. *Inflorescences* appearing with leaves, terminal, soon lateral, leaf-opposed, (3—)5—12(—18)-flowered, fasciculately branched, forming loose cluster with branches often partly coherent, often immediately at foot 2- or 3-branched; first internode $1^1/_2$—7 cm; branches $1^1/_2$—2 mm thick, 2—3 mm in fruit, hairy like younger sterile branches; bracts caducous, sessile, lanceolate, up to 12 × 3 mm. *Flowers* apetalous, ca $2^1/_2$ cm across, yellowish. Pedicel 5—15 mm, 1—$1^1/_2$ mm thick, hairy like branches of inflorescence, without bracteoles. Sepals 5, about circular, ca 9—12 × 9—11 mm, 3 outermost ones hirsute in apical part (up to 4 mm broad) and along margin, glabrous in central and basal part, 2 innermost ones wholly glabrous inside, all hirsute outside except in bud covered margins which are glabrous for breadth of ca 1 mm, ciliate at margin. Petals absent. Stamens ca 150—180, slightly curved in bud, all of about same length (innermost ones only very slightly longer), $4^1/_2$—$5^1/_2$ mm; filament white, 2—$3^1/_2$ mm long, longest in innermost stamens, 0.3—0.5 mm broad; anther ca 0.5 mm broad, obtuse at apex; thecae yellow, linear, opening with apical pore, ciliate at margin with few 0.2—0.3 mm long glassy hairs. Carpels (4—)5(—6), arranged around conical receptacle, white, oblong, ca $3^1/_2$ × $1^1/_2$ mm, glabrous, each with ca 30 ovules; styles spreading, white, flattened, ca 5 mm long, near base 0.5 mm thick, 0.6 mm broad, channelled above. *Pseudocarps* indehiscent, dark green, about globular, slightly appressed, ca 30 mm diam., 25 mm high including enclosing sepals, which are up to 40 × 27 mm, at base up to 8 mm thick; carpels ca 10 × 7 mm, 1(—2)-seeded. Seeds ovoid, $5^1/_2$ × $3^1/_2$ mm, glossy dark brown to black, with ca 0.2 mm long aril.

Siam: Nakawn Sritamarat: Kao Soi Dao, Patalung, *Kerr 19228*, fl. Apr. 1930 (BM).

Sumatra: *Korthals* (L, U). — Tapanuli: Sibolga, near Barus, *NIFS bb 31025*, fr. Dec. 1939 (A, BZ, L, SING). — Sum. W. Coast: Lubualung, *Teysmann 455 IIB* (BZ). — Sum. E. Coast: Panglong, Sungei Missigit, Bengkalis, *Beguin 569*, fl. & fr. Jan. 1920 (BZ, L). — Indragiri: Pulau Kedongon, Kuantan Distr., *NIFS bb 24828*, June 1938 (BZ, L, SING); Muara Pedjangki, Indr. Bovenl., *NIFS bb 27478*, Apr. 1939 (A, BZ, L); near Sungai Akar, Indr. Bovenl., *NIFS bb 28616*, July 1939 (BZ, L). — Djambi: Muara Sidjuan, *NIFS bb 12822*, Sept. 1928 (BZ). — Palembang: Riv. Rupit, W of Suka Radja, *Forbes 2974*, fl. 1881 (BM, CAL, FI, L, P, SING); Riv. Rupit, *Forbes 3002*, fl. 1881 (L); Lematang Ulu, *Grashoff 124*, Jan. 1915 (BZ); Banjuasin and Kubu Regions, *Grashoff 763*, Oct. 1915 (BZ, L); Ogan Ulu near Sugihwaras, *Alfiah TB 466*, Aug. 1921 (BZ); Banjuasin and Kubu Regions, *Thorenaar 95-E-1P-924*, fl. Oct. 1921 & Sept. 1922, fr. Feb. 1922 (BZ, L); ibidem, *Thorenaar 95-E-1P-760*, fl.

July 1922, fr. Aug. 1922, & veg. Dec. 1919 (BZ, L, WAG); *Thorenaar T-3P-873*, Dec. 1922, fr. Oct. 1923 & Jan. 1924 (BZ, CAL, K, L, WAG); *Thorenaar 95-E-3P-T898*, fr. Oct. 1923 & Jan. 1924 (BZ, K, L, SING, WAG); Lematang Ilir, Darmo, *NIFS bb 8728*, June 1925 (BZ); Ogan Ulu near Sugihwaras, *NIFS bb 20104*, fr. Nov. 1935 (BZ); Lematang Ilir, Semangus Res., *NIFS bb 31738*, May 1940 (A, BZ, L). — Lampong Distr.: Kebang, *Teysmann 4402 HB* (BZ, CAL, K, L); Tulangbawang, near Manggala, *NIFS bb 8467*, June 1925 (BZ). — Riouw-Lingga Arch.: Tandjong Pinang, *Teysmann* (BZ).

Malay Peninsula: Kedah: Terai Res., *Mal CF 17849*, fr. May 1929 (SING). — Perak: Larut, *Kunstler 5905*, fr. Apr. 1884 (CAL, SING); Waterloo, *Curtis 2685*, May 1890 (K); Parit For. Res., *Symington CF 39460*, fr. Apr. 1935 (SING). — Trengganu: Ulu Brang, *Moysey & Kiah SF 33458*, fr. July 1937 (SING); ibidem, *Moysey & Kiah SF 33708*, fr. July 1937 (SING). — Selangor: Sungai Bulok Res., *Abu CF 4904*, Aug. 1919 (SING). — Malacca: Bujong, *Scortechini 1864*, fl. March 1883 (BM, CAL, FI, L, SING). — Johore: Ulu Segun, Gunong Santi, *Corner*, Apr. 1936 (SING); Sungai Sedili, *Ngadiman SF 36854*, fr. July 1939 (A, BZ, SING). — Pulau Penang: The Sput, *Curtis*, Apr. 1890 (SING); *Curtis 2465*, fr. July 1890 (BM, CAL, SING). — Singapore (probably at least partly cultivated): Garden Jungle, *Ridley*, fr. 1894 (BM, CAL, K, SING); ibidem, *Ridley 6178*, fl. 1894 (CAL, BM, SING); Reservoir Jungle, *Corner*, June 1937 (SING); Bukit Timah, *Corner SF 34906*, fl. March 1938 (SING); Garden Jungle, *Nur SF 18197*, Nov. 1941 (SING); Bukit Timah, *Ngadiman*, Nov. 1947 (SING).

Borneo: NW. Borneo: Mt Mattang, Sarawak, *Beccari PB 2554*, fl. Nov. 1866 (FI); near Kuching, *Haviland 1517*, fr. (K, SING; hirsute form). — W. Borneo: Sungai Smittau, *Hallier 1292*, fr. July 1917 (BZ, L; hirsute form); Ketapang, near Muara Kojong Sungai Kelik, *NIFS bb 7489*, Oct. 1924 (BZ; hirsute form); Simpang, Lubukbatu, *NIFS bb 7388*, Oct. 1924 (BZ); Sanggau, Sungai Labai, *NIFS bb 7872*, Feb. 1925 (BZ); Sekadan, Tamang, *NIFS bb 8017*, March 1925 (BZ); Sanggau, near Ketatai, *NIFS bb 18572*, May 1934 (BZ, L); Melawi, near B. Water Emang (near Ng Betung), *NIFS bb 26864*, Feb. 1939 (A, BZ, L). — S. and SE. Borneo: Bandjermasin, *Motley 895*, fl. & fr. 1857—8 (K; hirsute form); Pleihari, near Asam-Djorong, *NIFS bb 9509*, fr. Nov. 1925 (BZ); Muaratewe, near Muhut, *NIFS bb 10080*, Aug. 1926 (BZ); Sampit, near Natainangka Katimpun, *NIFS bb 14075*, fr. (BZ). — E. and NE. Borneo: Bungalun Riv., *Butten 583*, Nov. 1912 (U); W. Kutai, Long Puhus, *Endert 4832*, fr. Nov. 1925 (BZ, K, L); W. Kutai, Long Djenau, *Endert 5077*, fr. Nov. 1925 (BZ, K, L); Bulungan, near Mara, *NIFS bb 10844*, Feb. 1927 (BZ); W. Kutai, near Longbleh, *NIFS bb 16119*, Nov.—Dec. 1931 (BZ, SING); ibidem, *NIFS bb 16144*, Nov.—Dec. 1931 (A, BZ, L); W. Kutai, Bukitlajang, *NIFS bb 16251*, Dec. 1931 (BZ, L, SING); ibidem, *NIFS bb 16256*, Dec. 1931 (BRI, BZ, SING); W. Kutai, near Longbleh, *NIFS bb 16140*, Nov.—Dec. 1931 (BZ, L); W. Kutai, *NIFS bb 17140*, Nov.—Dec. 1931 (A, L). — Br. N. Borneo: Beaufort (Jesselton Int. Distr.), *Cuadra BNB A 1358*, Apr. 1948 (SING).

Cultivated: Bot. Gard. Bogor (from Borneo): no IV-G-9, fl. (BZ).

Distribution. Sumatra, Malay Peninsula, and Borneo.

Ecology. In primary and old secondary forests at low altitudes (up to 300 m). Flowering in the Malay Peninsula from March to May, fruiting from April to July; in Sumatra and Borneo flowering from July to November, fruiting from July to January.

Vernacular names. Sumatra: *Ampalu* (Sum. W. Coast); *Simar timbaho darat* (Bataks, Tobo); *Mĕmpĕlu* (Sum. E. Coast); *Bira, Gawal, Gawar* (Indrag.); *Bawal* (Djambi); *Djangkang, Sedjerangkong, Simpur, S. kidjang, S. rawang* (Palemb.); *Simpur ajer* (Lamp.). Mal. Pen.: *Merah, Simpoh, S. jangkang* (= stilted s.). Borneo: *Entepung rimba* (Malay); *Beriga, Berige, Djonging, Kadjang, Kajo pajan, Keruing paya, Ketang bajut, Markadjang, Reriga, Riga, Soretang, Suretang, Tampuro, Tempuru* (Dajak Malay).

Notes. 1. *Dillenia eximia* Miq. was based on leaves from a sapling

or young tree only. These leaves certainly belong to the species as concepted here. The occurrence of longer, narrower leaves in saplings and young plants is generally found in *Dillenia*. I have seen leaves of intermediate size and shape in flowering specimens, e. g. in the material from the tree, cultivated in the Botanic Garden at Bogor.

2. A few specimens are distinctly more hirsute than the species usually is. They are all from Borneo (*Haviland 1517, Hallier 1292, NIFS bb 7489, Motley 895*). In habit these specimens strongly resemble *D. reticulata* and to my idea it is impossible to distinguish with certainty the hirsute form of *D. eximia* from *D. reticulata* if only sterile material is available. Under *D. reticulata* a number of specimens will be cited which belong to one of these two species, but can not be identified at the moment as the material is sterile (p. 80). The flowers and fruits have perfect characters for identification (structure of the androecium; presence or absence of petals; number of carpels), whereas I have not seen the nearly glabrous state, which is the commonest one in *D. eximia*, in *D. reticulata*.

33. Dillenia reticulata King 1889

Dillenia reticulata King, J. As. Soc. Beng. 58, II, 1889, p. 367; Ridl., Fl. Mal. Pen. 1, 1922, p. 11; Craib, Fl. Siam. En. 1, 1925, p. 25; *Foxw., Mal. For. Rec. 3, 1927, p. 148 (with 2 plates); Burk., Dict. Econ. Prod. Mal. Pen., 1935, p. 810; *Hoogl., Fl. Mal. I, 4, 1951, p. 168, fig. 11.

Wormia mollissima Boerl., Cat. Hort. Bogor., 1899, p. 5.

Type specimens: *Dillenia reticulata:* Scortechini 1840, Dipong, March 1883; holotype in CAL, isotype in K. — *Wormia mollissima:* Cultivated in Hort. Bogor., no IV-G-23, from Bonjong Wakka, Lampong Distr., Sumatra; holotype in BZ, isotype in BZ, CAL, FI, L, US.

Large deciduous trees, up to 40 m high, 70 cm thick, with straight bole, up to 30 m, with conspicuous stilt-roots to ca 2 m high. Bark brown. Branches sympodial, younger ones 4—7 mm thick, densely shortly hirsute, glabrescent, older ones with transverse and longitudinal fissures. Leaf-scars rather close to each other, clasping about $^1/_2$ of branch, subfalcate with ca 11 leaf-traces about middle of scar. *Leaves* elliptic or elliptic-oblong to obovate, (10—)15—30(—45) × (6—)10—20(—28) cm, with (16—)25—35(—40) nerves on either side, on saplings and young trees up to 90 cm long; rounded to slightly emarginate at apex, obtuse to rounded or slightly cordate at base; margin entire to slightly undulate-dentate, nerves only very slightly curving upward, ending in margin, often with small tuft of hairs at apex; shortly tomentose-hirsute on intervenium, densely so on nerves and midrib, more or less glabrescent above, rather densely shortly hirsute on intervenium, nerves, and midrib beneath. Petiole 4—10 cm, slightly winged with up to 2 mm broad, non-amplexicaul wings, glabrous above, densely shortly hirsute beneath, hairs increasing in length towards margins. Inflorescences terminal, soon lateral, leaf-opposed, (3—)5—10(—15)-flowered, fasciculately branched, forming loose cluster with branches often partly coherent, often immediately at foot 2- or 3-branched; up to 15 cm long, first internode up to 6 cm; branches 4—2 mm thick, rather densely shortly tomentose; bracts caducous, triangular, up to 10 × 6 mm. *Flowers* ca 8 cm across. Pedicel $1^1/_2$—4 cm, $1^1/_2$—2 mm thick, thickened to 3—4 mm at apex, densely shortly tomentose,

without bracteoles. Sepals 5, broadly oval, ca 20—25 × 16—20 mm, glabrous inside except densely shortly hirsute margin, up to 5 mm broad at apex, gradually narrowing downward, rather densely shortly hirsute outside, ciliate at margin. Petals 5, yellow, obovate, ca 35 × 16 mm, rounded at apex, narrowed towards base. Stamens ca 400—440, all slightly curved in bud, those of outer whorl ca 11 mm long with 8 mm long filament, outermost ones within this whorl ca 5 mm long, with 1 mm long filament, size thence gradually increasing towards centre of flower, innermost ones ca 9 mm long with 4 mm long filament; filament 0.3—0.6 mm broad, gradually narrowing towards anther; anther ca 0.6 mm broad, rounded to obtuse at apex; thecae linear, opening with apical pore. Carpels 9—10, arranged around conical receptacle, lanceolate, ca 6 × $1^1/_2$ mm, densely hirsute in apical part or glabrous, each with 50—70 ovules; styles spreading, cylindric, 5—6 mm long, 0.5 mm thick near base, 0.2 mm near apex, channelled above. *Pseudocarps* indehiscent, greenish yellow, about globular, ca $3^1/_2$ cm diam., 3 cm high including enclosing sepals which are up to 45 × 42 mm, up to 6 mm thick at base; carpels ca 16 × $8^1/_2$ mm, 1—3-seeded. Seeds ovoid, ca $3^1/_2$ × $2^1/_2$ mm, glossy black, with ca 0.2 mm long aril.

var. reticulata

Dillenia reticulata King 1889, l. c..

Carpels densely hirsute in apical part.

Malay Peninsula: Malacca: Dipong, *Scortechini 1840,* fl. March 1883 (CAL, K); *Maingay 1620 (Kew Distr. 8),* fl. 1865—6 & May 1868 (CAL, GH, K, L).

var. psilocarpella Hoogl. var. nov.

Dillenia reticulata var. psilocarpella Hoogl., Fl. Mal. I, 4, 1951, p. 168, descr. angl.. — *Wormia mollissima* Boerl. 1899, l. c.. — Differt a var. reticulata carpellis glabris.

Type specimen: Henderson SF 21801, Tembeling, Pahang, 12 July 1929; holotype in K, isotypes in BM, BZ, DD, IFI, MO, NY, SING.

Carpels wholly glabrous.

Malay Peninsula: Perak: Sungai Brotal, *Taohun CF 39256,* fr. Feb. 1935 (SING). — Pahang: Tembeling, *Henderson SF 21801,* fr. July 1929 (BM, BZ, DD, IFI, K, MO, NY, SING). — Selangor: Kwala Lumpur, *Curtis 2312,* fl. Feb. 1890 (CAL, SING); Weld's Hill, Kwala Lumpur, *Ahmad CF 5024,* fl. March 1920 (SING); Ulu Gombak, *Strugnell CF 12695,* fl. March 1927 (SING). — Johore: Sungai Segun, Gunung Panti, *Corner SF 30678,* fl. Apr. 1936 (SING).

Sumatra: Palembang: Tandjong Ning, *Forbes 2832,* fr. 1881 (BM, GH, L); Riv. Rawas, Muara Mengkulem, *Forbes 3040a,* fr. 1880 (BM, CAL, L).

Borneo: S. & SE. Borneo: Tanah Bumbu, near Baru Srigadung, *NIFS bb 14208,* fr. Jan. 1930 (BZ). — E. and NE. Borneo: Balikpapan, near Riko, Gunung Haping, *NIFS bb 14961,* fr. Nov. 1930 (BZ, L).

Cultivated: Bot. Gard. Bogor (from Sumatra, Lamp.): *Beccari,* 1876 (FI); no IV-G-23, fr. & veg. (BZ, CAL, L, US). — Publ. Gard., Kwala Lumpur: *Meh CF 10316,* fr. June 1925 (E).

Distribution. Sumatra, Malay Peninsula, and Borneo; *var. psilocarpella* throughout the area of the species, *var. reticulata* known only from Malacca.

Ecology. In forests at low altitudes (up to 200 m), usually at swampy localities. The stilt-roots are also developed when the species grows on dry habitat. In general the flowering- and fruiting-time agree with that of *D. eximia*; besides the species was collected in fruit in the Malay Peninsula in February.

Vernacular names. Malay Peninsula: *Simpoh jangkang* (= stilted s.), *S. paya* (= marsh s.). Borneo: *Simpur, Tempuran.*

Note. In vegetative state the species can hardly be distinguished from hirsute forms of *D. eximia* (cf. under that species). The following specimens, known only from leaf-collections, are such forms, most probably referable to the present species:

Sumatra: Sum. W. Coast: Painan, near Duku, *NIFS bb 3122*, March 1922 (BZ, L). — Sum. E. Coast: Sungai Kuning, *Koorders 10291β*, March 1891 (BZ); Sigati, *Koorders 10289?*, March 1891 (BZ; type of *Dillenia rhizophora* Boerl. & Koord., cf. p. 135); Siak Sri Indrapura, near Tuassei, *NIFS bb 3614* (BZ, L); Selatpandjang, Penjengat, *NIFS bb 21524*, Oct. 1936 (BZ, L). — Indragiri: Kuantan Distr., Djake, *NIFS bb 26498*, Dec. 1938 (A, BZ, L).

Malay Peninsula: Perak: Kuala Kangsar, *Osman CF 7046*, Feb. 1922 (SING). — Pahang: Kamansul Res., Temerloh, *Hamid CF 10687*, Oct. 1925 (SING).

Borneo: W. Borneo: Kapuas, Selimbau, *Teysmann 8147 HB* (BZ); Ulu Kenepai, *Hallier 1460*, 1893—4 (BZ, L). — S. & SE. Borneo: Gunung Pamatton, Martaraman, Riam, etc., *Korthals* (L); Tanah Bumbu, Baru, *NIFS bb 13044*, Dec. 1928 (BZ). — E. & NE. Borneo: W. Kutai, Kombeng, *Endert 5176*, Nov. 1925 (BZ, L); Balikpapan, Sepaku, *NIFS bb 24646*, June 1938 (A, BZ, L); Balikpapan, Sepan, *NIFS bb 25596*, Aug. 1938 (BZ).

34. Dillenia borneensis Hoogl. spec. nov.

Dillenia aurea Auct. non Sm.; Martelli in Becc., Malesia 3, 1886, p. 155.

Dillenia borneensis Hoogl., Fl. Mal. I, 4, 1951, p. 166, descr. angl..

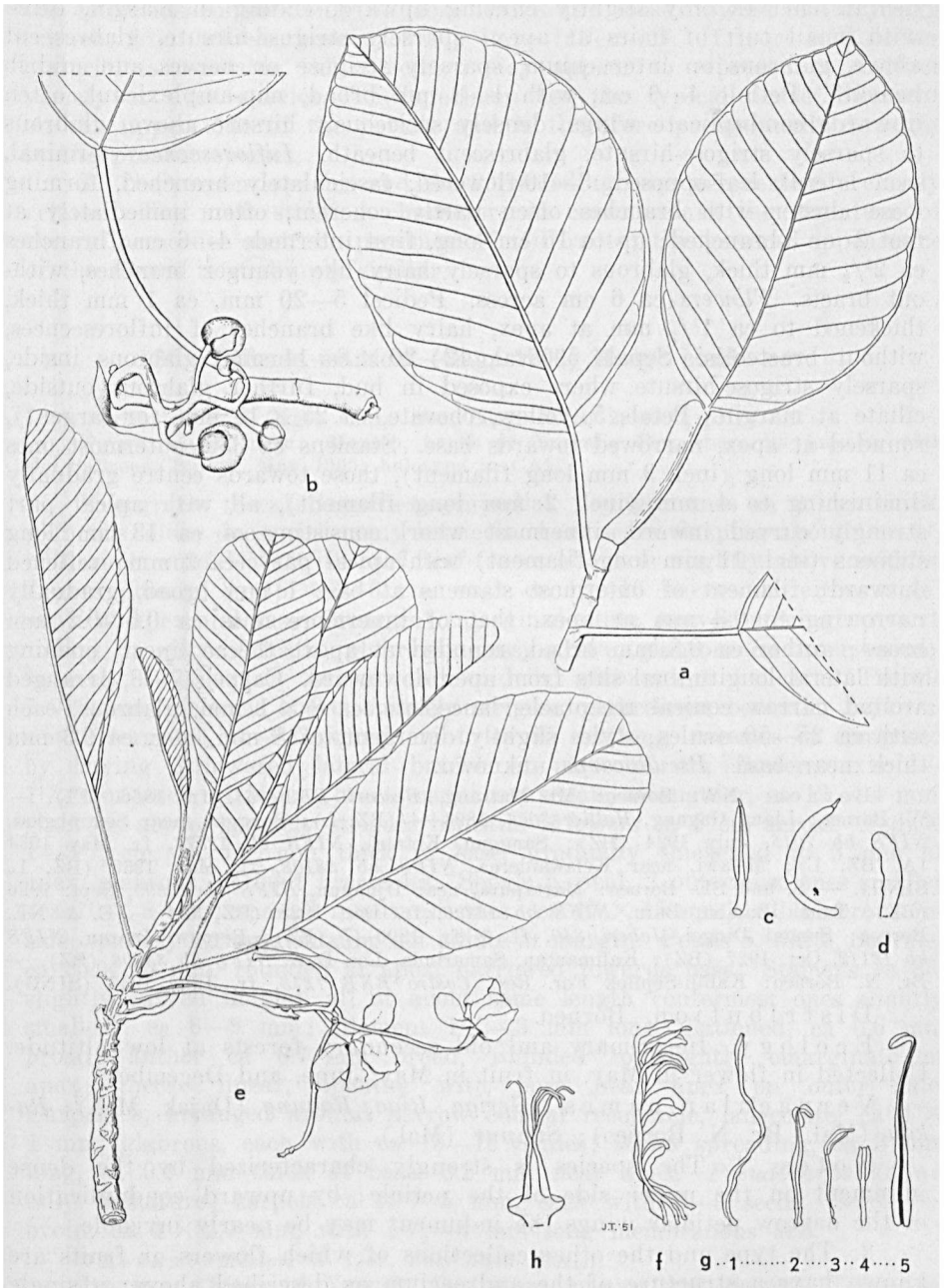
Type specimen: NIFS bb 28108, Melawi, W. Borneo, 18 May 1939; holotype in L, isotypes in A, BZ, K, NY, SING.

Descriptio typi: Rami novelli glabri; cicatrices semi-lunulares, ramum dimidio amplectentes. Folia juvenilia obovata vel elliptica, usque ad 12 × 7½ cm, 14—29-nervata, apice rotundata, basi obtusa decurrente, margine minute dentata. Petiolus usque ad 7 cm, supra dense sericeus, subtus glaber. Inflorescentia terminalis, mox lateralis, basi trifurcata. Flores ad 6 cm diam., pedunculo 5—20 mm longo. Sepala 5, 12—20 × 8—14 mm. Petala 5, in alabastro ad 25 × 15 mm. Stamina ca 335, exteriora ca 11 mm longa filamento 9 mm longo, apice intus curvata, longitudine in staminibus interioribus deminuente usque ad 4 mm longa filamento 2 mm longo, verticilli intimi stamina ca 13 mm longa filamento 11 mm longo, apice (2 mm) recurvata. Carpella 8, glabra, lanceolata, ca 8 × 1 mm, ca 25-ovulata, stylis divergentibus ca 8 mm longis.

Fig. 9 e—h, p. 81.

Deciduous trees, up to ca 36 m high, 70 cm thick, with stilt-roots. Branches sympodial, younger ones ca 4 mm thick, glabrous to sparsely strigose-hirsute, glabrescent. Leaf-scars clasping about ½ of branch, semi-lunular with ca 15 leaf-traces about middle. *Leaves* elliptic to elliptic-oblong or obovate, (12—)25—40 × (7½—)12—20 cm, with (14—)25—35 nerves on either side; rounded, sometimes slightly retuse at apex, obtuse, often slightly unequal-sided at base, decurrent; margin minutely undulate-

Fig. 9 — a, b, c, d. *Dillenia fagifolia* Hoogl. (p. 74); a. vegetative branch, × ⅜; b. inflorescence, × ⅘; c. stamen as seen from the centre of the flower and from aside, × 4; d. staminode, × 12; all after type specimen; e, f, g, h. *Dillenia borneensis* Hoogl. (p. 80); e. flowering branch with inflorescence with flowers in bud and young leaves, × ⅜; f. stamens from the outer group as present in the nearly open flower, × 2½; g. stamens in sequence from outside towards the centre of the flower, 1—4: stamens of the outer group, 5: stamen of the inner group, × 2½; h. gynoecium, longitudinal section, × 1¼; all after type specimen.


b
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dentate, nerves only slightly curving upward, ending in margin, often with small tuft of hairs at apex; sparsely strigose-hirsute, glabrescent above, glabrous on intervenium, sparsely strigose on nerves and midrib beneath. Petiole 4—9 cm, with 1—3 mm broad, non-amplexicaul, often upwards conduplicate wings, densely sericeously hirsute above, glabrous to sparsely strigose-hirsute, glabrescent beneath. *Inflorescences* terminal, soon lateral, leaf-opposed, 3—10-flowered, fasciculately branched, forming loose cluster with branches often partly coherent, often immediately at foot 2- or 3-branched; up to 15 cm long, first internode 4—6 cm; branches ca $2^1/_2$ mm thick, glabrous to sparsely hairy like younger branches, without bracts. *Flowers* ca 6 cm across. Pedicel 5—20 mm, ca 1 mm thick, thickened to ca $1^1/_2$ mm at apex, hairy like branches of inflorescences, without bracteoles. Sepals 5, oval, 12—20 × 8—14 mm, glabrous inside, sparsely strigose-hirsute where exposed in bud, further glabrous outside, ciliate at margin. Petals 5, yellow, obovate, ca 25 × 15 mm (or larger?), rounded at apex, narrowed towards base. Stamens ca 335, outermost ones ca 11 mm long (incl. 9 mm long filament), those towards centre gradually diminishing to 4 mm (incl. 2 mm long filament), all with apical part strongly curved inward, innermost whorl consisting of ca 13 mm long stamens (incl. 11 mm long filament) with apical part (ca 2 mm) reflexed outward; filament of outermost stamens at base 1 mm broad, gradually narrowing to 0.3 mm at apex, that of innermore ones ca 0.6—0.2 mm broad; anther ca 0.8 mm broad, rounded at apex; thecae linear, opening with lateral longitudinal slits from apex downward. Carpels 7—8, arranged around narrow conical receptacle, lanceolate, ca 8 × 1 mm, glabrous, each with ca 25—50 ovules; styles slightly divergent, ca 8 mm long, ca 0.3 mm thick near base. *Pseudocarps* unknown.

Borneo: NW. Borneo: Mt Mattang, *Becoari PB 4064*, fr. 1866 (FI). — W. Borneo: Liang Gagang, *Hallier 3066*, 1893—4 (BZ, L); Sanggau, near Semrangkai, *NIFS bb 7015*, July 1924 (BZ); Sanggau, Ketatai, *NIFS bb 18571*, fr. May 1934 (A, BZ, L); Melawi, near Kelawaideras, *NIFS bb 28108*, fl. May 1939 (BZ, L, SING). — S. and SE. Borneo: Martapura, near Djungun, *NIFS bb 10399*, Sept. 1926 (BZ); Tanah Bumbu, Baru, *NIFS bb 13396*, fr. Dec. 1928 (BZ, L). — E. & NE. Borneo: Sungai Dingei, *Jaheri 840*, fl. & fr. 1896—7 (BZ); Berouw, Inaran, *NIFS bb 12112*, Oct. 1927 (BZ); Kalimantan, Samarinda, Loa Duri, *NIFS bb 33706* (BZ). — Br. N. Borneo: Kabili-Sepilok For. Res., *Castro BNB 7273*, fr. June 1937 (SING).

Distribution. Borneo.

Ecology. In primary and old secondary forests at low altitude. Collected in flower in May, in fruit in May, June, and December.

Vernacular names. *Geriga, Riga, Rogung* (Dajak, Mal.); *Rakau* (Mal., Br. N. Borneo); *Simpur* (Mal.).

Notes. 1. The species is strongly characterized by the dense indument on the upper side of the petiole; by upward conduplication of the narrow petiolar wings the indument may be nearly invisible.

2. The type and the other collections of which flowers or fruits are known have a structure of the androecium as described above; a single exception is *Jaheri 840*, where the structure of the androecium is as follows: Stamens in 2 distinct groups, larger outer group (ca 165) slightly curved in bud, ca 7 mm long, smaller inner group (ca 22) with apical part reflexed outward in bud, ca 9—13 mm long. Unfortunately

the collection consists only of loose leaves and loose flowers and a young branch, from which these probably have fallen off. If more and better material is available this specimen may appear to represent a distinct variety or even species. The specimen has the typical dense indument on the upper side of the petiole and is therefore preliminarily brought to the present species.

3. The present species and the 2 preceding ones are certainly closely related. The most striking characters in common are the structure of the inflorescence and the presence of stilt-roots; the general appearance of the leaves is strikingly similar.

35. Dillenia mansoni (Gage 1906) Hoogl. comb. nov.

Wormia mansoni Gage, J. As. Soc. Beng. N. S. 2, 1906, p. 73.

Type specimen: Manson, banks of Yunzalin Riv. above its junction with the Salween, Burma, May 1905; holotype in CAL.

Evergreen, trees? Branches sympodial, younger ones ca 2 mm thick, glabrous, older ones with many lenticels. Leaf-scars clasping about $^1/_2$—$^2/_3$ of branch, subfalcate with ca 7 leaf-traces about or slightly above middle. *Leaves* oblong, 8—16 × 3—6 cm, with ca 12—16 nerves on either side; acute at apex and base, decurrent; margin dentate, nerves curving upward, ending in apex of teeth; glabrous, glossy above, glabrous on intervenium, sparsely strigose on nerves and midrib, glabrescent beneath. Petiole 7—15 mm, glabrous above, sparsely strigose, glabrescent beneath. *Inflorescences* terminal, 3—9-flowered, up to ca 15 cm long, racemes or composed by having 3-flowered lateral branch at place of 4th flower; axis 2—$1^1/_2$ mm thick, glabrous; bracts caducous, sessile, triangular, ca 12 × 4 mm, glabrous above, sparsely strigose beneath. *Flowers* ca 5 cm across. Pedicel 1—$3^1/_2$ cm, ca $1^1/_2$ mm thick at base, gradually thickened to 5 mm at apex, glabrous, without bracteoles. Sepals 5, oval, 2 outermost ones smaller (ca 10 × 8 mm) than 3 innermost ones (ca 17 × 15 mm), all glabrous inside, sparsely strigose outside, not ciliate at margin. Petals 5, white, obovate, ca 25 × 15 mm, rounded at apex, narrowed towards base. Stamens ca 85, slightly curved in bud, all of about same length (outermost ones slightly smaller), ca 6—9 mm; filament $1^1/_2$—3 mm long, flattened, ca 0.6 mm broad; anther ca 0.7 mm broad, rounded to slightly emarginate at apex; thecae linear, opening with pore near apex on outer side. Carpels 5, arranged around narrow conical receptacle, lanceolate, ca 4 × 1 mm, glabrous, each with ca 15—18 ovules; styles spreading, ca 3 mm long, ca 0.4 mm thick at base, 0.2 mm near apex. *Pseudocarps* known only immature; carpels ca 10 × 5 mm, each with 3—5 seeds. Seeds obovoid, ca 4 × 2.7 mm, with $1^1/_2$—3 mm long membranous aril.

?Assam: *Masters N 1737*, July 1845 (CAL).

Burma: Banks of Yunzalin Riv. above junction with Salween, Tenasserim, *Manson*, fl. May 1905 (CAL).

Distribution. Burma and ? Assam. The Assam specimen is sterile and referred here with some doubt.

Ecology. The type specimen was collected on a riverbank.

36. Dillenia bracteata Wight 1840

Dillenia bracteata *Wight, Ic. Pl. Ind. Or. 2, 1840, t. 358; Hook.f. & Thoms., Fl. Br. Ind. 1, 1872, p. 37; Watt, Dict. Econ. Prod. Ind. 3, 1890, p. 112; Brandis, Ind. Forester 26, 1900, p. 430; Brandis, Ind. Trees, 1906, p. 3; Gamble, Fl. Pres. Madr. 1, 1915, p. 7.

Wormia bracteata (Wight) Hook.f. & Thoms., Fl. Ind. 1, 1855, p. 68; Drury, Handb. Ind. Fl. 1, 1864, p. 12; *Beddome, Fl. Sylv. 1, 1869, t. 115.

Type specimen: Wight 13, Peninsula Ind. Orient.; holotype in K, isotypes in CAL, GH.

Large evergreen trees. Branches sympodial, younger ones 2—3 mm thick, densely tomentose-hirsute with short yellowish hairs, glabrescent. Leaf-scars clasping about $^2/_5$—$^1/_2$ of branches, subfalcate with ca 9 leaf-traces slightly above middle, with on both sides a short single line directed lateralward. *Leaves* elliptic to oblong or obovate, (5—)10—17(—20) × (2.7—)5—10(—12) cm, with (10—)14—20 nerves on either side; slightly retuse or rounded to obtuse, sometimes slightly acuminate at apex, obtuse to acute at base, decurrent; margin slightly undulate to dentate, nerves slightly curving upward, ending in apex of teeth or otherwise in margin; sparsely shortly hirsute on intervenium, less sparsely so on nerves, rather densely so on midrib, more or less glabrescent above, slightly more densely so and less soon glabrescent beneath. Petiole 15—30(—40) mm, densely shortly hirsute, glabrescent, with non-amplexicaul, up to $1^1/_2$ mm broad wings. *Inflorescences* terminal, 2—3(—6)-flowered racemes, up to ca 7 cm long; axis ca 2 mm thick, densely hirsute like younger branches; bracts caducous, sessile, lanceolate, ca 8—12 × 3—4 mm, acute at apex, or spathulate, ca 10—17 × 4—7 mm, rounded at apex, more or less densely shortly hirsute on both sides, most densely so beneath. *Flowers* ca 9 cm across. Pedicel 4—10 mm, ca 1—$1^1/_2$ mm thick, thickened to 2—$2^1/_2$ mm at apex, densely hirsute like axis of inflorescence, without or with 1—2 caducous bracteoles; bracteoles sessile, lanceolate, ca 5 × 2 mm. Sepals 5, 2 outermost ones ovate, ca 20 × 13 mm, 3 innermost ones oval, ca 25 × 16 mm, glabrous, 2 outermost ones with 1—2 mm broad sparsely sericeous upper part inside, densely sericeous outside except in bud covered margins, which are glabrous for breadth of up to $2^1/_2$ mm, all ciliate at margin. Petals 5, yellow, obovate, ca 40 × 25 mm, rounded at apex, narrowed towards base. Stamens ca 230, slightly curved in bud, all of about same length, ca 9 mm; filament ca 3 mm long, ca 0.3 mm broad; anther ca 1.0 mm broad, rounded or slightly emarginate at apex; thecae linear, opening with pore near apex on outer side. Carpels 5, arranged around rather narrow conical receptacle, oblong, ca 6 × $2^1/_2$ mm, glabrous or hirsute with ca 0.5 mm long, rather thin, appressed hairs, mainly in upper part, each with ca 30 ovules, in lower part in 2 double rows; styles for lower 3—4 mm parallel, above this spreading, ca 9 mm long, ca 0.5 mm thick at base, 0.2 mm near apex, channelled above. *Pseudocarps* indehiscent, about globular, ca $2^1/_2$—3 cm diam. including enclosing sepals which are up to ca 30 × 20 mm; carpels ca 9 × 6 mm, each with 0—1 seeds. Seeds obovoid, ca 5 × $4^1/_2$ mm, dark reddish brown to black, arillate.

India: fl. & fr. (K); *Wight 13*, fl. (CAL, GH, K). — Malabar: Wynaad, *Beddome 41*, fl. (BM); Anaimalais, *Beddome 42*, fl. (BM); Coorg, March 1921 (DD); Chomdanthode, Wynaad Range, Manantoddy, *For. Res. Rang. 335*, fl. Feb. 1936 (DD);

ibidem, *Bor 8506 & 8507*, fl. Dec. 1937 (DD); ibidem, *For. Res. Rang.*, fr. March 1938 (DD). — Madras: Kambakan slopes, *Nagara Menon*, fl. & fr. May 1914 (K); Kambakan Hill, Chingleput Distr., *Fischer 4719*, fl. Feb. 1922 (CAL); ibidem, *Fischer 4787*, fl. Apr. 1923 (CAL).

Ceylon: *Wight*, fr. 1836 (E).

Distribution. Deccan Peninsula, known from two regions, viz. the Nilgiris on the W. coast and Kambakan Hill near Madras on the E. coast. The Ceylon record is probably due to an error.

Ecology. In forests; the altitude has been noted only once: 700 m in the Anaimalais. Flowering from December to May.

Vernacular name. *Kate gunna* (Malayalam).

Note. *Dillenia repanda* Roxb. 1832, described from Hindoostan, comes near to the present species. The description is absolutely insufficient for identification and I have seen no type specimen. If it would appear to be identic, the correct name for the present species will have to be changed. Hook.f. & Thoms. (1855) reduced it with some doubt to the present species without changing the name.

37. Dillenia hookeri Pierre 1879

Dillenia hookeri *Pierre, Fl. For. Cochinch. 1, 1879, t. 5; Laness., Pl. Util. Col. Fr., 1886, p. 281; Fin. & Gagnep., Bull. Soc. Bot. Fr. Mém. 4, 1906, p. 9; Fin. & Gagnep., Fl. Gén. Ind.-Ch. 1, 1907, p. 20; Craib, Fl. Siam. En. 1, 1925, p. 22; Gagnep., Suppl. Fl. Gén. Ind.-Ch. 1, 1938, p. 21; Hoogl., Fl. Mal. I, 4, 1951, p. 168.

Type specimen: Pierre 663, Knang Repoeu Mtn, Tpong Prov., Cambodia, June 1870; lectoholotype in P.

Evergreen trees, ca 10—15 m high, or, usually, shrubs, about 1—2 m high. Wood reddish. Branches sympodial, younger ones 3—5 mm thick, densely silky hirsute, later on hairs more appressed to glabrescent. Leaf-scars clasping about $^1/_2$ of branch, subfalcate with emarginate upper margin, with ca 13 leaf-traces about middle. *Leaves* oblong to oblanceolate, (15—)17—22(—30) × (5$^1/_2$—)7—9(—14) cm, with (22—)30—40(—45) nerves on either side; rounded, sometimes slightly acuminate at apex, acute at base, decurrent; margin entire to slightly dentate, nerves slightly curving upward, ending in apex of teeth or otherwise in margin, at apex with small tuft of hairs; rather densely velvety tomentose, most densely so on nerves, with 1—2 mm long hairs directed towards margin approximately parallel to nerves, glabrescent above, more densely velvety tomentose with hairs slightly more distant, not glabrescent beneath. Petiole 1$^1/_2$—4 cm, densely sericeous, with 1(—2) mm broad, non-amplexicaul wings, in base of blade gradually narrowing into midrib. *Flowers* solitary, terminal, rarely 2 together, ca 4—5 cm across. Pedicel 1$^1/_2$—4 cm, ca 2 mm thick, thickened to ca 3 mm at apex, densely sericeous with rather distant hairs, with 3 approximately verticillate bracteoles 4—8 mm below flower; bracteoles sessile, lanceolate, 20—35 × 7—10 mm, acute or often more or less truncate at apex, base slightly decurring along pedicel, with entire margin, densely silky hairy on both sides, ciliate at margin. Sepals 5—6, ovate to oval, ca 15 × 10 mm, glabrous inside, densely sericeous outside, densely ciliate at margin. Petals 5, yellow, obovate, ca 25 × 13 mm, rounded at apex, narrowed towards base. Stamens ca 190, slightly curved in bud, all of about same length, 8—10 mm; filament flattened,

3—4 mm long, ca 0.5 mm broad; anther ca 0.8 mm broad, emarginate with sharp edge at apex, incision 0.3—0.5 mm deep; thecae linear, opening with apical pore. Carpels 6—7, arranged around narrow conical receptacle, oblong, ca $5 \times 1^1/_2$ mm, glabrous, each with ca 18 ovules; styles spreading, cylindric, ca 11 mm long, 0.4—0.2 mm thick. *Pseudocarps* indehiscent, about globular, 2—$2^1/_2$ cm diam. including enclosing sepals, which are up to ca 25×14 mm; carpels ca 14×6 mm, 1—5-seeded. Seeds obovoid, ca $3^1/_2 \times 3$ mm, exarillate.

Siam: Pitsanulok: Nakawn Tai, *Kerr 5844*, fl. Apr. 1922 (BM, E, K, P). — Ubon: Ban Mawng, *Lakshnakara 912*, fl. June 1932 (BM, K). — Rachasima: Lam Nang Rawng, *Suksakorn 924*, fl. March 1920 (K). — Surat: Kanchanaclit, *Kerr 13077*, fl. Aug. 1927 (BM, K). — Puket: Satul, *Kerr 13695*, fl. Dec. 1927 (BM). — Nakawn Sritamarat: Singora, *Vanpruk 797*, fl. Nov. 1915 (K).

Indo-China: Laos: Kilo 90 de la route de Savannakhet à Quâng Tri, *Poilane 11594*, fr. Jan. 1925 (P); Paksane, Wieng Chan, *Kerr 20730*, fl. March 1932 (BM, K, P). — Cambodia: Angkor & Oudang, *Thorel 657*, fl. & fr. 1866—8 (BZ, K, P); near Knang Repoeu Mtn, *Pierre 663*, fr. March 1870 (K, P); Samrongtong Prov., *Pierre 663*, fl. March 1870 (K); near Knang Repoeu Mtn, *Pierre 663*, fl. May 1870 (A, L); ibidem, *Pierre 663*, fr. June 1870 (P); Kompong Chhnang, *Godefroy 181 (Exp. Harmand)*, fl. June 1875 (NY, P); Babaur, *Coudere*, fl. 1883—5 (P); Phou Tock, *Hahn 31* (P); *Gourgand 4, 5, & 7*, fl. 1907 (P); Pnom Penh, *d'Alleizette*, fl. June 1909 (L); Angkor, *d'Alleizette*, fl. June 1909 (L); *Magnien & Gourgand*, fl. (P); Kilo 169 route de Frimbell, *Poilane 464*, fl. Aug. 1919 (P); Kompong Chhnang, *Pételot*, fl. & fr. July 1921 (P); *Pételot 4698*, fl. (UC); between Samrong & Anlong Vehg, *Poilane 13843*, fl. (P); between La Khang Chocung & Po Bong, Sre Umbell Prov., *Poilane 15292*, fl. (P); Pnog Penh, *Béjaud 856*, fl. & fr. (P); Kadak, W of Kampot, *Poilane 27321*, fl. June 1938 (P). — Cochinchina: *Thorell 657*, fr. 1862—6 (P); *Thorell 1566*, fr. 1862—6 (BM, BR, E, G, K, NY, P); Chu Drau Mat, Saigon Prov., *Pierre 663*, fl. March 1865 (L); Baria, *Pierre 663*, fl. Dec. 1866 (P); between Tay Ninh & Soui Da, *Pierre 663*, fl. March 1867 (K); *Talmy*, fl. 1868 (P); near Lakkone, *Counillon* fl. 1890 (P); Cap St Jacques, Saigon, *Docters van Leeuwen 4810*, fl. & fr. Oct. 1920 (BZ); Saigon, *Evrard 168*, fl. & fr. Oct. 1920 (P); near Hon Quan, *Evrard 811*, fl. Apr. 1922 (P).

Malay Peninsula: Singapore: *Cantley*, fl. (SING).

Distribution. Siam, S to Satul, and Indo-China, N to ca 17° N. I do not believe that the Singapore record is reliable. The only data on the label are the collector and the printed title "Flora of Singapore".

Ecology. In deciduous forests, in savannahs, and on open grassy ground, at low altitudes.

Vernacular names. Siam: *San noi* (Siamese & Lao; Pitsanulok), *San tao* (Surat), *Sam taie* (Ubon), *San bad* (Rachasima), *Plu sabat* (Khmer). Indo-China: *Plou bat, So bac, So nho, So trang.*

Uses. The species is suitable as an ornamental shrub. The wood is sometimes used, e. g. for the manufacture of buffalo-bells (Pierre 1879). Used as a medicine against cancer? ("contre la plaie", *Hahn*).

Note. Pierre describes and figures the androecium as consisting of stamens of two different lengths; I have analysed several flowers and always found all stamens of about the same length.

38. Dillenia excelsa (Jack 1822) Gilg 1893

Wormia excelsa Jack, Mal. Misc. 2, 7, 1822, p. 69; *de Vriese, Pl. Ind. Bat. Or., 1856, p. 79, t. 6—7; *Sieb. & de Vriese, Flore Jard. Roy. Pays-Bas, 1858, p. 65 (with plate); Miq., Fl. Ind. Bat. 1, 2, 1859, p. 10; Miq., Ann. Mus. Bot. Lugd. Bat. 4, 1868, p. 76; Koord. & Val., Bijdr. 1 Booms. Java, 1894, p. 168; Moll. & Janssen.,

Mikr. Holz. Java Baumarten 1, 1906, p. 71; Back., Schoolfl. Java, 1911, p. 10; Koord., Exk. Fl. Java 2, 1912, p. 600; *Koord. & Val., Atl. Baumarten Java 1, 1913, f. 4; Gage & Burk., J. Str. Br. R. A. S. 73, 1916, p. 243; Corn., Gard. Bull. S. S. 10, 1939, p. 5; Corn., Wayside Trees Malaya, 1940, p. 206; Back., Bekn. Fl. Java (em. ed.) 4, 1942, fam. 80, p. 3.

Capellia multiflora Bl., Bijdr. 1, 1825, p. 5.

Wormia oblonga Wall., Cat., 1828, no 951, nomen nudum; Hook.f. & Thoms., Fl. Ind. 1, 1855, p. 67; Miq., Fl. Ind. Bat. 1, 2, 1859, p. 11; Hook.f. & Thoms., Fl. Br. Ind. 1, 1872, p. 35; King, J. As. Soc. Beng. 58, II, 1889, p. 364; Ridl., Fl. Mal. Pen. 1, 1922, p. 9; Craib, Fl. Siam. En. 1, 1925, p. 21.

Capellenia multiflora Bl. ex Hassk., Cat. Hort. Bog. Alt., 1844, p. 178 (intended as correction for *Capellia*).

Capellenia pauciflora Zoll. & Mor., Syst. Verz. Zoll., 1845—6, p. 35.

Wormia grandifolia Miq., Fl. Ind. Bat. Suppl., 1860, p. 619.

Wormia excelsa f. grandifolia (Miq.) Miq., Ann. Mus. Bot. Lugd. Bat. 4, 1868, p. 76.

Dillenia magnoliaefolia Martelli in Becc., Malesia 3, 1886, p. 155.

Dillenia glabra Martelli in Becc., Malesia 3, 1886, p. 157; Merr., Bibl. En. Born. Pl., 1921, p. 383.

Dillenia tomentella Martelli in Becc., Malesia 3, 1886, p. 159; Merr., Bibl. En. Born. Pl., 1921, p. 383.

Dillenia mattanensis Martelli in Becc., Malesia 3, 1886, p. 160; Merr., Bibl. En. Born. Pl., 1921, p. 383.

Dillenia excelsa (Jack) Gilg in Engl. & Prantl, Nat. Pfl. Fam. 3, 6, 1893, p. 123; Merr., Bibl. En. Born. Pl., 1921, p. 383; Merr., En. Philip. Fl. Pl. 3, 1923, p. 60; Heyne, Nutt. Pl. Indon., 1950, p. 1072; Hoogl., Fl. Mal. I, 4, 1951, p. 169.

Dillenia oblonga (Wall. ex Hook.f. & Thoms.) Gilg in Engl. & Prantl, Nat. Pfl. Fam. 3, 6, 1893, p. 123.

Dillenia pauciflora (Zoll. & Mor.) Gilg in Engl. & Prantl, Nat. Pfl. Fam. 3, 6, 1893, p. 123.

Wormia pauciflora (Zoll. & Mor.) Koord. & Val., Bijdr. 1 Booms. Java, 1894, p. 169; Back., Schoolfl. Java, 1911, p. 10.

Capellia pauciflora Zoll. & Mor. ex Hook.f. & Jacks., Ind. Kew. 1, 1895, p. 415, sphalm. for *Capellenia*.

Wormia grandiflora Miq. ex Hook.f. & Jacks., Ind. Kew. 2, 1895, p. 1233, sphalm for *grandifolia*.

Wormia tomentella (Martelli) Ridl., J. Str. Br. R. A. S. 33, 1900, p. 37; Ridl., J. Str. Br. R. A. S. 54, 1910, p. 5; Ridl., Fl. Mal. Pen. 1, 1922, p. 9; Burk., Dict. Econ. Prod. Mal. Pen., 1935, p. 2265.

Dillenia mattadensis Martelli ex Dur. & Jacks., Ind. Kew. Suppl. 1, 1902, p. 136, sphalm. for *mattanensis*.

Dillenia secunda Hunter (ed. by Ridl.), J. Str. Br. R. A. S., 53, 1909, p. 98.

Type specimens: *Wormia excelsa:* Jack, near Bencoolen, probably lost; de Voogd 503, kampong Minjak, Palembang, Sumatra, 20 Nov. 1929; neoholotype in L, isotype in BZ. — *Capellia multiflora:* Blume 1687; lectoholotype in L. — *Wormia oblonga:* Wallich 951B, Hb. Finlayer; lectoholotype in K. — *Capellenia pauciflora:* Zollinger 1021, Java; holotype in G, isotypes in BM, FI, L, P. — *Wormia grandifolia:* Diepenhorst 2509 HB, Padang an Priaman, Sumatra occ.; holotype in U, isotypes in BZ, L. — *Dillenia magnoliaefolia:* Beccari PS 548, Ajer Mantjur, Padang Prov., Aug. 1878; holotype in FI, isotypes in BM, CAL, K, L, U. — *Dillenia glabra:* Beccari PB 3940, Riv. Lingga, Sarawak, Oct. 1867; holotype in FI. — *Dillenia tomentella:* Beccari PB 1193, Kutching, Sarawak, Dec. 1865; holotype in FI, isotypes in K, M, P. — *Dillenia mattanensis:* Beccari PB 2556, Mt Mattang, Sarawak, Sept. 1866; holotype in FI, isotypes in G, K, P. — *Dillenia secunda:* Hunter, Pulau Penang; not seen.

Evergreen trees, up to 40 m high, 75 cm thick, with up to 20 m bole, dense dark green, rounded, cylindrical or pyramidal crown, without or with only slightly developed buttresses. Bark grey to brown, scurfy with reddish scales; heartwood red to dark brown. Branches sympodial, younger ones ca 3 mm thick, glabrous to sparsely strigose-hirsute or more or less densely hirsute or tomentose, glabrescent. Leaf-scars clasping about $^2/_3$

of branch, broadly to narrowly semi-lunular with ca 13 leaf-traces near lower margin, on each side horizontally diverging to slightly upward directed single line. *Leaves* subcoriaceous, elliptic to oblong, (10—)15—30(—40) × (5—)7—10(—14) cm, with (9—)10—13(—16) nerves on either side; rounded to acute, sometimes slightly acuminate at apex, acute, often unequal-sided at base, decurrent; margin slightly undulate, entire, or dentate, nerves curving upward, ending in apex of teeth or otherwise in margin; glabrous, glossy above, slightly glossy, glabrous or more or less hirsute on intervenium, glabrous to sparsely strigose, sparsely strigose-hirsute, or hirsute on nerves beneath. Petiole 2—5 cm, glabrous above, hairy like nerves beneath. *Inflorescences* terminal, racemes or composed by having second flower replaced by secondary raceme, (3—)5—8(—12)-flowered, sometimes some inflorescences crowded at end of branch-system, thereby inflorescences seemingly up to 30-flowered; axis glabrous to slightly strigose-hirsute, sparsely to densely hirsute, or sparsely to densely tomentose, 4—3 mm thick; bracts caducous, oblong-triangular, ca 10—15 × 4—5 mm. *Flowers* 7—10 cm across, with strange penetrating odour. Pedicel 2—7 cm, $1^1/_2$—2 mm thick, gradually thickened to 3—5 mm at apex, hairy like axis of inflorescence, without bracteoles. Sepals 5, oval to ovate, 20—35 × 13—16 mm, 2 outermost ones slightly smaller than 3 innermost ones, glabrous inside, glabrous to densely tomentose-hirsute with 0.2—0.5 mm long hairs except in bud covered margins which are glabrous for breadth of 1—$2^1/_2$ mm outside, often reddish, particularly in fruit, not ciliate at margin. Petals 5, bright yellow, obovate, 40—50 × 25—33 mm, rounded at apex, narrowed towards base. Stamens in 2 distinct groups, those of outer group (ca 300—320) slightly curved in bud, 10—11 mm long, those of inner group (ca 26—35) with apical part reflexed outward in bud, 16—20 mm long, generally thicker than those of outer group; filament yellow, of stamens of outer group 2—4 mm long, 0.3—0.4 mm broad, flattened, of those of inner group 3—5 mm long, 0.6—0.9 mm broad, rather thick; anther reddish to purplish, ca 1 mm broad, emarginate, often with sharp edge, at apex; thecae linear, opening with pore near apex on inner side. Carpels (5—)6—8(—10), arranged around narrow conical receptacle, lanceolate, ca 12—14 × $2^1/_2$ mm, glabrous, each with 20—25 ovules; styles spreading and recurved, pink, thickly linear, 16—20 mm long, $1^1/_2$—2 mm broad, channelled above. *Pseudocarps* dehiscent; carpels 18—20 × 12—16 mm, yellowish green outside, whitish inside, each with 1—3 seeds; seeds obovoid, ca 6 × 4 mm, dark brown with reticulate surface, with 2—3 mm long, red, membranous aril.

var. excelsa

Wormia excelsa Jack 1822. — *Capellia multiflora* Bl. 1825. — *Capellenia pauciflora* Zoll. & Mor. 1845—6. — *Dillenia magnoliaefolia* Martelli 1886. — *Dillenia glabra* Martelli 1886. — *Dillenia mattanensis* Martelli 1886. — *Dillenia excelsa* (Jack) Gilg 1893. — *Dillenia pauciflora* (Zoll. & Mor.) Gilg 1893.

Wormia excelsa var. borneensis Miq., Ann. Mus. Bot. Lugd. Bat. 4, 1868, p. 77. *Dillenia excelsa var. borneensis* (Miq.) Merr., Bibl. En. Born. Pl., 1921, p. 383.

Type specimen: *Wormia excelsa var. borneensis:* Korthals, Dusson, Borneo; holotype in L.

Younger branches glabrous to sparsely hirsute. Leaves beneath glabrous on intervenium, glabrous to sparsely strigose on nerves. Axis

of inflorescences and pedicels glabrous to slightly strigose-hirsute. Sepals glabrous to slightly appressed-hairy outside.

Sumatra: *Korthals*, fl. & fr. (GH, K, L, MEL, S, U). — Sum. W. Coast: Indrapura, fl. (L); Ajer Mantjur, Padang, *Beccari PS 548*, fl. Aug. 1878 (BM, CAL, FI, K, L, U); Desa Tapjing, *Koorders 10292β*, fl. Feb. 1891 (BZ); Pulau Pauh on the Kuanten Riv., *Koorders 10293β*, fl. Feb. 1891 (BZ); near Padang Tarab, *Koorders 10294β*, fl. Feb. 1891 (BZ). — Sum. E. Coast: Kuala Piasa Est., Asahan, *Yates 820*, fr. July 1923 (A, MICH, UC); Guru Batu, Asahan, *Yates 1214*, fl. Nov. 1924 (BZ, MICH, NY, P, UC); ibidem, *Yates 1306*, fr. Feb. 1925 (BZ, L, MICH, NY, P, S, UC); Serdang, Indrapura, Batu Bara, *Yates 2162*, fr. Aug. 1926 (BZ, L, MICH, NY, P, UC); Silo Maradja, Asahan, *Bartlett 8718*, fl. July 1927 (MICH, NY, US); Aer Kandis near Rantau Parapat, *Rahmat Si Toroes 2540*, fl. May—June 1932 (A, MICH, NY, UC, US); Sigamata near Rantau Parapat, Bila, *Rahmat Si Toroes 3262*, fr. June—July 1933 (A, MICH, NY, S, US); near Huta Bagasan, Asahan, *Rahmat Si Boeca 6597*, fl. & fr. Sept. 1934—Feb. 1935 (A, SING). — Palembang: Lematang Ulu, *Grashof 151*, fr. Feb. 1915 (BZ); Lematang Ilir, dusun G. Megang, *Endert 201-E-SP-966*, fl. July 1920 (BZ, K, L, WAG; transition to *var. pubescens*); ibidem, *Endert 201-E-SP-981*, fl. Jan. 1922 (BZ); ibidem, *same number*, fl. Dec. 1923 (BZ, K, L, SING, U, WAG); ibidem, *same number*, fr. Feb. 1924 (BZ, K, L, P, SING); Aerubi, N of Ranaulake, *van Steenis 3175*, fl. Oct. 1929 (BZ); Kampong Minjak, *de Voogd 503*, fl. Nov. 1929 (BZ, L); Lematang Ilir, near G. Megang, *NIFS bb 19453*, fr. Oct. 1934 (A, BZ, L). — Lamp. Distr.: Natar, *Teysmann 4259* HB, fl. (BZ, CAL, L, U); Seputih Tulangbawang, Kutabumi, *Gusdorf 181 & 182*, fr. Feb. 1914 (BZ); Telokbetong, Seputih, *Dirksen 16*, fr. Jan. 1921 (BZ); Telokbetong, near Merah Batin, *NIFS bb 5921*, fl. Nov. 1923 (BZ, L); Gunung Raté Berenong, *Iboet 238*, fl. May 1921 (BZ). — Simalur: Tapah, Dèfajan, *Achmad 1441*, fl. Oct. 1919 (BZ, K, L, P).

Malay Peninsula: Johore: Lipit Kajang, *Kahim CF 12061*, fr. Oct. 1926 (IFI, SING); Danau, Sungai Sedili, *Corner*, fl. March 1932 (SING); Sungai Dohol, Mawai-Temalaung Road, *Corner SF 29335*, fl. May 1935 (A, BM, BZ, K, SING). — Singapore: *Anderson 1*, fr. Oct. 1861 (BM, CAL, E, K, MEL, P).

Java: fl. (BR, GH, L, P); *Blume*, fl. (L); *Blume 1687*, fl. (L); *Blume 1823*, fl. (L); *van Hasselt*, fl. (L); *Horsfield*, fl. (BM); *Horsfield 96*, fl. (BM); *Horsfield 719*, fr. (K); *de Vriese*, fl. (BR, K); *de Vriese 30*, fl. (L); *de Vriese & Teysmann*, fl. 1859—60 (L); *Zollinger 1021*, fl. (BM, FI, G, L, P); *Zollinger 3074*, fl. (BM, G, P). — W. Java: Kali Putjang, Tjikambulon, fl. Oct. 1871 (BZ); Tjimara, Udjung Kulon, Batuhideung Dist., *Koorders 1641β*, fl. June 1892 (BZ, CAL, K, L); Djasinga, Pasir Madang, *Backer 10333*, fl. Nov. 1913 (BZ); Bodjong Lonang, *Backer 16956*, fl. Nov. 1914 (BZ); S of Djasinga, *Backer 26022*, fl. Aug. 1918 (BZ). — C. Java: Wanaredja near Madjenang, *Backer 18548*, fl. Jan. 1915 (BZ); Madjenang, *Backer 18572*, fl. Jan. 1915 (BZ); ibidem, *Backer 18722*, fl. Jan. 1915 (BZ). — Nusa Kambangan: *Koorders 1643β*, fl. Dec. 1891 (BZ, K, L, WAG); *Koorders 1644β*, fl. Dec. 1891 (BZ, L); *Koorders 26871β*, fr. Jan. 1897 (BZ, WAG); *Koorders 26872β*, fr. (BZ); *Koorders 39277β*, fr. Sept. 1901 (BZ).

Borneo: *Korthals*, fl. & fr. (L); *Low 22*, fl. (K). — NW. Borneo: Mt Mattang, *Beccari PB 2556*, fl. Sept. 1866 (FI, G, NY, S); Lingga Riv., *Beccari PB 3940*, fl. Oct. 1867 (FI); Streep Riv., *Hewitt*, fl. June 1906 (K). — W. Borneo: Suka Lanting, *Hallier 108*, fr. 1893—4 (BZ); ibidem, *Hallier B 220*, fl. & fr. 1893—4 (BZ, L); Kuala Nusa, Kuala Kapuas, *NIFS bb 2164*, fl. Apr. 1921 (BZ, L); Sukadana, Kualan, *NIFS bb 6296*, fr. Feb. 1924 (BZ); Daun Kabesi near Selimbau, *Main 1839*, fl. Oct. 1949 (BZ); Danau Menjiban, above Bunut, *Main 2145*, fl. Oct. 1949 (BZ, L). — S. & SE. Borneo: Dusson, *Korthals*, fl. (L); Tanjong Petong, *Korthals*, fr. (L); Bandjermasin, *Motley 802*, fl. 1857—8 (CGE, K); Batang Blitang, *Teysmann 8146 HB*, fl. (BZ); Bulu Lembok, Pleihari, *NIFS bb 418*, fl. July 1918 (BZ); Pleihari, *Abdoel Rachid 1894*, fl. Feb. 1919 (BZ); Sungai Buru near Buntok, *NIFS bb 1074*, fl. Nov. 1919 (BZ); Sungai Buntok near Buntok, *NIFS bb 1148*, fl. & fr. Jan. 1920 (BZ); Danau Pamalasan, *NIFS bb 1647*, fl. & fr. Oct. 1920 (BZ); Lower Dajak, Tewai Baru, *NIFS bb 8202*, fl. & fr. March 1925 (BZ, L); Lower Dajak, Katundjung, *NIFS bb 12249*, fl. Nov. 1927 (BZ); Sampit, Terantang, *NIFS bb 13942*, fl. Nov. 1929 (BZ); Pleihari, Djorong, *NIFS bb 14166*, fr. Jan. 1930 (BZ, L). — E. & NE. Borneo: Sungai Tjetran, *Jaheri 1284*, fl. & fr. 1896—7 (BZ); Sungai Bruni, *Jaheri 1360*, fl. 1896—7 (BZ); *Jaheri 1893*,

fl. (BZ); Pladju, *Amdjah 23*, fl. & fr. May 1912 (BZ); Bulungan, near Sadjau Riv., *Rutten 95*, fl. 1914 (U); W. Kutai, near Djembajan, Djembajan Riv., *Endert 1421*, fl. June 1925 (BZ, L); W. Kutai, Kimbeng, *Endert 5187*, fl. Nov. 1925 (BZ, L). — Br. N. Borneo: Kinabatangan, *Creagh*, fl. & fr. March 1895 (K); E. Coast, *Creagh*, fr. (K); *Creagh*, fr. (BM); near Lemon, Kinabalu Region, *Gibbs 2806*, fl. Jan. 1910 (BM); *Villamil 25*, fr. Aug.—Nov. 1915 (A, US); *Agama 434*, fl. & fr. May—Aug. 1917 (A, K, US); *Castillo 619*, fl. & fr. Jan.—Aug. 1919 (A); Sandakan & Vicinity, *Ramos 1379*, fl. & fr. Sept.—Dec. 1920 (A, K, P, US); Sandakan, Mylburgh Prov., *Elmer 20051*, fr. Oct.—Dec. 1921 (A, BM, BZ, C, CAL, G, GH, K, L, M, MO, NY, P, S, SING, U, UC); Tawao, Elphinstone Prov., *Elmer 21159*, fl. Oct. 1922—March 1923 (A, BM, BZ, C, G, GH, K, L, M, MO, NY, P, S, SING, UC); Kinabatangan, *Arsat BNB 1052*, fr. March 1929 (A, NY); Batu Putch, *Arsat BNB 1260*, fr. (IFI, K); ibidem, *Burut Ho BNB 1887*, fl. June 1932 (BZ, IFI, K); Marotai, *Maidin BNB 2346*, fr. Oct. 1932 (A, BZ, IFI, K); Loro, *Balajadia BNB 3722*, fl. Sept. 1933 (BZ, IFI, K); Elopura, Sandakan, Sepilok For. Res., *Castro BNB A 40*, fl. Sept. 1947 (SING; transition to *var. pubescens*); Elopura, Sandakan, Segaluid Riv., *Cuadra BNB A 1019*, fr. Nov. 1947 (SING; transition to *var. pubescens*); Elopura, Sandakan, Sepilok For. Res., *Cuadra BNB A 876*, fl. & fr. Aug. 1948 (SING; transition to *var. pubescens*); Kinabatangan Besar, *Cuadra BNB A 2147*, fl. & fr. Oct. 1948 (SING). — Banguey Isl.: *Castro & Melegrito 1719*, fr. July—Sept. 1923 (A, K, UC). — Labuan: *Maidin BNB 7330*, fl. June 1937 (SING; transition to *var. pubescens*).

Cultivated: Bot. Gard. Bogor: *Teysmann, fl.* 1860 (L); *Beccari*, 1876 (FI); *Pierre*, Nov. 1877 (P); no IV-G-20, fl. Nov. 1891 & fr. Oct. 1896 (BZ, CAL, K, L); *van Harreveld*, fl. July 1907 (GRO); Hertenkamp, *van Steenis 2278*, fl. Oct. 1928 (BZ).

Without locality: *Junghuhn 693*, fl. (L).

var. pubescens (Corn. 1939) Corn. ex Masamune 1942

Wormia oblonga Wall. ex Hook.f. & Thoms. 1855. — *Dillenia oblonga* (Wall. ex Hook.f. & Thoms.) Gilg: 1893. — *Dillenia secunda* Hunter 1909.

Wormia excelsa var. pubescens Corn., Gard. Bull. S. S. 10, 1939, p. 7, based on *Wormia oblonga* Wall. ex Hook.f. & Thoms. 1855.

Dillenia excelsa var. pubescens (Corn.) Corn. ex Masamune, En. Phan. Born., 1942, p. 463.

Younger branches sparsely to densely hirsute. Leaves glabrous on intervenium, glabrous to sparsely strigose on nerves beneath. Axis of inflorescence and pedicel sparsely to densely hirsute. Sepals more or less densely tomentose-hirsute outside.

Siam: Nakawn Sritamarat: Ban Pa Prek, Tungsong, *Rabil 173*, fr. July 1929 (BM). — Pattani: Bukit, *Kerr 7133*, fl. & fr. July 1923 (BM, E, K).

Sumatra: Atjeh: Kuala Kepong, E of Trumon, *Asdat 203*, fr. Sept. 1941 (BZ). — Sum. E. Coast: E of Lubuk Pakam, *Lörzing 3298*, fr. Oct. 1914 (BZ). — Indragiri: Lisun Kwantan Mts near Lubuk Djambi, *Buwalda 7141*, fl. Nov. 1939 (BZ). — Djambi: Sungai Lesing near Pahu, *Posthumus 1025*, fl. Oct. 1925 (BZ, L, SING). — Palembang: Bigingteluk, Riv. Rawas, *Forbes 3229*, fl. 1881 (BM, CAL, FI, GH, L, P, S); ibidem, *Forbes 3255a*, fl. 1881 (BM, CAL, DD, FI, GH, L); Banjuasin & Kubu Region, *Grashof 801*, fl. Nov. 1915 (BZ, L); Lematang Ilir, *Endert E 810*, fl. & fr. Jan. 1920 (BZ, L). — Lamp. Distr.: Menggala, *Gusdorf 53*, fl. Dec. 1913 (BZ, L).

Malay Peninsula: fl. (K); *Wallich 951B (Herb. Finlayer)*, fl. (K); *Anderson*, fl. 1863 (P); *Griffith 54a*, fl. & fr. (GH, K, P); *Scortechini*, fl. (DD, G); *Scortechini 222b*, fl. (CAL). — Kedah: Woods at Yan, *Ridley 5370*, fr. June 1893 (BM, CAL, SING); P.W.D.-Res., *Meh CF 9020*, fl. (K); Gunung Jerai, *Meh CF 9045*, fr. (K); Inchong Est., *Sparc SF 37605*, fl. Aug. 1941 (BZ, SING). — Prov. Wellesley: *Ridley's Coll. 12625*, fr. Aug. 1905 (BM, SING). — Perak: fl. (BZ, UPS); Gopeng, *Kunstler 504*, fl. & fr. Aug. 1880 (CAL, FI, K, L); Larut, *Kunstler 2857*, fl. March 1882 (A, CAL); ibidem, *Scortechini 96a*, fr. Nov. 1882 (CAL); ibidem, *Scortechini 1092*, fl. July 1884 (CAL); Changkat Serdang, *Wray 735*, fl. (CAL, SING); Kampar, *Curtis 3184*, fl. & fr. Dec. 1895 (CAL, SING); Taiping, *Derry = 6257*, fl. Sept. 1898 (SING); Tapah, *Ridley 14083*, fl. Nov. 1908 (BM, SING); Changkat Mentri, S. Perak, *Kloss 6474*, fl. Sept. 1918 (K); ibidem, *Kloss 6485*, fl. & fr. Sept. 1918 (K); Kelumpang, *Somerville CF 14354*, fl. & fr. Oct. 1928 (IFI); Bidor, *Corner SF 31510*, fl. July

1936 (SING); Sungai Krian Est., *Spare SF 34568*, fl. May 1938 (BZ, L, SING). — Pahang: Pasir Loyang, *Ridley 2625*, fl. July 1891 (CAL, K, SING); Temerloh, Kuala Semantan, *Ridley 2637*, fl. Nov. 1891 (CAL, SING); Temerloh, *Hamid CF 5166*, fl. Dec. 1919 (K, SING); between Raub & Sungai Simpan, *Burkill & Haniff SF 16856*, fl. Nov. 1924 (BRI, SING); Tras road, Raub, *Kalong CF 20469*, fl. Dec. 1929 (SING); *Walker CF 14153*, fl. July 1930 (SING). — Selangor: Lubu Kelang, Kuala Lumpur, *Huting*, fl. 1890 (SING); Batu Caves, *Ridley*, fr. Dec. 1896 (SING); Kerling, *Goodenough 10623*, fr. Oct. 1899 (SING); Batu Tiga, *Ridley*, fl. Feb. 1904 (SING); Kuang, *Ridley 13388*, fl. Aug. 1908 (K, SING); Ulu Gerubah, *Burn-Murdoch*, fl. & fr. Nov. 1909 (BM); Rantau Panjang, *Kloss*, fl. July 1914 (BM); Batu Caves, *Ridley*, fr. March 1915 (BM, K); Kuala Lumpur, *Hamid CF 602*, fl. June 1916 (SING); Batu Caves, *Ridley*, fl. Dec. 1920 (K); Semempik, *Hume 8322*, fr. July 1921 (SING); Ginting Sempak, *Strugnell CF 13605*, fr. Aug. 1927 (IFI); Kaching For. Res., *Strugnell CF 13955*, fl. Sept. 1927 (SING); Sungai Lalang Kajang, *Symington CF 22936*, fl. & fr. March 1930 (IFI); Kepong Plant., *Tachun CF 16921*, fl. Apr. 1930 (IFI); ibidem, *Symington CF 32870*, fl. Nov. 1933 (DD); *Franck 1025*, fr. Sept. 1937 (C). — Negri Sembilan: Tampin, *Yakim CF 1984*, fl. June 1918 (K, SING); Linggi, *Usope CF 588*, fl. May 1919 (K, SING). — Malacca: *Griffith*, fl. (CAL, K); *Maingay 1333 (Kew Distr. 6)*, fl. 1865—6 (K); *Maingay 1333A (Kew Distr. 6)*, fl. May 1868 (CAL, GH, K, L); Sungai Udang, *Alvins 353*, fl. Dec. 1884 (SING); *Derry 46*, fl. June 1888 (K, SING); Bukit Panchor, *Derry 1025*, fl. 1892 (CAL, MEL, SING); Machap, *Goodenough 2005*, fl. May 1894 (CAL, SING). — Pulau Penang: Coast, *Curtis 257*, fl. June 1885 (K, SING); Sullok Bahang, *Lewis = 257*, fr. June 1890 (SING); ibidem, *Curtis = 257*, fr. Sept. 1890 (SING).

Borneo: NW. Borneo: Baram, *Hose 118*, fl. Nov. 1894 (K); Baram Distr., Marudi, *Hose 280*, fl. June 1895 (BM, E, K); Sampadi Hill, Sarawak sea coast, *Nat. Coll.*, fl. Nov. 1927 (UC); near Long Kapa, Mt Dulit (Ulu Tinjar), *Richards 2536*, fl. Nov. 1932 (A, K, SING). — Br. N. Borneo: Tinkayo, *Creagh*, fl. Apr. 1895 (K); Bettatan near Sandakan, *Kloss 19089*, fr. Aug. 1927 (BZ, K, SING, UC); Kabili-Sepilok For. Res., *Keith BNB 7212*, fl. May 1937 (SING); Sungai Arang, Elopura, Sandakan, *Kadir BNB A 927*, fl. & fr. Dec. 1948 (SING).

Philippines: Balabac Isl.: Cape Melville, *Fénix BS 15653*, fl. July 1912 (K).

var. tomentella (Martelli 1886) Corn. ex Masamune 1942

Dillenia tomentella Martelli 1886. — *Wormia tomentella* (Martelli) Ridl. 1900.

Wormia excelsa var. tomentella (Martelli) Corn., Gard. Bull. S. S. 10, 1939, p. 8.

Dillenia excelsa var. tomentella (Martelli) Corn. ex Masamune, En. Phan. Born., 1942, p. 463.

Younger branches tomentose-hirsute to densely shortly tomentose. Leaves on intervenium more or less densely hirsute with 0.4—1 mm long hairs, on nerves more densely hirsute beneath. Axis of inflorescences sparsely hirsute to densely tomentose-hirsute, pedicel glabrous to slightly tomentose-hirsute. Sepals glabrous to slightly appressed-hairy outside.

Sumatra: Sum. E. Coast: Simelungun, Besar Maligas, *NIFS bb 5335*, March 1923 (BZ, L). — Banka: Menumbing, *Teysmann* (BZ); Djebus, *Teysmann 3417 HB* (BZ); Muntok, Majang, *NIFS bb 7300*, Aug. 1924 (BZ).

Malay Peninsula: Johore: Sungai Kayu, Kota Tinggi-Mersing Road, *Kiah SF 32190*, fl. Oct. 1936 (K, L, SING). — Singapore: fr. (SING); fr. 1893 (SING); Selitar, *Ridley 6382*, fl. June 1894 (CAL, SING); Bukit Timah, *Ridley 6809*, fr. 1895 (BZ, SING); Changi Road, *Baker*, fl. Oct. 1917 (SING); Reservoir Jungle, *Corner & Herklots*, fl. June 1930 (SING); ibidem, *Symington CF 22979*, fr. July 1930 (SING).

Borneo: Sungei Semengoh, *Caroll 7170*, fr. Feb. 1922 (SING). — NW. Borneo: near Kuching, *Beccari PB 1193*, fl. Dec. 1865 (FI, K, M, P); ibidem, *Beccari PB 1271*, fr. Dec. 1865 (FI, K, P); Saraman, near Kuching, *Haviland 1989*, fr. Dec. 1893 (K, SING). — W. Borneo: Smittau, Pulau Madjang, *NIFS bb 7679*, Nov. 1924 (BZ); Putus-Sibau, near Punut, *NIFS bb 7700*, Nov. 1924 (BZ). — E. & NE. Borneo: E. Kutai, Muara Karangan, *NIFS bb 7966*, Dec. 1924 (BZ); W. Kutai, Bukit Lajang, *NIFS bb 16224*, Dec. 1931 (A, BZ, L); ibidem, *NIFS bb 16232*, Dec. 1931 (A, BRI, BZ, L, SING); W. Kutai, near Kelumpang, *NIFS bb 16964*, May 1932 (BZ); Bulungan,

near Nunukan, *NIFS bb 26220*, July 1938 (BZ, L). — Br. N. Borneo: *Castro 977*, fl. Nov. 1920 (A, US); Beaufort, *Lupang BNB 5403*, fl. Apr. 1935 (SING).

Cultivated: Singapore: Bandstand, *Ridley*, fl. 1890 & fr. 1892 (SING); Arboretum, *Nur 1437 & 1892*, March 1918 (SING); Econ. Gard., *Mathieu*, fl. June 1918 (SING); Bandstand, *Nur*, fr. Sept. 1918 (SING); Arboretum, *Nur*, June 1924 (SING); Econ. Gard., *Deshmukh*, July 1929 (SING); Bot. Gard., *Deshmukh*, fl. (SING); Raffles College, *Corner SF 32546 & 32548*, fr. Jan. 1937 (A, BZ, K, SING).

The following specimens, of which only sterile material is available, belong either to *var. excelsa* or to *var. pubescens:*

Sumatra: Atjeh: Langsa, *NIFS bb 2575*, Jan. 1922 (BZ, L). — Tapanuli: Sibolga, Pulau Morsala near Pulau Pune, *NIFS bb 3771*, Jan. 1922 (BZ, L); Sibolga, near Pulau Pune, *NIFS bb 18698*, Aug. 1934 (A, BZ, L). — Sum. W. Coast: *Korthals* (L); Priaman, *Diepenhorst 2124 HB* (BZ); Priaman or Padang, *Diepenhorst 2509 HB* (BZ, L, U; type of *Wormia grandifolia* Miq.); Balai Selasa, Muara Sakai, *NIFS bb 5972*, Oct. 1923 (BZ); Huta Padang Est. near Kisaren, *Krukoff 271*, Dec. 1930 (BZ, NY, US). — Sum. E. Coast: Labuan Ratu Sematahari, *NIFS bb 9748*, May 1926 (BZ). — Djambi: Muara Tebo, Sei Bengkal, *NIFS bb 12796*, May 1928 (BZ). — Benkulen: Redjang, near Tabah Penandjung (Tg Serawai), *NIFS bb 1801* (BZ, L); Redjang, Taba Penandjung, Pematang Paraduan Sialang marga Djambu, *NIFS bb 2270*, July 1921 (BZ, L); Lais, near Talang Benal, *NIFS bb 8859*, March 1925 (BZ, L). — Palembang: Ogan Ulu, *Teysmann 3615 HB* (BZ, CAL); Dermo, Enim, *Teysmann 3641 HB* (BZ); Banjuasin and Kubu Region, near dusun Upang, *Thorenaar T 1138* (BZ); Muara Dua, *Grashoff 487*, July 1915 (BZ); Lematang Ilir, Keban Agung, *NIFS TB 652*, July 1922 (BZ); Lematang Ulu, Lubuk betung, *NIFS TB 654*, Dec. 1922 (BZ); Muara Dua, Kisau, *NIFS bb 9226*, March 1925 (BZ); Lematang Ulu, Geramat, *NIFS bb 8705*, Apr. 1925 (BZ); Martapura, *Bal 50*, Feb. 1930 (BZ). — Lamp. Distr.: *Zollinger 2835 HB*, Sept. 1845 (BZ); Seputih Tulangbawang, Sukadana, *Gusdorf 244*, Feb. 1914 (BZ); Tandjongkarang, *Endert E 1318*, Sept. 1920 (BZ, L); Redjosari, Natar, *Dirksen 1*, Nov. 1920 (BZ, L); Kaliandak, Kota Dalam, *NIFS bb 7998*, March 1925 (BZ, L). — Mentawei Isls: Pulau Siberut, near Simarara Kocha, *NIFS bb 17484*, Sept. 1932 (BZ, SING). — Pulau Enggano: Kiaah, *NIFS bb 19724*, June 1935 (BZ, L); Bua-Bua, *Lütjeharms 3970*, June 1936 (A, BZ, K, L, P).

Malay Peninsula: Pulau Penang: *Wallich 951, coll. by G. Porter* (K).

Java: *Blume* (L, NY); *Junghuhn* (L); *Spanoghe* (L). — W. Java: Palabuanratu, near Panumbahan, Djampangkulon, *Koorders 1640 β*, July 1890 (BZ); Palabuanratu, Songgrawa, Djampangkulon, *Koorders 1639β*, Sept. 1890 (BZ); Panggarawa, *Backer 2214*, Dec. 1911 (BZ). — Isls near SW. Bantam: Trouwersisl., *NIFS Ja 2624*, May 1933 (A, BZ, L). — Nusa Kambangan: *Koorders 1642β & 1645β*, Dec. 1891 (BZ); *Koorders 20110β*, June 1895 (BZ); *Koorders 20195β*, Oct. 1895 (BZ, P); *Koorders 20268β*, 1895 (BZ); *Koorders 24824β & 24841β*, Sept. 1896 (BZ); *Koorders 24634β*, Oct. 1896 (BZ).

Borneo: (U). — W. Borneo: Sukadana, Paib, *NIFS bb 8051*, March 1925 (BZ); Melawie, Tjatit B. Tengkujung, *NIFS bb 26040*, Sept. 1938 (BZ, L). — S. & SE. Borneo: Lower Dajak Distr., Laut Nusa (Kahajan), *NIFS bb 2104*, Feb. 1921 (BZ); Muara Tewe, Nihan Dajak, *NIFS bb 10041*, July 1926 (BZ); Puruk Tjahu, Muara Djaan, *NIFS bb 10516*, Oct. 1926 (BZ); Muara Tewe, Lau Katjang, *NIFS bb 10919*, March 1927 (BZ); Tanah Bumbu, Baru, *NIFS bb 13401*, Jan. 1929 (BZ, L). — E. & NE. Borneo: Tandjong Redeb, Labauan, *NIFS bb 11526*, June 1927 (BZ); Bulungan, Kabiran, Sungai Bengalun, *NIFS bb 11677*, July 1927 (BZ); Berau, Inaran, *NIFS bb 12086*, Oct. 1927 (BZ); W. Kutai, Bukitlajang, *NIFS bb 16174*, Nov.—Dec. 1931 (BRI, BZ, SING); W. Kutai, Djembajan (Sungai Kelesan), July 1938 (BZ, L, SING); W. Kutai, Mendoni (Sungai Klidjang), *NIFS bb 29228*, Aug. 1939 (BZ, L). — Br. N. Borneo: Kinabatangan, *Maidin BNB 1678* Feb. 1932 (K); Sandakan Batu, *Puasa 2550*, Nov. 1925 (UC).

Distribution. The species is common in Sumatra, the Malay Peninsula, and Borneo, less common in W. Java. *Var. pubescens* is exclusively found in the Malay Peninsula N of Johore and together with the other varieties in the southern part of the Malay Peninsula (Johore), Borneo, and Sumatra. Intermediates between *var. excelsa* and *var. pubes-*

cens are rather rare, though more frequent in British North Borneo. *Var. tomentella* is found mainly in the Southern part of the Malay Peninsula (Johore, Singapore), Banka, and Borneo, and is rare in Sumatra (once collected in Sumatra East Coast). *Var. excelsa* is found exclusively in Western Java, and further in Sumatra, the South of the Malay Peninsula (Johore and Singapore only), and Borneo. The only record from the Philippines (Balabac Isl. S of Palawan) belongs to *var. pubescens.*

Ecology. In forests on rather dry to swampy soil, at low altitudes.

Vernacular names. The number of vernacular names recorded for the present species is extremely high. Of the names, cited below, "*Kendikara*" has been chosen as the official name in the Bahasa Indonesia (cf. Lists of tree names, issued by the Forest Research Institute at Bogor).

Sumatra: *Ampalu* (Tapan.), *Ampalu rimbo* (Sum. W. Coast), *Bahah falah* (Simalur), *Bungah simpur* (= flower s.; Indrag.), *Enèhè* (Enggano), *Kalek Bakurok* (Tapan., Sum. W. Coast), *Nilau birrih* (Djambi), *Peileggoa* (Mentawei), *Pisang mawe* (Sum. E. Coast), *Simpur* (Djambi, Sum. E. Coast, Palemb., Benk.), *S. areng* (Lamp. Distr.), *S. ayer* (id.), *S. kiedjang* (Palemb.), *S. perampuan* (Lamp. Distr.), *S. rawang* (Palemb., Lamp. Distr.), *S. rimba* (Benk.), *S. rimbo* (Palemb.), *S. talang* (id.), *S. tjipu* (Sum. E. Coast, *S. way* (Lamp. Distr.), *Sisitue* (Atjeh). Malay Peninsula: *Kambai hutan, Penaga hlui* (Malacca), *Simpoh* (Kedah, Selangor, Johore, Penang), *S. ayer* (Perak, Pahang, Negri Sembilan), *S. padi* (Pahang), *S. pagar* (Kedah), *S. pasir* (Kuala Lumpur), *S. paya.* Banka: *Simpur lakki, S. rimba.* Java: *Djadjatian, Ki segel, Segel, Sempur segel, S. tjai* (Sundanese); *Drègèl, Sempur batu, Sempu lanang, Wuru* (Javanese); *Simpur* (Malay). Borneo: *Alung-alung* (Dajak, Punan), *Djamihing* (Malay, Bondarese), *Djelangin* (Tidung., Batajan), *Djengin* (Malay, Berauw), *Djiing, Djochin* (Daj.), *Gara* (Dajak, Kapuas), *Kadjamihing* (Dajak, Kapuas; Malay, Sampit), *Kajuringin, Kandikara* (*Kendikara, Kendikkara*) (Malay, Kutinese), *Kanigara* (*Kenigara, Kaligara*) (Bandjarese, Bondarese, Malay), *Kegihing, Urib* (Dajak), *Pampan* (Dusun Rungus), *Randaman* (Banggi), *Ringin* (Dajak), *Simporotan* (Malay, Br. N. Borneo), *Simpur* (id.), *S. bukit* (Malay, Sarawak), *S. laki* (Malay; Sarawak, Brunei, and Sandakan), *Tjidahura, Tjumihing* (Dajak, Siangese).

Uses. The wood, though of rather bad quality, is sometimes used in house-building.

Note. The varieties, which were distinguished by Corner (1939) and which I have retained here differ in the following characters: *var. pubescens* differs by the dense indument on the outer side of the sepals, *var. tomentella* by the indument on the lower side of the leaves; the character of the indument on other parts is of less importance. Intermediates between *var. excelsa* and *var. pubescens* are known; *var. excelsa* represents the generally more glabrous plants.

39. Dillenia luzoniensis (Vidal 1886) Martelli ex Dur. & Jacks. 1902

Wormia luzoniensis Vidal, Revis. Pl. Vasc. Filip., 1886, p. 36; Elm., Leafl. Philip. Bot. 7, 1915, p. 2622.

Tetracera borneensis Auct. non Miq.; Rolfe, J. Bot. 23, 1885, p. 209; Vidal, Revis Pl. Filip., 1886, p. 36.

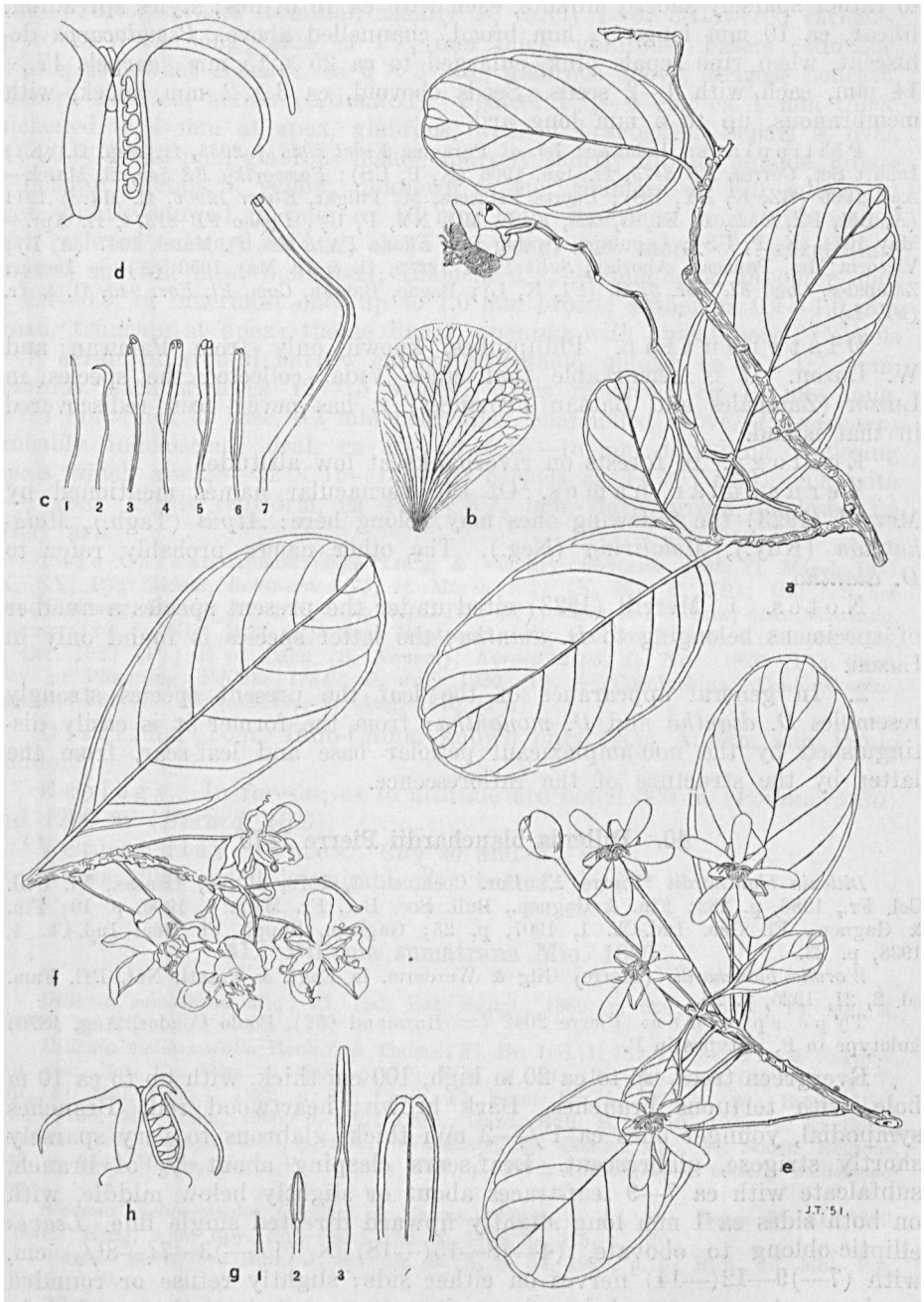
Dillenia luzoniensis (Vidal) Martelli ex Dur. & Jacks., Ind. Kew. Suppl. 1, 1902, p. 136; Merr., Philip. J. Sc. 1, Suppl., 1906, p. 95; Merr., En. Philip. Fl. Pl. 3, 1923, p. 60, p. p.; Hoogl., Fl. Mal. 1, 4, 1951, p. 168.

Type specimen: Comision de la Flora Forestal de Filipinas 3, Zambales, Luzon; lectohelotype (isotype) in L, isotypes in Fl, K.

Fig. 10 a—d, p. 95.

Evergreen trees. Branches sympodial, younger ones ca $1^1/_2$ mm thick, shortly strigose to entirely glabrous, glabrescent, older ones with grey bark. Leaf-scars clasping about $^1/_2$ of branch, semi-lunular with sharp depression in upper margin, with ca 10 leaf-traces near or slightly below middle. *Leaves* subcoriaceous, oval to oblong, (3—)6—15(—20) × (2—)3—7(—11) cm, with (4—)6—12(—15) nerves on either side; rounded to slightly emarginate at apex, rounded at base; margin entire to slightly emarginate at end of nerves, nerves curving upward, bifurcate near margin, one fork towards margin, second fork along margin, anastomising with next nerve; glabrous on both sides or sparsely strigose on midrib and basal part of nerves beneath. Petiole $^1/_2$—1 cm, glabrous above, glabrous to shortly strigose beneath, with ca 1 mm broad, non-amplexicaul wings. *Inflorescences* terminal, racemes with only one flower open at a time and soon falling fruits, continuously growing and thus lateral, leaf-opposed on older defoliate branches; axis distinctly zigzag, up to 40 cm long, with up to 30 scars of fallen flowers, lower internodes longer (3—4 cm) than upper ones (0.6—1 cm), very shortly strigose like younger branches; bracts caducous, triangular, with ca 4 mm broad base clasping about half of axis, ca 7 mm long, obtuse at apex, glabrous above, shortly strigose, most densely so near middle and towards apex, beneath, finely and shortly ciliate at margin. *Flowers* ca 6—8 cm across. Pedicel 2—$2^1/_2$ cm, $1^1/_2$ mm thick, slightly thickened to 2 mm at apex, shortly strigose, without bracteoles. Sepals 5, oval, 15—18 × 10—14 mm, glabrous inside, shortly appressedly silky hairy outside, finely and shortly ciliate at margin. Petals 5, yellow, obovate, 40—50 × 30—40 mm, rounded at apex, narrowed towards base. Stamens in 2 distinct groups, those of outer group (ca 120) slightly curved in bud, 8 mm long, those of inner group (ca 50) with apical part reflexed outward in bud, 14—20 mm long; outside outer stamens often some (ca 6) staminodes, linear, 7 mm long; filament of outermost stamens ca 5 mm long, gradually diminishing to 2 mm towards centre; anther ca 0.8 mm broad, rounded to emarginate at apex, sometimes with very small mucro at end of connective; thecae linear, opening with pore near apex on inner side. Carpels 7—8, arranged around narrow conical, nearly cylindric receptacle, lanceolate, ca 8 × $2^1/_2$ mm, glabrous

Fig. 10 — a, b, c, d. *Dillenia luzoniensis* (Vidal) Dur. & Jacks. (p. 93); a. branch with relatively young (above, with young bud) and older (below, on older defoliate branch, with open flower from which the petals have fallen off) inflorescence, × ½; b. petal, × ½; c. 1—2: staminodes, 3—6: stamens of outer group, 7: stamen of inner group, × 2½; d. gynoecium, longitudinal section, × 2½; all after *Elmer 12906;* e, f, g, h. *Dillenia pulchella* (Jack) Gilg (p. 113); e. flowering branch, × ½; f. fruiting branch, × ½; g. 1: staminode, × 2½, 2: stamen of outer group, × 2½, 3: stamen of inner group, × 2½, 4: apex of stamen of outer group, × 12½; h. gynoecium, longitudinal section, × 2½; e, g, and h after *CF 939,* f after *Lela CF 2677.*


d
c 1 2 3 4 5 6 7
b
a
f
h
g 1 2 3
e
J.T. '51

to rather sparsely shortly hirsute, each with ca 16 ovules; styles spreading, linear, ca 10 mm long, $^1/_2$ mm broad, channelled above. *Pseudocarps* dehiscent, when ripe sepals pink, enlarged to ca 25 × 15 mm; carpels 17 × 14 mm, each with 1—2 seeds. Seeds obovoid, ca 3 × 2 mm, black, with membranous, up to 5 mm long aril.

Philippines: Palawan: Isl. of Paragua, *Vidal 2026 & 2035*, fr. resp. fl. (K); Inhurt Set, *Curran FB 3475*, fr. Jan. 1906 (K, P, US); *Foxworthy BS 549*, fl. March—Apr. 1906 (BZ, K, NY, US); Puerta Princesa, Mt Pulgar, *Elmer 12906*, fl. March 1911 (A, BM, BZ, CAL, E, FI, G, GH, K, L, MO, NY, P, U); *Danao FB 21574*, fl. Apr.—May 1914 (K, P, US); Lapulapu, Iwahig PC., *Edaño PNH 208*, fl. March 1947 (A, L); Victoria Mts, Panacan, Aborlan, *Sulit PNH 12289*, fl. & fr. May 1950 (A). — Luzon: Zambales, *Com. Fl. For. 3*, fl. (FI, K, L); Bagac, Bataan, *Com. Fl. For. 940*, fl. & fr. (FI, L).

Distribution. Philippines, known only from Palawan and W. Luzon. It is remarkable that since Vidal collected the species in Luzon (Zambales and Bataan Provinces) it has never been rediscovered in that island.

Ecology. In forests on riverbanks at low altitude.

Vernacular names. Of the vernacular names mentioned by Merrill (1923) the following ones may belong here: *Atpúi* (Tagb.), *Malakatmón* (Kuy.), *Malaliring* (Neg.). The other names probably refer to *D. diantha*.

Notes. 1. Merrill (1923) cited under the present species a number of specimens belonging to *D. diantha*; the latter species is found only in Luzon.

2. In general appearance of the leaf the present species strongly resembles *D. diantha* and *D. monantha*; from the former it is easily distinguished by the non-amplexicaul petiolar base and leaf-scar, from the latter by the structure of the inflorescence.

40. Dillenia blanchardii Pierre 1879

Dillenia blanchardii *Pierre, Fl. For. Cochinch. 1, 1879, pl. 14; Laness., Pl. Util. Col. Fr., 1886, p. 282; Fin. & Gagnep., Bull. Soc. Bot. Fr. Mém. 4, 1906, p. 10; Fin. & Gagnep., Fl. Gén. Ind.-Ch. 1, 1907, p. 23; Gagnep., Suppl. Fl. Gén. Ind.-Ch. 1, 1938, p. 23.

Wormia blanchardii (Pierre) Gilg & Werderm. in Engl. & Prantl, Nat. Pfl. Fam. ed. 2, 21, 1925, p. 25.

Type specimen: Pierre 2042 (= Harmand 652), Poulo Condor, Aug. 1876; holotype in P, isotypes in P.

Evergreen trees, up to ca 20 m high, 100 cm thick, with up to ca 10 m bole, with tortuous branches. Bark brown; heartwood red. Branches sympodial, younger ones ca $1^1/_2$—2 mm thick, glabrous to very sparsely shortly strigose, glabrescent. Leaf-scars clasping about $^3/_5$ of branch, subfalcate with ca 7—9 leaf-traces about or slightly below middle, with on both sides ca 1 mm long slightly upward directed single line. *Leaves* elliptic-oblong to obovate, (4—)8—15(—18) × (1.8—)3—7(—$8^1/_2$) cm, with (7—)9—12(—14) nerves on either side; slightly retuse or rounded to obtuse at apex, rounded at base, decurrent; margin entire to slightly undulate, nerves curving upward, not reaching margin, in upper part of leaf vein towards margin; glossy, glabrous on both sides. Petiole (0.6—)1—2(—3) cm, glabrous, with $^1/_2$—$1^1/_2$ mm broad non-amplexicaul

wings. *Inflorescences* terminal, usually 2-, rarely 1- or 3-flowered racemes, up to ca 5 cm long; axis ca $1^1/_2$ mm thick, glabrous; bracts caducous, elliptic, somewhat concave, ca 6 × 3 mm, glabrous above, strigose beneath. *Flowers* ca 6 cm across (estimated). Pedicel $1^1/_2$—4 cm, ca 1 mm thick, thickened to 4 mm at apex, glabrous, without bracteoles. Sepals 5, oval, 16—20 × 8—12 mm, glabrous inside, sparsely shortly hirsute outside, ciliate at margin. Petals 5, yellow, unknown to me. Stamens ca 170, outermost ones slightly curved in bud, ca 10 mm long, innermost ones with apical part reflexed outward in bud, ca 15 mm long, with many of intermediate lengths, shortest most numerous; filament $2^1/_2$—4 mm long, in outer ones ca 0.4—0.5, in innermost ones up to 1.0 mm broad; anther ca 0.7—1.0 mm broad, truncate at apex; thecae linear, opening with apical pore. Carpels 5—7, arranged around narrow conical receptacle, oblong, ca 6 × $1^1/_2$ mm, glabrous, each with ca 12—15 ovules; styles recurved, ca 10 mm long, ca 0.7 mm thick at base, 0.2 mm near apex, channelled above. *Pseudocarps* probably indehiscent, oval, ca 25—30 × 15—18 mm including enclosing sepals which are 28—32 × 15—17 mm; carpels ca 14 × 7 mm, each with 0—1 seed. Seeds reniform, ca $4^1/_2$ × $3^1/_2$ mm, dark brown, enclosed by fleshy aril.

Indo-China: Annam: Nha Trang & Vicinity, *Robinson 1266*, fl. March 1911 (K, NY, P); ibidem, *Robinson 1479*, fl. March 1911 (K, NY, P, US); Húi han heo near Nhatrang, *Poilane 4802*, fl. & fr. Sept. 1922 (P); Mère et l'Enfant, near Nhatrang, *Poilane 5130*, fr. Nov. 1922 (P); near Nhatrang along road to Ninh-Hoa, *Poilane 8356*, fl. Oct. 1923 (P); E of Cana (S. Annam), *Evrard 2405*, fl. Nov. 1925 (P); Cana, Prov. of Phanrang, *Poilane 17849*, fl. July 1930 (P). — Cochinchina: Poulo Condor, *Harmand 652 (= Pierre 2042)*, fr. Aug. 1876 (P).

Distribution. Indo-China, known only from Annam and Poulo Condor.

Ecology. In forests; as to altitude are noted 300 m (*Poilane 5130*) and 1200 m (*Evrard 2405*).

Vernacular names. *Cáy sô* and *So nho.*

Uses. The wood is suitable for beams.

41. Dillenia sumatrana Miq. 1860

Dillenia sumatrana Miq., Fl. Ind. Bat. Suppl., 1860, p. 620; Hoogl., Fl. Mal. I, 4, 1951, p. 170.

Dillenia meliosmifolia Hook.f. & Thoms., Fl. Br. Ind. 1, 1875, p. 36; Fin. & Gagnep., Bull. Soc. Bot. Fr. Mém. 4, 1906, p. 10; Ridl., J. Str. Br. R. A. S. 54, 1910, p. 7; Ridl., Fl. Mal. Pen. 1, 1922, p. 12; Craib, Fl. Siam. En. 1, 1925, p. 23; Burk., Dict. Econ. Prod. Mal. Pen., 1935, p. 810; Corn., Gard. Bull. S. S. 10, 1939, p. 3; Corn., Wayside Trees Malaya, 1940, p. 204; *Watanabe, Ill. Comm. Med. Pl. South. Regions, 1942, p. 244; Heyne, Nutt. Pl. Indon., 1950, p. 1072. (orthography usually *meliosmaefolia*).

Wormia meliosmifolia (Hook.f. & Thoms.) King, J. As. Soc. Beng. 58, II, 1889, p. 365; *King, Ann. Roy. Bot. Gard. Cal. 5, 1896, p. 115, t. 130.

Wormia parviflora Ridl., J. Str. Br. R. A. S. 54, 1910, p. 6; Ridl., Fl. Mal. Pen 1, 1922, p. 9.

Dillenia elmeri Merr., Univ. Calif. Publ. Bot. 15, 1929, p. 195.

Type specimens: *Dillenia sumatrana:* 454 HB, Lubukalung, Sum. W. Coast; holotype in U, isotypes in BZ, L. — *Dillenia meliosmifolia*; Griffith 51, Malacca; holotype in K. — *Wormia parviflora:* Curtis, Ayer Panas, Malacca, May 1900; lectoholotype in SING. — *Dillenia elmeri:* Elmer 21028, Tawao, Elphinstone Prov., Br.

N. Borneo, Oct. 1922—March 1923; holotype in UC, isotypes in BM, BZ, C, G, GH, K, L, M, MO, NY, P, SING, U.

Rather tall, slender, evergreen trees, up to 20 m high, 35 cm thick, with up to 6 m bole. Bark reddish brown. Branches sympodial, younger ones $1^1/_2$—3 mm thick, moderately to densely hirsute with 0.3—1.5 mm long hairs, glabrescent. Leaf-scars clasping about $^1/_2$ of branch, semilunular to subfalcate with ca 11 leaf-traces slightly above middle. *Leaves* oblong, (13—)16—30(—45) × (5—)7—16(—20) cm, with (13—)15—20 (—26) nerves on either side; acute to acuminate at apex, acute to obtuse at base; margin dentate to nearly entire, nerves usually slightly curving upward, ending in apex of teeth with short mucro; slightly shining, glabrous to sparsely hirsute on intervenium and nerves, glabrous to densely hirsute on midrib above, dull, glabrous to slightly hirsute on intervenium, slightly to rather densely strigose-hirsute on nerves, rather densely to densely strigose-hirsute on midrib beneath. Petiole $1^1/_2$—5 cm, glabrous to densely hirsute above, sparsely strigose, particularly near base, to densely hirsute beneath. *Inflorescences* terminal; flowers solitary or in 2(—3)-flowered racemes with flowers attached close to each other; axis 0.1—2(—5) cm long, $2^1/_2$—$1^1/_2$ mm thick, densely hirsute like younger branches; bracts caducous, lanceolate, 6—20 × 1—4 mm, densely hirsute on both sides, most densely so above. *Flowers* ca 6 cm across. Pedicel 1—3 cm, when in fruit prolonged to 2—5 cm, 1.3—2 mm thick, thickened to $2^1/_2$—3 mm at apex, moderately to densely hirsute like younger branches, without bracteoles. Sepals 5, ovate, 10—14 × 9—11 mm, glabrous except up to 5 mm broad densely shortly sericeous margin near apex inside, densely sericeous outside, densely ciliate at margin. Petals 5, yellow, obovate, ca 25 × 15 mm, rounded at apex, narrowed towards base. Stamens yellow, in 2 distinct groups, those of outer group (ca 200) slightly curved in bud, 6—$7^1/_2$ mm long, those of inner group (ca 18—20) with apical part reflexed outward in bud, 10—11 mm long; filament 2—$3^1/_2$ mm long, in stamens of outer group 0.1—0.3, in those of inner group 0.2—0.4 mm broad; anther 0.5—0.7 mm broad, in stamens of outer group rounded with often bifurcate mucro at apex, in those of inner group slightly mucronate to slightly emarginate. Carpels 7—10, white, arranged around narrow conical receptacle, lanceolate, ca 4—5 × $1^1/_2$ mm, glabrous, each with ca 15—20 ovules; styles spreading, white, linear-lanceolate, flat, 5—6 mm long, up to 0.8 mm broad, with acute apex. *Pseudocarps* indehiscent, yellow or orange-yellow, about globular, 2—$2^1/_2$ cm diam. including enclosing sepals which are up to 25 × 20 mm, up to $2^1/_2$ mm thick at base; carpels coriaceous, ca 12 × 7 mm, each with 1(—2) seeds. Seeds oval, ca 5 × $3^1/_2$ mm, glossy black, exarillate.

Sumatra: Sum. E. Coast: near Badjalinggi S of Tebingtinggi, *Lörzing & Jochems 7603*, 1920 (BZ); Bila (Aek Buro), *Lörzing 11585*, fr. Apr. 1925 (BZ); Silo Maradja, Asahan, near Talun Djoring, *Rahmat Si Toroes 828*, fl. July—Aug. 1928 (A, MICH, SING); Huta Padang Est. near Kesarin, *Krukoff 298*, Dec. 1930 (BZ, NY, US); Masihi For. Res., Asahan, *Krukoff 4047*, fl. Oct.—Nov. 1932 (A, BRI, BZ, G, L, MO, NY, SING, US); near Huta Bagasan, Asahan, *Rahmat Si Boeea 1055*, fl. Sept. 1934—Feb. 1935 (A, S, SING); ibidem, *Rahmat Si Boeea 6616*, fl. Sept. 1934—Feb. 1935 (A, SING, US); near Aek Salabat, Asahan, *Rahmat Si Boeea 9628*, fl. July 1936 (A). — Lamp. Distr.: Gunung Trang, *Forbes 1607*, fr. Aug. 1880 (BM, CAL, GH, SING). — Pulau Bras: near Laping, *Koorders 10505β*, Feb. 1890 (BZ). — Pulau

Simalur: *Achmad 1076*, fl. Apr. 1919 (BZ, L). — Pulau Nias: near Sibolga, *NIFS bb 5713*, fl. May 1923 (BZ). — Mentawei Isls: Siberut, *Kloss SF 14083*, fr. Sept. 1924 (BM, BZ, K, SING, UC); ibidem, *Iboet 106*, fl. Sept. 1924 (BZ, L).

Malay Peninsula: *Scortechini*, fl. (BZ, K, L, UPS); *Scortechini 1910a*, fl. (CAL, DD, P). — Perak: Gopeng, *Kunstler 858*, fr. Oct. 1880 (BM, CAL, DD); ibidem, *Kunstler 4779*, Aug. 1883 (BM, CAL, E, K, L, SING); Chanderiang, *Kunstler 5787*, fr. March 1884 (BM, CAL, K, L, SING); Jura, *Kunstler 8151*, fl. Sept. 1885 (CAL, FI, UPS); Ulu Bubong, *Kunstler 10175*, fl. Jan. 1886 (CAL, G, L, US). — Dindings: Bukit Tungal, *Ridley*, fr. March 1896 (SING); Lumut, *Curtis* = *3489*, fl. Dec. 1902 (SING). — Pahang: Chatin, Temerloh, *Hamid CF 4773*, fr. Aug. 1919 (K, SING); Temerloh, *Bonar CF 6326*, fl. Oct. 1925 (K, SING); Kawansul For. Res., *Hamid CF 10686*, fl. (IFI); Raub, *Kalong CF 20295*, fl. Oct. 1929 (IFI). — Selangor: Kuala Lumpur, *Curtis 2311*, fr. July 1890 (SING); Bukit Etam, Kuala Lumpur, *Kelsall 1847*, fr. Jan. 1891 (BM, CAL, SING); Ulu Gombak, *Burn-Murdoch 132*, fl. 1908 (BM); Weld's Hill, *Hamid CF 969*, fl. Apr. 1917 (SING); ibidem, *Rahman CF 1801*, fl. Jan. 1918 (SING); ibidem, *Ahmad CF 3898*, fl. July 1919 (K); Sungai Lalang Kajang, *Symington CF 22863*, fr. March 1930 (IFI); Bangi Kajang, *Osmar & Tachun CF 23660*, fr. Dec. 1930 (IFI); Rantau Panjang, *Barnard CF 29057*, fr. Feb. 1932 (DD). — Negri Sembilan: Gunung Angsi, *Ridley*, fr. Dec. 1898 (SING); Bangi, Kajang For. Res., *Ahmad CF 5194*, fr. Feb. 1920 (K, SING); Bukit Tangga, *Ridley*, fl. Dec. 1920 (K); Senaling Inas For. Res., *Holttum SF 9757*, fr. Nov. 1922 (BZ, K, SING); Gunung Angsi For. Res., *Ali CF 23679*, fl. (IFI); Gunung Angsi, *Framok 353*, Aug. 1937 (C). — Malacca: *Griffith 51*, fr. (K); *Maingay 1298 (Kew Distr. 7)*, fl. July 1865—6 (K); Bujong, *Scortechini 1910*, fr. March 1883 (CAL); *Alvins 161*, fr. Nov. 1884 (SING); Selandar, *Alvins 676*, fr. Jan. 1885 (SING); Sedanau Res., *Derry 380*, fr. Nov. 1889 (MEL, SING); Merlimau, *Derry 1077*, fl. Oct. 1892 (CAL, P, SING); *Goodenough 1500*, fr. Oct. 1893 (K, SING); Ayer Panas, *Goodenough 1983*, fl. June 1894 (BM, SING); Ayer Kroh, *Ridley*, 1899 (SING); S. side of Selandar For., *Burkill SF 1357*, fr. Dec. 1915 (K, SING).

Borneo: NW. Borneo: Kayangeran For. Res., Lawas, *Omar 82*, fr. June 1924 (SING) — Br. N. Borneo: *Villamil 240*, Sept.—Oct. 1916 (K); Tawao, Elphinstone Prov., *Elmer 21028*, fr. Oct. 1922—March 1923 (BM, BZ, C, G, GH, K, L, M, MO, NY, P, SING, U, UC).

Cultivated: Singapore: Changi, *Baker 5843*, fl. Oct. 1917 (G); ibidem, *Baker 5570*, fr. Nov. 1917 (G); Econ. Gard., *Deshmukh*, fl. Aug. 1919 (SING); ibidem, *Deshmukh*, fr. May 1921 (SING); ibidem, *Henderson SF 1347*, fl. Sept. 1921 (SING).

Distribution. Sumatra and some of the adjacent islands (Pulau Bras, Simalur, Nias, and Siberut), Malay Peninsula (not in the southernmost part), and Borneo (known only from Sarawak and British North Borneo).

Ecology. In forests, up to 500 m altitude.

Vernacular names. Sumatra: *Dwasa hupang, Kaju si marbadji bodat, Kaju hatapang dolok* (Sum. E. Coast); *Duwa saopang* (Toba Mal.); *Surumah delok* (Simalur). Malay Peninsula: *Simpoh bukit* (= hill-s.), *S. hutan* (= woodland s.), *S. jantan* (= big s.), *S. padi* (= little s.). Borneo: *Simpoh gunang* (Sarawak).

Uses. The fruit is eaten. The wood is of rather bad quality, but sometimes used in house-building.

42. Dillenia sibuyanensis (Elm. 1913) Merr. 1914

Wormia sibuyanensis Elm., Leafl. Philip. Bot. 5, 1913, p. 1772.

Dillenia sibuyanensis (Elm.) Merr., Philip. J. Sc. Bot. 9, 1914, p. 332; Merr., En. Philip. Fl. Pl. 3, 1923, p. 62; Hoogl., Fl. Mal. I, 4, 1951, p. 170.

Type specimen: Elmer 12078, Magallanes, Mt Giting-Giting, Capiz Prov., Isl. of Sibuyan, March 1910; lectoholotype (isotype) in L, isotypes in A, BM, BZ, CAL, E, FI, G, GH, K, MO, NY, P, US.

Evergreen shrubs, 3 m high or higher, with numerously rebranched branches. Bark smooth, greyish brown, when old scaling off in plates. Wood moderately hard and heavy, sappy white, odourless, with a slight sweet taste. Branches sympodial, younger ones 1—1$^1/_2$ mm thick, glabrous to sparsely hirsute, glabrescent. Leaf-scars clasping $^1/_3$—$^1/_2$ of branch, broadly subfalcate with ca 7 leaf-traces in lower half. *Leaves* rigidly chartaceous, narrowly obovate to oblanceolate, (2—)3$^1/_2$—6(—9) × ($^1/_2$—)1—2(—3) cm, with (5—)7—9(—10) nerves on either side; acuminate at apex, acute at base, decurrent; margin entire to very slightly emarginate at end of nerves; nerves curving upward, ending $^1/_2$—1 mm from margin, with secondary nerve towards margin; shining, deep green, glabrous above, dull, much lighter green, glabrous on intervenium, sparsely strigose on nerves, with hairy domatia in axil of nerves beneath. Petiole 5—16 mm, glabrous above, glabrous to sparsely strigose beneath, sparsely ciliate at margin near base. *Inflorescences* terminal; flowers solitary or in 2—3-flowered racemes; axis ca 3 cm long, ca 1 mm thick, hairy like younger branches; bracts caducous, lanceolate, acuminate. *Flowers* ca 5 cm across. Pedicel $^1/_2$—3 cm, ca 1 mm thick, thickened to ca 2 mm at apex, sparsely hirsute. Sepals 7—9, oval to obovate, outermost ones smaller (ca 12 × 7 mm) than innermost ones (ca 15 × 10 mm), glabrous inside, slightly hirsute outside, sparsely ciliate at margin. Petals 5, lemon yellow, narrowly obovate, ca 30 × 13 mm, rounded at apex and base. Stamens in 2 distinct groups, those of outer group (ca 70) slightly curved in bud, 7—8 mm long, those of inner group (ca 20) with apical part reflexed outward in bud, 12—16 mm long; filament of outer stamens of outer group 2—3 mm long, ca 0.2 mm broad, that of inner stamens of outer group and of those of inner group 1$^1/_2$—2 mm long, ca 0.5 mm broad; anther 0.6—0.8 mm broad, emarginate at apex; thecae linear, opening with pore near apex on outer side. Carpels (5—)7(—8), bright red, arranged around narrow conical receptacle, lanceolate, ca 6—8 × 1.5—1.8 mm, glabrous, each with 6 ovules; styles spreading, whitish, linear, ca 12 mm long, 1 mm broad near base, 0.3 mm near apex, acute at apex. *Pseudocarps* dehiscent; carpels ca 15 × 10 mm, each 1-seeded. Seeds obovoid, ca 3.5 × 2.8 mm, brown, enclosed by yellow, membranous aril.

Philippines: Sibuyan: Magallanes, Mt Giting-Giting, *Elmer 12087*, fl. & fr. March 1910 (A, BM, BZ, CAL, E, FI, G, GH, K, L, MO, NY, P, US).

Distribution. Philippines, Sibuyan Island only.

Ecology. Scattered along forested river banks from about sea level to 300 m.

43. Dillenia retusa Thunb. 1791

Arbor zeylanica fructu acidulo Godhapara dicta Herm., Mus. Zeyl., 1717, p. 49; Burm., Thes. Zeyl., 1737, p. 30.

Dillenia integra *Thunb., Trans. Linn. Soc. 1, 1791, p. 199, t. 18; DC., Syst. 1, 1818, p. 437; DC., Prod. 1, 1824, p. 76.

Dillenia retusa *Thunb., Trans. Linn. Soc. 1, 1791, p. 200, t. 19; DC., Syst. 1, 1818, p. 437; DC., Prod. 1, 1824, p. 76; Wight & Arn., Prod. Fl. Pen. Ind. Or. 1, 1834, p. 6; Hook.f. & Thoms., Fl. Br. Ind. 1, 1872, p. 37; Trim., Handb. Fl. Ceyl. 1, 1893, p. 13; Gamble, Man. Ind. Timb. 2nd ed., 1902, p. 5; Gamble, Fl. Pres. Madras 1,

1915, p. 7; Abeyesundere & Rosayro, Draft of 1st Checkl. Ceyl., 1939, p. 18; Dougl. & Baas Becking, Bull. Bot. Gard. Btzg III, 17, 1947, p. 298.

Wormia integra (Thunb.) Hook.f. & Thoms., Fl. Ind. 1, 1855, p. 68.

Wormia retusa (Thunb.) Hook.f. & Thoms., Fl. Ind. 1, 1855, p. 68.

Dillenia retusa var. integra (Thunb.) Boerl., Cat. Hort. Bog., 1899, p. 7.

Type specimens: *Dillenia integra:* herb. Thunberg, Ceylon; holotype in UPS, original of Thunberg's figure, not seen. — *Dillenia retusa:* idem.

Evergreen trees, up to ca 20 m high, 70 cm thick. Bark brownish grey, wood reddish brown. Branches sympodial, younger ones $1^1/_2$—2 mm thick, more or less densely appressed silky hairy, glabrescent. Leaf-scars clasping about $^2/_5$—$^1/_2$ of branch, semi-lunular with 9 leaf-traces in middle. *Leaves* obovate, ($8^1/_2$—)13—18(—21) × (5—)$7^1/_2$—10(—12) cm, with 10—14 nerves on either side; rounded to retuse at apex, acute at base, decurrent; margin entire to slightly dentate, nerves ending in apex of teeth or otherwise in margin; shining, glabrous above, rather dull, glabrous on intervenium, sparsely strigose on nerves and midrib beneath. Petiole 1.3—2.2 cm, glabrous above, densely to sparsely strigose beneath. *Inflorescences* terminal, usually 2—3-, rarely 1-flowered, with 2—4 cm long axis with flowers usually attached close to each other, with triangular bracts, 4—8 × 1—2 mm, often small bud, ca 2 × 1 mm, at apex between 2 pedicels or next to single pedicel, never seen developing further. *Flowers* 6—8 cm across. Pedicel 1—$3^1/_2$ cm long, 0.7—1.5 mm thick, slightly thickened to $2^1/_2$ mm at apex, sparsely strigose to sparsely hirsute, without bracteoles. Sepals 5, circular to oval, 2 outermost ones smaller (ca 16 × 14 mm) than 3 innermost ones (ca 20 × 20 mm), up to $2^1/_2$ mm thick at base, all glabrous inside, rather densely appressedly silky hairy outside, most densely so on central part from base upward, 3 innermost ones more densely so than 2 outermost ones, all densely ciliate at margin. Petals 5, white, obovate, ca 35 × 25 mm, rounded at apex, narrowed towards base. Stamens ca 180, outermost ones slightly curved in bud, ca $6^1/_2$ mm long, innermost ones with apical part reflexed outward in bud, ca 11 mm long, with several of intermediate lengths; filament purple, whitish towards base, in outermost stamens ca 2, in innermost ones ca 3 mm long, all ca 0.8 mm broad; anther 0.5—0.8 mm broad, acuminate at apex; thecae white, linear, opening with pore near apex on outer side; connective purple. Carpels 5—6, arranged around broad conical receptacle, lanceolate, ca 8 × $2^1/_2$ mm, glabrous, each with 22—34 ovules in 2 double rows; styles spreading, cylindric, 7—8 mm long, 0.4 mm thick near base, 0.2 mm near apex, channelled above, acute at apex. *Pseudocarps* indehiscent, orange, about globular, 2—3 cm diam. including enclosing sepals which are up to 45 × 40 mm, at base up to 8 mm thick; carpels ca 13 × 8 mm, each with many seeds. Seeds ovoid, ca $2^1/_2$ × 2 mm, exarillate.

India: "Penins. Ind. Or.", *Rottler* (K); idem, *Wight 23*, fl. (GL, K).

Ceylon: Colombo, *Berkett 963*, fl. (MEL); Calte, *Champion*, fl. Apr. (CGE); *Kelaart*, fl. (K); *Walker*, fl. (G); *Walker 55* (G); *Wight*, fl. March 1836 (E); *Thwaites CP 2960*, fl. Sept. 1864 (BM, BZ, OAL, CGE, G, GH, K, MEL, P); forest of Achmimené, *de Poli*, fl. Apr. 1879 (P); *Rudolf*, fl. Feb. 1896 (MICH); Elpikya, *Pearson 935*, 1897 (CGE).

Cultivated: Bot. Gard. Peradeniya: *Detch*, fl. & fr. May 1922 (A); *Dir. of Agric.*, fl. March 1925 (IFI). — Bot. Gard. Calcutta: fl. (BZ, C, CAL, DD, U); *Voigt*, fr. (C); *Anderson*, fl. (CAL, K); *Wallich 6625a*, fl. July 1807 (CGE, K); fl. 1848 (OX); *Pierre*, fl. Apr. 1863 (P); *Kurz*, fl. (BZ, CAL); *Mayr*, fr. 1866—7

(A, M). — Bot. Gard. Bogor: fl. (CAL); *Beccari*, fl. 1876 (FI); no IV-G-22, fr. Aug. 1890 (BZ, K, L); no IV-G-28, fl. Nov. 1889, fr. Oct. 1896 & Apr. 1912 (BZ, K, L, U); no XII-B-IX-53, fl. (BZ).

Locality unknown: fl. (P); *Brandis*, fl. (DD); *Dahl* (S); *Helfer* (P); *de Hügel*, fl. 1829 (M); fl. Apr. 1884 (CAL).

Distribution. Ceylon; also reported from the Deccan Peninsula, but this is probably due to misidentification of *D. bracteata*. The specimens, cited under India above, are not reliable as to their geography.

Ecology. In Ceylon rather common in moist low country; known in flower from April to September.

Vernacular name. *Godapara* (Singhalese).

Use. The fruit is edible.

44. Dillenia monantha Merr. 1914

Dillenia monantha Merr., Philip. J. Sc. Bot. 9, 1914, p. 321; Merr., En. Philip. Fl. Pl. 3, 1923, p. 60; Hoogl., Fl. Mal. I, 4, 1951, p. 170.

Type specimen: Merrill 9237, Taytay, Palawan, Apr. 1913; lectoholotype (isotype) in L, isotypes in A, BM, BZ, CAL, GH, K, MO, NY, P, SING.

Evergreen trees, up to 17 m high. Bark smooth. Branches sympodial, younger ones ca 2 mm thick, glabrous to very shortly strigose, glabrescent. Leaf-scars clasping about $^2/_5$ of branch, semi-lunular with 5—7 leaf-traces near lower margin, with on both sides single line, 1—$1^1/_2$ mm long, diverging slightly upward to slightly downward. *Leaves* elliptic-oblong to lanceolate, ($3^1/_2$—)8—14(—17) × (1.8—)$3^1/_2$—7(—$8^1/_2$) cm, with (5—)7—9(—11) nerves on either side; rounded to obtuse, rarely acute at apex, obtuse to acute at base, decurrent; margin slightly undulate-dentate, nerves curving upward, ending in margin either directly or through ca 1 mm long vein; shining on both sides, most so above, glabrous above, glabrous on intervenium and nerves, glabrous to sparsely very shortly strigose on midrib beneath. Petiole 5—12(—25) mm, 2.4—4(—5) mm broad including 1—$1^1/_2$ mm broad wings, glabrous above, glabrous to sparsely very shortly strigose beneath. *Flowers* solitary, terminal, ca 10 cm across. Pedicel $2^1/_2$—5(—7) cm, $1^1/_2$—2 mm thick, thickened to 5 mm at apex, glabrous to sparsely very shortly hirsute, without bracteoles. Sepals 5, oval, 2 outermost ones smaller (ca 15 × 12 mm) than 3 innermost ones (ca 22 × 15 mm), glabrous on both sides, glabrous to ciliate at margin. Petals 5, yellow, obovate, ca 50 × 28 mm, rounded at apex, narrowed towards base. Stamens ca 110, outermost ones slightly curved in bud, ca 9 (some to 7) mm long, innermost ones with apical part reflexed outward in bud, up to 15 (some to 17) mm long, size gradually increasing towards centre of flower, stamens of 9 and 15 mm represented by largest number; filament 2—3 mm long, 0.4—0.5 mm broad; anther ca 0.7 mm broad, rounded at apex; thecae linear, opening with pore near apex on outer side. Carpels 4—5, arranged around narrow conical receptacle, lanceolate, ca 7—8 × $1^1/_2$ mm, glabrous to sparsely hirsute with 0.2—0.4 mm long, rather rigid hairs, each with 11—16 ovules; styles slightly spreading, linear, ca 8 mm long, 0.2—0.4 mm broad. *Pseudocarps* dehiscent; sepals spreading, enlarged to ca 35 × 17 mm; carpels ca 15 × 13 mm, each with 1 seed. Seeds ob-ovoid, ca 4 × $2^1/_2$ mm, with ca 1 mm long membranous aril.

Philippines: Palawan: Dumaran, Paragua Prov., *Vidal 1098*, fr. (K); *Curran FB 4518*, fl. June 1906 (L, US); Taytay, *Merrill 9237*, fl. Apr. 1913 (A, BM, BZ, CAL, GH, K, L, MO, NY, P, SING); *Escritor BS 21555*, fl. Aug. 1913 (K, US); Dumaran, *Escritor BS 21642*, fl. Aug. 1913 (P); Taglupa, *Alcacid PNH 6016*, fl. May 1938 (A); Binohan Mtn near Puerta Princesa, *Ebalo 401*, fl. Feb. 1940 (A). — Calamianes: Culion, *Fénix BS 15647*, fl. July 1912 (BM, K); Busuanga, *Ramos BS 41245*, fl. Sept. 1922 (A, K, P); Culion, *Herre 1010*, fl. Apr. 1931 (A, NY, UC); ibidem, *Bartlett 15541*, fl. & fr. July 1935 (A).

Distribution. Philippines, known only from Palawan and the Calamianes.

Ecology. In dry secondary forests and in open grasslands at low altitudes.

Vernacular names. *Malacatmon* (Tag.).

Note. In general appearance of the leaf the species strongly resembles *D. luzoniensis* and *D. diantha*; from the former it is easily distinguished by the solitary flowers, from the latter by the non-amplexicaul petiolar wings and ditto leaf-scars.

45. Dillenia turbinata Fin. & Gagnep. 1906

Dillenia turbinata *Fin. & Gagnep., Bull. Soc. Bot. Fr. Mém. 4, 1906, p. 11, pl. 1; *Fin. & Gagnep., Fl. Gén. Ind.-Ch. 1, 1907, p. 23, pl. 1; Merr., Philip. J. Sc. 21, 1922, p. 502; Merr., Lingn. Sc. J. 5, 1927, p. 128; Gagnep., Suppl. Fl. Gén. Ind.-Ch. 1, 1938, p. 23; Masamune, Fl. Kainantensis, 1943, p. 205.

Dillenia heterosepala *Fin. & Gagnep., Bull. Soc. Bot. Fr. Mém. 4, 1906, p. 11, pl. 2; *Fin. & Gagnep., Fl. Gén. Ind.-Ch. 1, 1907, p. 24, pl. 2; Merr., Lingn. Sc. J. 9, 1930, p. 40; Gagnep., Suppl. Fl. Gén. Ind.-Ch. 1, 1938, p. 24; Masamune, Fl. Kainantensis, 1943, p. 205.

Type specimens: *Dillenia turbinata:* Bon 5299, Lac Thô, Tonkin Occ., 1892; holotype in P. — *Dillenia heterosepala:* Bon 5421, Thien Thou, Tonkin Occ., 11 June 1892; holotype in P.

Evergreen trees, up to 30 m high, 1 m thick. Bark grey or greyish green. Branches sympodial, younger ones 3—5 mm thick, densely ferrugineous-hirsute, glabrescent. Leaf-scars clasping about $^1/_2$ of branch, subfalcate with ca 15 leaf-traces in upper half. *Leaves* obovate, (6—)15—30(—40) × (3$^1/_2$—)8—14(—18) cm, with (9—)15—22(—40) nerves on either side; rounded to obtuse, rarely acute at apex, acute at base, decurrent; margin dentate to nearly entire, nerves ending in apex of teeth; deep green, glabrous on intervenium and nerves, densely shortly hirsute on midrib above, pale green, sparsely hirsute on intervenium, rather densely so on nerves and midrib beneath. Petiole 2—3(—4$^1/_2$) cm, slightly winged with up to 1$^1/_2$ mm broad, non-amplexicaul wings; glabrous above, hirsute to nearly glabrous beneath. *Inflorescences* terminal, 2—4-flowered racemes, 1$^1/_2$—7 cm long; axis 5—3 mm thick, densely hirsute like younger branches, without bracts. *Flowers* 10—13 cm across. Pedicel 3—20 mm, 2—3 mm thick, densely hirsute like axis, without bracteoles. Sepals 5, oval, 2 outermost ones slightly larger (ca 35 × 20 mm) than 3 innermost ones (ca 32 × 18 mm), glabrous except upper margin of ca 5 mm breadth in 2 outermost ones inside, hairy except in bud covered margins outside, indument rather densely villose in 2 outermost ones, densely appressedly sericeous in 2 innermost ones, in third sepal partly like in outermost, partly like in innermost ones; densely ciliate at margin. Petals 5, bright yellow or, rarely, white or pink, obovate, 55—

70 × 35—45 mm, rounded at apex, narrowed towards base. Stamens in 2 distinct groups, those of outer group (ca 310—325) slightly curved in bud, 14—18 mm long, those of inner group (ca 25) with apical part reflexed outward in bud, 20—25 mm long; filament purplish red, of stamens of outer group 5—11 mm long, 0.4—1 mm broad, of those of inner group 2—5 mm long, 1—1$^1/_2$ mm broad; anther in stamens of outer group for whole length 0.8—1.0 mm broad, in those of inner group 0.8 mm broad at apex, up to 2.0 mm at base by broadening of connective towards base, slightly emarginate at apex in stamens of inner group and innermost ones of outer group, to manifestly acuminate in outermost stamens; thecae yellow, linear, opening with pore near apex on outer side; connective purplish red. Carpels 8—9, white, arranged around rather narrow conical receptacle, lanceolate, 8—10 × 3—3$^1/_2$ mm, glabrous, each with ca 40—45 ovules, in lower part in 2 double rows; styles spreading, cylindric, ca 13 mm long, ca 0.8 mm thick near base, 0.4 mm near apex. *Pseudocarps* indehiscent, dull red or red, about globular, ca 5 cm diam., 4$^1/_2$ cm high including enclosing sepals which are up to 6 × 4$^1/_2$ cm; carpels ca 17 × 8 mm, each with 1 or more seeds. Seeds obovoid, ca 6 × 4 mm, glossy dark brown, glabrous, exarillate.

China: Kwangsi: Ma Hou Ho, Sup Man Ta Shan, *Liang 69570*, fr. July 1937 (A); Shan Pi Pa Muk, Shap Man Taai Shan, Tang Lung village SE of Shang-sze, *Tsang 23992*, fr. Aug. 1934 (A, MO, NY). — Hainan: *Henry 8622*, fr. 1889 (K); *Konishi 21959*, fr. June 1909 (UC); *Chun 6494*, fl. March 1920 (UC); Yik Tsok Mau, Fan Ya, *MacClure 9275*, fl. Apr. 1922 (A, BM, E, G, K, MO, P); Sai Young Pi Ba Shue, Tai Shui Kau, Lin Fa Shan & Vicinity, Lam Ko Distr., *Tsang 15730*, fr. July 1927 (A, G, K, NY, S, UC); Sai Ip Pei Pa Shue, Lin Fa Shan (Taam Chau-Lam Ko Distr.), *Tsang 17025*, fr. May 1928 (A, K, MO, P, UC); Po-ting, Nam Lung Shaan, *May 97*, Aug. 1928 (UC); Hung Mo Tung, Hung Mo, above Fan Ta, *MacClure & Fung 18288*, Aug. 1929 (A, DD, K, NY); E of Po-ting, Ling Shui, *Ko 52211*, fr. Apr. 1932 (A, K, NY, P); Way to Seven Finger Mts, *Liang 61621*, fl. Apr. 1932 (A, K, NY); between Paai Poon Ts'uen and Fan Maan Ts'uen, Ling Shui Distr., *Fung 20079*, fl. & fr. May 1932 (A, BM, E, G, K, MO, NY, P, UC); Yaichow, *How & Chun 70272*, fl. March 1933 (A, E, K, NY, P); Tai Wong Ling & Vicinity, Tung Pin Tin village, Ching Mai Distr., *Lei 461*, fl. March 1933 (A, K, L, NY, P, SING, UC); Yaichow, *How 70391*, fl. March 1933 (NY); Ping Pa, Ue Lung Ling, Ch'ang-kiang Distr., *Lau 1439*, fl. May 1933 (A, BM, NY, P); Pak Shik Ling & Vicinity, Ku Tung village, Ching Mai Distr., *Lei 715*, fr. June 1933 (BZ, K, L, NY, P, SING, UC); Yaichow, *How 70953*, fr. July 1933 (A, NY, P); ibidem, *Liang 62040*, fr. July 1933 (A, NY); *Wang 32976*, fl. July 1933 (NY); *Wang 36660*, fl. Jan. 1934 (A, NY); Shan Ping Pa, Chim Fung Ling, near Sam Mo Watt village, Kamp-en Distr., *Lau 3687*, fl. Apr. 1934 (A, P, S); Po-ting, *How 71792*, fr. Apr. 1935 (A); ibidem, *How 72058*, fr. Apr. 1935 (A); ibidem, *How 72084*, fl. (BZ, G); ibidem, *How 72444*, fr. May 1935 (SING); Yeung Lam Shan, near Yeung Lam village, Yai-hsien Distr., *Lau 6260*, fr. May 1935 (A); Bak Sa, *Lau 25919*, fl. March 1936 (A).

Indo-China: Tonkin: Lac Thô, *Bon 5299*, fl. 1892 (P); Thien Thou, *Bon 5421*, fr. June 1892 (P); Chan Mong For. Res., Phu Tho Prov., *Fleury 30126*, fl. Apr. 1914 (P); Hui La For. Res., Tuyen Quang Prov., *Fleury 37429*, fl. May 1918 (P); between Vinh Yen and Ban Dao, *Pételot 4581*, fl. Apr. 1931 (NY, P); Su Poul Sis Links, Vinh Yen Prov., *Pételot 5470*, fr. May 1935 (A, P); Lan Hit, Thai Nguyen Prov., *Pételot 2401*, fl. May 1940 (A, NY, MO). — Annam: Bogiang, Thua Thien Prov., *Eberhardt 2779*, fl. (P); Co Ba (Ke Nhe) For. Res., Nghe An (Vinh) Prov., *Chevalier 32544*, fr. May 1914 (P); Hon Ba massif, Nha Trong Prov., *Chevalier 38602*, fr. Aug. 1918 (P); Beu Tiam, Quang Tri Prov., *Poilane 1126*, March 1920 (P); Bana near Tourane, *Poilane 1582*, fr. June 1920 (P); ibidem, *Poilane 7253*, fr. July 1923 (P); ibidem, *Poilane 7274*, fr. July 1923 (P); Lien Chien near Tourane, *Poilane 7581*, fr. Aug. 1923 (P); between Nhatrang and Ninh Hoa, *Poilane 8248*, fr. Oct. 1923 (P);

Dent du Tigre, Quang Tri Prov., *Poilane 10395*, fr. May 1924 (P); Dong Co Pat massif, Quang Tri Prov., *Poilane 11139*, fr. July 1924 (P); Mt Bani near Tourane, *Clemens 3916*, fr. July 1927 (P, UC); ibidem, *Clemens 4120*, fl. May—July 1927 (A, K, NY, P, UC); P. Sapoum near Blao, Haut Donai Prov., *Poilane 22044*, fl. & fr. Feb. 1933 (P); ibidem, *Poilane 23794*, fl. Jan. 1935 (P); Bana near Tourane, *Poilane 29297*, fr. March 1939 (P); Poste 6, Quang Nam Prov., *Poilane 29570*, fl. March 1939 (P); Hui Baih Ma Station near Hué, *Poilane 29764*, fl. Apr. 1939 (P); ibidem, *Poilane 29874*, fl. & fr. Apr. 1939 (P).

Distribution. S. China (Kwangsi and Hainan) and Indo-China (Tonkin and Annam), S to ca 15° N.

Ecology. Usually in dense forests, often in ravines, rarely in open places; most common at medium altitudes (in Annam 500—1200 m), descending to 300 m and probably lower. Flowering from January to July, fruiting to August.

Vernacular names. Hainan: *Pai (Pei, Pi) Pa Shu* (Ching Mai Distr.), *Baai Tui* (Lai dialect). Indo-China: *Cay Long, Cay long tia, Cay so, Cay tro* (Annamite); *Co sanh manh* (Muong); *Po bua* (Loi); *Ta vaci* (Moi).

Uses. The fruit is edible; the wood is suitable for beams.

Notes. 1. In most specimens where the colour of the petals has been noted they are said to be yellow; white and pink both have been noted once (*Lau 1439* and *Tsang 23992* resp.).

2. *Poilane 8248* and *23794* are referred here with some doubt. The number of nerves is higher than usual in the species, viz. ca 35 in *Poilane 8248* and ca 40 in *Poilane 23794*. Though the material is insufficient, it further matches the species reasonably.

46. Dillenia ovata Wall. ex Hook.f. & Thoms. 1855

Dillenia ovata Wall., Cat., 1828, no 945, nomen nudum; Hook.f. & Thoms., Fl. Ind. 1, 1855, p. 70; Miq., Fl. Ind. Bat. 1, 2, 1859, p. 12; Hook.f. & Thoms., Fl. Br. Ind. 1, 1872, p. 36; *Pierre, Fl. For. Cochinch. 1, 1879, t. 10; Laness., Pl. Util. Col. Fr., 1886, p. 282; King, J. As. Soc. Beng. 58, II, 1889, p. 366; Fin. & Gagnep., Bull. Soc. Bot. Fr. Mém. 4, 1906, p. 10; Fin. & Gagnep., Fl. Gén. Ind.-Ch. 1, 1907, p. 22; Back., Fl. Batavia 1, 1907, p. 5; Back., Schoolfl. Java, 1911, p. 11; Koord., Exk. Fl. Java 2, 1912, p. 601; *Crev. & Lemarié, Cat. Prod. Ind.-Ch. 1, 1917, p. 191, pl. 65; Ridl., Fl. Mal. Pen. 1, 1922, p. 11; Craib, Fl. Siam. En. 1, 1925, p. 23; *Crev. & Pétel., Bull. Econ. Ind.-Ch. Nouv. Sér. 32, 1929, p. 19; Burk., Dict. Econ. Prod. Mal. Pen. 1, 1935, p. 810; Gagnep., Suppl. Fl. Gén. Ind.-Ch. 1, 1938, p. 23; Corn., Wayside Trees Malaya, 1940, p. 204; Back., Bekn. Fl. Java (em. ed.) 4, 1942, fam. 80, p. 5; Hoogl., Fl. Mal. I, 4, 1951, p. 170.

Dillenia aurea Auct. non Sm.; J. Schmidt, Bot. Tidskr. 32, 1916, p. 334.

Type specimen: Wallich 945, G. Porter, Penang; holotype in K.

Evergreen trees, up to 30 m high, 100 cm thick, usually smaller, ca 6—12 m high, 30—40 cm thick, with rather knotted trunk; crown lowly attached, leaving up to 5 m bole. Bark reddish or brown, flaky. Branches sympodial, younger ones ca 3 mm thick, densely hirsute, most densely so in axil of leaves, glabrescent. Leaf-scars clasping about $^1/_2$ of branch, subfalcate with ca 13 leaf-traces somewhat above middle. *Leaves* ovate to oval or elliptic, (7—)10—20(—30) × (5—)7—12(—15) cm, with (14—)18—25(—30) nerves on either side, in young trees and on saplings 30—60 × 14—18 cm, ca 50-nerved; rounded to obtuse, in young trees and on saplings to acute, at apex, rounded to acute, often unequal-sided

at base; margin entire to obscurely dentate, nerves ending in margin or apex of teeth; sparsely hirsute on intervenium, rather densely so on nerves, densely so on midrib above, tomentose-hirsute on intervenium, slightly more densely so on midrib and nerves beneath; often small tuft of hairs at apex of nerves at margin. Petiole (2—)3—4$^1/_2$ cm, densely hirsute. *Flowers* solitary, terminal, ca 16 cm across. Pedicel 5—9 mm, 2—3 mm thick, thickened at apex to 5—6 mm, densely hirsute, with 2 bracteoles above middle; bracteoles caducous, sessile, lanceolate, lower one larger (ca 10 × 4 mm) than upper one (ca 6 × 2 mm), densely hirsute. Sepals 5, oval, 2 outermost ones ca 25—30 × 20—27 mm, 3 innermost ones narrower, ca 25—30 × 16 mm, up to 5 mm thick at base, glabrous inside, hairy except in bud covered margins outside, indument rather densely villose in 2 outermost ones, densely appressed sericeous in 2 innermost ones, in third sepal partly like in outermost ones, partly like in innermost ones; densely ciliate at margin. Petals 5, lemon yellow, obovate, 6$^1/_2$—7$^1/_2$ × 5—6 cm, rounded at apex, narrowed towards base. Stamens in 2 distinct groups; those of outer group (ca 450—480) slightly curved in bud, 16—20 mm long, those of inner group (ca 26) with apical part reflexed outward in bud, ca 25 mm long; filament flattened, that of stamens of outer group 4—12 mm long, 0.4—0.8 mm broad, of those of inner group 3—6 mm long, 1—2 mm broad; anther in outermost stamens of outer group for whole length 0.7—0.9 mm broad, in inner stamens of outer group 0.8 mm broad at apex, up to 1.5 mm at base by broadening of connective towards base, slightly emarginate to mucronate with up to 0.5 mm long mucro, with largest mucro in outermost stamens, at apex, in stamens of inner group 0.8 mm broad at apex, up to 2.0 mm at base, emarginate at apex; thecae linear, opening with pore near apex on outer side. Carpels (8—)10(—12), arranged around conical receptacle, lanceolate, ca 6—7 × 2—2$^1/_2$ mm, glabrous, each with ca 50 ovules, in lower part in 2 double rows; styles spreading, yellowish white, filiform, ca 20 mm long, at base ca 0.8 mm thick. *Pseudocarps* indehiscent, dull yellow, appressed globular, ca 6 cm diam., 4$^1/_2$ cm high including enclosing sepals, which are ca 75 × 55 mm, up to 15 mm thick at base; carpels ca 22 × 10 mm, each with 1—7 seeds embedded in glutinous pulp. Seeds obovoid, ca 5 × 4 mm, glossy dark brown, glabrous, exarillate.

Siam: Ta Uten, Nakawn Pahan, *Kerr*, fl. Feb. 1924 (BM). — Pitsanulok: Nakawn Tai, *Kerr 5869*, fr. Apr. 1922 (BM, K). — Udawn: Kao Keo Kang, Dan Sai, *Kerr 5803*, Apr. 1922 (BM, K); Pu Tong, Loi, *Kerr 8847*, fl. March 1924 (BM, K); Kao Krading, Loi, *Kerr 20081*, fl. Feb. 1931 (BM); ibidem, *Lakshnakara 1377*, fl. (BM, K). — Ubon: Sangka, Surin, *Kerr 8272*, fl. Jan. 1924 (BM, E, K); Surin, *Put 649*, fl. Feb. 1927 (BM). — Rachasima: Lam Nang Rawng, *Suksakorn 935*, fl. March 1920 (K). — Chantaburi: Kaw Chang, Klong Son, *Schmidt 417*, fl. Feb. 1900 (C, M, S); ibidem, *Schmidt 648*, fr. Feb. 1900 (C); Baw Rai, Krat, *Kerr 9519*, fr. Dec. 1924 (BM); Kaw Chang, Lem Dan, *Rabil 22*, fr. June 1925 (BM, K); W of Kao Sabab, *Seidenfaden 2763*, Feb. 1935 (SING). — Prachinburi: Sriracha For., Nong Kaw, *Collins 152*, fr. Aug. 1913 (K); ibidem, *Collins 349*, fl. Feb. 1914 (K); ibidem, *Collins 517*, fl. Sept. 1917 (BM, K); Nong Yai Boo, *Collins 713*, fr. March 1921 (K); Sriracha For., *Collins 812*, fr. Apr. 1922 (K); Nah Prow, Sriracha, *Collins 858*, fl. March 1923 (K); Nong Nain Khea, Sriracha For., *Collins 1130*, fr. March 1926 (K, US). — Nakawn Sritamarat: Na Wong, Patalung, *Kerr 15330*, fl. Apr. 1928 (BM).

Indo-China: *Pierre*, fr. (A); *Poilane*, fr. (P). — Laos: Kilo 20 road from Savannakhet to Quang Tri, *Poilane 11822*, fl. Jan. 1925 (P); near Savannakhet, *Poilane*

12073, fl. March 1925 (P). — Annam: Nha Trang, *Krempf*, fr. (P); Lang Buin massif between Klou & Danhine, *Chevalier 30935*, Feb. 1914 (P); Lang Vai, Quang Tri Prov., *Poilane 1287*, fl. Apr. 1920 (P); Ca Na, Phanrang Prov., *Poilane 5817*, fl. March 1923 (P); Massif de la Mère et l'Enfant, Nhatrang Prov., *Poilane 6694*, fr. May 1923 (P); Hué & Vicinity, *Squires 320*, fl. Jan.—May 1927 (A, BM, BZ, K, P, UC); Dalat & Vicinity, *Squires 775*, fl. March—Apr. 1932 (A, BM, BR, BZ, G, K, M, MO, NY, P, S, SING); near Djiring, Haut Danai Prov., *Poilane 24678*, fl. March 1935 (P); Col d'Ailao, Quang Tri Prov., *Poilane 30065*, fr. July—Aug. 1939 (P); Tang Phan For., *Müller 1971*, fr. Aug. 1939 (P); near Beuméthuot, Darlac Prov., *Poilane 32373*, fr. Apr. 1941 (P). — Cambodia: fr. (P); *Simond* (P); Mt Srangui, *Pierre 725* (P); Pen Lovier, *Pierre 767a*, fl. March 1870 (CAL, P); Mt Knang Krepoeu, *Pierre 767b*, May 1870 (K, P); Mt Dom Reek, *Harmand 296 (= Pierre 2046)*, fl. July 1876 (NY, P); Kamchai near Kampot, *Hahn 126*, fl. Feb. 1896 (P); near Pnom Kumchieg, Kampot Prov., *Chevalier 31753*, fl. March 1914 (P); Pursah, *Chevalier 31988*, fl. March 1914 (P); *Béjaud 486*, May 1929 (A, NY, P); Pnom Penh, *Béjaud 487*, fl. (P); Izgbam, *Thung v. Dieu 76*, fr. Aug. 1931 (P); Kadak W of Kampot, *Poilane 27324*, fr. June 1938 (P); Mio Xang Bo, Mimat, *Müller 300*, July 1938 (P). — Cochinchina: *Talmy 6* (P); *Thorell 968*, fl. & fr. 1862—6 (K, P); Thu Drau Mat, *Pierre 2038*, fl. March 1865 (P); Bao Chiang, Bien Hoa Prov., *Pierre 2038*, fl. Sept. 1865 (K, P); Ben Xue, Thu Drau Mat Prov., *Pierre 2037*, fl. & fr. Apr. 1866 (P); Cay Cong, Tay Ninh Prov., *Pierre 2040*, fl. Apr. 1866 (A, P); base of Cau Thi Vai Mtn, Baria Prov., *Pierre 2039*, fr. Dec. 1866 (K); Mu Xoai, Dinh Mts, Baria Prov., *Pierre 144*, fl. March 1867 (P); Poulo Condor, *Harmand 855 (= Pierre 2046)*, fl. Oct. 1876 (K); Phu Quoc, *Pierre 1799*, fl. Feb. 1877 (P); Tau Dinh For., Bienhoa Prov., *Vinot 29*, fl. Feb. 1912 (P); Trang Bom For. Res., Bienhoa Prov., *Fleury 30084*, fl. March 1914 (P); Giaray, Bienhoa Prov., *Poilane 199*, fr. July 1919 (P); near Honquan, *Evrard 792*, fr. Apr. 1922 (P); Tha Byh, Tay Minh, *Müller 994*, fl. March 1939 (P); Budap, *Müller 1711*, July 1939 (P).

Sumatra: Sum. E. Coast: Brandar-Batsy For. Res., Simalungan, *Endert 1349*, Jan. 1922 (BZ, L). — Lamp. Distr.: Kutabumi, Tulangbawang, *Gusdorf 187*, fr. Feb. 1914 (BZ); Pamangillan, Seputih, *Dirksen 19*, Jan. 1921 (BZ, L). — Banka: Koba, *Teysmann* (BZ); Sungai Liat, *Teysmann* (BZ); Toboali, *Teysmann*, fl. (BZ); *Anta*, fl. 1949 (BZ, L).

Malay Peninsula: *Scortechini*, fl. (CAL, DD, FI, L); *Scortechini 1155*, Aug. 1884 (CAL); *Ridley*, fr. Aug. 1896 (SING). — Kedah: Bukit Pinang, Alor Star, *Ridley 15182*, March 1910 (BM, K, SING); Gunong Jerei, *Meh CF 9041*, fl. (K); Minjau Kedah, *Meh CF 17790*, fl. March 1929 (K); between Alor Star & K. Nerang, *Corner*, July 1936 (SING); Koh Mai For. Res., *Kiah SF 35212*, fl. Apr. 1938 (A, BRI, BZ, SING). — Perak: Goping, Kinta, *Kunstler 4429*, fl. June 1883 (CAL, K); Temengor, *Ridley 14586*, fr. July 1909 (BM, SING); Grik, Upper Perak, *Burkill & Haniff SF 12409*, fr. July 1924 (SING); Sungai Kenering, Upper Perak, *Henderson SF 23889*, fr. June 1930 (BZ, IFI, NY, SING). — Pahang: Pulau Chengei, Pahang Riv., *Ridley 2614*, fl. & fr. July 1891 (BM, CAL, K, SING); Kuala Tahan, *Seimund 918*, fl. Feb. 1921 (SING); between Raub & S. Simpan, *Burkill & Haniff SF 16853*, fl. Nov. 1924 (BRI, BZ, SING); Rotan Tunggal For. Res., Raub, *Kalong CF 23402*, fr. June 1930 (SING); Chegar Perah, *Henderson SF 22589*, fr. Aug. 1930 (A, BZ, IFI, NY, SING); Resthouse, Raub, *Corner*, fr. Feb. 1936 (SING). — Selangor: Kuala Kubu, *Ridley*, fr. June 1896 (SING); *Goodenough*, fr. 1899 (SING). — Langkawi Isls: Kuala Quah, Langkawi, *Haniff & Nur SF 7073*, fr. Nov. 1921 (SING). — Pulau Penang: *Porter (Wallich 945)*, fl. (K); Waterfall (probably Bot. Gard.), *Curtis 228*, fl. Apr. 1884 & May 1885, fr. Apr. 1890 (BM, CAL, K, P, SING); ibidem, *Curtis*, fl. May 1890 (CAL).

Cultivated: Bot. Gard. Bogor: no IV-G-57, fl. Nov. 1889 & Oct. 1896, fr. Feb. 1896 (BZ, CAL, K, L, MEL); *Lauterbach 474*, fr. 1890 (BRSL); *Kuntze 4898*, fl. June 1895 (NY). — Batavia: Weltevreden, *Backer 35307*, fl. Dec. 1903 (BZ, U); ibidem, *Backer 35308*, fl. Dec. 1904 (BZ, U).

Distribution. Siam and Indo-China N to about 17°30′ N. latitude, Sumatra, Malay Peninsula (not in Johore and Singapore), and Banka.

Ecology. In open forests, savannahs, or belukar; in Malaysia at low altitudes, in Indo-China up to 1500 m.

Vernacular names. Siam: *Inai teo, Masarn, Ma tone* (Sriracha);

Plaw (Sui, Surin); *San doi de* (Ta Uten); *San, Ta nok kod* (Loi); *Ton mesan* (Kaw Chang). Indo-China: *Cay so, Cay xa trop, So, So anh trai* (Annamite); *Phlou, Phlou thom* (Cambodia); *May san* (Laotien); *Blao, Xo pho* (Moi). Sumatra: *Pisang maru, P. mobai* (Sum. E. Coast); *Kaju simpur ajer berak bulung, Ranggang waka, Simpur minjak* (Lamp. Distr.). Banka: *Simpur darut, S. laki.*

Uses. The tree is sometimes planted as an ornamental; the wood is suitable for beams and planks and may be used in furniture-making; the fruit is eaten in jellies.

Note. In general appearance of the leaf the species strongly resembles *D. turbinata*, though in the latter species the leaves are usually more obovate. In flowering state it is easily distinguished from *D. turbinata* by the solitary flowers. As to geographical distribution the species practically exclude each other.

47. Dillenia indica L. 1753

Syalita *Rheede, Hort. Mal. 3, 1683, p. 39—42, t. 38—9; Adans., Fam. d. Pl. 2, 1763, p. 364.

Arbor indica flore maximo, cui multae innascuntur siliquae Ray, Hist. Pl. 2, 1688, p. 1707.

Malus rosea Malabarica Syalita dicta Pluken., Mantissa, 1700, p. 124.

Dillenia Linn., Hort. Cliff., 1737, p. 221; Linn., Crit. Bot., 1737, p. 80.

Dillenia indica L., Sp. Pl., 1753, p. 535; Burm.f., Fl. Ind., 1768, p. 124; **Hill, Dec. Cur. Eleg. Trees, 1773, p. 5, t. 3; *Baill., Adansonia 7, 1866—7, p. 93; Miq., Ann. Mus. Bot. Lugd. Bat. 4, 1868, p. 79; Hook.f. & Thoms., Fl. Br. Ind. 1, 1872, p. 36; Brand., For. Fl. NW. & C. Ind., 1874, p. 1; Kurz, J. As. Soc. Beng. 43, II, 1874, p. 46; Kurz, For. Fl. Br. Burma I, 1877, p. 19; King, J. As. Soc. Beng. 58, II, 1889, p. 366; Watt, Dict. Econ. Prod. Ind. 3, 1890, p. 113; Trim., Handb. Fl. Ceyl. 1, 1893, p. 12; Koord. & Val., Bijdr. 1 Booms. Java, 1894, p. 161; Gamble, List Darjeeling Distr. Beng., 1896, p. 1; Ridl., J. Str. Br. R. A. S. 33, 1900, p. 38; Brand., Ind. Forester 26, 1900, p. 429; Kanjilal, For. Fl. School Circle, 1901, p. 13; Cooke, Fl. Pres. Bomb. 1, 1901, p. 6; Gamble, Man. Ind. Timb. 2nd ed., 1902, p. 4; Prain, Beng. Pl., 1902, p. 195; Duthie, Fl. Upp. Gang. Pl., 1903, p. 21; Brand., Ind. Trees, 1904, p. 3; Moll & Jansson., Mikrogr. Holz. Java Baumarten 1, 1906, p. 71; Fin. & Gagnep., Bull. Soc. Bot. Fr. Mém. 4, 1906, p. 9; Fin. & Gagnep., Fl. Gén. Ind.-Ch. 1, 1907, p. 21; *Talbot, For. Fl. Bomb. Pres. & Sind 1, 1909, p. 10, f. 7; Back., Schoolfl. Java, 1911, p. 10; Kanjilal, For. Fl. Sawilik & Jaunsar For. Div., 1911, p. 32; Koord., Exk. Fl. Java 2, 1912, p. 601; *Koord. & Val., Atl. Baumart. Java 1, 1913, f. 2; Gamble, Fl. Pres. Madras 1, 1915, p. 7; Kirtikar & Basu, Ind. Medic. Pl., 1918, p. 38; Haines, Bot. Bihar & Orissa 2, 1921, p. 6; Merr., Bibl. En. Born. Pl., 1921, p. 383; **Troup, Sylviculture Ind. Trees 1, 1921, p. 6; *Wester, Philip. Agric. Rev. 14, 1921, p. 277, pl. 27a (photo of fruit); Ridl., Fl. Mal. Pen. 1, 1922, p. 10; Craib, Fl. Siam. En. 1, 1925, p. 22; *Gilg & Werderm. in Engl. & Prantl, Nat. Pfl. Fam. 2nd ed., 21, 1925, p. 11; Cowan & Cowan, Trees N. Beng., 1929, p. 8; Pears. & Brown, Comm. Timb. India 1, 1932, p. 3; Kanjilal, Kanjilal, & Das, Fl. Assam 1, 1934, p. 10; Burk., Dict. Econ. Prod. Mal. Pen. 1, 1935, p. 809; **Blatter & Millard, J. Bomb. Nat. Hist. Soc. 38, 1936, p. 415, pl. 29, 31, & 32 & Some Beautif. Ind. Trees, 1937, p. 45 & 3 pl.; Gagnep., Suppl. Fl. Gén. Ind.-Ch. 1, 1938, p. 21; *Corn., Wayside Trees Malaya, 1940, p. 204, pl. 52; Back., Bekn. Fl. Java (em. ed.) 4, 1942, fam. 80, p. 4; *Watanabe, Ill. Comm. Med. Pl. South. Regions, 1942, p. 244; Heyne, Nutt. Pl. Indon., 1950, p. 1072; Quisumb., Medic. Pl. Philip., 1951, p. 612; Hoogl., Fl. Mal. I, 4, 1951, p. 171.

Dillenia speciosa Thunb., Trans. Linn. Soc. 1, 1791, p. 200; **Sm., Exot. Bot. 1, 1804, p. 3, t. 2, 3; Roxb., Fl. Ind. ed. Carey 2, 1832, p. 650; Wight & Arn., Prod. Fl. Pen. Ind. Or. 1, 1834, p. 5; *Wight, Ic. Pl. Ind. Or. 3, 1844—5, t. 823; Hook.f. & Thoms., Fl. Ind. 1, 1855, p. 69; **Hook.f., Bot. Mag. 83, 1857, t. 5016; Miq., Fl. Ind. Bat. 1, 2, 1859, p. 11; Dalz. & Gibs., Bomb. Fl., 1861, p. 2; Drury, Handb. Ind.

Fl. 1, 1864, p. 10; *Bedd., Fl. Sylv. 1, 1869, t. 103; **Réveil c.s., Règne Vég. &c., Fl. Médic. &c., Atl. 1, 1870, pl. 48; **Hérincq c.s., Traité Bot. Gén., Atl. 2, 1870, pl. 37; Laness., Pl. Util. Col. Fr., 1886, pp. 188, 282, 583.

Dilema Griff., Notul. 4, 1854, p. 705.

Dillenia elongata Miq., Fl. Ind. Bat. 1, 2, 1859, p. 12.

Dillenia indica f. elongata (Miq.) Miq., Ann. Mus. Bot. Lugd. Bat. 4, 1868, p. 79.

Dillenia pentagyna Auct. non Roxb.; Laness., Pl. Util. Col. Fr., 1886, p. 281.

Type specimens: *Dillenia indica:* Rheede, l. c., t. 38—39. — *Dillenia speciosa:* idem, cf. below under Notes. — *Dillenia elongata:* Teysmann 453 HB, Lubu Alung, Sum. W. Coast; holotype in U, isotypes in BZ, CAL, L.

Evergreen trees, up to 30 m high, 120 cm thick, with usually rather crooked trunk, without or with small buttresses, usually shallowly grooved and with many knots; crown irregular, attached up to ca 15 m, usually lower, rather lax with thick, crooked, richly branched branches. Bark smooth, rich orange brown to dark orange, moderately thick (up to ca 7 mm), peeling off in small, thin, hard scales. Sapwood white; heartwood pinkish white or light brown or dark red. Branches sympodial, younger ones ca 5 mm thick, appressedly silky hairy, most densely so just above axil of leaves, under insertion of leaves with suberect hairs, glabrescent. Leaf-scars clasping about $^1/_2$ of branch, subfalcate with ca 15 leaf-traces in upper half. *Leaves* oblong, (8—)15—30(—40) × (4—)6—12(—15) cm, with (20—)30—40(—70) nerves on either side, in young trees and on saplings up to 70 × 18 cm; acute or obtuse, sometimes slightly acuminate at apex, rounded to acute at base, decurrent; margin slightly to distinctly dentate with nerves ending in apex of teeth; bright green, shining, glabrous on intervenium and nerves, sparsely hirsute on midrib above, less shining, glabrous to sparsely strigose on intervenium, sparsely to rather densely strigose on nerves and midrib beneath. Petiole $2^1/_2$—$7^1/_2$ (—15) cm, glabrous above, more or less densely silky strigose beneath. *Flowers* solitary, terminal, 15—20 cm across. Pedicel 4—8 cm, 4—6 mm thick, thickened to ca 8 mm at apex, appressedly silky hairy, most densely so immediately below flower, sometimes with single lanceolate bracteole, up to 6 × 2 mm, glabrous above, strigose beneath. Sepals 5, in open flower forming cup-shaped calyx, yellowish green, oval, 2 outermost ones 40—50 × 30—40 mm, 3 innermost ones 50—60 × 40—50 mm, up to 10 mm thick at base, glabrous on both sides, not ciliate at margin. Petals 5, white with green veins, obovate, 70—90 × 50—65 mm, rounded at apex, narrowed towards base. Stamens in 2 distinct groups, those of outer group (ca 550) slightly curved in bud, 13—15 mm long, those of inner group (ca 25) with apical part reflexed outward in bud, 20—22 mm long; filament white, of stamens of outer group 5—7 mm long, flattened, ca 0.5 mm broad, of those of inner group 6—10 mm long, rather thick, ca 0.7—0.9 mm broad, 0.4 mm thick; anther ca 0.7—0.9 mm broad, emarginate at apex; thecae linear, opening with pore near apex on outer side. Carpels 14—20, yellowish green, arranged around broad conical receptacle, lanceolate ca 14 × 3 mm, glabrous, each with 40—80 ovules in 2 double rows; styles spreading, white, at base yellowish, linear-lanceolate, ca 25 mm long, flat, up to $3^1/_2$ mm broad, channelled above, acute at apex. *Pseudocarps* indehiscent, yellowish green, about globular, ca 8—10 cm diam. including enclosing sepals, 2 outermost ones of which are up to 12 × 9 cm, 3 innermost ones up to 15 × 12 cm, all up to $2^1/_2$ cm thick at base; carpels ca 35 × 15 mm,

each with 5 or more seeds embedded in glutinous pulp. Seeds reniform, ca 4 × 6 mm, black, finely echinate, mainly along outer margin, with up to 0.6 mm long spines, exarillate.

India: *F. v. Mueller*, fl. (CAL); Himalaya, *Rich 125* (K); "Pen. Ind. Or.", *Rottler* (K); *Wallich 943A*, fl. (CGE, G); Plains of India, *Royle*, fl. (K); *Wight 21*, 1832 (CGE, G, GL, K); N. Divis., *Kistnasawmy 1856*, fr. July 1884 (MEL); *Cowan*, fl. June 1923 (E); Murkongselleh US 7 P. Pathak, *Off. Supervisor*, fl. July 1936 (DD). — South. Himalaya Region: Naokote, *Wallich 943B*, May 1821 (K); Nepal, *Wallich 943*, fl. 1829 (CGE, K); Sikkim Terai, *Hooker*, fr. (K); Sikkim, *Hooker* (GH, P); Sikkim Siooke, *Gamble 1070*, Feb. 1873 (DD, K); Duphla Hills, *Lister*, 1874 (CAL); Duphla Hills, Dorpani & Hamatti, *Lister*, Feb. 1875 (CAL). — United Provs: Saharunpur, *Jameson* (E). — Behar & Orissa: Balidiha, Mayurbhanj, fr. Sept. 1940 (DD). — Deccan Peninsula: Fort St George, *Bulkley*, 1703 (OX); Malabar (L); ibidem, fl. (M); Coromandel, Macé, fl. (P); Coromandel, *König*, fl. (BM); Madras, *Bourne 2220*, June 1900 (K); ibidem, *Bourne 2451*, fl. Aug. 1901 (K). — Bengal: Gathord, *Bulkley*, Oct. 1704 (OX); *Roxburgh*, fl. 1796 (E, G); *Roxburgh*, fl. 1797 (LINN); *Roxburgh*, fl.. (BM); Calcutta, *Wallich*, fl. (G); *Wallich 943*, fl. (CAL, CGE, K); E. Bengal, *Griffith 55A*, fl. (CAL, GH, P); Dewangung (W. Mymensing), *Clarke 4847*, fl. July 1867 (BM); Chittagong Hill Tracts, *Teague 3*, Apr. 1914 (DD); Agartala, Tipperah (Hill), *Debbarman 345*, Dec. 1914 (CAL); Kelatuli For., Cox's Bayas, *Sinclair 3199*, Aug. 1943 (E). — Assam: Goalpara, *Hamilton 1256 (= Wallich 943E)*, fl. July 1808 (CGE, E, K); *Jenkins* (CAL); *Jenkins 348*, Upper Assam, fl. (K, NY); Plains of Assam, *Masters 56* (MEL); banks of the Brahma, *Masters 1035*, fr. (CAL); *Simons* (CAL); Outer Khasia Hills, below. Cherung, *Schlich 15001* (DD); Cachar, *Hooker & Thomson* (K); Silhet, *Hooker & Thomson* (K); ibidem, *Hooker & Thomson*, Aug. 1850 (CGE); ibidem, *Hooker & Thomson*, Nov. 1850 (BM, C, CAL, CGE, G, GH, L, P); Telain, *Hooker & Thomson*, Nov. 1850 (P); Digboi, Upper Assam, *Barnard DD 15*, fl. July 1935 (BM); Pengaree, Upper Assam, *Barnard DP 16*, fl. July 1935 (BM); Darrang Div., *For. Off. 1*, fl. June 1937 (DD); Kamrup Div., *For. Off.*, fl. & fr. 1937 (DD); Siksager Div., *For. Off.*, fl. 1937 (DD).

Ceylon: *Herb. Burman* (L); *Herb. Houttuyn* (L); *Thwaites CP 2961*, fl. (DD, K); *Walker*, fl. (G).

Burma: Maulmein, *Falconer 271*, fl. Feb. (CAL); Mergui, *Griffith*, fl. (K); Pegu, Yomah hills, *Kurz 1805*, fr. (CAL); *Toppin 3131* (CAL); Yahudan, Tenasserim, *Meebold 14737*, fr. March 1911 (CAL); Tavoy Distr., Kaleinaung Res., *Parker 2209*, fr. Nov. 1924 (A, DD); Kokkine, Rangoon, *Parkinson 14459*, fl. June 1932 (DD).

China: Yunnan: Szemao, *Henry 12746*, fr. (K, NY); Fo Hai, *Wang 74979*, fr. July 1936 (A); Sheau-meng-yeang, Che-li-Hsien, *Wang 75586*, fl. 1936 (A); ibidem, *Wang 75788*, fr. Aug. 1936 (A); Maan-bang, Dahl-meng-lung, Che-li-Hsien, *Wang 76358*, fl. Aug. 1936 (A); Che-li-Hsien, *Wang 78021*, fr. Aug. 1936 (A); Maan-kung-han, Dah-meng-lung, Che-li-Hsien, *Wang 78604*, Sept. 1936 (A); Maan-tsang, Sheau-meng-yeang, Luh-shuen-Hsien, *Wang 81061*, fr. Nov. 1936 (A).

Siam: Krungtep, Bangkok, *Kerr 4337*, fl. July 1920 (BM, K); ibidem, *Marcan 299*, fl. July 1920 (K) (both probably planted). — Rachaburi: Neeckey, near Wangka, *Kostermans 751*, May 1946 (L); S of Ka Tha Lai in Pan Paung Riv. Valley, *Kostermans 846*, fl. June 1946 (L). — Surat: Ban Kamp Kep, *Kerr 13348*, fl. Aug. 1927 (BM).

Indo-China: Mekong, Tak Sai, *Thorell* (P). — Tonkin: Tchontiao, near Mnt Bavi, *Balansa 3380*, fl. July 1886 (P); Tu Phap, near Mnt Bavi, *Balansa 3381*, fl. Aug. 1886 (K, P); between Phu nho quan & Yen Doe, *Chevalier 29174*, Nov. 1913 (P); Le Pau Nhau near Lai Chan, *Poilane 26961*, fr. Dec. 1937 (P); N. of Tonkin, *Poilane* (P). — Laos: Ban-bo, *Spire 264*, fl. (P); Cam Keut Prov., *Spire 317* (P). — Annam: Co Ba For. Res., Nghé-An (Vinh) Prov., *Fleury 30193*, fr. May 1914 (P); Loc han, Chanh hoa Prov., *Poilane 1733*, fl. Aug. 1920 (P); Tourane & Vicinity, *Clemens 3407*, June 1927 (A, NY, P, UC); foot of the Bu Khang, Vinh Prov., *Poilane 16643*, fl. Aug. 1929 (P). — Cambodia: Krwanh Mts, *Pierre 3381*, fl. March 1870 (P).

Sumatra: (GH); *Korthals* (L, MEL); *Forbes*, 1881—2 (SING). — Atjeh: Gulo, Alas Lands, *Pringgo Atmodjo 451*, fr. June 1904 (BZ, L); Gajo Lueus near Gunung Gumpang, *NIFS bb 22474*, Feb. 1937 (BZ, L). — Tapanuli: Sibolga, *Batten Pooll*, fr. Aug. 1939 (SING). — Sum. W. Coast: Duku, *Korthals* (L); Lubu Alung, *Teysmann 453 IIB* (BZ, CAL, L, U). — Sum. E. Coast: Benkalis, Lebong, near Ulung

Tandjung Aer, Katanang, *NIFS bb 2948*, fr. March 1922 (BZ). — Indragiri: Kuanten Riv. near Belukan, *Koorders 10290 β*, Feb. 1891 (BZ). — Palembang: Rawas, *Grashoff 1150* (BZ, L). — Lamp. Distr.: Kottadjawa, *Forbes 1303*, July 1880 (BM, CAL, FI, GH, L, P); Kota Agung, *NIFS bb 13611*, fr. Feb. 1929 (BZ).

Malay Peninsula: *Scortechini 403*, fr. (CAL, SING); *Scortechini*, fl. June 1884 (K). — Perak: Ulu Temengor, *Ridley 14587*, fl. & fr. July 1909 (BM, K, SING); Batu Tegoh, Taiping, *Henderson SF 10309*, fr. Aug. 1922 (SING); Ulu Kenderong, Upper Perak, *Hamid CF 11050*, fr. March 1926 (SING). — Kelantan: Chaning, *Ridley*, fr. Feb. 1914 (K, SING); Sungai Ketil near Gua Musang, *Henderson SF 22654*, fr. Aug. 1929 (BRI, IFI, SING). — Trengganu: Ulu Brang, *Moysey & Kiah SF 33871*, fr. July 1937 (SING). — Pahang: Pulau Tawar, *Ridley 2673*, fl. 1891 (CAL, SING); Sungai Sar, Ulu Tembeling, *Henderson SF 22064*, fl. & fr. July 1929 (A, BZ, SING); Sungai Serau, *Oswon CF 27951*, fr. Oct. 1931 (SING); base Bukit Batu Papan, Sungai Lebir, *Henderson SF 29560*, fr. July 1935 (BZ, K, SING). — Selangor: Batu Tiga, *Wray 2154*, fr. June 1888 (CAL, SING). — Malacca: Bukit Panchor, *Goodenough 1263*, fl. (BM, SING); ibidem, *Derry 1083*, fr. Sept. 1892 (MEL, SING). — Pulau Penang: *Maingay 7/2*, fl. & fr. (BM, CAL, G, K, L); Dolo Kramat, *Curtis*, fl. July 1890 (SING). — Singapore: *Ridley*, fr. Nov. 1892 (SING); Bukit Panping, *Ridley 3702*, fr. 1892 (CAL, SING).

Java: (BZ, L, U); *Lahaie 2214*, fr. 1794—6 (P); *Blume*, fr. (CAL, L, NY); *Korthals*, fl. & fr. (L); Tempuran, near Batu nante, *Korthals* (L); *Junghuhn* (L); *de Vriese* (L). — W. Java: Palabuanratu, *Koorders 1622β*, May 1890 (BZ); ibidem, *Koorders 1623 β* (BZ, L); Buitenzorg, *Boerlage*, Nov. 1896 (BZ); Tjitarik near Tjisalak (Parungkuda), *Bakhuizen v. d. Brink 5065* (= *Bakhuizen v. d. Brink Jr 659*), Dec. 1920 (BZ, L, U); Buitenzorg, *Bakhuizen v. d. Brink Jr 2042*, fl. Dec. 1922 (BZ, U). — C. Java: Kedungdjati, *Koorders 1627β*, Aug. 1888 (BZ); ibidem, *Koorders 1625β*, Nov. 1888 (BZ, K, L, P, WAG); ibidem, *Koorders 1626β*, Dec. 1888 (BZ, L); Brebes, Tegal, *Koorders 1621β*, Sept. 1891 (BZ, L); Kedungdjati, *Koorders 1628β*, Apr. 1892 (BZ, K, L, P); Subah, Pekalongan, *Koorders 11426β*, fr. Apr. 1892 (BZ); ibidem, *Koorders 14293β*, June 1893 (BZ); ibidem, *Koorders 14826β*, fl. Nov. 1893 (BZ, WAG); Kedungdjati, *Koorders 25517β*, fl. & fr. Nov. 1896 (BZ, WAG); Subah, Pekalongan, *Koorders 27350β*, fr. Apr. 1897 (BZ); ibidem, *Koorders 36915β*, fr. May 1899 (BZ, L); ibidem, *de Monchy*, fr. (BZ); Darupono between Bodja & Kendal, *Beumée 3871*, March 1919 (BZ, WAG); Subah, Pekalongan, *Wolff v. Wülfing 4245*, June 1919 (BZ). — E. Java: Passinan, Lumadjang Prov., *Zollinger 2672*, fr. Feb. 1845 (BM, BZ, FI, G, P).

Borneo: *Korthals*, fl. (K, L, U, S). — NW. Borneo: Sarawak Riv., *Beccari PB 2823*, fl. Nov. 1886 (FI, K). — S. & SE. Borneo: Bandjermasin, *Korthals*, fr. (L); Tewe Riv., *Korthals*, fl. (L); between Muara Uja & Kundiru Baru, *Winkler 2710*, fl. July 1908 (BRSL, L). — E. & NE. Borneo: B. Ulu Sibuku, *Amdjah 529*, fr. 1893—4 (BZ, L); Gitam Riv., lower Mahakam region, *Witkamp*, fr. (BZ); W. Kutai, near Kikam Batu, *Endert 2347*, Aug. 1925 (BZ, L). — Br. N. Borneo: *Wood 925*, fr. Oct. 1920 (A, US).

Cultivated: Dehra Dun: *Edgeworth 49*, fl. 1844 (K); *Gamble*, fl. (OX); *Gamble 24690*, fl. Aug. 1894 (K); *Bulakidass*, fl. June 1915 (DD); *Crupto*, fl. Sept. 1921 (DD); *Kewalramani 1*, fl. July 1922 (CAL); *Khan*, fl. Aug., fr. Oct. 1930 (DD); *Gupta*, fl. July (IFI); *Sharma 22*, fl. July, fr. Dec. (NY). — Calcutta: *Voigt*, fl. (C); *Wallich 826*, fl. 1815 (C); *Wallich 943*, fl. (K); *Wallich 77*, fl. (P); *Wallich*, fl. (C); *Falconer 78*, fl. & fr. (CAL, GH, K, L, P); *Hooker & Thomson*, July 1845 (P); *Pierre*, fl. 1863 (P); *Kurz* (BZ); fl. & fr. (BZ, C, K, L, M, P); *King*, fl. (CAL). — Penang: Waterfall Gard., *Nur*, fr. July 1918 (SING); *Nur*, fr. Sept. 1918 (SING); Waterfall Gard., *Haniff 53*, fr. Jan. 1928 (UC). — Singapore: Arboretum, *Nur 1545*, March 1918 (SING); Gard. Jungle, *Burkill*, Nov. 1918 (SING); Bot. Gard., *Deshmukh*, fr. July 1920 (SING); ibidem, *Best*, fr. Sept. 1921 (SING); ibidem, *Nur*, July 1924 (SING); ibidem, *Nur*, fr. Sept. 1929 (A, BZ, SING); Water viaduct between Mac Ritchie Reservoir & Pierce Reservoir, *Sinclair*, July 1949 (DD, L). — Sibolangit: *Lörzing 9081*, fr. June 1922 (BZ, L). — Bot. Gard. Bogor: (BZ, FI); *155*, fl. (BZ); no IV-G-11, fr. June 1890 & fl. Jan. 1892 (BZ); no IV-G-14a, fr. June 1890, fl. Nov. 1891, fr. Apr. 1912 (BZ); *van Harreveld*, July 1907 (GRO); no IV-G-54 (BZ); no XI-B-(III)3 (BZ). — Flores: Endeh, *van Heurn*, fr. Apr. 1930 (BZ). — Luzon: Manila, *MacClure BS 16091*, fr. Sept. 1925 (UC). — Brisbane: Bot. Gard., *White 8807*, fl.

(BRI). — Hawaii: Wahiaura Gard., Ouahu, *Degener 12821*, fr. Jan. 1940 (MO, NY). — Panama: Balboa, *Standley 30869*, Nov. 1923—Jan. 1924 (K); Exper. Gard., *Wetmore & Abbe 239*, Jan. 1932 (A); fl. & fr. (C; photograph). — Cuba, Harvard Trop. Gard., Soledad: no 4146, *Jack*, fr. March 1926, veg. June 1928 (A); no 5559, *Jack*, fl. Oct. 1927 & July 1929 (A, NY). — Santo Domingo: Rio Yabón, *Ekman 15666*, July 1930 (S). — Costa Rica: Mayaguez, Agric. Exper. Stat., *Britton & Britton 7451*, Nov. 1923 (NY). — St Thomas: *Conde de Val Flov*, Sept. 1907 (BM); *Neltkropp*, Dec. 1930 (NY; seedlings). — Martinique: *Hahn 1156*, fr. Oct. 1869 (BM, P). — Brasil: near Manos, *Labroy*, fl. July 1906 (P). — Amani, E. Afr. Res. Inst.: *Greenway 1585*, June 1929 (IFI, K). — Goettingen, Bot. Gard.: *Hallier*, Feb. 1892 (L). — Exact locality unknown: Hort. Chel., May 1823 (K); *Salvoza 594*, fl. July 1929 (A).

Locality unknown: several specimens (C, CAL, CGE, DD, E, G, L, MEL, NY, S); Khawak, *Edgeworth*, March 1841 (OX).

Distribution. India, Burma, S. China (Yunnan), Siam, Indo-China, Sumatra, Malay Peninsula, Java, and Borneo. The species is often cultivated and it is therefore difficult to say whether it is indigenous in all the regions mentioned.

Ecology. The species is often found along streaming water (*Saraca* streams sensu Corner and larger rivers). The fruits which are edible are dispersed either by animals, e. g. elephants (cf. Blatter & Millard, l. c.), or by streaming water. In the latter case the fruit as a whole may be deposited on a river edge and the seeds may germinate inside the fruit (cf. figure in Troup, l. c.).

Vernacular names. A very large number of vernacular names has been noted for the species in India and Burma in the literature mentioned above. Unfortunately on the herbarium labels rarely names are noted which makes it difficult to say whether the names all refer to the present species; the total number exceeds 45. The following list is taken from Pearson & Brown, l. c. and may represent the most generally used and reliable ones: *Otengah, Otingah* (Assam); *Panpui* (Garo); *Chalta, Chalata, Hargesa* (Bengal); *Ramphal mechiaphal* (Nepalese); *Mota kermal* (Marathi); *Thabyu* (Burmese); *Uva* (Tamil); *Uva, Pedda kalinga* (Telugu); *Betta-kanagala, Kad-kanagala* (Kanarese, Bombay); some other names are: *Syalita* (Malayalam); *Hondapara, Wampara* (Singhalese, Ceylon). Outside India and Burma the following names have been noted: Siam: *Matat* (Siamese, Bangkok), *Sankwang* (Surat), *San pao* (Lao, Chiengmai). Indo-China: *Cay so* (Annamese), *Co sanh* (Muaong, Annam), *Dok shan* (Laos), *Mak sane* (Laos). Sumatra: *Ampalo* (Idrag.), *Simpur* or *S. ajer* (Atjeh, Sum. E. Coast, Palemb.). Malay Peninsula: *Simpoh* or *S. ajer*. Java: *Simpur ajer* (Malay); *Sempur, S. batu, S. tjai* (Sundanese); *Kosar* (fide Koorders & Valeton, l. c.), *Lampes* (?: *Koorders 14293β*), *Lengsar* (*Koorders 36915β*), *Sapi* (*Koorders 27350β*), *Sempu, Simpol* (Javanese). Borneo: *Kajo kaloh* (Kajan-Dajak, W. Kutai).

Uses. The wood yields a fair plank and rafter and is suitable for interior use and ornamental panelling; in India it is used for making gunstocks and boats. It yields an excellent firewood. The fruit, particularly the thickened calyx, is eaten in curries or jellies, and mixed with sugar used as a cough mixture. It gives a lather with water and is used as soap. Because of its beautiful foliage and flower the species is often planted as an ornamental tree; in glasshouses it seems to be rarely in flower (Baillon 1866—7).

Notes: 1. In the Species Plantarum ed. 1 (1753) Linnaeus cited under *Dillenia indica* only *Dillenia* Linn., Hort. Cliff. and *Syalita* Rheede, Hort. Mal.. The specimen in Clifford's garden lived only a few weeks and can hardly be considered the type of the species, the less so as no material seems to have been preserved. I therefore consider as the type the figure in Rheede's Hortus Malabaricus, on which Linnaeus' description is practically wholly based.

2. In the Mantissa Plantarum II, 1771, p. 405 Linnaeus makes a note that *Sangius* Rumph. belongs to the same genus; in the Species Plantarum ed. 2, 1762, p. 754 he reduced *Sangius* Rumph. to *D. indica*. Thunberg (1791) bases on *Sangius* Rumph. the binomial *Dillenia serrata* Thunb. and on *Syalita* Rheede the binomial *Dillenia speciosa* Thunb.; the latter name for having the same type as *Dillenia indica* L. is superfluous.

3. *Dillenia indica var. aurea* (Sm.) O. K. has to be excluded (cf. under *Dillenia aurea* Sm.) as well as some of the figures published under the name *Dillenia speciosa* Thunb., representing *Hibbertia scandens* (Willd.) Dryand. (cf. p. 136).

48. Dillenia pulchella (Jack 1822) Gilg 1893

Wormia pulchella Jack, Mal. Misc. 2, 7, 1822, p. 70; Hook.f. & Thoms., Fl. Ind. 1, 1855, p. 68; Miq., Fl. Ind. Bat. 1, 2, 1859, p. 11; Hook.f. & Thoms., Fl. Br. Ind. 1, 1872, p. 36; Villar, Nov. App., 1880, p. 347; King, J. As. Soc. Beng. 58, II, 1889, p. 365; Ridl., J. Str. Br. R. A. S. 33, 1900, p. 37; Gage & Burk., J. Str. Br. R. A. S. 73, 1916, p. 243; Ridl., Fl. Mal. Pen. 1, 1922, p. 9; Burk., Dict. Econ. Prod. Mal. Pen., 1935, p. 2265; Corn., Wayside Trees Malaya, 1940, p. 206.

Dillenia micrantha Martelli in Becc., Malesia 3, 1886, p. 156; Merr., Bibl. En. Born. Pl., 1921, p. 383.

Dillenia parvifolia Martelli in Becc., Malesia 3, 1886, p. 158; Merr., Bibl. En. Born. Pl., 1921, p. 383.

Dillenia pulchella (Jack) Gilg in Engl. & Prantl, Nat. Pfl. Fam. 3, 6, 1893, p. 123; Merr., Bibl. En. Born. Pl., 1921, p. 383; Heyne, Nutt. Pl. Indon., 1950, p. 1072; Hoogl., Fl. Mal. I, 4, 1951, p. 171.

Type specimen: *Wormia pulchella:* Jack, Natal, Sumatra, probably lost; Ridley 3965, Singapore, 15 Oct. 1892; neoholotype in L, isotypes in BM, CAL, MEL, SING. — *Dillenia micrantha:* Beccari PB 514, Sarawak, Banting, Batang Lupar Prov., Sept. 1865; holotype in FI. — *Dillenia parvifolia:* Beccari PB 3177, Sarawak; lectoholotype in FI, isotype in K.

Fig. 10 e—h, p. 95.

Evergreen trees, up to 40 m high, 90 cm thick, with up to 25 m bole, with large and heavy crown, without buttresses. Bark reddish, with clear or red sap. Heartwood red. Branches not typically sympodial, younger ones ca 1 mm thick, glabrous. Leaf-scars clasping about $^1/_2$ of branch, subfalcate with ca 7 leaf-traces about middle. *Leaves* oval to ovate, (4—)5—10(—15) × ($2^1/_2$—)$3^1/_2$—$5^1/_2$(—9) cm, with (4—)6—7(—8) nerves on either side; rounded, sometimes slightly emarginate, to obtuse at apex, acute at base, decurrent; margin entire, nerves curving upward, ending about 1 mm from margin; bright green, shining, glabrous above, dull, glabrous with glabrous domatia in axil of nerves beneath. Petiole 1—$1^1/_2$ cm, glabrous. *Flowers* axillary, solitary or 2, rarely 3 serially placed, often 2—4 mm above axil and serial flowers 2—4 mm above each other, less often 3—6 flowers on apical part of leaf-less branch with distinct leaf-

scars. *Flowers* ca $3^1/_2$ cm across. Pedicel $2^1/_2$—$7^1/_2$ cm, 1 mm thick, thickened to $2^1/_2$—3 mm at apex, glabrous to sparsely hirsute, without or with 1—2 small bracteoles, ca 1×1 mm. Sepals 5, ovate to oval, outermost one ca $8^1/_2 \times 7$ mm, 4 innermost ones 12—16 × 8—11 mm, glabrous inside, glabrous to sparsely hirsute outside, sparsely shortly ciliate at margin. Petals 5, yellow, oblong, ca 20×9 mm, with rounded apex and base. Stamens in 2 distinct groups, those of outer group (ca 110) slightly curved in bud, 4—$4^1/_2$ mm long, those of inner group (ca 10) with apical part reflexed outward in bud, 10—11 mm long, thicker than those of outer group; filament in stamens of outer group $1^1/_2$—3 mm long, 0.2—0.4 mm broad, in those of inner group 5—7 mm long, 0.4—1.0 mm broad; anther of stamens of outer group ca 0.5, of those of inner group ca 1.0 mm broad, obtuse to slightly emarginate at apex; thecae linear, opening with lateral longitudinal slits. Carpels 4—6, usually 5, arranged around narrow conical receptacle, oblong, ca 4—$4^1/_2 \times 1$—$1^1/_2$ mm, glabrous, each with 7—10 ovules; styles spreading, pink, linear, flattened, $5^1/_2$—$6^1/_2$ mm long, at base ca 1.0, near apex ca 0.2 mm broad, acute at apex. *Pseudocarps* dehiscent, sepals in fruit enlarged to ca 20×10 mm; carpels ca 15×12 mm, each with 1—2 seeds. Seeds obovoid, ca 3×2 mm, enclosed by red, membranous aril.

Sumatra: Tapanuli: near Barus Kobun (M. Tapus), *NIFS bb 31018*, Dec. 1939 (BZ, L). — Sum. E. Coast: near the Aek Kanopan, Lundut Concess., Kuala, *Bartlett 6903*, fr. March 1927 (MICH, NY, US); Bengkalis, near Pulau Mendal Kelumang, *NIFS bb 12477*, May 1928 (BZ); Selat Pandjang Panglong (Pulau Tebing Tinggi), *NIFS bb 17701*, Oct. 1933 (A, BZ, L). — Indragiri: near Belimbing, *NIFS bb 28567*, July 1939 (BZ, L); ibidem, *NIFS bb 28710*, Aug. 1939 (BZ, L, SING). — Djambi: near Betaro, *NIFS bb 12860*, Nov. 1928 (BZ). — Palembang: Banjuasin & Kubu Region, *Endert 347*, 1918 (BZ, L); Banjuasin, near Kajunglintjir, *NIFS T 1062*, Apr. 1924 (BZ); Banjuasin, Sebubut, *NIFS T 1209*, fr. Apr. 1925 (BZ); Sehanak Riv., *NIFS bb 13605*, fl. & fr. Apr. 1929 (BZ). — Banka: Djebus, *Teysmann* (BZ); *Teysmann* (BZ); S. Banka, Bihang, *NIFS bb 15092*, March 1931 (BZ). — Riouw-Lingga Archip.: Lingga, near Labuh (Pulau Singkep), *NIFS bb 17173*, Nov. 1932 (A, BZ); Karimun, Simpang Kiri, *NIFS bb 17407*, May 1933 (BZ, L); Karimun, Paja Selegeh, Tandjong Batu, *NIFS bb 17404*, May 1933 (BZ, L).

Malay Peninsula: *Ridley*, fr. (UC). — Perak: Larut, *Kunstler 2472*, fl. Oct. 1881 (CAL, E); *Kunstler 10573*, fr. July 1886 (BM, CAL, DD, FI, K); Taiping, *Curtis* = *1379*, fr. Oct. 1895 (BM, SING, UC); Sungai Krian Est., *Spare SF 36206*, fl. Feb. 1939 (A, BZ, SING). — Dindings: Pangkor, Lumut, *Curtis 1379*, fr. Jan. 1888 (K, SING). — Pahang: Kuala Pahang, *Ridley*, fr. (MEL); ibidem, *Ridley 1499*, fr. May 1890 (CAL, SING); Belingoo, Temerloh, *Lela CF 2677*, fr. (SING). — Malacca: *Griffith*, fr. (CAL, K); *Griffith 54*, fr. 1845 (GH, K, P); *Anderson*, 1863 (P); *Maingay 1440 (Kew Distr. 5)*, fl. Dec. 1865—6 (CAL, K); Selandar, *Alvins 656*, fr. Jan. 1885 (SING); ibidem, *Alvins*, fr. March 1886 (SING); Bukit Bruang, *Derry 446*, fr. Apr. 1890 (MEL, SING); Ayer Panas, *Derry 505*, fr. Apr. 1890 (K, SING); Bukit Bruang, *Ridley*, fr. 1892 (CAL). — Johore: Pinyerong, *Camtley*, fr. Feb. 1882 (SING); Penkalan Raja, Pontian, *Ngadiman SF 26640*, July 1939 (SING). — Singapore: fl. (A, SING); *Ridley*, fr. (K); Dalvery Road, *Ridley 4713*, fr. (CAL, DD, K, L, SING); Bukit Timah, *Ridley*, fl. Feb. 1890 (SING); Chan Chu Kang, *Ridley 3965*, fr. Oct. 1892 (BM, CAL, L, MEL, SING); Jurong, *Niat*, fl. 1894 (SING); Bukit Timah, *Ridley 5849*, fl. 1894 (MEL, SING, UC); Grange Road, *Ridley*, fr. 1905 (MO); Cluny Road, *Ridley*, fl. March 1906 (MO); Dalvery Road, *Ridley*, fr. May 1906 (BZ); Jurong, *Corner SF 26041*, fl. Nov. 1932 (BZ, K, SING).

Borneo: Setapok For. Res., *Caroll 7176*, fl. Jan. 1922 (SING). — NW. Borneo: Banting, Batang Lupar Prov., *Beccari PB 514*, fl. Sept. 1865 (FI); near Kuching, *Beccari PB 3177*, fl. (FI); ibidem, *Beccari PB 4065*, 1866 (FI); *Beccari*, fr. (P); near Kuching, *Haviland 1975*, fr. Dec. 1892 (K, L); ibidem, *Haviland 2213*, fl. Feb. 1893

(K, SING); ibidem, *Haviland 2214*, fl. Feb. 1893 (BM, K, L, SING); Redjang, Libu, *Haviland = 2214*, fl. March 1893 (GH); ibidem, *Haviland = 2214*, fr. Apr. 1893 (BM, CGE, K, L, SING, UC); *Nat. Coll. 2406*, fr. Feb.—June 1914 (A). — W. Borneo: Sintang, *Teysmann 8145 HB*, fr. (BZ); near Kubu, *NIFS bb 6334*, March 1924 (BZ); Mempawah, near Amdjongan, *NIFS bb 14244*, May 1930 (BZ); Sintang, Sekawas (Kapuas Riv.), *Moin 1782*, fl. Sept. 1949 (BZ, L). — Br. N. Borneo: Mengalong, *Melegrito BNB 2504*, fl. Jan. 1932 (BZ, IFI, K); ibidem, *Melegrito BNB 2509*, fl. Feb. 1932 (A, BZ, K); Pasir Tinggi, Weston, *Sulciman BNB 2182*, fr. March 1932 (A, BZ, IFI, K).

Cultivated: Kuala Lumpur: Public Gard., *CF 939*, fl. Jan. 1917 (SING). — Singapore: Arboretum, Gard. no 1891, *Nur*, March 1918 (SING); Lawn J, *Nur 175*, Aug. 1918 (SING); Arboretum, *Nur*, June 1924 (SING).

Distribution. Sumatra, Malay Peninsula, Riouw-Lingga Archipelago, Banka, and Borneo; in Borneo until now not found in the eastern part.

Ecology. In primary and old secondary forests at low altitudes, on wet, often peaty soil.

Vernacular names. Sumatra: *Djaha keling* (Palemb.), *Dungun* (Sum. E. Coast), *Simar pimasa* (Tapan.), *Simpur paya* (Sum. E. Coast). Malay Peninsula: *Simpoh ayer* (= water s.), *S. paya* (= marsh s.), *S. paya hitam* (= black marsh s.). Riouw-Archipelago: *Perepat darat*. Borneo: *Debah lulus, Ilas* (Dajak); *Simpur bukit, S. laki, S. rimba* (Mal.; Brunei and Br. N. Borneo).

Uses. The wood, which is hard and heavy, is of good quality and sometimes used in house-building. The species may be suitable as an ornamental tree.

49. Dillenia parkinsonii Hoogl. spec. nov.

Type specimen: Anonymus 863, Nanleikchaung For., Upper Chindwin Divis., Burma, 24 May 1934; holotype in K.

Descriptio typi: Rami novelli breviter sericei; cicatrices ramos $^3/_4$ amplectentes. Folia obovato-oblonga, 23—27 × $6^1/_2$—$10^1/_2$ cm, 40—50-nervata, apice acuta, paulo acuminata, basi acuta decurrente, margine dentata. Petiolus 2—3 cm. Inflorescentiae probabiliter lateraliter dispositae ad ramos defoliatos, biflores. Flores diam. ca 8 cm; pedicellus 20—65 mm, in floribus bracteolatus bracteolis 3 subverticillatis, caducis, 20—32 mm longis, in fructu 20 mm longus ebracteolatus. Sepala 5, 2 exteriora ovata, ca 20 × 14 mm, 3 interiora obovata, ca 23 × 12 mm, intus glabra, extus sparsim strigoso-hirsuta, margine ciliata. Petala 5, obovata, ca 40 × 30 mm. Stamina ca 230, conformia, 11—14 mm longa; filamentum 7—9 mm longum. Carpella 5—7, glabra, oblonga, ca 6 × 2 mm, 14-ovulata, stylis paulo divergentibus. Fructus indehiscens, subglobularis, ca 2 cm diam.; carpella ca 10 × 6 mm, usque ad 5-seminata; semina exarillata.

Fig. 11, p. 116.

Shrub or tree?, probably deciduous. Branches not typically sympodial; younger ones ca 2 mm thick, slightly to densely sericeous, glabrescent. Leaf-scars clasping about $^3/_4$ of branch, narrowly subfalcate with ca 21 leaf-traces about middle. *Leaves* obovate-oblong, 20—27 × $6^1/_2$—$10^1/_2$ cm, with 38—50 nerves on either side; acute, slightly acuminate at apex, acute at base, decurrent; margin distinctly dentate, nerves slightly curving upward, ending in apex of teeth; scabrid, shortly hirsute above, slightly scabrid, sparsely shortly hirsute on intervenium, strigose along nerves and midrib beneath. Petiole 2—3 cm, sparsely hirsute above, rather

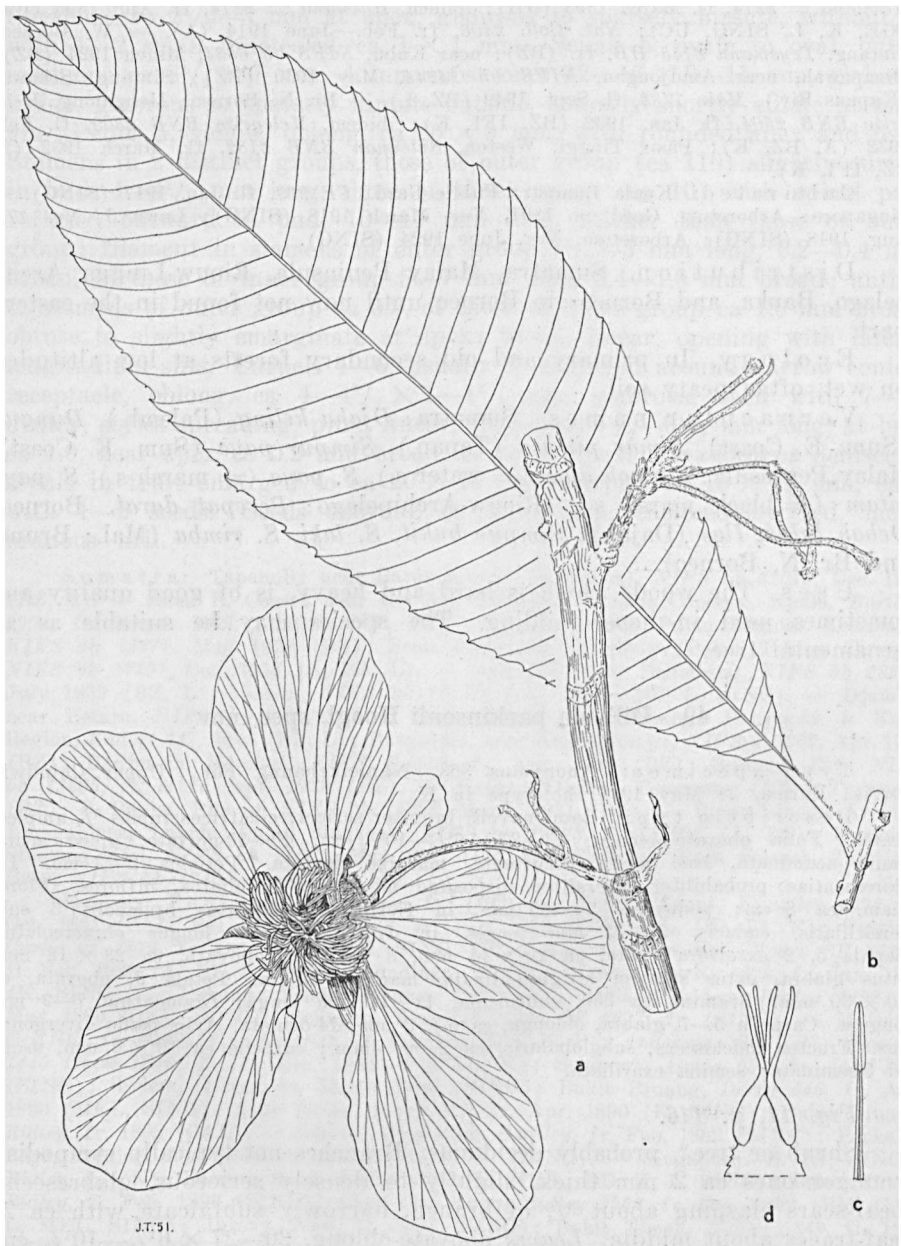


Fig. 11 — *Dillenia parkinsonii* Hoogl. (p. 115); a. flowering branch, × 1; b. leaf, × ½; c. stamen, × 2; d. gynoecium, longitudinal section, × 2; a after *Silviculturist Burma s. n.*, b, c, d after type specimen.

densely strigose beneath. *Inflorescences* fascicled, 2—3 flowers on short shoot lateral on ca 7 mm thick branches or terminal on ca 1 cm long, ca $2^1/_2$ mm thick lateral branch. *Flowers* ca 8 cm across. Pedicel 20—65 mm, ca 1.2—1.7 mm diam., thickened to 3—4 mm at apex, shortly strigose-hirsute, without or with 3 subverticillate bracteoles; bracteoles caducous, linear-oblanceolate, 12—32 × $2^1/_2$—$6^1/_2$ mm, shortly strigose-hirsute on both sides. Sepals 5, 2 outermost ones ovate, ca 20 × 14 mm, 3 innermost ones obovate, ca 23 × 12 mm, all glabrous inside, sparsely shortly strigose-hirsute outside, mainly in central part, ciliate at margin. Petals 5, obovate, ca 40 × 30 mm, rounded at apex, narrowed towards base. Stamens ca 230, slightly curved in bud, all of about same length, ca 11—14 mm long; filament 7—9 mm long, flattened, ca 0.2 mm, near base up to 0.8 mm broad; anther ca 0.8 mm broad, slightly emarginate at apex; thecae linear, opening with apical pore. Carpels 5—7, arranged around conical receptacle, oblong, ca 8 × 2 mm, glabrous, each with ca 14 ovules; styles only slightly diverging, ca 10 mm long, 0.5 mm thick at base, 0.2 mm near apex. *Pseudocarps* indehiscent, about globular, ca 2 cm diam.; carpels ca 10 × 6 mm, each with up to 5 seeds. Seeds obovoid, ca $3^1/_2$ × 3 mm, dark brown, exarillate.

Burma: Manleikchaung For., Upper Chindwin Divis., *863*, fl. May 1934 (K); *Silviculturist Burma*, fl. 1939 (DD).

Distribution. Burma.

Ecology. The type was collected in "Scrub-Indaing".

Vernacular name. *Wet-zinbyun.*

Notes. 1. I have named this species in honour of Mr C. E. Parkinson, formerly Forest Botanist at Maymyo, who made extensive collections in Burma and published a critical study on some Indian and Burmese Dillenias belonging to the group of deciduous species (Indian Forester 61, 1935, p. 447).

2. The species is the only one belonging to this group with all stamens of about the same length. Though on none of both specimens examined a note is given about the species being deciduous, I expect the species to belong to this group on account of the structure of the inflorescences and of the presence in both collections of leaves, which give the impression of being relatively young and having appeared with or some time after the flowers.

50. Dillenia pentagyna Roxb. 1795

Dillenia pentagyna **Roxb., Pl. Corom. 1, 1795, p. 21, t. 20; Buch.-Ham., Trans. Linn. Soc. 15, 1826, p. 100; Roxb., Fl. Ind. ed. Carey 2, 1832, p. 652; Wight & Arn., Prod. Fl. Pen. Ind. Or. 1, 1834, p. 5; Hook.f. & Thoms., Fl. Ind. 1, 1855, p. 71; Miq., Fl. Ind. Bat. 1, 2, 1859, p. 12; Dalz. & Gibs., Bomb. Fl., 1861, p. 2; Drury, Handb. Ind. Fl. 1, 1864, p. 10; *Beddome, Fl. Sylv. 1, 1869, pl. 104; Hook.f. & Thoms., Fl. Br. Ind. 1, 1872, p. 38; Brand., For. Fl. NW. & C. Ind., 1874, p. 2; Kurz, For. Fl. Br. Burma 1, 1877, p. 21; *Pierre, Fl. For. Cochinch. 1, 1879, pl. 6—8; Watt. Dict. Econ. Prod. Ind. 3, 1890, p. 114; Koord. & Val., Bijdr. 1 Booms. Java, 1894, p. 163; Gamble, List Darjeeling Distr., Beng., 1896, p. 2; Brand., Ind. Forester 26, 1900, p. 430; Cooke, Fl. Pres. Bomb. 1, 1901, p. 6; Gamble, Man. Ind. Timb. 2nd ed., 1902, p. 6; Duthie, Fl. Upp. Gang. Pl., 1903, p. 21; Prain, Beng. Pl., 1903, p. 195; Brand., Ind. Trees, 1906, p. 4; Fin. & Gagnep., Bull. Soc. Bot. Fr. Mém. 4, 1906, p. 8; Fin. & Gagnep., Fl. Gén. Ind.-Ch. 1, 1907, p. 19; Bourdillon, For. Trees Travancore, 1908, p. 1;

Talbot, For. Fl. Bomb. Pres. & Sind 1, 1909, p. 10; Back., Schoolfl. Java, 1911, p. 11; Koord., Exk. Fl. Java 2, 1912, p. 601; *Koord. & Val., Atl. Baumarten Java 1, 1913, f. 3; Gamble, Fl. Pres. Madras 1, 1915, p. 8; Haines, Bot. Bihar & Orissa 2, 1921, p. 7; *Troup, Sylviculture Ind. Trees 1, 1921, p. 3; Parkinson, For. Fl. Andam. Isls, 1923, p. 72; Cowan & Cowan, Trees N. Beng., 1929 p. 8; Pears. & Brown, Comm. Timb. India 1, 1932, p. 7; Kanjilal, Kanjilal, & Das, Fl. Assam 1, 1934, p. 11; Back., Bekn. Fl. Java (em. ed.) 4, 1942, fam. 80, p. 5; Hoogl., Fl. Mal. I, 4, 1951, p. 172.

Dillenia augusta Roxb., Hort. Beng., 1814, p. 43, nomen nudum; Roxb., Fl. Ind. ed. Carey 2, 1832, p. 652.

Colbertia coromandeliana DC., Syst. 1, 1818, p. 435, based on *Dillenia pentagyna* Roxb. 1795; DC., Prod. 1, 1824, p. 75.

Wormia augusta Steud., Nomencl. ed. 2, 2, 1821, p. 789, nomen nudum.

Wormia floribunda Steud., Nomencl. ed. 2, 2, 1821, p. 789, nomen nudum.

Wormia coromandelina Spreng., Syst. 2, 1825, p. 631, based on *Dillenia pentagyna* Roxb. 1795.

Colbertia augusta Wall., Cat., 1828, no 948, nomen nudum; G. Don, Gen. Hist. 1, 1831, p. 77.

Colbertia floribunda Wall., Cat., 1828, no 950, nomen nudum.

Colbertia minor Zoll. & Mor. in Nat. & Geneesk. Arch. Neêrl. Ind. 2, 1845, p. 579.

Dillenia floribunda Hook.f. & Thoms., Fl. Ind. 1, 1855, p. 71; Hook.f. & Thoms., Fl. Br. Ind. 1, 1872, p. 38.

Dillenia pentagyna var. augusta (Roxb.) Kurz, J. As. Soc. Beng. 43, II, 1874, p. 46.

Dillenia pentagyna var. flavida Pierre, Fl. For. Cochinch. 1, 1879, sub pl. 6—8.

Dillenia pentagyna var. albida Pierre, Fl. For. Cochinch. 1, 1879, sub pl. 6—8.

Dillenia pentagyna var. indica Pierre, Fl. For. Cochinch. 1, 1879, sub pl. 6—8.

Dillenia baillonii Pierre ex Laness., Pl. Util. Col. Fr., 1886, pp. 281, 702, based on *Dillenia pentagyna* Pierre 1879, l.c.; Gilg in Engl. & Prantl, Nat. Pfl. Fam. 3, 6, 1893, p. 128; Fin. & Gagnep., Bull. Soc. Bot. Fr. Mém. 4, 1906, p. 8; Fin. & Gagnep., Fl. Gén. Ind.-Ch. 1, 1907, p. 19; Craib, Fl. Siam. En. 1, 1925, p. 22; Crev. & Pétel., Bull. Econ. Ind.-Ch. Nouv. Sér. 32, 1929, p. 19; Gagnep., Suppl. Fl. Gén. Ind.-Ch. 1, 1938, p. 21.

Dillenia minor (Zoll. & Mor.) Gilg in Engl. & Prantl, Nat. Pfl. Fam. 3, 6, 1893, p. 125.

Dillenia angusta Roxb. ex Hook.f. & Jacks., Ind. Kew. 1, 1895, p. 759, sphalm. for *augusta*.

Dillenia hainanensis Merr., Lingn. Sc. J. 13, 1934, p. 64; Masamune, Fl. Kainantensis, 1943, p. 205.

Type specimens: *Dillenia pentagyna:* Roxburgh, Coromandel; holotype in BM. — *Dillenia augusta:* Wallich 948, HB Calcutta; holotype in K, isotypes in BM, CAL, CGE, G, K. — *Wormia floribunda:* Wallich 950, Salween Riv., 1827; holotype in K. — *Colbertia minor:* Zollinger 2358, Java; holotype in G, isotypes in BM, BZ, FI, MEL, P. — *Dillenia baillonii:* Pierre 661, in prov. Samrongtong, Cambodia, Apr. 1870; lectoholotype in P, isotypes in A, K. — *Dillenia hainanensis:* MacClure 20038, Ngai Distr., Hainan, Apr.—May 1932, flowers only; together with leaf-specimen MacClure 20085 holotype in NY, isotypes in A, G, K, MO, P, UC.

Deciduous trees, up to 25 m high, 100 cm thick, with usually rather crooked, near upper altitudinal limit of species very crooked trunk; crown irregular; bole up to 12 m. Bark smooth, greyish, up to 15 mm thick, peeling off in thin scales. Sapwood white, heartwood brown. Branches not typically sympodial, glabrous, younger ones ca 2—4 mm thick, smooth, older ones with fine longitudinal fissures. Leaf-scars clasping about $^2/_3$ of branch, broadly V-shaped, with ca 19—21 leaf-traces about middle in single or near centre double row. *Leaves* obovate, 20—50 × 10—20 cm, with (15—)25—50 nerves on either side, in young trees and on saplings up to 120 × 40 cm, up to 75-nerved; rounded to obtuse at apex, acute at base, decurrent; margin nearly entire to manifestly dentate with nerves ending in apex of teeth, often with 1, rarely 2, secondary nerves downward 1—3 cm from margin, ending in apex of

smaller teeth; dark green, shining, thinly strigose, particularly on nerves, glabrescent above, lighter green, slightly shining, densely more or less appressedly silky hirsute on nerves and midrib, less densely so on intervenium beneath; often small tuft of hairs at end of nerves exceeding margin. Petiole $1^1/_2$—5(—8) cm, glabrous above, more or less densely strigose-hirsute beneath, slightly winged with non-amplexicaul wings; wings at base up to 3, near base of blade ca 1 mm broad, without venation; in leaves of young trees and saplings wings up to 15 mm broad, not sharply separated from blade, with nervation like blade. *Inflorescences* fascicled, 2—7 flowers on up to 3 mm long short shoot with hairy bracts lateral on 6—30 mm thick branches, rarely at apex of 5—7 mm thick branches. *Flowers* 25—30 mm across. Pedicel $2^1/_2$—6 cm, ca 0.5 mm thick, glabrous, without bracteoles. Sepals 5, green or purplish, oval, ca 8—12 × 5—9 mm, obtuse to rounded at apex, glabrous on both sides, ciliate at margin, particularly in upper part. Petals 5, yellow, obovate, 15—20 × 5—10 mm, rounded to obtuse at apex, narrowed towards base. Stamens in 2 distinct groups, those of outer group (ca 60—90) slightly curved in bud, $2^1/_2$—4 mm long, those of inner group (10) with apical part reflexed outward in bud, 6—9 mm long; outside outer stamens often up to 20 staminodes; filament of stamens of outer group flattened, 0.8—3.0 mm long, 0.2—0.4 mm broad, of those of inner group rather thick, 4—7 mm long, at base up to 1.2 mm broad, 0.7 mm thick, narrowed to 0.3 mm at apex; anther of stamens of outer group ca 0.8—1.0 mm broad, of those of inner group ca 1.0 mm broad, 0.7 mm thick with thecae on outer side of connective, at apex nearly reaching each other, at base ca 1 mm from each other; thecae linear, opening extrorse with longitudinal slits. Carpels 5(—6), arranged around rather narrow conical receptacle, lanceolate, ca $3^1/_2$—4 × 1.2—1.5 mm, glabrous, each with 5—20 ovules; styles spreading, cylindric, ca 4 mm long, at base 0.4 mm thick, channelled above. *Pseudocarps* indehiscent, yellow, orange, or red, about globular, slightly flattened, ca 15 mm diam., 13 mm high including enclosing sepals which are up to 16 × 14 mm, up to 3 mm thick at base; carpels ca 8 × 5 mm, each 1(—2)-seeded. Seeds ovoid, ca 5 × $3^1/_2$ mm, black, glabrous, exarillate.

India: *Schlich* (K); *Rottler* (K); *Voigt*, fl. (C); *Wallich*, fl. & fr. (G); *Wight 3027*, fl. (CAL); NW. India, *Stewart*, fl. 1871 (E). — South. Himalaya Region: Sikkim Terai, *Anderson* (CAL); Sikkim, *Hooker & Thomson*, Aug. 1848 (GH, K, P); Sikkim Terai, Feb. 1867 (CAL); ibidem, *Kurz*, Oct. 1868 (CAL); ibidem, *Kurz* (CAL, K); Darjeeling Terai, *Clarke 12061*, June 1870 (K); Sikkim Terai, Siooke, *Gamble 3873*, fl. March 1873 (DD, K); Bamanpohri, Darjeeling Terai, *Lace 2185*, fl. March 1902 (E, K); Senohe Terai, *Cave*, March 1913 (CAL). — United Provs: Oudh, *Wallich 949* (K); Gorakpur & Mongro Hills, *Hamilton 1259 (= Wallich 949 p.p.)*, fl. & veg. June 1811 & Apr. 1814 (E, K); N of Indalpur, Shahjahanpur, Oct. 1885 (DD); near Wardagwram, Gonda Distr., *Duthie 9267*, Jan. 1890 (DD); Ramgarh, Gorakpur Distr., *Harsukh 21446a*, March 1898 (CAL, DD, K); Didburiyá, Kheri Distr., *Inayat 21446b*, Apr. 1898 (DD); Gorakpur Distr., *Harsukh 21446*, fl. Apr. 1898 (CAL, DD, K); Nishangarah, Bharaich Distr., *Harsukh 21447*, July 1898 (CAL, DD, K); Sungarhá, Gonda Distr. (Oudh), *Inayat 23549*, fl. May 1900 (L); Dudwa, *Haines 2106*, Feb. 1906 (DD, K); Sotiana For., N. Kheri, *Sis Ram*, fl. & fr. May 1920 (DD, SING). — Centr. Provs: Kandu Range, Melghat, *M 9* (DD); ibidem, *Berar 8014* (DD); *Donald*, Jan. 1910 (DD). — Behar & Orissa: Ma Beharinatkim, Manbhum, *Kurz* (BZ, CAL); Dadku Manbhum, *Wood*, Dec. 1879 (CAL); Parasnath, Hazaribagh, *Clarke 34780*, fl. & fr. Apr. 1884 (BM, G, K); Singbhum, *Haines 536*, Dec. 1902 (K); Balikhal, Mayurbhanj, fl. Apr. 1939 (DD); Kuldiha, Nilgiri State, Orissa, *Mooney 2034*, fl. Apr. 1942 (K). —

Deccan Pen.: Coromandelia, fl. (C); Coromandel, *Roxburgh*, fl. (BM); Concan, *Law*, fl. (BM, CAL, CGE, G, GH, K, L, M, P, UPS); Kimedi Mts, Circars, *Rupel* (BM); Courtallam, *Wight 14*, fr. March 1835 (K); ibidem, fr. Apr. 1835 (E); ibidem, *Wight*, Feb. 1836 (E); Paulghautchirry, *Wight 14*, Aug. 1844 (K); Nautacoo, Marumi, Courtallam, *Wight 22*, fr. (CGE, E, GL, K); *Wight 14*, fl. (C, GH, L, MEL, P); Moollis, *Ritchie 297*, fl. Feb. 1853 (K); ibidem, *Ritchie*, fl. Feb. 1853 (E); Canara & Ghats, *Ritchie 297*, fr. May 1853 (K); Ghats & Kula Midde, *Ritchie 297*, Apr.—Juno (K); Chandwar in Canara, *Ritchie 297*, fr. (E); Sirivaka, Godavery Distr., *Bourne*, Feb. 1902 (CAL, K); Taliparamba, Malabar, *Barber 7730*, fr. May 1906 (CAL); Dhoni, S. Malabar, *Fisher 1825*, fr. March 1910 (CAL); Pambadi Trao, *Meebold 12732*, Dec. 1910 (CAL); Anaimalai Hills, *Fisher 3367*, fl. Apr. 1912 (CAL); Travancore, Konney, *Calder & Ramaswami 80*, Aug. 1913 (CAL); Rampa Hills, Godavery Distr., *Ramaswami 1544*, Aug. 1914 (CAL); ibidem, *Narayanaswami 173*, Sept. 1920 (CAL). — Bengal: Chittagong, *Hooker & Thomson* (GH, K, P); Sorukpore, *Neary*, fl. (K); Ooiphoon Range, Chittagong, *Lister 262*, fl. March 1876 (CAL); Situpuhar Res., Chittagong, *Ellis 31*, fl. Apr. 1885 (CAL); Kodala Hill near Chittagong, *Badul Khan 421*, fl. & fr. Apr. 1887 (CAL, UPS); Shanmura W of Agartala, Tipperah, *Debbarman 401*, Dec. 1914 (CAL). — Assam: Outer Khasia Hills, below Jeerung, *Schlich* (DD); Inmoon Falls, *Masters*, March 1845 (CAL); *Hooker & Thomson*, July 1850 (K); Bhramaputhra Plains, *Kurz 155*, fl. March—Apr. 1876 (CAL, DD); Limatak, W. Manipur, *Watt 7173*, May 1882 (CAL); Nya Bungalow, Khasia, *Clarke 38139*, fl. May 1885 (K); Sheelgat, Nowgong, *Clarke 43201*, fl. March 1886 (CAL); Kaudlair, Lushai Hills, *Parry 213*, fl. (K); Marwaungklang, Lushai Hills, *Parry 513*, Jan. 1928 (K, SING).

Ceylon: *Wight 15*, fl. (E).

Burma: Mya-oang, *Buchanan* (BM); Salween, *Wallich 950*, fl. Feb. 1827 (K); Paklun, *Brandis 1216*, Oct. 1861 (MEL); Tonkyaghat, Pellowa Zeik, *Kurz 38*, fl. (CAL); Pegu, *Kurz 1806* (CAL); Kalein Res., S. Pegu, *Bo Pu 2539*, fl. March 1926 (DD); Rangoon, *Scott*, fl. Feb. 1934 (DD); Insein, Myaukhaing Res., *Po K'Laut 168*, fl. March 1948 (DD).

Andaman Islands: Bomlungta, *Parkinson 925*, Feb. 1916 (CAL, DD); *Convict*, fl. & fr. 1918 (CAL).

China: Yunnan: Maan-bang, Dah-meng-lung, Che-li-hsien, *Wang 76356*, fr. Aug. 1936 (A). — Hainan: Sin Woh, Taam Chau Distr., *Tsang 351 LU 17100*, fr. May 1928 (A, BM, E, G, K, MO, NY, P, UC); near Po-ting, Lingshui Distr., *Liang 61542*, fr. Apr. 1932 (A, NY); Chim Shan, Fan Maan Ts'uen & Vicinity, Lingshui Distr., *MacClure 20038 & 20058*, fl. & veg. May 1932 (A, G, MO, NY, P); Yaichow, *How 70322*, fl. March 1933 (NY, SING); Ka Chik Shan & Vicinity, Ch'ang Kiang Distr., *Lau 1743*, fr. May 1933 (A, BM, NY, P); *Wang 32899*, fl. July 1933 (A, NY); Yaichow, *Liang 62066*, fr. July 1933 (NY); Yeung Lam Shan, near Yeung Lam Village, Yai-hsien Distr., *Lau 6232*, fr. May 1935 (A).

Siam: Payap: Chiengrai, *Kerr*, fl. March 1921 (P, UC). — Udawn: Lôi, Kao Krading, *Kerr 8746*, fl. March 1924 (BM, E, K, P, UC); ibidem, *Kerr 20039*, fl. Feb. 1931 (BM). — Rachaburi: Sai Zok, Kanburi, *Kerr 10556*, fl. Feb. 1926 (BM).

Indo-China: Mekhong, *Thorell*, fl. 1866—8 (P). — Tonkin: Phu Tho, *Eberhardt 5051*, fl. (P). — Annam: San Thays Mts, Hué, *Harmand*, 1875—7 (P); Mekong-Hué road, *Harmand (= Pierre 1875)*, fr. Sept. 1877 (P); Laobao, Quang Tri Prov., *Poilane 1356*, fl. Apr. 1920 (P). — Cambodia: Samrongtong Prov., *Pierre 661*, fr. Apr. 1870 (A, P); Kompong Chhnang, *Godefroy 233*, June 1875 (K, P); Melouprey, *Harmand 444*, fl. Feb. 1876 (K, P); Dêt Prov., *Harmand (= Pierre 2047)*, fr. Jan. 1877 (P); Chéomkhsan, Shung Treng Prov., *Poilane 14889*, fr. March 1928 (P); Love, *Béjaud 401*, fl. (A, NY, P). — Cochinchina: *Pierre* (P); *Thorell* (P); *Thorell 1335*, 1862—6 (P); Bien Hoa, *Thorell*, 1862—6 (P); Dinh Mts, *Pierre 2046*, Aug. 1866 (BM, L, P); Dinh Mts (Mu Xoai), Baria Prov., *Pierre 2045*, Sept. 1867 (BM, K, L, P); Dinh Mts, *Pierre 661*, Aug. 1869 (K, P); ibidem, *Pierre 661*, fr. Oct. 1870 (A, BM, L, NY); Song Lu, Bien Hoa Prov., *Pierre 1601*, fl. Feb. 1877 (BM, K, L); ibidem, *Pierre 599*, fl. & fr. Feb. 1877 (P); Dan Man, Bien Hoa Prov., *Pierre 1601*, fl. March 1877 (P); between Quanloi & Xa Huat near Honquan, *Evrard 872*, fr. Apr. 1922 (P).

Java: *de Voogd 200 (725)* (L). — W. Java: Kuningan, Cheribon, *Houter 159*, March 1873 (BZ); Tomo, Preanger, *Koorders 1630β*, May 1890 (BZ, P); ibidem, *Koorders 1633β*, May 1890 (BZ); ibidem, *Koorders 1629β*, fr. July 1891 (A, BZ, K, L); ibidem, *Koorders 1635β*, *1636β*, *1637β*, *1638β*, July 1891 (BZ); ibidem,

Koorders 11874β, Apr. 1893 (BZ); between Tjitepong & Tjiletus, *Backer 17597*, fl. Nov. 1914 (BZ). — C. Java: Djocjacarta, *2837 IIB* (BZ); Kedungdjati, *Koorders 1697β*, May 1888 (BZ); ibidem, *Koorders 1599β*, fl. July 1888 (BZ); ibidem, *Koorders 1590β*, fl. Aug. 1888 (A, BZ, L); ibidem, *Koorders 1600β*, fl. Aug. 1888 (BZ); ibidem, *Koorders 1605β*, fl. & fr. Aug. 1888 (BZ); ibidem, *Koorders 1592β*, *1593β*, *1596β*, fr. Oct. 1888 (BZ); ibidem, *Koorders 1591β*, fr. Oct. 1888 (BZ, K, L); ibidem, *Koorders 1595β*, fl. & fr. Sept. 1889 (BZ); ibidem, *Koorders 1601β*, fr. Oct. 1889 (BZ); ibidem, *Koorders 1606β*, fl. & fr. Oct. 1889 (A, BZ, L); ibidem, *Koorders 1604β*, Oct. 1889 (BZ); ibidem, *Koorders 1603β*, Nov. 1889 (BZ); ibidem, *Koorders 1598β*, fl. Aug. 1890 (BZ); Darmotemulus, Brebes, Tegal, *Koorders 1611β*, Sept. 1891 (BZ); Margasari, Brebes, Tegal, *Koorders 1613β*, Sept. 1891 (BZ, L); Subah, Pekalongan, *Koorders 11424β*, Oct. 1891 (BZ); ibidem, *Koorders 11425β*. Feb. 1892 (BZ); Karangassam, Semarang, *Koorders 1610β*, March 1892 (BZ); Karangassam, *Koorders 1620β* (BZ); Kedungdjati, *Koorders 25115β*, fl. & fr. Sept. 1896 (BZ, L); Karangassam, *Koorders 28247β*. June 1897 (BZ); ibidem, *Koorders 33252β* (BZ, L); Subah, Pekalongan, *Koorders 36922β*, fl. May 1899 (BZ); Ngarengan, Taju, *Koorders 35492β*, June 1899 (BZ); Ngandang, *Koorders 36515β*, Nov. 1899 (BZ); Telawah, *NIFS K 7*, fr. (BZ); Margasari, *Beumée 515*, Nov. 1915 (BZ); Subah, *Beumée 3470*, fr. Oct. 1918 (BZ); Prupuk, Pekalongan, *Noltée 4033*, fl. Sept.—Oct. 1919 (BZ, WAG); Rembang, Kunduran, *Beumée 5248*, fl. Aug. 1920 (BZ); Semarang, Manggar, *Jansen 4652*, fr. Dec. 1922 (BZ); Telawa, Semarang Distr., *Vincent 4652a*, fr. Dec. 1923 (BZ); near Dk Masargin, Tambakredjo, *NIFS Ja 1598*, Apr. 1927 (BZ). — E. Java: near Gondang Malang, *Zollinger 2358*, fl. & fr. Oct. 1844 (BZ, FI, G, MEL, P); Badjulmati, Banjuwangi, *Koorders 1586β*, May 1889 (BZ); Puger-Watangan, *Koorders 1581β*, fl. Aug. 1889 (BZ, L, P); Rogodjampi-Balak, *Koorders 1587β*, Aug. 1889 (BZ); Puger-Watangan, *Koorders 1582β & 1588β*, fr. Oct. 1889 (BZ); ibidem, *Koorders 1583β*, fr. Oct. 1889 (BZ, P); Tjuramanis, Simpolan, Majang Distr., *Koorders 1585β*, fr. Dec. 1889 (BZ, K, L, P); ibidem, *Koorders 1584β*, fr. Jan. 1892 (BZ); Ngebel, Pulung Distr., *Koorders 1609β*, fr. Oct. 1892 (BZ, CAL, K, L, WAG); ibidem, *Koorders 1607β*, fl. Oct. 1892 (BZ, L); ibidem, *Koorders 1608β*, fl. & fr. Oct. 1892 (BZ, K, L, P); Puger-Watangan, *Koorders 12895β & 12896β*, fr. Nov. 1892 (BZ); Pantjur-Idjen, Pradjekan Distr., *Koorders 20731β*, fl. Nov. 1895 (BZ); Gadungan Pare, Sukaradja Distr., *Koorders 22743β*, June 1896 (BZ, L); Ponorogo, Madiun, *Koorders 29206β*, fl. Aug. 1897 (BZ, L); Ngandang, Sedan Distr., Gunung Gerang, *Koorders 36127β*, June 1899 (BZ); Tjuramanis, *Koorders 38473β*, fr. Nov. 1899 (BZ); Brombang near Ngebel, *Koorders 38719β*, fr. Nov. 1900 (BZ); Puger, *Koorders 39777β & 39840β*, May 1902 (BZ); Tjuramanis, *Koorders 40026β*, May 1902 (BZ); Pilangredjo, Madiun, *Wisse 46 & 59*, May 1919 (BZ); Dero (N of Padas), Madiun, *Wisse 117*, fr. Sept. 1919 (BZ); Bodjonegoro, Tjelobung, Bubuton, Rembang Distr., *NIFS Ja 1629*, July 1927 (BZ); Baluran, Bondowoso Distr., *Clason A 105*, fl. Nov. 1930 (GRO); Bodjonegoro, near Klino, *NIFS Ja 2039*, Jan. 1931 (BZ, K, L); Glenmore, *Rant*, fl. July 1931 (BZ). — Kangean Arch.: Kangean, between Ardjasa & Gelaman, *Backer 27160*, March 1919 (BZ); Kangean, Budhi, *Dommers 17*, fl. Sept. 1919 (BZ).

Lesser Sunda Islands: Sumba: Muamarra, *Iboet 452*, May 1925 (BZ, L). — Timor: fl. (BZ); Dilly, fl. (BZ); *Teysmann*, fr. (BZ); *Teysmann 10667 IIB*, fl. (BZ, FI). — Wetar: near Klisana, *Bloembergen 172 (= NIFS bb 27288)* (A, BZ, L); near Tarra, *Bloembergen 3772*, Apr. 1939 (BZ, L).

Celebes: SW. Peninsula: Sacpa Galung, Pare-pare, *Noerkas 296*, fl. June 1912 (BZ, L); Tanette, Parigi Distr., *Bünnemeyer 12558*, fl. June 1921 (BZ, L); Malino above Makassar, *Rant 433*, fl. & fr. Oct. 1931 (BZ, L). — Pulau Muna: near Raha, *NIFS bb 5864*, fl. & fr. Aug. 1923 (BZ).

Cultivated: Calcutta: *Wallich 948*, fr. (BM, CAL, CGE, G, K); *Wallich 949*, fr. (CAL, CGE, K); fl. (BZ, CAL, L, M, NY, P); *Kurz* (BZ, CAL); *Pierre*, fl. 1863—4 (P). — Bot. Gard. Bogor: no IV-G-13a, fl. Sept. 1892 & fr. (BZ, CAL, L, US); no IV-G-15 (BZ); no IV-G-19a, fr. (BZ); For. Res. Inst. Gard., cultivated from Noltée 3033, Margasari, Jan. & June 1922 (BZ; seedlings). — Bot. Gard. Hanoi: *Lemaire*, fl. (P); *Chevalier 29764*, Dec. 1913 (P).

Locality uncertain: (E); *Cleghorn* (E); *29*, fr. (DD); between Kysaphur & Soonorry For., *Wallich 949 (303)*, fl. March 1819 (K); Besarbati, fl. Apr. 1850 (K); Punkaban, *Clarke 13843*, Nov. 1870 (BM); Hishangabat Distr., *Hole 854*, Jan. 1908 (DD).

Distribution. India, Burma, Andaman Islands, China (Yunnan, Hainan), Siam, Indo-China, Java (not in the westernmost part), Lesser Sunda Islands, South Celebes. The area of the species shows a remarkable resemblance to that of *Tectona grandis* L.f. (cf. Hoogl., l. c. fig. 12).

Ecology. The species generally occurs in open forests to savannahs, in India in Sal forest (*Shorea* spec.), savannah forest, or mixed plains forest, where it is usually small, whereas on the hills it may be a fine large tree (Cowan & Cowan, l. c.); in Java common in teak forests. It flowers when leafless in the dry season, in Continental Asia from January to June, in Malaysia from June to November; each tree has only a short time of flowering.

Vernacular names. In the literature mentioned above a very large number of vernacular names has been noted for the species in India and Burma. Unfortunately on the herbarium labels rarely names are noted and therefore it is impossible to decide whether all these vernacular names refer to the present species; the total number exceeds 50. From Pearson & Brown, l. c. I cite the vernacular names as these will probably be the most common and reliable ones: *Akshi* (Assam); *Akachi, Achki* (Garo); *Karhotta* (Bengal); *Sahar* (Santhali); *Tatri* (Nepalese); *Karmal, Karambel, Kurweil* (Marathi); *Kanagola* (Kanarese); *Zinbyun* (Burmese); *Mai, Mak-san* (Shan); *Graw-grawp* (Kachin); *Khaw* (Karen); *Kalot* (Tg.); *Rai, Pinnai, Nai-tek* (Tamil); *Rawandan, Chinna-kalinga* (Telugu). Outside India and Burma the following names have been noted: Hainan: *Taai Ip Pei Pa Shue.* Siam: *Peng* (Lao, Nakawn Panom), *San do de* (Kao Krading). Indo-China: *Cay mi* (Annamese), *Meroi* (Moi), *So ba* (Annamese). Java: *Djunte* or *Djunti* (Sundanese), *Sempu* (Javanese), *Sompor* (Madurese), *Sumpor* (Kangean). Lesser Sunda Isls: *Hakki* (Sumba), *Kamatato* or *Paponuk* (Wetar). Celebes: *Tawro* (SW. Cel.), *Rondomi* (Munarese).

Uses. The timber is extensively used in India under cover for houseposts, rafters, and planking, and may be used for decorative work. In Java it is not used, probably because no large trees are available, except for making charcoal, which is of good quality. The fruit is eaten in curries and jellies and also used for making a cough cure.

Notes. 1. The colour of the petals in practically all cases is indicated as yellow, except by Pierre (1879) who distinguishes 3 varieties which also differ by the colour of the sepals: *var. flavida* sepals purple, petals yellowish; *var. albida* sepals greenish, petals whitish; *var. indica* sepals greenish, petals yellow. Other differences are not indicated and I have not been able to distinguish these varieties in the herbarium specimens.

2. *Dillenia baillonii* was proposed as a distinct species by Pierre in manuscript; the first to use the name was Lanessan without description, but with reference to *Dillenia pentagyna* Pierre non Roxb., which therefore was a valid publication. The differences given by Pierre are: less accentuated crenatures and a more obovate blade. To this Finet & Gagnepain added differences in the number of nerves (47 in *pentagyna*, 30—37 in *baillonii*) and in the indument of pedicels and flowers (glabrous in *pentagyna*, hairy in *baillonii*). In the type of *D. baillonii* and all other specimens from Indo-China the pedicels and flowers are glabrous, whereas

the other differences fall within the variability of *D. pentagyna* as delimited here.

51. Dillenia scabrella (D. Don 1825) Roxb. ex Wall. 1830

Dillenia scabrella Roxb., Hort. Beng., 1814, p. 32, nomen nudum; **Wall., Pl. As. Rar. 1, 1830, p. 20, t. 22; Roxb., Fl. Ind. ed. Carey 2, 1832, p. 653; Hook.f. & Thoms., Fl. Ind. 1, 1855, p. 70; Drury, Handb. Ind. Fl. 1, 1864, p. 10; Hook.f. & Thoms., Fl. Br. Ind. 1, 1872, p. 38; Kurz, J. As. Soc. Beng. 43, II, 1874, p. 46; Kurz, For. Fl. Br. Burma 1, 1877, p. 21; Brandis, Ind. Forester 26, 1900, p. 430; Gamble, Man. Ind. Timb. 2nd ed., 1902, p. 6; Prain, Bengal Pl., 1903, p. 195; Brandis, Ind. Trees, 1906, p. 4; Fin. & Gagnep., Bull. Soc. Bot. Fr. Mém. 4, 1906, p. 7; Fin. & Gagnep., Fl. Gén. Ind.-Ch. 1, 1907, p. 18; Kanjilal, Kanjilal, & Das, Fl. Assam 1, 1934, p. 11.

Colbertia scabrella (Roxb. nomen nudum) D. Don, Prod. Fl. Nep., 1825, p. 266.

Dillenia pilosa Roxb., Hort. Beng., 1814, p. 43, nomen nudum; Buch.-Ham., Trans. Linn. Soc. 15, 1827, p. 102; Roxb., Fl. Ind. ed. Carey 2, 1832, p. 652.

Wormia scabrella (D. Don) Spreng., Syst. 4, Cur. Post., 1827, p. 213.

Dillenia elata *Pierre, Fl. For. Cochinch. 1, 1879, t. 9; Laness., Pl. Util. Col. Fr., 1886, p. 281; Fin. & Gagnep., Bull. Soc. Bot. Fr. Mém. 4, 1906, p. 8; Fin. & Gagnep., Fl. Gén. Ind.-Ch. 1, 1907, p. 18; Gagnep., Suppl. Fl. Gén. Ind.-Ch. 1, 1938, p. 20.

Type specimens: *Colbertia scabrella:* Wallich 944, Cult. in Bot. Gard. Calcutta; holotype in K, isotypes in BM, BR, CAL, G, K, NY, P. — *Dillenia pilosa:* Wallich, cult. in Bot. Gard. Calcutta, Apr. 1818; holotype in K, isotypes in C, CGE. — *Dillenia elata:* Pierre 765, Chiruw Mts, Samrongtong Prov., Cambodia, Apr. 1876; lectoholotype in P, isotype in A.

Deciduous trees, up to 30 m high, ca 100 cm thick. Bark smooth, grey, red, or brown. Wood brown. Branches not typically sympodial, younger ones ca 3 mm thick, slightly hirsute to densely strigose, glabrescent. Leaf-scars clasping about $^2/_3$ of branch, broadly V-shaped with ca 15 leaf-traces near upper margin. *Leaves* obovate to narrowly obovate, 15—30(—35) × 6—14(—16) cm, with (25—)35—45(—50) nerves on either side; rounded to acute at apex, obtuse to acute at base, decurrent; margin slightly dentate to nearly entire, nerves rather straight, slightly curving upward near margin, ending in apex of teeth, sometimes smaller tooth between 2 nerves with vein ending in it; shortly hirsute with rather rigid hairs, glabrescent, often more or less scabrid above, rather densely softly strigose-hirsute, mainly on midrib, nerves, and veins, usually less scabrid beneath. Petiole $2^1/_2$—5(—8) cm, glabrous above, softly strigose-hirsute beneath, with ca 1—2 mm broad non-amplexicaul wings. *Inflorescences* fascicled, (1—)2—5 flowers on up to 3 mm long short shoot with small caducous hairy to nearly glabrous bracts lateral on ca 5—10 mm thick branches, rarely at apex of ca 5 mm thick branches. *Flowers* ca 4—5 cm across. Pedicel ca 2—4 cm, in fruit up to 6 cm long, ca 1—$1^1/_2$ mm thick, thickened to ca 2 mm at apex, in fruit ca 2 mm thick, thickened to ca 3 mm at apex, sparsely hirsute near base, glabrous towards flower, partly with 2—3 bracteoles at same or slightly different level from closely near base to ca 1 cm below flower; bracteoles caducous, lanceolate, up to ca 8 × $2^1/_2$ mm, glabrous above, sparsely strigose along midrib and in apical part beneath, ciliate at margin. Sepals 5, 2 outermost ones ovate, ca 12 × 10 mm, 3 innermost ones oval, ca 14 × 10 mm, glabrous on both sides, sparsely ciliate at margin near apex only. Petals 5, bright yellow, narrowly obovate, ca 25 × 10 mm, rounded at apex. Stamens in 2 distinct groups,

those of outer group (ca 110) slightly curved in bud, ca 4—5 mm long, those of inner group (ca 18) with apical part reflexed outward in bud, 9—10 mm long; filament of stamens of outer group ca 1—2 mm long, 0.3—0.4 mm broad, of those of inner group rather thick, ca 5 mm long, 0.6 mm broad, 0.6 mm thick; anther of stamens of outer group ca 0.4 mm broad, of those of inner group ca 1.0 mm broad, 0.4 mm thick with thecae on outer side of connective, in stamens of outer group rounded to obtuse at apex, in those of inner group slightly emarginate at apex; thecae linear, opening with longitudinal slits, in stamens of outer group lateral, in those of inner group on outer side. Carpels 5—7, arranged around rather narrow conical receptacle, ovate-oblong, ca $4^1/_2 \times 1^1/_2$ mm, glabrous, each with ca 8—10 ovules; styles recurved to slightly spreading, ca 8 mm long, ca 0.5 mm thick at base, 0.3 mm near apex, channelled above. *Pseudocarps* indehiscent, orange, about globular, ca 24 mm diam., 20 mm high including enclosing sepals which are up to ca 30 × 22 mm, ca 4 mm thick near base; carpels ca 12 × 7 mm, each with 0—2 seeds. Seeds obovoid, ca $5 \times 3^1/_2$ mm, glossy black, glabrous, exarillate.

India: Bengal: Kesalong, Chittagong Hill Tracts, *Lister 377*, fr. 1876 (CAL). — Assam: Camrupe Mts, Goalpara, *Hamilton 1258 (= Wallich 944)*, fl. Aug.—Sept. 1808 (E, K); Khasia Mts, *Hooker & Thomson*, fr. (CAL, CGE, GH, K, P); Lower Assam, *Mann 140* (CAL); Dhansiri, Nowgong Distr., *Kanjilal*, fl. Apr. 1914 (CAL).

Burma: Padaung, near Hampyi, Southern Shan States, *Robertson 140*, fl. March 1910 (K).

Indo-China: Laos: between Na Mo & M. Luang Nam Tha, Haut Mekhong Prov., *Poilane 26219*, fr. May 1936 (P); between Vieu Poukha & Tafa, Haut Mekhong Prov., *Poilane 26411*, fr. June 1936 (P). — Cambodia: Chiruw Mts, Samrongtong Prov., *Pierre 765*, fr. Apr. 1876 (A, P). — Cochinchina: Bao Chiang, Bien Hoa Prov., *Pierre 2041*, Sept. 1865 (A, BM, K, P).

Cultivated: Calcutta Bot. Gard.: fl. & fr. (BZ, CGE, L, P); *Wallich*, fl. (CAL, K); *Voigt* (C); *Wallich*, Apr. 1818 (C, CGE, K); *Wallich*, fl. 1819 (BM, G, K, LINN); *Wallich 944 & 944A*, fl. (BM, BR, CAL, CGE, G, K, NY, P); *Griffith*, fl. (K); fr. 1851 (CAL); *Kurz*, fl. (CAL, K); *Pierre 2943*, fl. Feb. 1863 (K, P). — Bot. Gard. Bogor: no IV-G-12, fl. 1915 & fr. (BZ). — Bot. Gard. Mauritius: fl. (CGE, K).

Without locality: *Wallich* (C); *Chuma*, June 1850 (K).

Distribution. Bengal, Assam, Burma, and Indo-China; possibly also Nepal.

Ecology. In forests, up to ca 1300 m altitude. As far as the few collections indicate, the flowering and fruiting time agree with those of *D. pentagyna* (flowering from January to June).

Vernacular names. *Daine oksi* (Assam; Buch.-Ham.); *Banjiou* (Ass.), *Mandiphang* or *Mundephang* (Kuki), *Agatchi-badura* (Garo; fide Kanjilal, Kanjilal, & Das 1934); *So bà nui, Pelou phom* (Indo-China; fide Pierre 1879).

Uses. The wood is of good quality; the fruits are edible.

Notes. 1. The occurrence in Nepal is recorded by D. Don (1825) on account of a specimen collected by Wallich; in the Calcutta herbarium one of the specimens of Wallich from the Botanic Garden bears besides the indication "Nepal". From these data the occurrence in Nepal can not be considered as certain.

2. The first description of the species, and therefore the first valid publication of the epithet *scabrella*, was given by D. Don under the name

Colbertia scabrella D. Don; Wallich was the first to use the combination "*Dillenia scabrella* Roxb." valid under the Rules, however without citing *Colbertia scabrella* D. Don. As both are based on the same specimen (*Dillenia scabrella* Roxb., Hortus Bengalensis 1814, published only as a nomen nudum) I have treated Wallich's binomial as if it were based on *Colbertia scabrella* D. Don, thus giving it priority to *Dillenia pilosa* Roxb. ex Buch.-Ham..

3. As the type of *D. pilosa* I consider a specimen from cultivation in the Botanic Garden at Calcutta, probably from the specimen on which Roxburgh based his new species, which was published only as a nomen nudum. The first valid description was given by Buchanan-Hamilton, who cited a specimen from Assam; it is not certain whether he compared this specimen with Roxburgh's material.

52. Dillenia parviflora Griff. 1854

Dillenia parviflora Griff., Notul. 4, 1854, p. 704; Kurz, J. As. Soc. Beng. 40, II, 1871, p. 45; Kurz, J. As. Soc. Beng. 43, II, 1874, p. 46; Hook.f. & Thoms., Fl. Br. Ind. 1, 1875, p. 38; Kurz, For. Fl. Br. Burma 1, 1877, p. 21; Watt, Dict. Econ. Prod. Ind. 3, 1890, p. 113; Brand., Ind. Forester 26, 1900, p. 430; Gamble, Man. Ind. Timb. 2nd ed., 1902, p. 6; Pears. & Brown, Comm. Timb. India 1, 1932, p. 6.

Dillenia kerrii Craib, Kew Bull. 1911, p. 8; Craib, Fl. Siam. En. 1, 1925, p. 23.

Dillenia elata Auct. non Pierre; Craib, Fl. Siam. En. 1, 1925, p. 22.

Type specimens: *Dillenia parviflora:* Griffith 50, Mergui; holotype in K. — *Dillenia kerrii:* Kerr 1046, hills between Muang Proa and Chiengdao, Siam, 5 March 1910; holotype in K, isotype in BM.

Deciduous trees, up to 40 m high, 100 cm thick. Branches not typically sympodial, younger ones ca 3 mm thick, more or less densely shortly hirsute, glabrescent. Leaf-scars clasping about $^3/_5$ of branch, subfalcate with ca 17—21 leaf-traces in upper part. *Leaves* obovate to elliptic-oblong, (11—)15—25(—30) × (6—)8—12$^1/_2$(—15) cm, with 25—35(—40) nerves on either side, in young trees and on saplings up to 37 × 15 cm with 44 nerves on either side; rounded to obtuse, often slightly acuminate at apex, obtuse, nearly rounded, to acute at base, decurrent; margin entire to shortly dentate, nerves rather straight to slightly curving upward, ending in margin; slightly scabrid, shortly hirsute, soon glabrescent on nerves and intervenium, densely shortly hirsute on midrib above, slightly scabrid, more or less densely hirsute, not glabrescent, on intervenium, nerves, and midrib beneath. Petiole 1$^1/_2$—3$^1/_2$(—5) cm, densely hirsute on both sides. *Inflorescences* fascicled, (1—)2—4(—7) flowers on up to 3 mm long short shoot with caducous bracts lateral on 5—10 mm thick branches, rarely at apex of ca 3—4 mm thick branches; bracts up to 15 × 7 mm, densely sericeously hirsute on both sides. *Flowers* ca 5 cm across. Pedicel 5—30(—60) mm long, ca 1—1$^1/_2$ mm thick, rather densely hirsute, without or with 1 or 2 bracteoles; bracteoles caducous, linear-lanceolate, ca 10 × 2 mm, densely hirsute. Sepals 5, oval, ca 12—16 × 7—10 mm, glabrous except up to 2 mm broad shortly hirsute part at apex of 2 outermost ones inside, densely sericeously hirsute except in bud covered margins which are glabrous for ca 0.7—1.0 mm outside, ciliate at margin. Petals 5, yellow, obovate, ca 25 × 12 mm, rounded at apex, narrowed towards base. Stamens in 2 distinct groups, those of outer

group (ca 140—170) slightly curved in bud, ca 5—6½ mm long, those of inner group (ca 11—14) with apical part reflexed outward in bud, ca 12—15 mm long; filament of stamens of outer group 1.2—3.0 mm long, ca 0.3—0.4 mm broad, of those of inner group ca 7—9 mm long, at apex 0.3, at base up to 1.0 mm broad; anther 0.8—1.0 mm broad, slightly emarginate at apex; thecae linear, opening with longitudinal lateral slits. Carpels 5—8, arranged around rather narrow conical receptacle, lanceolate, 4½—5 × 1.3 mm, glabrous, each with 12—16 ovules; styles recurved, ca 7 mm long, at base ca 0.7, near apex ca 0.2 mm thick and broad. *Pseudocarps* indehiscent, orange, about globular, ca 18 mm diam., 17 mm high including enclosing sepals which are up to 23 × 15 mm; carpels ca 13 × 7 mm, each with 1—4 seeds. Seeds obovoid, ca 5 × 3½ mm, black, exarillate.

var. parviflora

Dillenia parviflora Griff. 1854.

Carpels glabrous.

Burma: Mergui, *Griffith 50*, fl. (K); Youngeleen, *Brandis 1215*, fl. March 1862 (MEL); Pegu, Tonkyeghat, Palawa Zeik, *Kurz 39 (320)*, fl. (CAL, M); Pegu Yomah, *Kurz 1806*, fr. May 1871 (CAL, K); Salween, fl. March 1880 (NY); Youngeleen, *Brandis*, fl. 1880 (CAL); Tenasserim, *Meebold 14464*, fl. March 1911 (CAL); Tenasserim, Wagan, *Meebold 15160*, fr. Apr. 1911 (CAL); Taking Valley 24°45′ NL., *Forrest 11823*, fl. Apr. 1913 (BM, E); Taking Valley 24°35′ NL., *Forrest 13601*, fl. Apr. 1917 (E); Myaungtaga, Insein Distr., *Parkinson 607*, fl. March 1925 (CAL, DD); Yapu-Kalunaung Res., Tavoy Distr., *Sein Syi 957*, fl. March 1925 (DD); Wa Zuu Chaung, Tavoy Distr., *Mg Me 927*, fl. March 1925 (CAL, DD); Theebyu, Theinkun Chaung, S. Tenasserim, *Parkinson 1924*, fl. Feb. 1926 (K); Arakan Yoma, Sandoway, *Ba Pe 12036*, fl. Feb. 1931 (DD, K); Rangoon, *Barnard DLP 1*, fl. 1931 (BM); ibidem, *Parkinson 14144*, fl. March 1932 (DD); ibidem, *Dickason 5836A*, fr. Feb. 1934 (A); ibidem, *Scott*, fl. March 1934 (DD); Myaukhlaing Res., Insein Distr., *Po K'Laut 106*, fl. Feb. 1948 (DD).

Siam: Payap: Chiengmai, Doi Sutep, *Kerr 1787*, fl. Apr. 1911 (BM, CAL, L, P). — Rachaburi: Wangka, Kanburi, *Kerr 10493*, fl. Feb. 1926 (BM); Neeckey near Wangka, *Kostermans 246*, fr. Apr.—May 1946 (BRI, L, SING).

Cultivated: Calcutta, *Pierre*, fl. 1863 (P).

var. kerrii (Craib) Hoogl. stat. nov.

Dillenia kerrii Craib 1911.

Carpels hirsute in upper part only or for whole surface.

Burma: Tenasserim, *Gallatly 799*, fl. Apr. 1877 (CAL); Upper Burma, Ruby Mines, *Abdul Huk 232*, fl. March 1892 (CAL); Sherwood, Maymyo Distr., *Mg Po Khaut 11438*, fl. Apr. 1930 (DD).

Siam: Payap: between Muang Prao & Chiengdao, *Kerr 1046*, fl. March 1910 (BM, K); Muang Fang, *Kerr 5235*, fr. Apr. 1921 (BM, K).

Of the following specimens the variety cannot be ascertained as no flowers or fruits are available:

Burma: (NY); Amherst, *Falconer*, Apr. 1849 (CAL, MEL); Youngeleen, March 1880 (NY).

Distribution. Burma and W. Siam.

Ecology. In dry, open forests. Flowering in the dry season, from February to May.

Vernacular names. Burma: *Linyaw, Lingyaw.* Siam: *Lawe* (Siamese, Korat), *Masan hing, Masan kweng* (Lao, Chiengmai), *Kwawng* (Karen, Wangka).

Uses. The wood is little used, mainly for beaming and similar purposes.

Notes. 1. The differences of *var. parviflora* and *var. kerrii* are found only in the hirsute indument of the carpels in the latter. The type of *var. kerrii* and *Gallatly 799* have only the apical part hirsute, in the other specimens the carpels are hirsute for the whole surface.

2. *Ba Pe 12036* differs from the other specimens by a longer pedicel (up to 6 cm) and more-flowered inflorescences (up to 7-flowered).

53. Dillenia andamanica Parkinson 1935

Dillenia pilosa Auct. non Roxb. ex Buch.-Ham.; Kurz, J. As. Soc. Beng. 41, II, 1872, p. 291; Kurz, J. As. Soc. Beng. 43, II, 1874, p. 46; Kurz, J. As. Soc. Beng. 45, II, 1876, p. 115; Kurz, For. Fl. Br. Burma 1, 1877, p. 20; Parkinson, For. Fl. Andaman Isls, 1923, p. 71.

Dillenia andamanica *Parkinson, Ind. Forester 61, 1935, p. 452, pl. 29.

Dillenia nicobarica Kurz ex Parkinson, Ind. Forester 61, 1935, p. 449, nomen nudum.

Type specimen: Parkinson 1185, Bomlungta, Middle Andaman, 12 Apr. 1916; holotype in K, isotype in CAL.

Deciduous trees, up to 30 m high, 90 cm thick, with up to ca 15 m bole. Bark thin, smooth, greyish. Wood greyish. Branches not typically sympodial, younger ones ca 2—3 mm thick, rather densely shortly hirsute, glabrescent. Leaf-scars clasping about $^3/_5$ of branch, subfalcate with ca 13—17 leaf-traces slightly above middle. *Leaves* obovate to narrowly so, 22—45 × 11—17 cm, with 40—50 nerves on either side, on saplings and young trees narrower, up to 60 × 17 cm, up to 60-nerved; rounded to obtuse at apex, acute at base, decurrent; margin dentate, mainly in upper part, to nearly entire, nerves rather straight, slightly curving upward near margin, ending in apex of teeth; sparsely shortly hirsute, soon glabrescent above, shortly strigose-hirsute on midrib and nerves, on intervenium mainly on transverse venation, more or less glabrescent beneath. Petiole $^1/_2$—2 cm, glabrous above, densely shortly sericeously hirsute beneath, with up to $1^1/_2$ mm broad, non-amplexicaul wings. *Flowers* appearing before leaves, solitary, sometimes 2 together, on up to 3 mm long short shoots, rarely a second serially arranged ca 2 mm above the first, in axil of leaf-scars on 2—6 mm thick branches; short shoots with bracts; bracts caducous, sessile, ovate to lanceolate, 10—25 × 5—7 mm, glabrous above, densely shortly hirsute beneath. *Flowers* ca 12 cm across. Pedicel 1—$3^1/_2$ cm, ca $1^1/_2$—2 mm thick, more or less densely strigose-hirsute, glabrescent, without bracteoles. Sepals 5, 2 outermost ones smaller, ca 15 × 12 mm, than 3 innermost ones, ca 18 × 14 mm, glabrous inside, densely shortly sericeous except in bud covered margins which are glabrous for ca 3 mm outside, all densely ciliate at margin. Petals 5, yellow, obovate, 5—$5^1/_2$ × 3—$3^1/_2$ cm, rounded at apex, narrowed towards base. Stamens in 2 distinct groups, those of outer group (ca 100) slightly curved in bud, ca 7 mm long, those of inner group (ca 30) with apical part reflexed outward in bud, ca 13 mm long; filament of stamens of outer group $2^1/_2$—3 mm long, ca 0.3 mm broad, of those of inner group ca 8 mm long, ca 0.4 mm broad; anther ca 0.6—0.8 mm broad, obtuse at apex; thecae linear, opening with pore near apex on inner side. Carpels (6—)8, arranged around narrow conical receptacle, lanceolate, ca 5 × $1^1/_2$ mm, glabrous, each with ca 15—20 ovules; styles recurved, ca 10 mm long, slightly flattened,

ca 1 mm broad, channelled above. *Pseudocarps* indehiscent, orange, about globular, ca $2^1/_2$ cm diam. including enclosing sepals; seeds unknown.

Andaman Islands: S. Andaman, *Kurz* (CAL, K, P); Aberdeen, S. Andaman, *Kurz*, fl. (CAL); Middle Andaman, Middle Straits, *Kurz* (CAL); S. Andaman, *King*, fl. Apr. 1890 (BM, BZ, CAL, DD, E, G, GH, K, L, P); ibidem, *Heinig 105*, Aug. 1896 (CAL); *Prain's Coll.*, fl. & fr. Apr. 1899 (CAL, G, K); *Prain's Coll. 27*, fl. (CAL); Bomlungta, Middle Andaman, *Parkinson 581*, fl. May 1915 (CAL, DD, K); ibidem, *Parkinson 1185*, fl. Apr. 1916 (CAL, K); Porlob Isl. (Middle Andaman), *Kirat Ram 8789*, fl. Feb.—March 1934 (DD).

Nicobar Islands: Little Nicobar, *Kamphövener 2866* (C); Kamorta, *Kurz*, Feb. 1875 (BZ, CAL, K); Ganges Harbour, Great Nicobar, *Rogers*, fl. Apr. 1903 (CAL).

Distribution. Andaman and Nicobar Islands.

Ecology. Very common in the deciduous forests in these islands. Leafless when flowering, about March — May, in the hot season.

Uses. Useful for house-building?

54. Dillenia aurea Sm. 1806

Dillenia aurea **Sm., Exot. Bot. 2, 1806, p. 65, t. 92, 93; DC., Syst. 1, 1818, p. 436; DC., Prod. 1, 1824, p. 76; Buch.-Ham., Trans. Linn. Soc. Lond. 15, 1826, p. 101; Hook.f. & Thoms., Fl. Ind. 1, 1855, p. 70, p.p.; Hook.f. & Thoms., Fl. Br. Ind. 1, 1872, p. 37, p.p.; Brand., For. Fl. NW. & C. Ind., 1874, p. 2; Watt, Dict. Econ. Prod. Ind. 3, 1890, p. 112; Brand., Ind. Forester 26, 1900, p. 431; Gamble, Man. Ind. Timb. 2nd ed., 1902, p. 5; Prain, Beng. Pl., 1903, p. 196; Duthie, Fl. Upp. Gang. Pl., 1903, p. 21; Brand., Ind. Trees, 1906, p. 4, p.p.; Haines, Bot. Bihar & Orissa 2, 1921, p. 7; *Parkinson, Ind. Forester 61, 1935, p. 450, pl. 28 f. 2; Burk., Dict. Econ. Prod. Mal. Pen. 1, 1935, p. 809, p.p..

Dillenia pulcherrima Kurz, J. As. Soc. Beng. 40, II, 1871, p. 46; Kurz, J. As. Soc. Beng. 43, II, 1874, p. 46; Kurz, For. Fl. Br. Burma 1, 1877, p. 19; Watt, Dict. Econ. Prod. Ind. 3, 1890, p. 112; Gamble, Man. Ind. Timb. 2nd ed., 1902, p. 5; Brand., Ind. Trees, 1906, p. 4; Craib, Fl. Siam. En. 1, 1925, p. 24.

Dillenia indica var. aurea (Sm.) O. K., Rev. Gen. Pl. 1, 1891, p. 4, quoad comb..

Type specimens: *Dillenia aurea:* is wholly based on the plate published. — *Dillenia pulcherrima:* Dr Brandis, Burma; not seen by me.

Deciduous trees, up to 14 m high, 120 cm thick, with usually low and crooked, up to $3^1/_2$ m high bole. Bark reddish; heartwood reddish brown or grey. Branches not typically sympodial, younger ones 3—4 mm thick, slightly to densely hirsute, glabrescent. Leaf-scars clasping about $^1/_2$—$^3/_5$ of branch, subfalcate with 11—17 leaf-traces slightly above middle. *Leaves* elliptic-oblong, (15—)20—35(—50) × (7—)10—20(—30) cm, with (20—)25—35(—50) nerves on either side, on young plants and saplings generally longer and relatively narrower; rounded to truncate-emarginate at apex, truncate to (only in young leaves) acute, often asymetric at base, slightly decurrent when base truncate, strongly so when base acute; margin entire to very slightly undulate-dentate, nerves rather straight, ending in apex of teeth or otherwise in margin, often with small tuft of hairs at apex; sparsely hirsute, soon glabrescent above, sparsely hirsute, glabrescent on intervenium, strigose-hirsute on nerves and midrib beneath. Petiole 3—$6^1/_2$ cm, glabrous above, rather densely strigose-hirsute beneath. *Flowers* solitary, rarely 2 together at few mm distance on same branch, terminal, near base of pedicel with number of bracts and usually number of leaves under flower on branch in axil of one of bracts; bracts lanceolate, 15—30 × 6—10 mm, obtuse at apex, attached with broad base, densely sericeously hirsute on both sides; flowering slightly before and with ap-

pearance of leaves. *Flowers* 10—12 cm across. Pedicel ($1^1/_2$—)5—12 cm, 2—4 mm thick, thickened to 4—5 mm at apex, densely hirsute, without or often with 1—2 bracteoles; bracteoles like bracts at base. Sepals 5, oval, 2 outermost ones slightly smaller (ca 25 × 18 mm) than 3 innermost ones (ca 30 × 20 mm), 2 outermost ones shortly hirsute in up to 7 mm broad apical part, further glabrous, 3 innermost ones wholly glabrous inside, hirsute except in bud covered margins which are glabrous for breadth of up to 5 mm outside, densely ciliate at margin. Petals 5, yellow, obovate, $4^1/_2$—$5^1/_2$ × $3^1/_2$—$4^1/_2$ cm, rounded at apex, narrowed towards base. Stamens in 2 distinct groups, those of outer group (ca 150) slightly curved in bud, 10—$11^1/_2$ mm long, those of inner group (ca 50) with apical part reflexed outward in bud, 16—21 mm long, outside outer stamens sometimes some staminodes, 5—10 mm long; filament of stamens of outer group 3—$4^1/_2$ mm long, ca 0.5 mm broad, of those of inner group 9—11 mm long, ca 1.2 mm broad; anther 0.7 mm broad in stamens of outer group, 0.9 mm in those of inner group, sharply emarginate at apex; thecae linear, opening with pore near apex, in stamens of outer group on inner side, in those of inner group on outer side. Carpels 10—12, arranged around rather narrow conical receptacle, lanceolate, ca $8^1/_2$ × 2 mm, glabrous or densely hirsute with ca 1 mm long, rather rigid hairs, each with ca 19—22 ovules; styles spreading, ca 19 mm long, slightly flattened, ca 0.8 mm broad, channelled above. *Pseudocarps* indehiscent, orange-yellow, about globular, 30—35 mm diam. including enclosing sepals which are up to 40 × 30 mm; carpels ca 21 × 8 mm, 1- to few-seeded. Seeds obovoid, ca 4 × 3 mm, glossy dark brown, exarillate.

var. aurea

Dillenia aurea Sm. 1806. — ? *Dillenia pulcherrima* Kurz 1871. — *Dillenia indica var. aurea* (Sm.) O. K. 1891.

Carpels glabrous.

India: NW. India, *Stewart*, fl. 1871 (E). — United Provs: Daibhar, Gorakhpur Distr., *Harsukh 21380*, fl. Apr. 1898 (DD, K); Barhantar Nala, Nepal Frontier Distr., *Inayat 23550*, fr. May 1900 (CAL, DD); Chauk, Gorakhpur Distr., *Shri Ram 10*, fl. & fr. May 1916 (DD); Bhamar, Gonda Divis., *Sus Ram 18*, fl. & fr. May 1916 (DD). — Centr. Provs: S. Mandla Divis., *Nat. Ranger 8275*, fl. May 1914 (DD). — Behar & Orissa: Manbhum, *Campbell*, fl. & fr. May 1886 (CAL); ibidem, *Campbell 8782*, fr. 1886 (DD); Singhbhum, *Haines 21*, fl. Apr. 1903 (BZ, CAL, DD, E, MEL, SING); near Hazaribagh, *Haines 21a*, fl. June 1905 (K); Madalgarh hill, Musnea bungalow, Sonthal Parganas, *Haslett 7/1585*, fr. Apr. 1907 (DD).

Burma: Pegu, Tonkyeghat, *Kurz 40*, fl. (CAL, M); Pegu Yomah, Taung Kao, E. slopes, *Kurz 1807*, fl. & fr. (BZ, CAL, K, M); Pyinmane, *Ny Pya 1*, fl. (K); Shan Hills, Terai, *Collett 593*, fl. (K); Maymyo Hill, Upper Burma, *Badal Khan 53*, fl. June 1888 (CAL); near Shiltaung, *Prazer 388*, fr. Oct. 1890 (CAL); Shan Hills, Upper Burma, *Abdul Huk 86*, fl. 1892 (CAL, DD, P); Myitkyina, Kachin Hills, *Pottinger*, fl. March 1897 (CAL); ibidem, *Shaik Mokim*, fr. 1897 (CAL); ibidem, *Shaik Mokim*, fl. March 1898 (A, BM, BZ, CAL, CGE, FI, G, K, L, M, MEL, P, UPS); Kachin Hills, Metkina, *Shaik Mokim 19*, fr. June 1899 (A, CAL); Kachin Hills, Ciduoch, *Shaik Mokim 104*, fr. June 1899 (CAL); Thaton Distr., W. side Dawna Hills, *Lace*, fl. Feb. 1909 (E); Myitkyina Distr., Koekin Pidaung Plain, *Buchanan 66B*, fl. May 1909 (E); Myitkyina Distr., *Buchanan*, fl. (E); Ani Sakan, near Maymyo Plateau, *Lace 6193*, fr. May 1913 (DD, E, K); near Taukte, Tharawaddy Distr., *Rogers 291*, fl. & fr. Apr. 1914 (CAL, DD, E); Magwe Distr., Natmauk-Kyagan road, *Rogers 963*, fl. March 1915 (CAL, DD); N. Tanggoo Divis., *Rodger 2*, fr. Apr. 1915 (DD); Myinmann, *Basat*, fl. May 1916 (DD); *Burma For. School Ser. 16*, fl. Apr. 1919 (IFI);

idem 35, fl. Apr. 1919 (L); *idem 41*, fl. May 1919 (IFI); Insein, Myaukhlaing Res., *Po Khaut 11*, fr. Feb. 1948 (DD).

var. trichocarpella Hoogl. var. nov.

Type specimen: Lace, Maymyo Plateau, May 1912; holotype in E.
Descriptio typi: Differt a *Dillenia aurea* Sm. *var. aurea* carpellis hirsutis.

Carpels densely hirsute outside, with ca 1 mm long rather rigid hairs.

Burma: Maymyo Plateau, *Lace*, fr. May 1912 (E).

Of the following specimens the variety can not be ascertained as no flowers or fruits are available:

India: Centr. Provs: *Donald* (DD). — Behar & Orissa: Kumandi Res., Palaumau, *Gamble 8785*, Dec. 1880 (K); Singhbhum, *Haines 21*, Dec. 1902 (CAL); near Barwadih, Palamau, *Haines 21a*, Dec. 1906 (K).

Burma: Pegu Yomah, *Kurz 40* (CAL); Myitkyina, Mogaung Range, *Maung Mya 2813*, March 1926 (DD).

Siam: Payap: Meh Trang, *Kerr 1063*, March 1910 (BM, CAL, K, P).

Distribution. India (not in the Deccan Peninsula, Bengal, and Assam), Burma, NE. Siam; *var. trichocarpella* as yet known only from Burma.

Ecology. In the Sal (*Shorea robusta*) forests in the Indian part of the area, in the dry Dipterocarp (In or Indaing) forests of Lower Burma associated with *Dipterocarpus tuberculatus*, *Shorea obtusa*, and *Pentacme suavis* (Parkinson, 1935). Flowering in the dry season, from February to June.

Vernacular names. India (fide Haines, 1921): *Korkotta* (K., S.), *Aghai* (Th.), *Keringila, Karmata* (Gond.), *Rai* (Orissa); (fide Brandis, 1874): *Chamaggai* (Oudh), *Dheugr* (Nepal). Burma: *Byu, Byuben, Linyaw*. Siam: *Ma san juang, Masan hing*.

Notes. 1. *D. indica var. aurea* (Sm.) O. K. is nomenclaturally based on *D. aurea* Sm., though Kuntze when making this new combination had a specimen of *D. ovata* (from cultivation in the Botanic Garden at Bogor).

2. The original description is based wholly on the plate published. The character of the shape of the leaf, which is the most reliable distinctive character for the species against the closely related *D. obovata*, is not well given in the figure. As only the present species occurs where the drawing was made (E of the Gogra Riv., United Provs) Parkinson (1935 l. c.) retained *D. aurea* for the present species; I have followed him as the geographical argument seems reliable. It is assumed that the type had glabrous carpels, as the variety with hirsute carpels is not (yet?) known from India.

55. Dillenia obovata (Bl. 1825) Hoogl. 1951.

Colbertia obovata Bl., Bijdr. 1, 1825, p. 6; Hassk., Pl. Jav. Rar., 1848, p. 175.
Wormia obovata (Bl.) Spreng., Syst. 4, Cur. Post., 1827, p. 213.
Dillenia ornata **Wall., Pl. As. Rar. 1, 1830, p. 21, t. 23; *Parkinson, Ind. Forester 61, 1935, p. 451, pl. 28, f. 1.
Dillenia aurea Auct. non Sm.; Hook.f. & Thoms., Fl. Ind. 1, 1855, p. 70, p.p.; de Vriese, Pl. Ind. Bat. Or., 1856, p. 80; Miq., Fl. Ind. Bat. 1, 2, 1859, p. 12; Miq., Ann. Mus. Bot. Lugd. Bat. 4, 1868, p. 80; Hook.f. & Thoms., Fl. Br. Ind. 1, 1872, p. 37, p.p.; Kurz, J. As. Soc. Beng. 43, II, 1874, p. 46; Kurz, For. Fl. Br. Burma 1, 1877, p. 20; *Pierre, Fl. For. Cochinch. 1, 1879, pl. 11—13; Laness., Pl. Util. Col. Fr., 1886, p. 282; King, J. As. Soc. Beng. 58, II, 1889, p. 367; Koord. & Val., Bijdr.

1. Booms. Java, 1894, p. 165; Fin. & Gagnep., Bull. Soc. Bot. Fr. Mém. 4, 1906, p. 9; Brand., Ind. Trees, 1906, p. 4, p.p.; Fin. & Gagnep., Fl. Gén. Ind.-Ch. 1, 1907, p. 21; Back., Fl. Batavia 1, 1907, p. 385; Back., Schoolfl. Java, 1911, p. 11; Koord., Exk. Fl. Java 2, 1912, p. 601; *Koord. & Val., Atl. Baumarten Java 1, 1913, f. 1; Ridl., Fl. Mal. Pen. 1, 1922, p. 11; Craib, Fl. Siam. En. 1, 1925, p. 21; Burk., Dict. Econ. Prod. Mal. Pen., 1935, p. 809, p.p.; *Corn., Wayside Trees Malaya, 1940, p. 201, pl. 50, 51; Back., Bekn. Fl. Java (cm. ed.) 4, 1942, fam. 80, p. 5; Heyne, Nutt. Pl. Indon., 1950, p. 1071.

Dillenia aurea var. blumei *Pierre, Fl. For. Cochinch. 1, 1879, pl. 12.

Dillenia aurea var. kurzii *Pierre, Fl. For. Cochinch. 1, 1879, pl. 13.

Dillenia aurea var. harmandii *Pierre, Fl. For. Cochinch. 1, 1879, pl. 11.

Dillenia harmandii Gagnep., Not. Syst. 6, 1937, p. 39; *Gagnep., Suppl. Fl. Gén. Ind.-Ch. 1, 1938, p. 22, f. 4.

Dillenia obovata (Bl.) *Hoogl., Fl. Mal. I, 4, 1951, p. 173, f. 13.

Type specimens: *Colbertia obovata:* Blume 1519, Java; lectoholotype in L. — *Dillenia ornata:* Wallich 947, Amherst, Martabania; lectoholotype in K. — *Dillenia aurea var. blumei:* Pierre 771, Mnt Knang Repocu, Tpong Prov., Cambodia, May 1870; lectoholotype in P, isotypes in BZ, K. — *Dillenia aurea var. kurzii:* Pierre 770, Knang Repoeu Mnts, Cambodia, June 1870; lectoholotype in P, isotype in K. — *Dillenia aurea var. harmandii & Dillenia harmandii:* Harmand 1321, Bassin d'Attopeu, Laos, Indo-China, 1875—7; holotype in P.

Deciduous trees, up to 35 m high, 70 cm thick, with up to 14 m, usually much shorter, often rather crooked bole, without or with small buttresses, with more or less deep longitudinal grooves in basal part; crown very dense, irregular or ovate. Bark yellowish to reddish grey, up to 15 mm thick, rather smooth, flaky; sapwood light yellow, heartwood light red or red. Branches not typically sympodial, younger ones glabrous, smooth, 3—8 mm thick, older ones with fine longitudinal fissures. Leaf-scars clasping about $^1/_2$—$^3/_5$ of branch, subfalcate with 11—21 leaf-traces about or slightly above middle. *Leaves* obovate, (16—)20—40(—60) × (10—)12—20(—26) cm, with (22—)30—45(—60) nerves on either side, on saplings and young trees narrowly obovate, 14—45 × 7—18 cm, 35—50-nerved; rounded, on saplings and young plants acute, at apex, acute at base, long-decurrent; margin slightly dentate to nearly entire, more conspicuously dentate on saplings and young trees, nerves rather straight, ending in apex of teeth, often with small tuft of hairs, often secondary nerve directed downward near margin, ending in apex of smaller teeth; dark green, in young leaves often more or less purplish, hirsute when young, later on glabrescent and then only hirsute on midrib above, dull with waxy coating, slightly hirsute on intervenium, strigose-hirsute on nerves beneath, rarely rather densely shortly villose on both sides. Petiole 1.3—4 cm, glabrous above, strigose-hirsute beneath, margin in basal part ciliate. *Flowers* solitary, rarely 2 or 3 together at apex of short side-branches, near base of pedicel with number of bracts; bracts lanceolate, 20—40 × 6—8 mm, attached with broad base, acute at apex, sericeously hirsute beneath and in apical part above, glabrous in basal part above; rarely leaf-bud in axil of one of bracts; flowering slightly before and with appearance of leaves. *Flowers* ca 14—16 cm across. Pedicel (15—)25—40(—50) mm, 4—6 mm thick, thickened to 7—9 mm at apex, more or less purplishly tinged, slightly hirsute, without or with whorl of 3 bracteoles at about $^2/_3$ of its height; bracteoles like bracts at base of pedicel. Sepals 5, oval, ca 30—38 × 20—30 mm, 2 outermost ones rather densely hirsute in apical part, up to 10 mm broad in centre, further glabrous, 3 innermost

ones wholly glabrous inside, slightly strigose-hirsute outside, densely ciliate at margin. Petals 5, bright yellow, obovate, ca 65—80 × 45—55 mm, rounded at apex, narrowed towards base. Stamens in 2 distinct groups, those of outer group (ca 200—240) yellow, slightly curved in bud, 12—13 mm long, those of inner group (ca 38—56) yellowish white, with apical part reflexed outward in bud, 22—24 mm long; outside outer stamens often some (up to 7) staminodes; filament of stamens of outer group $3^1/_2$—$5^1/_2$ mm long, 0.5—0.8 mm broad, of those of inner group 10—11 mm long, ca 1.5 mm broad; anther ca 1.2 mm broad in stamens of outer group, 1.5 mm in those of inner group, sharply emarginate at apex; thecae linear, opening with pore near apex, in stamens of outer group on inner side, in those of inner group on outer side. Carpels (6?—)9—11(—14)(—18?), arranged around conical receptacle, lanceolate, ca 13 × 2 mm, glabrous, each with ca 25—35 ovules; styles recurved, ca 20 mm long, flattened, up to 1.5 mm broad, 1 mm thick, channelled above. *Pseudocarps* indehiscent, yellow or orange, about globular, 35—40 mm diam. including enclosing sepals which are up to ca 50 × 40 mm, up to 6 mm thick at base; carpels ca 25 × 10 mm, 1- to few-seeded. Seeds reddish, brownish, or black, obovoid, ca 5 × $3^1/_2$ mm, glossy, exarillate, embedded in transparent slime.

Burma: Moulmein, *Wallich 947*, fl. Jan. 1827 (K); Amherst, *Wallich 1612*, fl. Feb. 1827 (CAL); Ataran, *Wallich 947*, fl. March 1827 (CAL, K); Amherst, *Wallich 947*, fl. 1827 (K); Moulmein, *Griffith 42*, fl. 1834 (CGE); Amherst, *Falconer*, Apr. 1849 (BZ, GH, K, M, MEL, P); Youngeleen, *Brandis 1214*, March 1862 (MEL); Amherst, *Pierre 3300*, fl. & fr. 1863—4 (P); Pegu, Plumadoe, Myitgnan Vall., *Kurz 40/b*, fl. (CAL); Pegu, Karenholes, *Kurz 1808*, Apr. 1871 (CAL); Moulmein, *Kurz*, fl. (CAL); Tenasserim, *Packman*, fl. (BM); Bithokho Range, Martaban Hills, *Brandis*, fl. March 1880 (CAL); Tavoy Distr., *Mokim 567*, fl. Apr. 1901 (CAL); W. side Dawna Hills, Thaton Distr., *Lace*, fl. Feb. 1909 (E); Kyauktalon, Tenasserim, *Meebold 14610*, fl. March 1911 (CAL); Pagaye, Tenasserim, *Meebold 15199*, fr. Apr. 1911 (CAL, S); Kaleinaung Res., Tavoy Distr., *Sein Gyi 957*, fr. March 1925 (CAL); ibidem, *Sein Gyi 958*, fl. March 1925 (CAL); Chaungnaukpyan, S. Tenasserim, *Parkinson 1604*, fl. Jan. 1926 (K); Maliwun, Victoria Point, S. Tenasserim, *Parkinson 2040*, fl. March 1926 (DD, K); *Parker 2668*, fl. Feb. 1927 (DD, UC).

Siam: Rachasima: Korat, *Witt*, fl. June 1903 (K). — Chantaburi: Klawny Magom, Kaw Chang, *Kerr 6929*, fr. Apr. 1923 (BM, K). — Rachaburi: Wangka, Kanburi, *Kerr 10499*, fl. Feb. 1926 (BM); Tripagodas, *Kostermans 374*, fr. May 1946 (L, SING). — Surat, Tapli, *Kloss 6731*, fl. (K); Huai Sai, Bandon, *Punyabukkana 861*, fl. March 1920 (CAL); Map Amarit, Chumpawn, *Kerr 11440*, fl. Jan. 1927 (BM). — Puket: Jongkah, *Curtis 2924*, fl. July 1893 (CAL, K, SING); Setul, *Ridley*, fl. March 1910 (SING); Kuan Po, Satul, *Kerr 13811*, fl. Jan. 1928 (BM); Adang, Sulut, *Kerr 14020*, fl. Jan. 1928 (BM); Nok Nang, Ranawng, *Kerr 16329*, fl. Jan. 1929 (BM); Tap-put, Pang-nga, *Kerr 19352*, fl. March 1930 (BM). — Nakawn Sritamarat: foot of Kao Keo hill, *E. G. Smith 479*, fl. (BM); Padang Besar, *Kerr 13625*, fl. Dec. 1927 (BM); Saba Zoi, Songkla, *Kerr 14798*, fl. March 1928 (BM). — Pattani: Jalor, *Gwyne-Vaughan 456*, fl. May 1899 (CAL, K, L, P); Ban Pari, Toh Mih, *Lakshnakara 650*, fl. Apr. 1931 (BM).

Indo-China: Laos: Plateau d'Attopeu, *Harmand 1321 (= Pierre 2043)*, fl. March 1877 (P). — Cambodia: Knang Repoeu Mts, Tpong Prov., *Pierre 771*, fr. May 1870 (BZ, K, P); ibidem, *Pierre 770*, May 1870 (NY); foot of Pangebakh Mtn, *Pierre 769*, May 1870 (P); Aral & Ranconvu Mts, Samrongtong Prov., *Pierre 589*, fr. (K, P); Knang Repoeu Mts, Tpong Prov., *Pierre 770*, fr. June 1870 (K, P; hirsute form); ibidem, *Pierre 3257*, fl. June 1870 (P); ibidem, *Pierre 768*, fl. & fr. June 1870 (A, K, P; hirsute form); Phu Quoc, *Pierre*, Jan. 1877 (K); *Hahn* (P). — Cochinchina: *Gaudichaud*, 1839 (FI).

Sumatra: Palembang: Musi-Ulu, *Endert 13*, fl. Sept. 1917 (BZ); Lematang Ilir, near G. Megang, *NIFS T 8 P 830*, fr. Nov. 1922 & fl. Oct. 1923 (BZ); Lematang

Ilir, near Darmo, *NIFS bb 8333*, Apr. 1925 (BZ); Martapura, *Bol 4*, Feb. 1930 (BZ). — Lamp. Distr.: Telok Betong, Bukit Rangal, *Elbert*, fr. 1908 (L); Telok Betong, near Merah Batin, *NIFS bb 5922*, fl. & fr. Nov. 1923 (BZ, L); Telok Betong, Hadjimenah, *NIFS bb 7717*, Jan. 1925 (BZ, L); Tulang Bawang Ilir, near Manggala, *NIFS bb 8472*, July 1925 (BZ).

Malay Peninsula: Kedah: Bukit Pinang, Alor Sta, *Ridley 15182*, fl. July 1900 (BM, K, SING; all with leaves of *D. ovata* added); road from Kodiang to the Singgora road, *Corner*, July 1936 (SING). — Prov. Wellesley: Bukit Mertajam, *Ridley*, fl. June 1900 (SING); Tassih Glugor, *Curtis*, fl. Apr. 1902 (SING). — Kelantan: Kg Muhang near Kota Bahru, *Corner SF 33445*, fl. Apr. 1934 (SING); Kota Bahru, *Corner SF 33450*, fr. Apr. 1937 (SING). — Trengganu: Sungai Besut, *Corner SF 33500* (SING). — Pahang: Kuala Lipis, *Corner SF 33531*, fl. & fr. May 1937 (SING). — Langkawi Isls: Rawei Isl., *Ridley 15758*, fl. Apr. 1901 (BM, K, SING); Gunung Raya, Langkawi, *Corner*, Nov. 1941 (SING).

Java: fl. or veg. (BZ, K, L, MEL, P, S, U); *Blume* (L, U); *Blume 1519*, fl. (L); *Junghuhn*, fl. (BZ, L); *Lahaye*, fr. (G, P); *Schl.*, fr. (P); *de Vriese*, fl. (L). — W. Java: Gunung Tjisalak, *118* (L); near Tjikoja, *Zollinger 195*, fl. June 1842 (FI, G, K, L, P); Salak?, *Ploem*, fl. (BZ); Koeningan, Cheribon, *Houter 158*, March 1873 (BZ); Palabuan Ratu, *Boerlage*, fl. & fr. (L); Kampbaru, Kedunghalang, *Boerlage 158*, fr. Oct. 1888 (L); Palabuanratu, *Koorders 1631β*, May 1890 (BZ); ibidem, *Koorders 1623β*, May 1890 (BZ, K, L); ibidem, *Koorders*, fr. May 1890 (BZ); ibidem, *Koorders 1634β*. fl. & fr. June 1890 (A, BZ, K, L); ibidem, *Koorders 33102β*, March 1891 (BZ); ibidem, *Koorders 11735β*, fr. Aug. 1891 (BZ, P); Tjimara Udjongkulon, *Koorders 1624β*, June 1892 (BZ); Palabuanratu, *Koorders 14043β*, fl. & fr. Sept. 1894 (BZ, P); near Tjampea, *Koorders 30593β*, Aug. 1898 (BZ); near Depok, *Koorders 30956* , fr. Aug. 1898 (BZ); Kebajoran, along the pasangrahan, *Backer 32593*, March 1907 (BZ, K, L, SING); between Rangkas Bitung & Tjileles, Bantam, *Backer 1104*, fr. June 1911 (BZ); between Tjileles & Gunung Kentjana, *Backer 1197*, June 1911 (BZ); Pasir Ajunan near Sadjira, *Backer 1954*, fl. & fr. June 1911 (BZ); Gunungkantjana, Lebakkidul, Bantam, *Koorders 41138β*, fl. & fr. June 1912 (BZ, L); Depok, *Koorders 42226β*, Sept. 1913 (BZ); S of Djasinga, *Backer 10071*, fl. Nov. 1913 (BZ); N of Wanajasa, *Backer 14419*, June 1914 (BZ); between Tjibadak & Bodjong Lapang, Preanger, *Backer 16897*, fl. Nov. 1914 (BZ); Tjitjurug, Djampang Kulon, *Backer 17249*, fl. & fr. Nov. 1914 (BZ); Tjiratjap, Djampang Kulon, *Backer 17464*, fl. Nov. 1914 (BZ); Baleh Kambang, Preanger, *Backer 25613*, fr. Aug. 1918 (BZ); Wanajasa (SE of Purwakarta), *Bakhuizen v. d. Brink 4811*, fl. July 1920 (BZ); Tji Lodong E of Depok, *Backer 35170*, May 1922 (BZ); Depok, Tree no 6, fr. Nov. 1924 (WAG); Djampangkulon, near Tjilrangkung, Tjitjaringao, *NIFS Ja 1253*, May 1926 (BZ); Pasir Honje S of Leuwiliang, *Bakhuizen v. d. Brink 7378*, fl. Oct. 1928 (BZ); Tjisolok, Preanger, *Bruggeman & Hagen 987*, fl. Nov. 1931 (BZ); Gunung Ascupan, *van Steenis 8248*, fl. & fr. Sept. 1936 (BZ); Pandeglang near Singiang, *NIFS Ja 3962*, Apr. 1937 (BZ, L); W. Preanger, S. Coast near Tjikepuh, *Franck 133*, Apr. 1938 (BZ); between Tipar & G. Tjikepuh, *van Steenis 11460*, fl. July 1939 (BZ). — C. Java: Darma Temulus, Tegal, *Koorders 1612β*, Sept. 1891 (BZ); Margasari, Brebes, Tegal, *Koorders 1614β*, Sept. 1891 (BZ, K, L); Banjumas, Madjenang, *Backer 18820*, Jan. 1915 (BZ); Prupuk, Pekalongan, *Noltée 4038*, fl. & fr. Oct. 1919 (BZ, WAG); ibidem, *Boots 4038*, fr. Nov. 1922 (BZ); ibidem, *de Boer 4038b*, fr. Jan. 1924 (BZ). — Nusa Kambangan: *Koorders 1615 1616α, 1618β, 1619α*, Dec. 1891 (BZ); *Koorders 1617β*, Dec. 1891 (BZ, L); *Koorders 20251β*, fl. Nov. 1895 (BZ, L); *Koorders 24671β*, Sept. 1896 (BZ).

Borneo: *Korthals*, fl. (L, U).

Cultivated: Bot. Gard. Bogor: fl. or veg. (BZ, L, U); *Teysmann*, fl. (K); no IV-G-17, fr. (BZ, US); no IV-G-17a, fl. & fr. Nov. 1889 (BZ, CAL, K, L); no VII-B-51, *Boerlage* (BZ).

Without data: material in BZ, S.

Distribution. Lower Burma, Siam, Indo-China, northern part of the Malay Peninsula, S. Sumatra, and W. Java (E to Tegal and Nusa Kambangan); the Borneo record (*Korthals*) is not reliable.

Ecology. Mainly in belukar and secondary forest at low altitudes; in Siam and Burma also in dry deciduous forests up to ca 1300 m, in Indo-China up to 1800 m altitude. Flowering when leafless, in the

northern part of its area (Burma, Siam, Indo-China, Malay Peninsula) from January to July, in the southern part (Sumatra and Java) from July to December.

Vernacular names. Burma: *Zinbyun* (Burmese), *Mai-san* (Shan). Siam: *Mai Sarn, San, San yai, San tong* (Peninsular Siam), *Kwawng padu* (Wangka). Indo-China: *Cay so ma.* Sumatra: *Simpur bener, S. rimba, S. talang.* Malay Peninsula: *Simpoh.* Java: *Sempu* (Javanese); *Sempur, S. batu* (Sundanese).

Uses. The fruit is eaten in curries. The wood is sometimes used in house-building.

Notes. 1. *Dillenia harmandii* Gagnep. is based on 2 specimens, the one being the lectotype (flowering material), the other a leaf-specimen representing *D. pentagyna.* The number of carpels of the type, said by Pierre to be 15—18, is in the flowers of the type collection I examined 10—14 and falls definitely within the variability of the species, though it is rather large.

2. The species is certainly closely related to the preceding one; the differences have been worked out by Parkinson (1935). Though the differences between the 2 species are found principally in the full-grown leaves, I have retained them as distinct species as the leaf-shape is very characteristic; additional differences in the flower are not of absolute value.

3. *D. aurea var. blumei* Pierre and *var. kurzii* Pierre were intended to reduce *Colbertia obovata* Bl. and *D. pulcherrima* Kurz as varieties to *D. aurea.* Besides Pierre cited some actual specimens. From the latter I have chosen the specimens to be considered as the type for these varieties, thus reducing both to *D. obovata*; if *D. pulcherrima* is considered to typify *D. aurea var. kurzii,* this variety must be reduced to *D. aurea.*

DOUBTFUL SPECIES

Dillenia repanda Roxb., Fl. Ind. ed. Carey 2, 1832, p. 652.

This species, described from the Deccan Peninsula (Hindoostan) is imperfectly known as no type specimen seems to exist and the description is insufficient. From the species known from the Deccan Peninsula it comes nearest to *D. bracteata,* and it may be identic with it (cf. p. 85).

Dillenia grandifolia Wall. ex Hook.f. & Thoms. 1855.

Dillenia grandifolia Wall., Cat., 1828, no 946, nomen nudum; Hook.f. & Thoms., Fl. Ind. 1, 1855, p. 71; Miq., Fl. Ind. Bat. 1, 2, 1859, p. 12; Hook.f. & Thoms., Fl. Br. Ind. 1, 1872, p. 38; King, J. As. Soc. Beng. 58, II, 1889, p. 368; Ridl., J. Str. Br. R. A. S. 59, 1911, p. 61; Ridl., Fl. Mal. Pen. 1, 1922, p. 11; Craib, Fl. Siam. En. 1, 1925, p. 22; Corn., Wayside Trees Malaya, 1940, p. 203.

Type specimen: Wallich 946, Convalescent Hill, Penang, August 1822; holotype in K, isotypes in CAL, CGE, P.

The species is based on leaves only, which were taken from a sapling or young tree and may belong either to *D. ovata* or to *D. reticulata.* In the latter case this species will have to be renamed *D. grandifolia* Wall. ex Hook.f. & Thoms.. A similar specimen is *Griffith 52* from Malacca (K). The identity of the species can only be ascertained by comparison with specimens of which the identity by means of additional characters (flowers,

normal leaves) is certain. Most of the later literature refers to specimens of *D. reticulata*.

Dillenia rhizophora Boerl. & Koord. in Koord.-Schum., Syst. Verz. 2, 1911, p. 36.

Type specimen: Koorders 10289β, Middle Sumatra, Banks of the Sigati Riv., 12 March 1891; holotype in BZ.

This species is based on some leaves only, belonging either to *D. eximia* or to *D. reticulata*; cf. p. 80.

The following specimens are insufficient for identification, but may represent new species:

1. *Haenke, Reliquiae Haenkeanae N 128*, Taragalac, Luzon, 1792 (UC). Leaves narrowly obovate, 8—16 × 3.2—6 cm, 8—11-nerved, obtuse at apex, acute at base, distinctly dentate at margin, glabrous. Petiole 2—3 cm, with amplexicaul wings; wings narrowly lanceolate, up to 3 mm broad.

2. *M. Oro FB 22873*, Samar, fr. Aug. 1914 (UC, US). Leaves oblong, ca 12 × 6 cm, 10—14-nerved; acute at apex and base; slightly undulate at margin, nerves curving upward, ending in margin; glabrous. Petiole 2—3 cm, with amplexicaul wings; wings caducous, not present in the specimens. Fruit in the UC specimen solitary on 25 mm long pedicel; sepals ca 25 × 15 mm, sparsely hirsute outside; petals and stamens unknown; carpels 5—7, ca 20 mm long, 16 mm broad, with ca 10—12 (?) ovules, with basal aril; seeds unknown. In the US specimen 2-flowered inflorescence with very short axis. The US specimen bears the name *Dillenia samarensis* n. sp., without author.

3. *M. Ramos BS 24195*, Catubig Riv., Samar, Feb.—March 1916 (US). Leaves oblong, 12—23 × 3.5—8 cm, acute at apex, distinctly dentate at margin, nerves on young leaf very sparsely hirsute beneath, on full-grown leaf glabrous; nerves curving upward, ending in apex of teeth. Petiole 2—3.5 cm, with amplexicaul wings; wings caducous, narrowly lanceolate. Probably leaves from a sapling of the same species as no 2.

4. *Sir W. McGregor*, Lowlands of British New Guinea, fr. 1890 (MEL). The specimen consists of an incomplete leaf (petiole partly absent, probably with caducous, amplexicaul wings), an older branch (without leaf-scars, with bark peeling off in papery flakes), and 2 immature fruits. The young fruits are like those of *D. papuana*, but differ from that species by the dense shortly sericeous indument on the outer side of the sepals. The number of carpels is 10, the stamens are probably all of about the same length. The specimen may represent a new species or be only a variety of *D. papuana*, or it may by identic with *D. pteropoda*, until now known only from the Philippines and the Moluccas. The material is definitely insufficient for identification.

EXCLUDED SPECIES

Dillenia scandens Willd., Sp. Pl. 2, 1799, p. 1251; = *Hibbertia scandens* (Willd.) Dryand. in Kon. & Sims, Ann. Bot. 2, 1807, p. 525, basonym; cultivated and Australia.

Dillenia integra Auct. non Thunb.; Moench, Meth. Suppl., 1802, p. 76; = *Hibbertia scandens* (Willd.) Dryand.; cultivated.

Dillenia volubilis (Andr.) *Vent., Choix d. Pl., 1803, p. 11 (*Hibbertia volubilis* **Andr., Bot. Repos. 2, 1800, t. 126); = *Hibbertia scandens* (Willd.) Dryand.; cultivated.

Dillenia turneraeflora Ker-Gawl., Recens. Pl. Bot. Repos., 1801, p. 27 (based on *Hibbertia volubilis* **Andr., Bot. Repos. 2, 1800, t. 126); = *Hibbertia scandens* (Willd.) Dryand.; cultivated.

Dillenia procumbens *Labill., Nov. Holl. Pl. 2, 1806, p. 16, t. 156; = *Hibbertia procumbens* (Labill.) DC., Syst. 1, 1818, p. 427; Australia.

Dillenia grossulariaefolia (Salisb.) Poir., Encycl. Suppl. 5, 1817, p. 146; = *Hibbertia grossulariaefolia* **Salisb., Parad. Lond. 2, 1807, t. 73; cultivated.

Dillenia speciosa Auct. non Thunb.; **Bot. Mag. 13, 1799, t. 499; *Mag. Bot. & Gard. 4, 1836, t. 56; = *Hibbertia scandens* (Willd.) Dryand.; cultivated.

Dillenia andreana F. v. M., Fragm. 5, 1866, p. 175; = *Saurauia andreana* (F. v. M.) Oliver ex F. v. M., Census Suppl. 2, 1885, p. 3; F. M. Bail., Queensl. Fl. 1, 1899, p. 106; Australia.

INVALIDLY PUBLISHED NAMES

The following names, most of which are included in the Index Kewensis, are not validly published according to the International Rules of Botanical Nomenclature; some other names have been cited already in the synonymy.

Dillenia humilis Donn, Cat. Hort. Cant. ed. 1, 1796, p. 64, nomen nudum.

Dillenia tetragyna Lag. ex DC., Syst. 1, 1818, p. 429, in syn. sub *Hibbertia diffusa* R. Br. ex DC..

Clugnia Comm. ex DC., Syst. 1, 1818, p. 433, in syn. sub *Wormia madagascariensis* (Poir.) DC..

Clugnia volupis Comm. ex DC., Syst. 1, 1818, p. 433, in syn. sub *Wormia madagascariensis* (Poir.) DC..

Clugnia volubilis Comm. ex Steud., Nom. ed. 1, 1821, p. 208, sphalm. for the preceding.

Dillenia radicans Hort. ex Link, Enum. Hort. Berol. 2, 1822, p. 86, nomen nudum.

Dillenia macrophylla Reinw. ex Blume, Cat. Gew. Btzg, 1823, p. 78, nomen nudum. In the Leyden herbarium a specimen is present under this name, consisting only of a number of petals, probably belonging to *D. indica*.

Dillenia aquatica Moon, Cat. Ind. Exot. Pl. Ceylon, 1824, p. 42, nomen nudum; = *D. indica*.

Dillenia racemosa Buch.-Ham. ex D. Don, Prod. Fl. Nep., 1825, p. 225, in syn. sub *Ternstroemia racemosa* D. Don.

Dillenia macrocarpa Ruiz ex Vesque in DC., Monog. Phan. 8, 1893, p. 62, in syn. sub *Clusia pavoni* Planch. & Triana.

Dillenia magnicapsula Pav. ex Vesque in DC., Monog. Phan. 8, 1893, p. 62, in syn. sub *Clusa pavoni* Planch. & Triana.

Dillenia rubescens Ruiz ex Vesque in DC., Monog. Phan. 8, 1893, p. 63, in syn. sub *Clusia elliptica* H. B. K..

Dillenia thurifera Pav. ex Vesque in DC., Monog. Phan. 8, 1893, p. 59, in syn. sub *Clusia thurifera* Planch. & Triana.

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The number in *italics* refers to the number of the species in the present revision (cf. list on p. 8—10); varieties and other infraspecific groups are indicated with *a, b,* etc. as follows: *8a: D. ovalifolia var. ovalifolia, 8b: var. sericea; 27a: D. philippinensis var. philippinensis, 27b: var. pubifolia; 33a: D. reticulata var. reticulata, 33b: var. psilocarpella, 33c: D. reticulata* or *D. eximia; 38a: D. excelsa var. excelsa, 38b: var. pubescens, 38c: var. tomentella, 38d: var. excelsa* or *var. pubescens; 52a: D. parviflora var. parviflora, 52b: var. kerrii, 52c: var. parviflora* or *var. kerrii; 54a: D. aurea var. aurea, 54b: var. trichocarpella, 54c: var. aurea* or *var. trichocarpella.*

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