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DELIMITATION AND SUBDIVISION OF THE CRYPTERONIACEAE (MYRTALES)

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CONTENTS

SUMMARY

A new delimitation and subdivision of the *Crypteroniaceae (Myrtales)* is given; no less than five genera, *Crypteronia, Dactylocladus, Axinandra* (all SE. Asia), *Alzatea* (S. America), and *Rhynchocalyx* (S. Africa) are included. Traditionally the *Crypteroniaceae* were considered to be a monotypic family.

The family is subdivided into two subfamilies, *Crypteronioideae* and *Alzateoideae*, the subfamilies each into two tribes, and some of the genera into sections. Of these taxa descriptions, synonymy, references, and notes on distribution and ecology are given, as well as a key for their identification. Of the species recognized only names, typification, synonyms, and distribution are briefly mentioned. In *Crypteronia* one new species, *C. macrophylla*, is described.

Argumentation for the present taxonomical treatment is given in a separate article in the next issue (Van Beusekom, 1975).

INTRODUCTION

In 1967 the first author started a revision of the Myrtalean family *Crypteroniaceae*, intended to be published in Flora Malesiana. Part of the work was meant to answer the question whether the *Crypteroniaceae* had to be maintained as a separate family, and if so, to present a good delimitation against related families.

For a well-founded decision on these general aspects a rather wide knowledge about the morphology of other Myrtalean families appeared to be indispensable, but this could not be acquired within the scope of work intended initially. Therefore, this part of the work was taken up later, by the second author. In a separate article in the next issue (Van Beusekom, 1975) morphology, relationships, distribution, and history of the systematical position of the Crypteroniaceous genera are discussed and compared to other *Myrtales*, amongst others resulting in an argumentation for the taxonomical treatment as given in the present paper. Up to now the family was usually regarded to be either monotypic, or to consist of only two genera. In the course of the revision it appeared that the family had to be enlarged with three other Myrtalean genera of somewhat dubious position, so that the family in its new composition includes no less than five genera, viz. *Crypteronia*, *Dactylocladus*, *Axinandra*, *Alzatea*, and *Rhynchocalyx*.

A subdivision in two subfamilies and some tribes and sections is introduced, partly on the base of already existing taxa. This elaborate subdivision was chosen on the base of remarkable discontinuity on different taxonomical levels in the family (Van Beusekom, 1975). Descriptions of family and genera are given, as well as full references and a key to the subfamilies, tribes, genera, and sections.

A revision of the species has not been included, since this will be published in Flora Malesiana by the first author. However, in the present precursory paper types and synonyms of the species recognized are given, and one new species of *Crypteronia* is described.

Not all collections examined will be cited in this paper; a full list will be issued in the Flora Malesiana Identification List series. Citation of collections is restricted here to the non-Asian taxa.

The bulk of the material present in herbaria has been examined. Apart from the collections of the Rijksherbarium at Leiden, material has been borrowed from or examined in the following institutions: Royal Forest Herbarium, Bangkok; British Museum (Nat. Hist.) Botany Department, London; Herbarium Bogoriense, Bogor; Instituto Botanico, Firenze; Royal Botanic Gardens, Kew; Forestry Institute, Kepong, Malaysia; Laboratoire de Phanérogamie, Paris; Botanic Gardens, Singapore; Botanisch Museum en Herbarium, Utrecht. The authors gratefully acknowledge the generous cooperation of the directors of these institutions.

CRYPTERONIACEAE

Crypteroniaceae DC., Prodr. 16, 2 (1868) 677, *nom fam.. cons.*; Koehne, Verh. Bot. Ver. Brandenburg 22 (1881) 67; Hutch., Fam. Fl. Pl. 1 (1926) 145; Back. & Bakh. *f.*, Fl. Java 1 (1963) 257; Willis, Dict. (ed. Shaw) (1966) 303; Hutch., Gen. Fl. Pl. 2 (1967) 33; Fam. Fl. Pl. ed. 3 (1973) 208. — Type genus: *Crypteronia* Bl.

Hensloviaceae Lindl., Bot. Reg. 20 (1834) fol. 1686, *in obs.*; Nat. Syst. Bot. ed. 2 (1836) 173; Veg. Kingd. (1846) 570; Mart., Consp. (1835) 14 (*'Henslowiaceae'*); Endl., Gen. Pl. (1837) 291; Meisn., Pl. Vasc. Gen. Comm. (1838) 84; Griff., Not. Pl. As. 4 (1854) 404; Miq., Fl. Ind. Bat. 1, 1 (1856) 715. — Type genus: *Henslowia* Wall. (Lindl. l.c.: *'Henslovia'*).

Evergreen trees. Twigs terete to quadrangular, the younger ones mostly with four narrow ribs or wings, with thickened nodes, petiole-bases mostly connected by a faint line. *Leaves* with minute or rudimentary stipules, opposite, simple, entire, penninerved, shortly petioled, with arched or almost straight nerves mostly anastomosing in a marginal vein. *Inflorescence* terminal or axillary, sometimes below the leaves, paniculate, copiously branched to extremely depauperate, branched up to the third order, with decussate side-axes which are sometimes arranged (sub)verticillately or subumbellately by contraction, either ending in profuse to very poor racemules, or in cymoid florescences. Bracts mostly

small to minute, sometimes with rudimentary stipules. *Flowers* (very) small, shortly pedicelled, bisexual, sometimes by reduction unisexual and then trees dioecious, actinomorphous, peri- to epigynous, (4)5(6)-isomerous, sometimes with twice the number of stamens; receptacle widely campanulate. *Sepals* valvate, triangular to deltoid, mostly persistent. *Petals* more or less rudimentary, sometimes absent, alternisepalous, inserted on the margin of the receptacle, inflexed and enveloping the stamens, valvate, rarely imbricate, sometimes cohering, soon caducous. *Stamens* if isomerous epipetalous, (alternisepalous), inserted on the margin of the receptacle, inflexed in bud, persistent or caducous; filaments sometimes very short; connective wide, with or without a tendency to conduplication, or completely conduplicate, sometimes with a dorsal tubercle or a large outgrowth; anthers adnate, marginal or submarginal, linear to semiorbicular, lengthwise dehiscent, introrse to latrorse. *Ovary* superior or inferior, 2—4(—5)-carpellate, 1—6-locular, septs not, or rarely partly, connate; style terminal, rather long to short, ± terete, mostly persistent; stigma capitate or punctate. Ovules situated in horizontal or vertical position, 1, 2, 3, or many per locule, anatropous; placentation parietal, septal, or basal. *Fruit* superior or 1/2- or 3/4-inferior, a chartaceous or woody capsule, subglobose to ellipsoid, small to big, loculicidally dehiscent with 2—6 valves, on the top often with the persistent style and stigma. *Seeds* few or many, flat, usually small, depressed-ellipsoid, situated basally, apically, centrally, or laterally in its membraneous wing in which the raphe is running freely; endosperm none; embryo straight.

Distribution. Pantropical. Five genera, with 11 species; 3 genera (1 monotypic) in tropical SE. Asia, including Ceylon, 1 monotypic genus in tropical S. America (Peru and Bolivia), and 1 monotypic genus in tropical S. Africa (Natal).

KEY TO SUBFAMILIES, TRIBES, GENERA, AND SECTIONS

1. Flowers in profuse to poor racemules. Ovary superior or inferior, 2—6-locular. Ovules inserted either basally and in vertical position, or septally and in horizontal position . . . . . subfam. **I. Crypteronioideae**
   2. Flower-bracts solitary. Stamens as many as sepals. Connective not or only slightly conduplicate. Fruit small, chartaceous. Seed situated (latero-)centrally in its wing trib. **A. Crypteronieae**
      3. Petals absent. Ovary superior, with many ovules per locule. Fruit with many seeds per locule . . . . . **1. Crypteronia**
         4. Ovary 2(or 3)-locular. Ovules septal, placed horizontally. Dioecious trees; flowers by reduction unisexual, rarely bisexual . . . sect. **a. Crypteronia**
         4. Ovary 3- or 4-locular. Ovules basal, placed vertically. Monoecious trees; flowers bisexual . . . . . sect. **b. Basispermia**
      3. Petals present, soon caducous. Ovary at least half-inferior, the lower part immersed in the receptacle, with 3 ovules per locule. Fruit with 3 or less seeds per locule . . . . . **2. Dactylocladus**
   2. Flower-bracts 3 per flower, the two outer ones often minute. Stamens twice as many as sepals. Connective completely conduplicate. Fruit big, woody. Seed situated basally in its wing . . . . . trib. **B. Axinandreae — 3. Axinandra**
      5. Connective quadrate-elliptic; filaments *c.* 0.5 mm. Style *c.* 0.5 mm. Ovules 1 per locule . . . . . sect. **a. Axinandra**
      5. Connective pear-shaped; filaments 1.5—2 mm. Style 2—5 mm. Ovules 2 per locule . . . . . sect. **b. Naxiandra**

1. Flowers not in racemules, mostly in poor, irregular whorls or umbellules*. Ovary superior, 1-locular. Ovules inserted parietally, in horizontal position
subfam. **II. Alzateoideae**
6. Connective completely conduplicate, with big dorsal outgrowth. Seeds in 4 vertical rows; seed situated centrally in its wing . . . . trib. **C. Alzateeae — 4. Alzatea**
6. Connective not conduplicate, without outgrowth. Seeds in 2 vertical rows; seed situated apically in its wing . . trib. **D. Rhynchocalyceae — 5. Rhynchocalyx**

SUBFAM. I. CRYPTERONIOIDEAE

Blattiaceae subfam. *Crypteronioideae* Niedenzu, Bot. Jahrb. 15 (1892) 167; in E. & P., Nat. Pfl. Fam. 3, 7 (1892) 21.

Flowers bisexual or by reduction unisexual, in profuse to poor racemules. Ovary superior or inferior, 2—4(—5)-carpellate, 2—6-locular; septs often touching in the centre but not, or rarely partly, connate. Ovules many or few, usually basal and in vertical position, sometimes on the septs and in horizontal position. Fruit a chartaceous or woody capsule, with as many locules as the ovary, each containing many or few seeds, usually in vertical, sometimes in horizontal position.

Distribution. Three genera in tropical SE. Asia, one of which wide-spread, the other two genera only in Borneo, respectively in Borneo, Malay Pen., and Ceylon. — **Fig. 1.**

TRIB. A. CRYPTERONIEAE

Aff. *Salicineae* trib. *Crypteronieae* Endl., Gen. Pl. Suppl. 4, 2 (1847) 38.
Rhamnaceae trib. *Crypteronieae* Miers, Trans. Linn. Soc. 28 (1873) 329; Baill., Hist. Pl. 6 (1877) 455.

Flower bracts solitary. Petals absent or present. Stamens as many as sepals, alternisepalous; connective not or only slightly conduplicate. Fruit small, chartaceous. Seeds small; seed situated (latero-)centrally in its wing.

Distribution. Two genera, *Crypteronia* and *Dactylocladus*; for distribution under these.

1. CRYPTERONIA

Crypteronia Bl., Bijdr. 17 (1826) 1151; Don, Gen. Hist. 2 (1832) 11; Meisn., Vasc. Pl. Gen. (1837) 68, 70 (Comm.) 49, 50; Endl., Gen. Pl. (1840) 1104; Suppl. 4, 2 (1847) 38; Hassk., Cat. Pl. Bogor. ed. 2 (1844) 232 (*'Crypterhonia'*); Planch., Hook. Lond. J. Bot. 4 (1845) 474; Bl., Mus. Bot. Lugd. Bat. 2 (1853) 123, t. 42; Walp., Ann. 4 (1858) 692; Benth. & Hook. *f.*, Gen. Pl. 1 (1867) 782; DC., Prodr. 16, 2 (1868) 677; Miers, Trans. Linn. Soc. 28 (1873) 329; Baill., Hist. Pl. 6 (1877) 455; Clarke in Hook. *f.*, Fl. Brit. Ind. 2 (1879) 573; Koehne, Verh. Bot. Ver. Brandenburg 22 (1881) 69; Boerl., Handl. 1 (1890) 551; Kuntze, Rev. Gen. Pl. 1 (1891) 250 (*'Cryptoneria'*); Niedenzu, Bot. Jahrb. 15 (1892) 161; in E. & P., Nat. Pfl. Fam. 3, 7 (1892) 21, t. 8; K. & V., Bijdr. 1 (1894) 201; King, J. As. Soc. Beng. 67, II (1898) 4; Hallier *f.*, Abh. Geb. Naturwiss. 18 (1903) 90; Meded. Rijks Herb. Leiden 1 (1911) 31; ibid. 35 (1918) 17; Gagnep. & Guill. in Fl. Gén. I.-C. 2 (1920) 695; Ridl., Fl. Mal. Pen. 1 (1922) 821; Steenis, Pac. Pl. Ar. 1 (1963) 78; Lec. in Fl. Camb. Laos Vietn. 4 (1965) 57; Hutch., Gen. Fl. Pl. 2 (1967) 33. — Type species: *C. paniculata* Bl.

Henslowia Wall., Pl. As. Rar. 3 (1831) 13, t. 221, *non* Bl., Mus. Bot. Lugd. Bat. 1 (1850) 242 *(Santal.)*; Lindl., Nat. Syst. Bot. ed. 2 (1836) 174 (*'Henslovia'*); Endl., Gen. Pl. (1837) 291; Meisn., Pl. Vasc. Gen.

*) as a result of contraction of the axes.

(1838) 118 (Comm.) 84; Planch., Hook. Lond. J. Bot. 4 (1845) 474; Walp., Rep. 5 (1847) 675; Lindl., Veg. Kingd. ed. 3 (1853) 570; Miq., Fl. Ind. Bat. 1, 1 (1856) 715. — Type species: *H. pubescens* Wall.
Quilamum Blanco, Fl. Filip. 1 (1837) 851; ed. 2, 1 (1845) 136; ed. 3, 1 (1877) 245; Endl., Gen. Pl. (1840) 1328; Suppl. 4, 2 (1847) 38; Meisn., Pl. Vasc. Gen. (Comm.) (1843) 372; Merr., Sp. Blanc. (1918) 282. — Type species: Q. *luteum* Blanco.

Leaves elliptic or ovate to (ovate-)lanceolate, glabrous or slightly pubescent; midrib flat or slightly impressed above, prominent beneath; nerves ascending and often anastomosing in a looped marginal nerve, intramarginal nerve mostly present. *Inflorescence* terminal or axillary, sometimes on leafless older nodes or ramiflorous, erect to more or less pendulous, poorly to rather copiously branched; axes terete to more or less angular, puberulous; racemules with very numerous flowers. Flower-bracts persistent. *Flowers* bisexual or by reduction unisexual and then trees dioecious, 4—5(6)-isomerous, pedicelled. Receptacle in- and outside puberulous, inside sometimes minutely tomentose, hardly or not accrescent. *Sepals* deltoid to triangular, persistent. *Petals* absent. *Stamens* persistent, in ♀ flowers staminodial and mostly permanently inflexed; filaments filiform, somewhat flattened, connective about orbicular, with or without a tendency to conduplication, dark when dry; anthers apically or laterally on the connective, semiorbicular to broad-linear, latrorse or ± introrse. *Ovary* superior or almost so, the lower part adhering to the receptacle, (sub)globose to pyramidal, 2—4-carpellate, 2—4-locular, with free or only basally connate septs, badly developed in ♂ flowers; style filiform to subulate, somewhat longer to shorter than the ovary, more or less puberulous, persistent; stigma punctate to capitate. Ovules many, either in horizontal position on the septs or in ± vertical position basally between the septs. *Fruit* superior or almost so, (sub)globose or more or less (ob)-ovoid, puberulous, upper part dehiscent with 2—4 valves, inside split as far as the basal connation of the septs; valves at the top kept together by the non-dehiscent part of style and stigma. *Seeds* many, very small, in horizontal or vertical position; seed ovoid-ellipsoid, situated latero-centrally in its narrow, membraneous wing, which has a shorter or longer apical and basal extension; raphe running closely along the embryo (microscopical !).

Distribution. Tropical continental SE. Asia and Malesia. — **Fig. 1.**
Remark. The genus is divided in two sections, sect. *Crypteronia* with 1 species, and sect. *Basispermia*, with 3 species.

Sect. a. Crypteronia

Sect. *Eucrypteronia* Niedenzu, Bot. Jahrb. 15 (1892) 172; in E. & P., Nat. Pfl. Fam. 3, 7 (1892) 21.

Leaves usually chartaceous to foliaceous. Tree dioecious; flowers by reduction unisexual, rarely bisexual. Ovary 2(3)-locular; septs not connate, their surface covered with many ovules situated in horizontal position. Fruit somewhat laterally compressed.

Distribution. Tropical continental SE. Asia (Assam, Bengal, Lower Burma, Thailand, Cambodia, and S. Vietnam) and W. Malesia (Malay Pen., Sumatra, Java, Lesser Sunda Is, Philippines, and NE. Borneo). — **Fig. 1.**
Ecology. Lowland and submontane tropical forest, especially in areas with a more or less seasonal climate (rare in Malay Pen., Sumatra, and Borneo!).

Only species:
C. paniculata Bl., Bijdr. (1826) 1151. — Type: *Blume s.n.* (L).

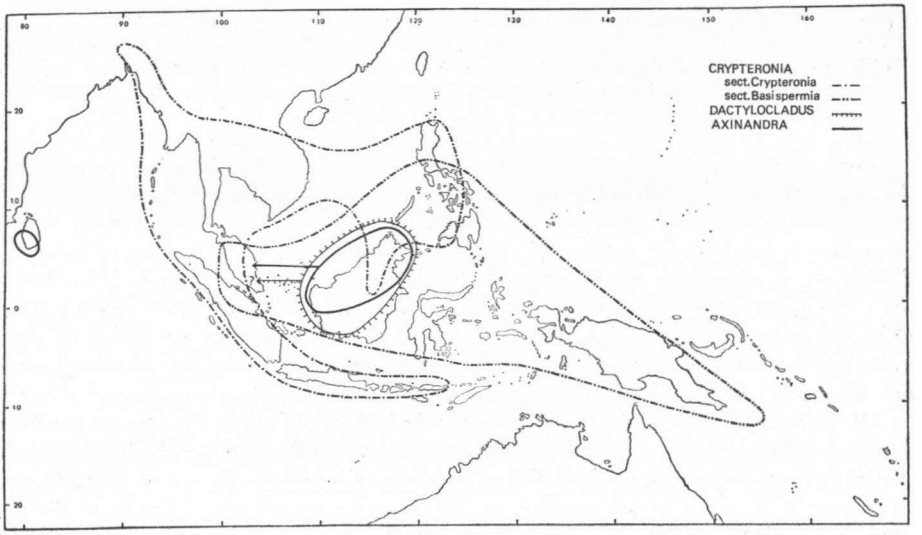

Fig. 1. Generalized distribution of *Crypteronia*, *Dactylocladus*, and *Axinandra*.

Synonyms: *Henslowia affinis* Planch., *C. affinis* (Planch.) Planch. *ex* Endl.; *H. glabra* Wall., *C. glabra* (Wall.) Planch. *ex* Endl.; *H. hookeri* Wall., *C. hookeri* Wall. *ex* A. DC.; *H. leptostachys* Planch., *C. leptostachys* (Planch.) Planch. *ex* Endl.; *Quilamum luteum* Blanco, *C. lutea* (Blanco) Bl.; *H. paniculata* (Bl.) Miq.; *H. pubescens* Wall., *C. pubescens* (Wall.) Planch. *ex* Endl.; *C. wallichii* A. DC.

Sect. b. Basispermia

Sect. *Basispermia* Niedenzu, Bot. Jahrb. 15 (1892) 173; in E. & P., Nat. Pfl. Fam. 3, 7 (1892) 21 (*'Basisporia'*). — Type species: *C. cumingii* (Planch.) Planch. *ex* Endl.

Leaves usually coriaceous. Tree monoecious; flowers bisexual. Ovary 3- or 4-locular; septs only connate at the very base where a conical-pyramidal placenta is situated on the bottom of the ovary, on which the many ovules occur in vertical position; placenta divided into compartments by the septs. Fruit not compressed.

Distribution. Malesia (Malay Pen., E. Central Sumatra, Borneo, S. and Central Philippines, Celebes, Moluccas, New Guinea), with a centre in Borneo. — **Fig. 1.**

Ecology. Lowland and submontane tropical rainforest.

Three species:

1. C. cumingii (Planch.) Planch. *ex* Endl., Gen. Pl. Suppl. 4, 2 (1847) 39. — Type: *Cuming 794* (K, F).

Synonyms. *C. javanica* Baill.; *Henslowia cumingii* Planch.; *C. laxa* Elmer *ex* Merr.

Distribution. Central and East Malesia.

2. C. griffithii Clarke in Hook. *f.*, Fl. Brit. Ind. 2 (1879) 574. — Type: *Griffith 2513* (K, L).

Distribution. Central and West Malesia.

3. C. macrophylla Beus.-Osinga *sp. nov.* — Type: *Ashton S 19372*, holo in L, duplicates (not seen) distributed to A, BO, K, KEP, MEL, MW, SAN, SING.

Folia ovato-oblonga ad lanceolata (20—)25—45 × 7—15 cm, basi plerumque emarginata interdum rotundata apice acuta usque ad paulo acuminata, glabra, nervis 15—25 paribus. Petiolus 5—10(—15) mm longus. *Inflorescentia* ramiflora 45—90 cm longa, pendula lignosa, semper usque ad tertium ordinem copiose ramosa axibus patentibus, axe principali terete, axibus primariis multis non omnibus oppositis, racemulis usque ad c. 30 cm longis. Bracteae axium triangulares c. 1 mm longae caducae, illae florum subulatae c. 1 mm longae persistentes. *Pedicelli* 1—3 mm longi. Receptaculum ± planum 1—1.5 mm latum dense puberulum. *Sepala* deltoidea c. 1 mm longa, intus cresta longitudinali dense puberula. *Stamina* 4, filamentis 1.5—3 mm longis glabris ultimo basi puberulis, connectivo c. 0.5 mm longo parum conduplicato, antheris ± linearibus 0.5 × 0.1—0.2 mm introrsis. *Ovarium* pyramidale quadriloculare 1—2 mm longum puberulum, super septis plus minusve impressum, stylo (1—)1.5—2.5(—3) mm longo 0.2—0.3 mm lato puberulo, stigmate truncato stylo vix latiore. *Fructus* (sub)globosus ad pyramidalis 2—2.5 × 2—2.5 mm, valvis 4. *Semina* c. 0.5 × 0.2 mm, alae extremitatibus apicalibus basalibusque embryonem aequantibus vel paulo longioribus.

Distribution. NW. and Central Borneo (S. and W. Sarawak, Kutai, Sambas area).

2. DACTYLOCLADUS

Dactylocladus Oliv., Hook. Ic. Pl. (1895) t. 2351; Gilg. in E. & P., Nat. Pfl. Fam. Nachtr. 1 (1897) 267; Hallier *f.*, Meded. Rijks Herb. Leiden 35 (1918) 18; Diels, Bot. Jahrb. 60 (1926) 312; Bakh. *f.*, Rec. Trav. Bot. Néerl. 40 (1943) preprint 329; Browne, For. Trees Saraw. & Brunei (1955) 261, t. 33; Willis, Dict. (ed. Shaw) (1966) 303. — Type species: *D. stenostachys* Oliv.

Leaves elliptic or obovate to (obovate-)oblong, glabrous; midrib thickish, ± flat above, prominent beneath; nerves ± straight, anastomosing in an indistinct marginal nerve. *Inflorescence* terminal or axillary to the highest leaves, erect, poorly branched; axes flattened, puberulous; racemules with at least a few tens of flowers. Flower-bracts caducous. *Flowers* bisexual, 5(4)-isomerous, almost sessile. Receptacle in- and outside puberulous, accrescent. *Sepals* triangular, persistent. *Petals* unguiculate, with suborbicular, irregularly lobed lamina, in bud covering the stamens as a hood, soon caducous. *Stamens* persistent; filaments terete, somewhat flattened; connective about orbicular, not conduplicate; anthers inserted transversally, somewhat below the upper margin of the connective, oblong to broad-linear, introrse. *Ovary* half-inferior, the lower part adnate with the receptacle, the top part semiglobose, puberulous, (3)4- or 5-carpellate, (3)4- or 5-locular, septs not connate; style subulate, somewhat longer than the ovary, puberulous, persistent; stigma capitate. Ovules 3 per locule, inserted in vertical position, basally between the septs. *Fruit* almost inferior, broad-ellipsoid, small, pericarp chartaceous, puberulous, inside dehiscent down to the bottom with (3)4 or 5 valves of which only the upper 1/4 protrudes from that part of the pericarp that is surrounded by and fused with the enlarged receptacle, at the top often kept together by the non-splitting stigma. *Seeds* 3 per locule (1 or 2 sometimes not developed), small, in vertical position; seed narrow-ellipsoid, flat, situated centrally in its more or less rectangular, narrow, membraneous wing almost 2 × as long as the body of the seed; raphe running close to the embryo.

Distribution. Borneo (one doubtful report from Malay Pen.). — **Fig. 1.**

Ecology. *D. stenostachys* is restricted to and characteristic of lowland peat swamps (see Browne, l.c.).

Only species:
D. stenostachys Oliv., Hook. Ic. Pl. (1895) t. 2351. — Lectotype: *Haviland 2916* (K, L); syntype: *Beccari 3272* (F).

TRIB. B. AXINANDREAE

Melastomataceae subfam. *Memecyloideae* trib. *Axinandreae* Hallier *f.*, Meded. Rijks Herb. Leiden 35 (1918) 18, *pro parte*; Krasser in E. &. P., Nat. Pfl. Fam. 3, 7 (1893) 196; Bakh. *f.*, Rec. Trav. Bot. Néerl. 40 (1943) preprint 329, *pro parte*.

Flower-bracts 3 per flower. Petals present. Stamens twice as many as sepals, epi- and alternisepalous; connective completely conduplicate, with a large appendix. Fruit big, woody. Seeds big; seed situated basally in its wing.

Distribution. One genus, *Axinandra*; for distribution, see there.

3. AXINANDRA

Axinandra Thw., Hook. J. Bot. 6 (1854) 66, t. 1 C; En. Pl. Zeyl. (1859) 122; Walp., Ann. 4 (1857)690; Benth. & Hook. *f.*, Gen. Pl. 1 (1867) 784; Bedd., Fl. Sylv. 2 (1869) t. 207; Baill., Adansonia 12 (1876) 84; Bull. Soc. Linn. Paris (1877) 126; Clarke in Hook. *f.*, Fl. Brit. Ind. 2 (1879) 581; Baill., Hist. Pl. 7 (1880) 27, 65; Boerl., Handl. 1 (1890) 528; Cogniaux in DC., Mon. Phan. 7 (1891) 1113; Krasser in E. & P., Nat. Pfl. Fam. 3, 7 (1893) 142, 196; Trim., Handb. Fl. Ceylon 2 (1894) 231; Ridl., Fl. Mal. Pen. 1 (1922) 826; Bakh. *f.*, Rec. Trav. Bot. Néerl. 40 (1943) preprint 332; Meijer, Ceylon J. Sc. (Bio. Sc.) 10 (1972) 72. — Type species: *A. zeylanica* Thw.
Naxiandra (Baill.) Krasser, l.c., 197, f. 182 A. — Type species: *N. coriacea* (Baill.) Krasser.

Leaves elliptic to oblong, sometimes ovate, glabrous; midrib impressed above, prominent beneath; nerves ascending and anastomosing in a looped marginal nerve, intramarginal nerve present. *Inflorescence* terminal or axillary and then at the end of the twigs, erect, poorly branched; axes more or less angular, puberulous; racemules with up to some tens of flowers. Flower-bracts 3 per flower, the outer ones often minute, persistent during anthesis. *Flowers* bisexual, 5(4)-merous, pedicelled. Receptacle puberulous on outside only, glabrescent in fruit, much accrescent and lignified in fruit. *Sepals* 5(4), deltoid, more or less acuminate, evanescent in fruit. *Petals* 5(4), valvate-connate or valvate- (or somewhat imbricate-) conduplicate or imbricate-contorted, more or less connate or cohering and soon dropping simultaneously in the shape of an umbrella, flimsy, consisting of a wide basal part tapering into a narrower median part which widens into a whether or not well-developed, frayed apical part, induplicate and enveloping the stamens which are situated in pairs between two longitudinal lamellae on the inside of each petal. *Stamens* 10(8), epi- and alternisepalous, (sub)equal, caducous; filaments (rather) thick and short, terete, to more or less flattened, tapering upwards; connective wide, large, conduplicate, mostly provided with a more or less distinct dorsal tubercle; anthers marginally at the apex of the connective, broad-linear, introrse. *Ovary* inferior, immersed in the receptacle, 3(2)-carpellate, 6(4)-locular, with free or towards the base somewhat connate septs, glabrous; style (subulate-)terete, shorter to distinctly longer than the receptacle and whether or not protruding from the ripe bud, glabrous, evanescent in fruit; stigma punctate, minute. Ovules 1 or 2 per locule, two (one) by two (one) in vertical position inserted basally on either side of the 3(2) stouter ones of the 6(4) septs. *Fruit* half-inferior, a big

woody capsule, globose to ellipsoid, (sub)glabrous, when young provided with a fragment of the style, inside dehiscent down to the bottom with 2—6 valves of which only the upper parts protrude from that part of the capsule which is surrounded by and fused with the enlarged receptacle of which the rim often remains visible as an irregular more or less conspicuous rib; visible part of the valves triangular, coarse, solid, deltoid at cross-section, glabrous. *Seeds* few, in vertical position; seed depressed-ellipsoid, situated basally and obliquely in its thin, (narrow-)oblong wing 2—3 × as long as the body of the seed; raphe running from the basal insertion all along the wing margin back to the embryo.

Distribution. W. Malesia (not common in Borneo and very rare in Malay Pen.) 3 species, and Ceylon, 1 species. — **Fig. 1.**

Remark. *Axinandra* is divided in two sections, sect. *Axinandra* (1 species), and sect. *Naxiandra* (3 species).

Sect. a. Axinandra

Sect. *Euaxinandra* Clarke in Hook. *f.*, Fl. Brit. Ind. 2 (1879) 581; Boerl., Handl. 1 (1890) 528; Cogniaux in DC., Mon. Phan. 7 (1891) 1113. — Type species: *A. zeylanica* Thw.

Petals cochleate-imbricate in the basal part, ± contorted in the median part, cohering but hardly or not connate, *c.* 1.5 mm long. Connective quadrate-elliptic, without dorsal tubercle. Filaments *c.* 0.5 mm. Style *c.* 0.5 mm, not protruding from mature bud. Ovules 1 per locule.

Distribution. Endemic in Ceylon.
Ecology. Lowland tropical rain forest.

Only species:
A. zeylanica Thw., Hook. J. Bot. Kew Misc. 4 (1854) 67. — Type: *Thwaites C. P. 2668* (BO, F, K, L, P, PER).

Sect. b. Naxiandra

Sect. *Naxiandra* Baill., Adansonia 12 (1876) 85; Bull. Soc. Linn. Paris (1877) 127; Hist. Pl. 7 (1880) 28; Clarke in Hook. *f.*, Fl. Brit. Ind. 2 (1879) 581; Boerl., Handl. 1 (1890) 528; Cogniaux in DC., Mon. Phan. 7 (1891) 1114. — Type species: *N. coriacea* (Baill.) Krasser.

Petals valvate to imbricate or valvate-connate in the basal part, valvate-conduplicate or valvate-connate in the median part, not much to completely connate, 2—6 mm long. Connective ± pear-shaped, with a more or less distinct dorsal tubercle. Filaments 1.5—2 mm. Style 1.5—5 mm, mostly protruding from mature bud. Ovules 2 per locule.

Distribution. W. Malesia; not common on Borneo and one species once found in Malay Pen.
Ecology. Primary lowland to submontane tropical rain forest.

Three species:
1. **A. alata** Baill., Adansonia 12 (1876) 86. — Type: *Beccari PB 3651* (F, P).
Distribution. W. Borneo (once found).

2. **A. beccariana** Baill., Adansonia 12 (1876) 85. — Type: *Beccari PB 3458* (F, P).

Synonyms. *A. borneensis* Bakh. *f.*; *A. maingayi* C. B. Clarke.
Distribution. W. Central Borneo and Malay Pen. (once found).

3. A. coriacea Baill., Adansonia 12 (1876) 85. — Lectotype: *Beccari PB 2622* (F, P); syntype: *Beccari 2036* (F, P).
Distribution. Borneo.

SUBFAM. II. ALZATEOIDEAE Beus., *subfam. nov.*

Type genus: *Alzatea* Ruiz & Pav.
Flores bisexuales, in florescentiis cymoideis irregularibus nunc umbellulatim nunc verticillatim nunc (sub)opposite dispositi in eadem panicula. Ovarium superum uniloculare bicarpellatum. Ovula multa parietalia in duo paribus oppositis serierum verticalium horizontaliter posita. Fructus capsula chartacea multiseminalis incomplete bilocularis propter excrescentionem septi ab utroque pari serierum ovulorum; semina horizontaliter posita.

Flowers bisexual, arranged in irregular cymoid florescences, sometimes (sub)umbellulately, or (sub)verticillately, or (sub)oppositely in the same panicle. Ovary superior, 1-locular, bicarpellate. Ovules many, parietal, placed horizontally in two opposite pairs of vertical rows. Fruit a chartaceous capsule, many-seeded, incompletely 2-locular as a result of the development of a sept from between each pair of ovule-rows; seeds in horizontal position.

Distribution. Two monotypic genera, one in tropical S. America, one in tropical S. Africa, both with limited distribution.
Remark. Both genera, *Alzatea* and *Rhynchocalyx*, are here for the first time combined into a subfamily and included in the *Crypteroniaceae*.

TRIB. A. ALZATEEAE

Flacourtiaceae trib. *Alzateeae* Hutch., Gen. Fl. Pl. 2 (1967) 231.

Connective conduplicate, provided with a large dorsal outgrowth. Seeds in 4 vertical rows; seed situated centrally in its wing.

Distribution. One genus, *Alzatea*; for distribution see there.

4. ALZATEA

Alzatea Ruiz & Pav., Prodr. (1794) 40, t. 7; Fl. Peruv. Chil. 3 (1802) 20, t. 241; Dietr., Vollst. Lex. Gärtn. 1 (1802) 299 (*'Alzalia'*); Hedw., Gen. (1806) 175; Roem. & Schult., Syst. Veg. 5 (1819) 569; A. DC., Prodr. 2 (1825) 10; Prodr. 16, 2 (1868) 677, *in obs.*; Spreng., Syst. Veg. 1 (1825) 202; Bl., Bijdr. 17 (1826) 1151, *in obs.*; Reichenb., Consp. (1828) 208; Handb. (1837) 301; Lindl., Intr. Nat. Syst. Bot. (1830) 111; Don, Gen. Syst. 2 (1832) 11; Spach, Veg. Phan. 2 (1834) 404; Meisn., Pl. Vasc. Gen. 1 (1837) 68; Dietr., Syn. Pl. 1 (1839) 873; Endl., Gen. Pl. (1839) 1090; Enchir. (1841) 575; Walp., Rep. 1 (1842) 539 (*'Azaltea'*); Planch. in Hook. Lond. J. Bot. 4 (1845) 477; Benth. & Hook. *f.*, Gen. Pl. 1 (1862) 362; Miers, Trans. Linn. Soc. Lond. 28 (1873) 328; Dietr. *ex* Pfeiff., Nom. 1, 1 (1873) 129, in synon. (*'Alziniana'*); Baill., Hist. Pl. 6 (1877) 32; Loesen. in E. & P., Nat. Pfl. Fam. 3, 5 (1892) 221; in E. & P., Nat. Pfl. Fam. (ed. 2) 20b (1942) 196; Hallier *f.*, Abh. Geb. Naturwiss. 18 (1903) 91; Bull. Herb. Boiss. 3, 2 (1903) 313; Meded. Rijks Herb. Leiden 1 (1911) 30; ibid. 35 (1918) 17; ibid. 41 (1921) 7, *in adnot.*; Macbride, Field Mus. Chicago Publ. 13 (1951) 393; Ruiz & Pav., Fl. Peruv. Chil. 4 (ed. López) in An. Inst. Bot. Cavanilles 12, 1 (1954) 123; Lourt., Ann. Missouri Bot. Gard. 52 (1965) 371; Willis, Dict. (ed. Shaw) (1966) 46; Hutch., Gen. Fl. Pl. 2 (1967) 231. — Type species: *A. verticillata* Ruiz & Pav.

Leaves elliptic or obovate, glabrous, rigidly coriaceous; midrib coarse, prominent above and less so beneath; nerves rather close-set, almost straight, strongly and shortly decurrent along the midrib, anastomosing in a slightly looped marginal nerve. *Inflorescence* terminal or axillary to the highest leaves, erect, not profusely branched; axes angular, puberulous. Bracts very minute, persistent. *Flowers* 5(6)-isomerous, proportionally large, pedicelled. Receptacle on outside faintly puberulous, inside glabrous and somewhat crustaceous, hardly or not accrescent. *Sepals* triangular, persistent. *Petals* rudimentary, extremely thin and flimsy, and hardly visible, already mucilaginous in bud. *Stamens* caducous; filaments thick and short, somewhat flattened, tapering upwards; connective wide, large, conduplicate, with a backward outgrowth in the shape of a triangular hooded cloak in which the upper part of the filament and part of the connective are embedded; anthers along the apical margin of the connective, linear, ± introrse. *Ovary* about ellipsoid, blunt-quadrangular across, glabrous; style thick and very short, glabrous, persistent; stigma capitate. *Fruit* superior, ovoid-globose, laterally compressed, glabrous, dehiscent with 2 valves which at the top bear a length half of the splitted style and stigma. Seed depressed-ellipsoid, its wing oblong to semicircular, *c.* 2× as long as the body of the seed, thin; raphe running in the lateral wing margin.

Distribution. In Peru and Bolivia on the eastern side of the Andes.
Ecology. Tropical (sub)montane forest.

Only species:
A. verticillata Ruiz & Pav., Fl. Peruv. Chil. 3 (1802) 20, t. 241. — Type: Unknown, probably in M.

Material seen (most from K):
PERU. Amazones, Dept. Loreto, *Ule 6750*; Pitabamba, Santa Ana, *Pearce s.n.*; San Martin, Zepelacio, near Moyobamba, *Klug 3349*; Rio Negro, *Woytkowski 6196*.
BOLIVIA. Sine loco, *Bang 829*.

TRIB. B. RHYNCHOCALYCEAE Beus., *trib. nov.*

Type genus: *Rhynchocalyx* Oliv.
Connectivum haud conduplicatum et sine excrescentione vel appendice. Semina in duo seriebus verticalibus, illa in eadem serie ab utroque pari placentarum oppositarum alterne oriunda. Semen in parte apicali eius alae locatum.

Connective not conduplicate, without outgrowth or appendix. Seeds in two vertical rows, those in the same row originating alternately from each of the two pairs of opposite placentas; seed situated apically in its wing.

Distribution. For distribution of the only genus of this tribe, *Rhynchocalyx*, see there.

5. RHIJNCHOCALYX

Rhynchocalyx Oliv., Hook. Ic. Pl. (1894) t. 2348; Engl. in E. & P., Nat. Pfl. Fam. Nachtr. 1 (1897) 260; Nachtr. 2 (1900) 48; Koehne in Engl., Pfl. Reich 17 (1903) 272; Hallier *f.*, Abh. Geb. Naturwiss. 18 (1903) 88; Bull. Herb. Boiss. 3, 2 (1903) 313; Meded. Rijks Herb. Leiden 1 (1911) 31; ibid. 35 (1918) 17; ibid. 41 (1921) 7, *in adnot.*; Henkel, Woody Pl. Natal Zulul. (1934) 121; Sprague & Metcalfe, Kew Bull. (1937) 392; Phillips, Gen. S. Afr. Fl. Pl. ed. 2 (1951) 533; Willis, Dict. (ed. Shaw) (1966) 969; Strey & Leistner, J. S. Afr. Bot. 34 (1968) 9, t. 1 & f. 1. — Type species: *R. lawsonioides* Oliv.

Leaves elliptic to oblong, glabrous, moderately coriaceous; midrib thickish, flat to somewhat impressed above, prominent beneath; nerves ascending and anastomosing, but no marginal nerve present. *Inflorescence* terminal, also axillary to the highest leaves, erect, profusely to poorly branched; axes more or less angular and flattened, glabrous. Bracts proportionally large, sometimes like small leaves, persistent during anthesis, at each side of the base accompanied by a minute stipule. *Flowers* 6-isomerous, small, pedicelled. Receptacle glabrous, somewhat accrescent. *Sepals* ovate, cuspidate, persistent. *Petals* narrowly unguiculate, with suborbicular irregularly lobed lamina, in bud covering the stamens as a hood, thin, caducous. *Stamens* caducous; filaments filiform-subulate, somewhat flattened; connective about elliptic, with a tendency to conduplication; anthers situated inward-marginally on the connective, broad-linear, ± introrse. *Ovary* ellipsoid, laterally compressed, glabrous, narrowed into a rather short, thick, glabrous, persistent style; stigma capitate. *Fruit* superior, ± didymous, laterally compressed, glabrous, only the upper half dehiscent with 2 valves which at the top bear a half of the longitudinally split style and stigma. Seed depressed-ovoid; its wing elliptic-ovate, *c.* 2× as long as the body of the seed, thin; raphe running in the lateral wing-margin.

Distribution. Very rare in S. Africa, as yet only found in a few localities in the 'coastal belt' of S. Natal and N. Transkei.

Ecology. *R. lawsonioides* occurs in moist, sheltered ravines harbouring forest of tropical character.

Only species:

R. lawsonioides Oliv., Hook. Ic. Pl. (1894) t. 2348. — Type: *J. M. Wood 3124* (K).

Material seen (most from K):

NATAL. Port Shepstone dist.: Murchison, *J. M. Wood 3124*, type; *Strey 7610*; Beacon Hill, *Strey 6539*, *7565*; Mgongongo, *Strey 7610*; between Port Shepstone and Margate, *De Joncheere s.n.*, IV. 1973; Alfred County, *Henkel 3982*.

TRANSKEI. Ntsubane forest, *Strey 9000*.