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CYRTOSPERMA (ARACEAE) AND ITS OLD WORLD ALLIES

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SUMMARY

The species of four genera of Old World Araceae–Lasiinae are enumerated: *Cyrtosperma* (11, Malesia and Oceania), *Lasia* (2, Indomalesia), *Podolasia* (1, West Malesia), and *Lasiomorpha* (1, Tropical West Africa). Species of *Cyrtosperma* are illustrated. Distribution maps are provided. The new combination *Urospatha wurdackii* is made for the Venezuelan *Cyrtosperma wurdackii* Bunting. *Dracontium spinosum* is lectotypified.

Hay (1986; to be published elsewhere) has defined and elaborated on generic and subtribal limits in the tribe Lasieae, a relict pantropical group of terrestrial or semi-aquatic, reticulately leaf-veined, often armed, hermaphrodite-flowered aroids. Four subtribes are recognised, of which Lasiinae is discussed here. Five genera are included: *Urospatha,* which is Neotropical and therefore beyond the scope of this paper, and Palaeotropical *Cyrtosperma, Lasiomorpha, Lasia,* and *Podolasia. Cyrtosperma* is remarkable as the only oligotypic genus of Araceae more diverse east than west of Wallace's Line. Its species, and those of *Lasiomorpha, Lasia,* and *Podolasia* are enumerated below.

LASIINAE

Lasiinae Schott, Prodr. Aroid. (1860) 399, *'Lasinae'*; Bogner, Oesterr. Bot. Zeitschr. 122 (1973) 202, pro parte excl. *Anaphyllum, Dracontioides,* and *Dracontium.*

Rhizomatous or suffruticose, solitary, clump-forming, or colonial herbs; leaves usually and stems more rarely armed, sometimes heavily so; modules of sympodia multifoliar, with prophylls and euphylls, without cataphylls; leaf blades simple, (4×-)pinnatifid to hastate. *Inflorescence* solitary, rarely cymose-paired, on peduncles similar to the petioles; spathes erect, deflected, sometimes acuminate-twisted, very rarely hood-forming, persistent, marcescent, or caducous. *Flowers* 6–(5–)4-tepalate and -staminate; filaments free or rarely united; ovary bi- to unilocular, multi- to uniovulate; placentation axile, basal, parietal, or apical. *Seed* campylotropous, reniform, rarely helical, albuminous or not; coat hard, pachychalazal, often warty or crested, sometimes smooth.

Distribution. Pantropical, excluding Australia.

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KEY TO OLD WORLD GENERA

1a. Stems suffruticose, erect to decumbent, usually with spiny internodes; leaves hastate to (4×-)pinnatifid; spathe caducous, rarely marcescent; placentation apical; fruit usually spinulous. Indomalesia ..... **Lasia** Lour.
b. Stem usually a condensed rhizome, rarely with distinct internodes and then unarmed; leaves entire, sagittate to hastate; spathe persistent to marcescent; placentation not apical, fruit smooth 2
2a. Petioles angular in cross section, armed in rows along the edges; plants stoloniferous, forming large colonies; spathe persistent, filaments of stamens united. Africa ..... **Lasiomorpha** Schott
b. Petioles not notably angular in cross section, armature scattered or in oblique combs; plants solitary or clump-forming; spathe persistent or marcescent, filaments free 3
3a. Spines mixed straight and down-turned; rhizome with distinct internodes and roots emerging from between the persistent leaf-bases; seed smooth, ± orbicular, large, to 7 mm diameter. West Malesia ..... **Podolasia** N.E. Br.
b. Spines mixed straight and up-turned or all up-turned; rhizome condensed; seed crested and/or warty, if smooth then less than 5 mm diameter. Malesia to Oceania ..... **Cyrtosperma** Griffith

CYRTOSPERMA

Cyrtosperma Griff., Notul. 3 (1851) 149; Icon. Pl. Asiat. (1851) t. 169; Schott, Gen. Aroid. (1858) 84, t. 84; Prodr. Aroid. (1860) 402; Seem., Viti (1862) 444; Fl. Vit. (1868) 287; Engl. in DC., Mon. Phan. 2 (1879) 268; in E. & P., Nat. Pflanzenfam. 2, 3 (1889) 123; Pflanzenr. 48 (23C) (1911) 14; Hook. f. in Benth. & Hook. f., Gen. Pl. 3 (1883) 997; Fl. Brit. India 6 (1893) 551; Ridley, Mat. Fl. Mal. Pen. 3 (1907) 47; Fl. Mal. Pen. 5 (1925) 127; Koord. Exkursionsfl. Java 1 (1911) 256; Merr., Enum. Philipp. Fl. Pl. 1 (1922) 179; Brown, Bull. Bish. Mus. 84 (1931) 129; Wilder, Bull. Bish. Mus. 86 (1931) 27; Kanehira, Fl. Microncs. (1933) 409; Henderson, Mal. Wildfl. Monoc. (1954) 242; Backer & Bakh. f., Fl. Java 3 (1968) 110; Corner & Watanabe, Ill. Guide Trop. Pl. (1969) 1036; Parham, Pl. Samoa (1972) 106; Suvatti, Fl. Thailand (1978) 350; Nicolson in A.C. Smith, Fl. Vit. Nov. 1 (1979) 451; Hay in Johns & Hay, Stud. Guide Monoc. Papua New Guinea 1 (1981) 52. — T y p e: *C. lasioides* Griff. (= *C. merkusii*).

[*Apereoa* Moerenhout, Voyages aux Îles du Grand Océan 2 (1837) 16, *nom. nud.*]

Arisacontis Schott, Bonplandia 5 (1857) 129. — T y p e: *A. chamissonis* Schott (= *C. merkusii*).

Massive to slender, usually solitary, occasionally clump-forming rhizomatous herbs; rhizome thick, with condensed internodes, creeping, the older parts long persistent or quickly rotting. *Leaves* several together on spiny, usually mottled petioles to c. 3 m long, with a prominent pulvinar geniculum at the apex; blades hastate to sagittate, generally all held facing the same direction, with the posterior lobes longer than the anterior. *Inflorescence* solitary, rarely paired, on peduncles similar to the petioles; spathe erect, rarely somewhat hood-forming, occasionally with the upper part long-acuminate and spirally twisted, convolute or not in the lower part, blackish

purple to white; spadix sessile to stipitate. *Flowers* hermaphrodite throughout the length of the spadix, 6–(5–)4-tepalate and -staminate; filaments free; receptive stigmas wet; ovary unilocular, multi- to uniovulate with basal to basal/parietal placentation. *Fruit* a red or orange berry rarely expelled from the spadix and hanging by the inner epidermis of the tepals as in *Anthurium*. *Seed* strongly campylotropous, reniform to orbicular to helically twisted, pachychalazal, strophiolate, smooth or crested or warty, albuminous.

Distribution. Eleven species; one, *C. merkusii,* from the Malay Peninsula, Borneo, Sumatra, Java, the Philippines, and Oceania; the remainder Papuasian. None is recorded from Sulawesi, Halmahera, or Australia.

Notes. As Engler (1911) defined it, *Cyrtosperma* was the only pantropical genus of Araceae other than the monotypic *Pistia,* the water weed *P. stratiotes* L. However, it transpires, particularly after examining vegetative morphology, that the characters which Engler considered important (unilocular ovaries with basal placentation) are parallel products of evolutionary reduction in the gynoecium in both the Lasiinae and the related subtribe Dracontiinae. Four of his species are now excluded from the genus [*C. spruceanum* (Schott) Engl., *C. senegalense* (Schott) Engl., *C. americanum* Engl., and *C. angustilobum* Engl.], together with the more recently described *C. wurdackii* Bunting (see below). Subsequent to Engler, Van Alderwerelt van Rosenburgh and Krause described five more species from New Guinea. Of these, four are now considered conspecific with a broadly variable *C. macrotum* Becc. ex Engler. *Cyrtosperma chamissonis* (Schott) Merr. and *C. edule* Schott, names for the plant cultivated as a root crop in the Pacific, and *C. lasioides,* the name of the type species of the genus, are reduced to synonyms of *C. merkusii* (Hassk.) Schott. *Cyrtosperma macrotum* and *C. merkusii,* both of which Engler, and subsequently Hay (1981), misinterpreted, are clarified. Six new species are described from New Guinea and the Solomon Islands.

Although the number of species is small, there is sufficient clumping of affinity to warrant some sort of recognition of supraspecific groupings. I have baulked, however, at formal ascription of the species to infrageneric taxa, as there are some whose affinity may only be suggested owing to lack of adequate material. Since Engler's *Cyrtosperma* was heterogeneous, and some of his species thoroughly confused, it is not profitable to consider his sectional classification.

KEY TO THE SPECIES

1a. Stamens exserted from the tepals at male anthesis; throughout the range of the genus ('Merkusii group') 2
b. Stamens not exserted from the tepals at male anthesis. New Guinea. 7
2a. Flowers hexamerous 3
b. Flowers tetramerous 6
3a. Petioles and undersides of laminae with reddish-brown blotches; juvenile leaves with pink costae . . . . . **2. C. johnstonii**
b. Leaves not blotched; juvenile leaves not with pink costae 4

4a. Spathe deflected from *and* at least 1.5 times as long as the spadix; spadix glaucous; receptive stigmas red; seed stony, helically twisted. Bougainville Island **5. C. bougainvillense**

b. Spathe and spadix not so; seed reniform and crested 5

5a. Ovary multi-ovulate; fruit up to 5-seeded; infructescence massive, to c. 35 cm long and c. 11 cm thick. Lorentz River in Irian Jaya . . . . . **6. C. giganteum**

b. Ovary uni- to bi-ovulate; fruit 1- to 2-seeded; infructescence less massive. Widespread but not recorded from New Guinea mainland . . **1. C. merkusii**

6a. Spathe erect; leaves asperous in the dry state. Rossel Island. . . **4. C. brassii**

b. Spathe hood-forming; leaves not so. Sudest (= Tagula) Island **3. C. gressittorum**

7a. Upper part of spathe twisted through at least one full turn *or* lower part of spathe convolute *and* flowers hexamerous ('Cuspidispathum group'). . . . 8

b. Upper part of spathe not twisted; lower part of spathe not convolute *or* lower part of spathe convolute *and* flowers tetramerous 9

8a. Lamina unarmed; lower part of spathe convolute . . . **7. C. cuspidispathum**

b. Lamina armed; lower part of spathe not convolute . . . . . **8. C. kokodense**

9a. Lower part of spathe convolute; flowers tetramerous ('Carrii group') **9. C. carrii**

b. Lower part of spathe not convolute; flowers hexamerous, pentamerous or tetramerous ('Macrotum group') 10

10a. Lamina held horizontally or with the posterior lobes down and the anterior lobe up, or (rarely) all lobes slightly above horizontal; spathe narrowly lanceolate **10. C. macrotum**

b. Lamina held with the posterior lobes up, anterior lobe down; spathe ovate to ovate-lanceolate . . . . . **11. C. beccarianum**

'Merkusii' group'

1. Cyrtosperma merkusii (Hassk.) Schott – Fig. 1.

Cyrtosperma merkusii (Hassk.) Schott, Oesterr. Bot. Wochenbl. 7 (1857) 61; Prodr. Aroid. (1860) 403; Engl in DC., Mon. Phan. 2 (1879) 271; in Becc., Malesia 1 (1882) 278; Pflanzenr. 48 (23C) (1911) 20, pro parte, excl. specim. Nov. Guin.; Drake, Ill. Fl. Ins. Mar. Pac. (1892) 325; Koord., Exkursionsfl. Java 1 (1911) 256; Merr., Enum. Philipp. Fl. Pl. 1 (1922) 179; Brown, Bull. Bish. Mus. 84 (1931) 129; Elmer, Leafl. Philipp. Bot. 10 (1938) 3618; Backer & Bakh. f., Fl. Java 3 (1968) 110; Parham, Pl. Samoa (1972) 106. — *Lasia merkusii* Hassk., Cat. Bog. (1844) 59; Pl. Jav. Rar. (1848) 161; Zoll., Syst. Verz. 1 (1854/55) 77; Miq., Fl. Ind. Bat. 3 (1855) 177. — T y p e: *Hasskarl s.n.*, Indonesia, Java, cult. Hort. Bogor. (L, holo).

[*Apereoa (Apeveoa) esculenta* Moerenhout, Voyages aux Îles du Grand Océan 2 (1837) 16, *nom. nud.*]

[*Pothos lasia* sensu Wallich, List (1847) 4447H, non Roxburgh (1820), i.e. *Lasia spinosa.*]

Cyrtosperma lasioides Griff., Notul. 3 (1851) 150; Icon. Pl. Asiat. (1851) t. 169 & 173 fig. 1a; Schott, Gen. Aroid. (1858) t. 84; Prodr. Aroid. (1860) 403; Engl. in DC., Mon. Phan. 2 (1879) 270; Arac. Exsicc. et Ill. (1883) n. 89; Pflanzenr. 48 (23C) (1911) 19; Hook. f., Fl. Brit. India 6 (1893) 551; Ridley, Mat. Fl. Mal. Pen. 3 (1907) 47; Fl. Mal. Pen. 5 (1925) 126, fig. 216;

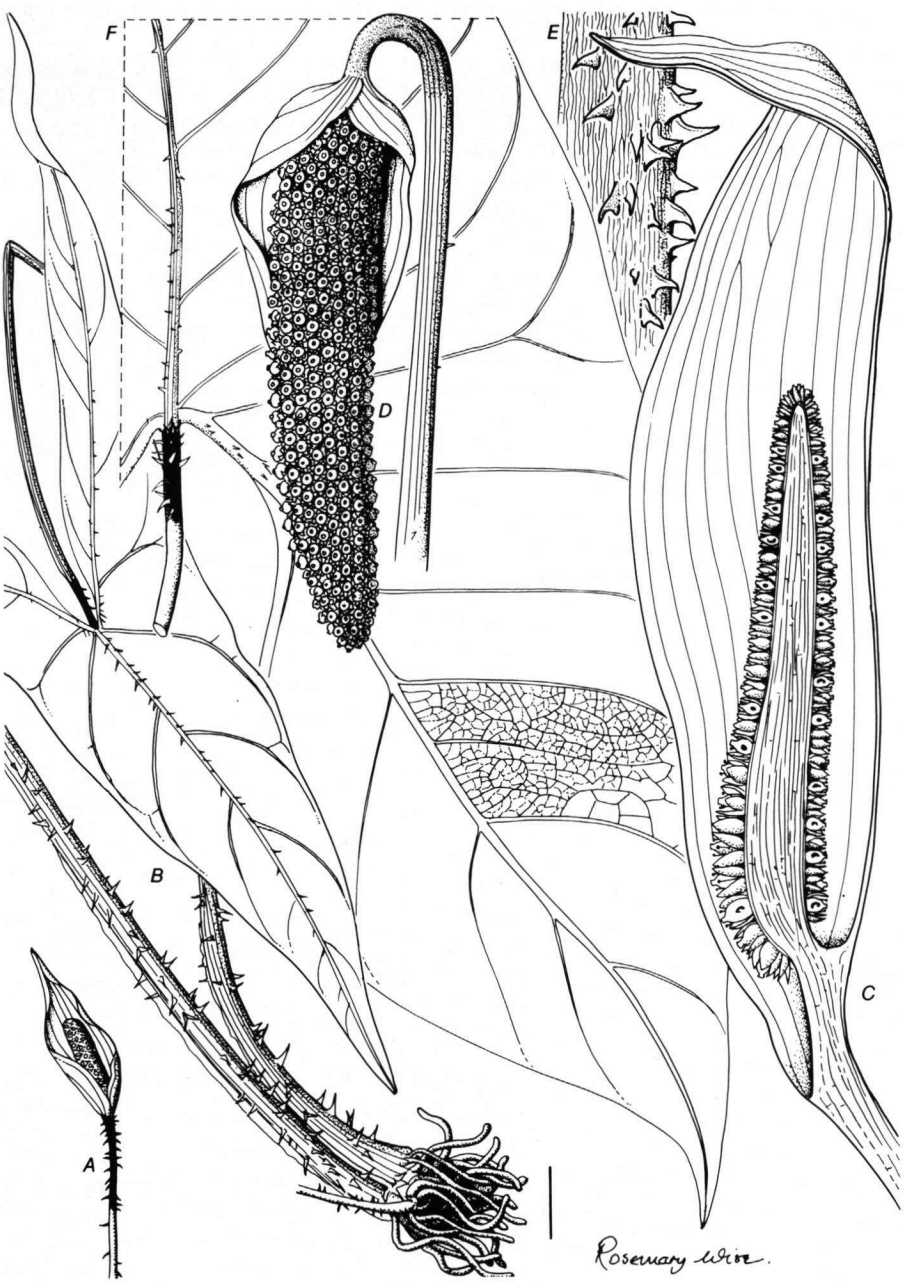

Fig. 1. *Cyrtosperma merkusii* (Hassk.) Schott. – A, B *Maingay 3182*; C *Wilder 853*; D, F *van Steenis 1279*; E, petiole, *Rahmat si Boeea 9518*. Bar = 2 cm.

Henderson, Mal. Wildfl. Monoc. (1954) 242; Corner & Watanabe, Ill. Guide Trop. Pl. (1969) 1036. — T y p e: *Griffith 5950*, Malaysia, Malacca (K, holo).

Arisacontis chamissonis Schott, Bonplandia 5 (1857) 129. — *Cyrtosperma chamissonis* (Schott) Merr., Philipp. J. Sci. 9 (1914) Bot. 65; Wilder, Bull. Bish. Mus. 86 (1931) 27; Kanehira, Fl. Micrones. (1933) 409; Barrau, J. Agr. Trop. Bot. Appl. 4 (1957) 36; Bull. Bish. Mus. 219 (1958) 42; op. cit. 223 (1961) 39; J. Parham, Pl. Fiji Isl. ed. 2 (1972) 363; Loumala, J. Polynes. Soc. 83 (1974) 14; Nicolson in A.C. Smith, Fl. Vit. Nov. 1 (1979) 451. — T y p e: *Chamisso 54*, Raiatea (W, holo, fide Nicolson, n.v.).

[*Arum sagittaefolium* Cham. ex Schott, loc. cit. pro syn.]

Cyrtosperma edule Schott ex Seem., Bonplandia 9 (1861) 260, *nom. nud.*, *'edulis'*; Schott, Bonplandia 9 (1861) 367, *'edulis'*; Seem., Viti (1862) 444; Fl. Vit. (1868) 287, *'edulis'*; Engl., Pflanzenr. 48 (23C) (1911) 17, pro parte, excl. specim. Nov. Guin.; B. Parham, Agr. J. Dept. Agr. Fiji 13 (1942) 41, *'edulis'*; Fl. Fiji Isl. (1964) 267. — T y p e: *Seemann 653*, Fiji (BM, holo; K, iso).

Cyrtosperma cuspidilobum Schott, Ann. Mus. Bot. Lugd.-Bat. 1 (1863/4) 284. — T y p e: *Korthals s.n.*, Borneo (L, holo).

Cyrtosperma intermedium Schott, l.c. — *Cyrtosperma merkusii* var. *intermedium* (Schott) Engl. in DC., Mon. Phan. 2 (1879) 271; Pflanzenr. 48 (23C) (1911) 21. — T y p e: *Korthals s.n.*, Sumatra (L, holo).

Cyrtosperma dubium Schott, l.c. — T y p e: *Korthals s.n.*, Borneo (L, holo).

Cyrtosperma ferox L. Linden & N.E. Brown, Ill. Hort. (1892) 39, t. 153; Gard. Chron. Ser. 3, 12 (1892) 122; Engl., Pflanzenr. 48 (23C) (1911) 21. — T y p e: *N.E. Brown s.n.*, cult. Hort. Kew ex Borneo (K, holo).

Cyrtosperma merkusii var. *giganteum* Nadeaud, J. Botanique 11 (1897) 116. — T y p e: *Nadeaud s.n.*, Tahiti, Hitiaa (P, holo).

[*Cyrtosperma griffithii* Merr., Philipp. J. Sci. 2 (1907) Bot. 422, sphalm. pro *C. merkusii*.]

Cyrtosperma bantamense Koord., Bull. Jard. Bot. Buitenz. ser. 3, 1 (1919) 160, *'bantamensis'*, *'nom. subnud.'*; Koord. ex Koord.-Schumacher, Exkursionsfl. Java 4 (1923) 183, fig. 377, *'bantamensis'*. — T y p e: *Koorders 41645*, Java, Bantam (BO, lecto, selected here).

Cyrtosperma nadeaudeanum J.W. Moore, Bull. Bish. Mus. 102 (1933) 22. — T y p e: *Nadeaud s.n.*, Raiatea (P, holo).

Robust to gigantic herbs to 4 m tall; rhizome short and slender to very large, sometimes globose and weighing up to 70 kg, weakly to freely suckering. *Leaves* several, sagittate, rarely hastate; petioles c. 40 cm to c. 3 m long, heavily armed – often very heavily with stout conical spines towards the base – to unarmed (cult.); blade c. 30 cm to 1.3 m long, to c. 80 cm wide, armed or not abaxially, held more or less horizontally to vertically with the posterior lobes down; posterior lobes somewhat exceeding the anterior ones; primary venation of the anterior lobe curvinerved (in small specimens) to pinnate (in large ones); posterior midribs naked in the sinus for c. 5 cm. *Inflorescence* solitary on a peduncle similar to but usually shorter than the petioles and like them with a geniculus at the top turning blackish on drying. *Spathe* very variable in size, colour, and shape, 2.5 to c. 30 cm long, white to yellow to green to purple, if pale then usually with purplish streaks outside, rolled back to deflexed to erect (with increasing size), in the latter somewhat constricted above the level of the apex of the spadix; spadix 2–24 cm long, equalling or exceeding half the length of the spathe, sessile to stipitate, if stipitate than stipe free or adnate to the spathe. *Flowers* hexamerous; ovary (1–)2-ovulate; stamens exserted from the tepals at male anthesis. *Fruit* reddish orange, sessile, 1(–2)-seeded. *Seed* campylotropous, almost circular in profile to shallowly kidney-shaped, 5–11 mm long; seed-coat

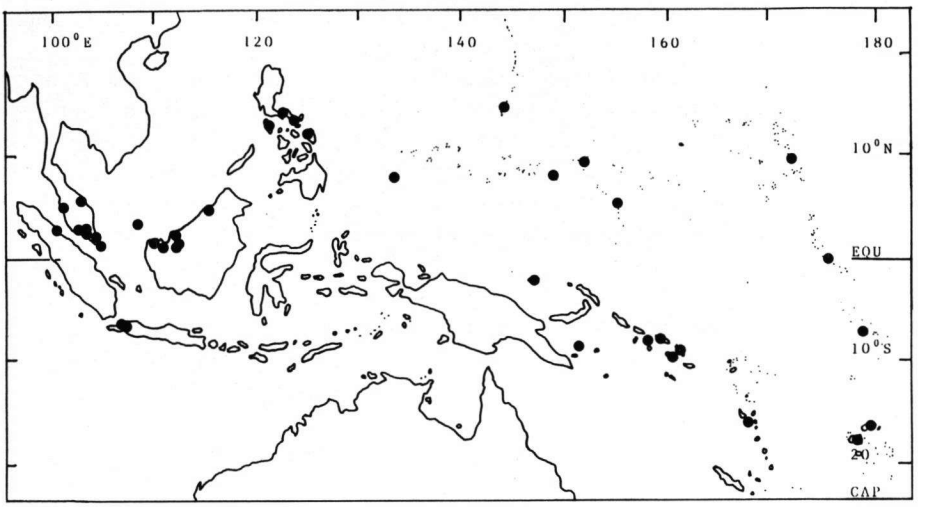

Fig. 2. Distribution of *Cyrtosperma merkusii* (Hassk.) Schott. (Additional localities further East in Oceania.)

brown with c. 3 raised, warty, longitudinal crests to sparsely and more or less irregularly warty and faintly crested.

Distribution. Malesia to Oceania, excluding Sulawesi, the Moluccas, and mainland New Guinea. In lowland swamp forests, open swamps, and in cultivation. Fig. 2.

Notes. The species, as now understood, covers a wide range of morphological variation. Figure 1 illustrates some extremes. Poise of the spathe appears to be affected by its size relative to that of the spadix. Where the spathe is relatively small, its base is stretched during expansion of the inflorescence and the spathe is deflected. Where it is relatively large there is, as it were, enough to go round at the base and it is held erect.

Armature is heavy throughout the range of the wild plant, and it would seem that unarmed forms have been selected in cultivation. The unarmed cultivars lie towards the massive end in the range in size. Nicolson (1979) has suggested that these be surveyed for polyploidy; there are few fruiting collections, and these show lower fruit set than the wild forms. Seeds in the cultivated plants differ somewhat from those of the wild, principally in size – they are large – and to some extent in the degree of ornamentation of the testa and curvature of the seed, both of which tend to be less marked in the cultivated forms. None of these characteristics, however, shows sufficient correlation with another to allow formal taxonomic distinction between the wild and the cultivated plants throughout the range, particularly in the absence of detailed observations on a range of living plants.

Aspects of the economic botany of this species are discussed by Barrau (ll.cc.), Burkill (1935), Brown (l.c.), Loumala (l.c.), B. Parham (l.c.), J. Parham (l.c.),

Purseglove (1972), and have been recently summarised and extended in Chandra (1984). A number of cultivars are locally and informally recognised.

The source from which this plant was distributed in cultivation remains an enigma. The species is clearly wild, little used, and usually heavily armed in Peninsular Malaysia, Sumatra, Borneo, and Java where it is very rare (Van Steenis, pers. comm.). Plants from the Philippines, however, appear to be of the unarmed or weakly armed gigantic cultivated kind, which has, perhaps, escaped there. Heavily armed and unarmed very large plants of this species are found in the Solomon Islands, in and out of cultivation. The most closely related species are from Bougainville (Solomon Islands), the Louisiade Archipelago (off the eastern tip of New Guinea), and from a single locality in southern Irian Jaya.

Thus the 'Merkusii group' has a natural distribution that is split between western Malesia and Papuasia. The occurrence of seemingly wild-type plants in the Solomon Islands makes it difficult to arrive at a single suggestion as to the origin of *C. merkusii* in Pacific cultivation. Possibilities that present themselves are a) that like the 'Merkusii group' *C. merkusii* itself has a split natural distribution that pre-dates the influence of Man, and that the species came into cultivation in the Solomon Islands or West Malesia or both independently; or b) that the seemingly wild type plants that occur in the Solomon Islands are relics of introductions from the west of the earliest (still spiny) selected forms (such as are cultivated in the Trobriand Islands and on Manus Island to the North of New Guinea). Then it must be considered merely coincidental that there are closely related endemic species in the area.

Further data are needed on chromosomes throughout the range, and more detailed understanding of the morphology of the stem in both wild and cultivated plants. Information on these features is very scant.

As a crop plant *C. merkusii* seems to be becoming obsolete, *Colocasia* and *Xanthosoma* being favoured, and applied botany has so far given it little attention. However, as an early Melanesian and Polynesian crop (Barrau, ll.cc.), its origin, variation, and development are of ethnological interest, and the species deserves further biological inquiry.

Specimens seen (in alphabetical order of collector):

PENINSULAR MALAYSIA. Malacca, Sendor, *Alvins 523* (SING); Malacca, *Alvins 1000* (SING); Sungei Ujong, Bukit Kupayeh, *Alvins 2203* (SING); Johore, *Bogner 358* (M); Johore, Sungei Sedili, N of Kota Tinggi, *Bogner 1510* (US); Malacca, Sendor, *Burkill 540* (SING); Negri Sembilan, Tampu, *Burkill 1416* (SING); Johore, 46 mile K. Sedili New Rd., *Burkill 1844* (K, L, SING); Batu Kuai, *Curtis 2988* (SING); Malacca, Ayer Panas, *Derry 298* (SING); Pahang, Sungei Lembing, *Hardial 1* (K, L, SING); Pahang, Kota Klanggi, *Henderson s.n.* (SING); Pahang, Titi Bungor, *Henderson s.n.* (SING); Johore, Labu Forest Reserve, Sungei Gatong, *Henderson 30261* (SING); Kluang, *Holttum 9419* (K, SING); Kluang, *Kehding s.n.* (FI); Perak, Larut, *King's Collector 2260* (L, SING), *4357* (K, P, SING, US), *5654* (BM, K, L, SING); Malacca, *Maingay 1554* (K), *3182* (K); Kuala Selangor, Sungei Tinggi, *Mohammed Nur s.n.* (SING); Johore, 20 mile Kota Tinggi–Jemalung Rd., *Nicolson 1217* (K, L, SING, US), *1225* (US); Pahang, Kuala Makau, *Ridley 2395* (K); Selangor, Rawang Forest Reserve, *Ridley 7864* (K); Trengganu, Dungun, *Soepadmo & Mahmud 9067* (A); Pahang, Tasek Berah, *Stone 9477* (KLU, MO).

SINGAPORE. *Allen s.n.* (SING); Reservoir Jungle, *Corner s.n.* (SING); *Croat 53252* (MO); *Gaudichaud s.n.* (P); *Horsfield s.n.* (BM); Macritchie Reservoir, *Maxwell 81118* (SING); *Ridley s.n.* (B, BM, SING).

SUMATRA. Asahan, Silo Maradja, *Bartlett 6442* (US); *Korthals s.n.* (L), *150* (L); Asahan, *Rahmat si Boeea 1976* (US), *2309* (US), *9518* (L).

JAVA. Cult. Hort. Bogor., *van Alderwerelt van Rosenburgh 296* (BO); Gunung Salak, *Blume s.n.* (L); Temoraong Tandang, *Boerlage s.n.* (L); cult. Hort. Bogor., *Hasskarl s.n.* (L); Bantam, *Koorders 41645* (BO); Bogor, *Lanjouw 12* (A, BO, K, L); Citeureup, Cileungsir, *Meijer 361* (BO); cult. Hort. Bogor., *Nicolson 975* (BO), *977* (BO, L); Cidjadas, *van Steenis 5424* (L, SING); cult. Hort. Bogor., *Teijsmann s.n.* (L); *Zippelius 42* (L); Bantam, *Zollinger 3256* (P).

BORNEO. Sarawak, Binatang, *Anderson 9021* (K, L, SAR); Sarawak, *Beccari P.B. 685* (FI, K), *P.B. 689* (FI, P); Sarawak, 5 miles S of Sarikei, *Bogner 1363* (K, US); Sarawak, Div. 2, Betong, *Brooke 8257* (BM, L); Sarawak, Lundu, *Brooke 8472* (L); Sarawak, Div. 1, Kuching, *Brooke 9687* (L); Sarawak, Div. 2, Simanggang, *Brooke 10727* (BM, L, SING, US); Sarawak, Lundu, Mt Gadin, *Clemens & Clemens 21925* (NY); Sarawak, Setapok Forest Reserve, *Hay s.n.* (SAR); Brunei, Bt Peradajan, nr. Labu, *Hotta 13592* (L); *Korthals s.n.* (L); Sarawak, Bau, *Nicolson 1350* (US), *1352* (US).

NATUNA ISLANDS. Bunguran, Kampi Ranai, *van Steenis 1279* (L, SING).

PHILIPPINES. Mindoro, Bulalacao, *Berjemos BS 1515* (US); Mindoro, Mt Yagaw, Mataragsik, *Conklin 19039* (L); Luzon, 19 km S of Daet, Barrio Tuaca, *Croat 53048* (MO, US); Luzon, Sorsogon Prov., Mt Bulusan, Irosin, *Elmer 15234* (L, MO, P, UC, US); Samar, Borongan, *Merrill 5218* (US); Luzon, Laguna, *Nicolson 837* (US); Samar, Catubig R., *Ramos BS 24267* (US); Luzon, Sorsogon Prov., Pilar, *Regalado & Ugalde 37495* (A, L).

PAPUASIA & OCEANIA. Palau Islands, Arekabesan, *Adelbai & Ngirakesan 2* (BISH); Marshall Islands, Arno Atoll, *Anderson 3718* (L, US); Solomon Islands, Guadalcanal, Matanika Valley, nr. Honiara, *Barrau 608* (BISH); Solomon Islands, Guadalcanal, Tinahula R., *Brown 2500* (BM); Caroline Islands, Koror, Ngerebodel Hamlet, *Canfield & Byochel 450* (US); Gilbert Islands, *Catala s.n.* (P); Ellice Islands, Nanurea, *Chambers 37* (MO); Samoa, Savaii Taga, *Christopherson 2830* (BISH); Marshall Islands, Wotho Atoll, *Fosberg 32461* (US); Marshall Islands, Ailuk Atoll, *Fosberg 33968* (US); Marshall Islands, *Fosberg 34018* (US); Marshall Islands, Ujae Atoll, *Fosberg 34302* (US); Papua New Guinea, Kiriwina Islands, *Frodin UPNG 2105* (K, UPNG); Marianna Islands, *Gaudichaud s.n.* (L); Vanuatu, Malekula, SW. Bay, *Green RSNH 6459* (K, P); Polynesia, Washington Island, *Herms & Kirby s.n.* (UC); Solomon Islands, Santa Ysabel, Tatamba, *Hunt RSS 2880* (K, US), *2882* (K, US); Fanning Island, *Long 3502* (US); Tahiti, *Moerenhout s.n.* (P); Society Islands, Raiatea, *Moore 675* (BO, L, MO, U); Guam, Agana Swamp, *Moore 1976* (US); Gilbert Islands, Onotoa, *Moul 8132* (B, BISH), *8159* (B, BISH); Tahiti, Hitiaa, *Nadeaud s.n.* (P); Raiatea, *Nadeaud s.n.* (P); Micronesia, Werua Islet, Kapingamangi, *Niering 582* (US); Cook Islands, Raratonga, Tupapa Valley, *Parks & Parks 22509* (K, UC, US); Samoa, *Powell 52* (K); Gilbert Islands, *Rock 46* (B); Ellice Islands, *Rock 48* (B); Society Islands, Reiono Islat, *Sachet 1640* (P); Papua New Guinea, Manus Island, NE of Kabuli village, *Sands 2868* (US); Marquesas Islands, Hiva Oa, *Schafer 5603* (K); Fiji, *Seemann 653* (BM, K); Samoa, Tutuila Island, *Setchell 284* (B); Tahiti, *Setchell & Parks 410* (A, B, P, US); Marshall Islands, Ailuk Atoll, *St. John & Cowan 21842* (BISH, US); Solomon Islands, Malaita, Kwai'aka R., *Stone 2320* (US); Solomon Islands, New Georgia, *Waterhouse 189* (K); Samoa, Takaofo, *Whistler 4648* (B); Cook Islands, Raratonga, Titikavika, Arane Stream, *Wilder 845* (BISH), *853* (BISH); Mortlock Islands, *Womersley NGF 19335* (LAE); Caroline Islands, Truk, Ulalu, *Wong 158* (A, US); Caroline Islands, Yap, Rul, Ngolok, *Wong 367* (A, BISH, US).

2. Cyrtosperma johnstonii (W. Bull) N.E. Brown

Cyrtosperma johnstonii (W. Bull) N.E. Brown, Gard. Chron. 18, 2 (1882) 808; Becc., Bull. Roy. Soc. Tosc. di Ort. 10, 1 (1885) 5; Engl., Pflanzenr. 48 (23C) (1911) 19; Hort., Gard. Chron. ser. 3, 56 (1914) 155, fig. 70, 179; N.E. Brown in Curtis, Bot. Mag. ser. 4, 10 (1914) t. 8567; Alderw., Bull. Jard. Bot. Buitenz. ser. 3, 1 (1920) 373. — *Alocasia johnstonii* W. Bull, Retail list 143 (1878) 154; Hort., Gard. Chron. ser. 2, 13 (1880) 759; André, Ill.

Hort. 27 (1880) 133, t. 395; Maedicke in Moller, Deutsche Gartn.-Zeit. 26, 12 (1911) 135, t. 3. — T y p e: *N.E. Brown s.n.*, cult. Royal Bot. Gardens Kew (K, lecto, selected here).

Gigantic suckering herb to c. 3 m tall, usually with one crown strongly dominant, but eventually forming a clump of large crowns. *Leaves* several together, hastate to sagittate; petioles to 2.5 m long, irregularly and obliquely mottled white, green, brown and pink, heavily armed with the spines coalescing into oblique combs; costae bright pink in young specimens, later with the laminas blotched reddish brown beneath and the costae green to brown; posterior lobes somewhat exceeding the anterior, to c. 70 cm long; peduncle similar to but shorter than the petioles. *Spathe* deeply and narrowly boat-shaped, 9–c. 40 cm long, rather abruptly more deeply and narrowly concave in the upper portion, erect, dark purple outside, pale dirty yellowish green within; spadix 7–25 cm long, with a short free stipe, somewhat glaucous; flowers hexamerous; anthers exserted at male anthesis; ovary 1- to 2-ovulate; fruit and seed unknown.

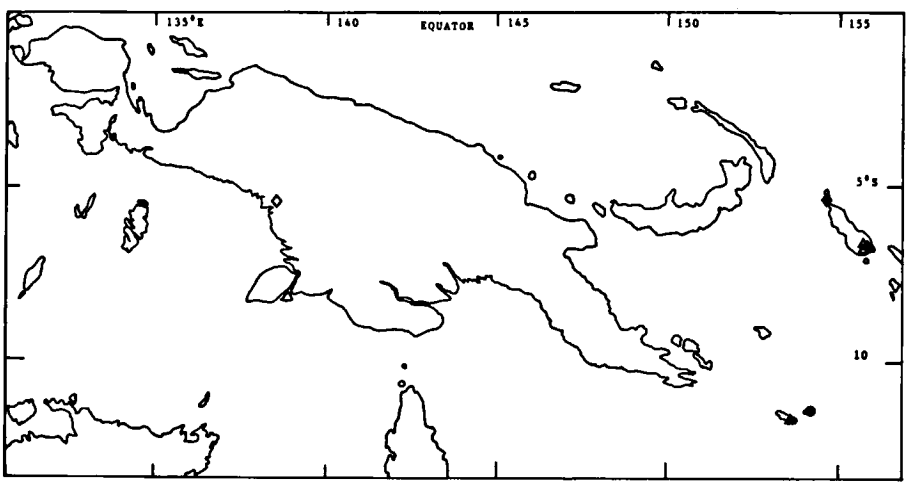

Fig. 3. Distribution of the 'Merkusii group' of *Cyrtosperma* species, excluding *C. merkusii*. △= *C. bougainvillense* A. Hay, ● = *C. brassii* A. Hay, ◇ = *C. giganteum* Engl., ▲ = *C. gressittorum* A. Hay; ◆ = putative field locality for *C. johnstonii* (W. Bull) N.E. Brown.

D i s t r i b u t i o n. Known only from and widely distributed in cultivation, and said to have been introduced from the Solomon Islands. There are no collections which can be said with confidence to be of this species and from wild plants. However, *Waterhouse 42-B* (K), is from a juvenile plant collected at Hapan, Buka Island in 'open country'. Buka Island lies at the north-western end of the Solomon Island Chain (fig. 3). The specimen is labelled *Caladium*, suggesting that it may have had pink coloration in the leaf.

N o t e s. *Cyrtosperma johnstonii* is phenotypically very variable. The variation is related to maturity of the plant and the conditions of cultivation. Young plants have very brightly coloured pink costae visible on the adaxial side of the leaf. In well-

Fig. 4. *Cyrtosperrma grassittorum* A. Hay. – *Brass 28049*: A, B, bar = 2 cm; C, flowers, bar = 4 mm.

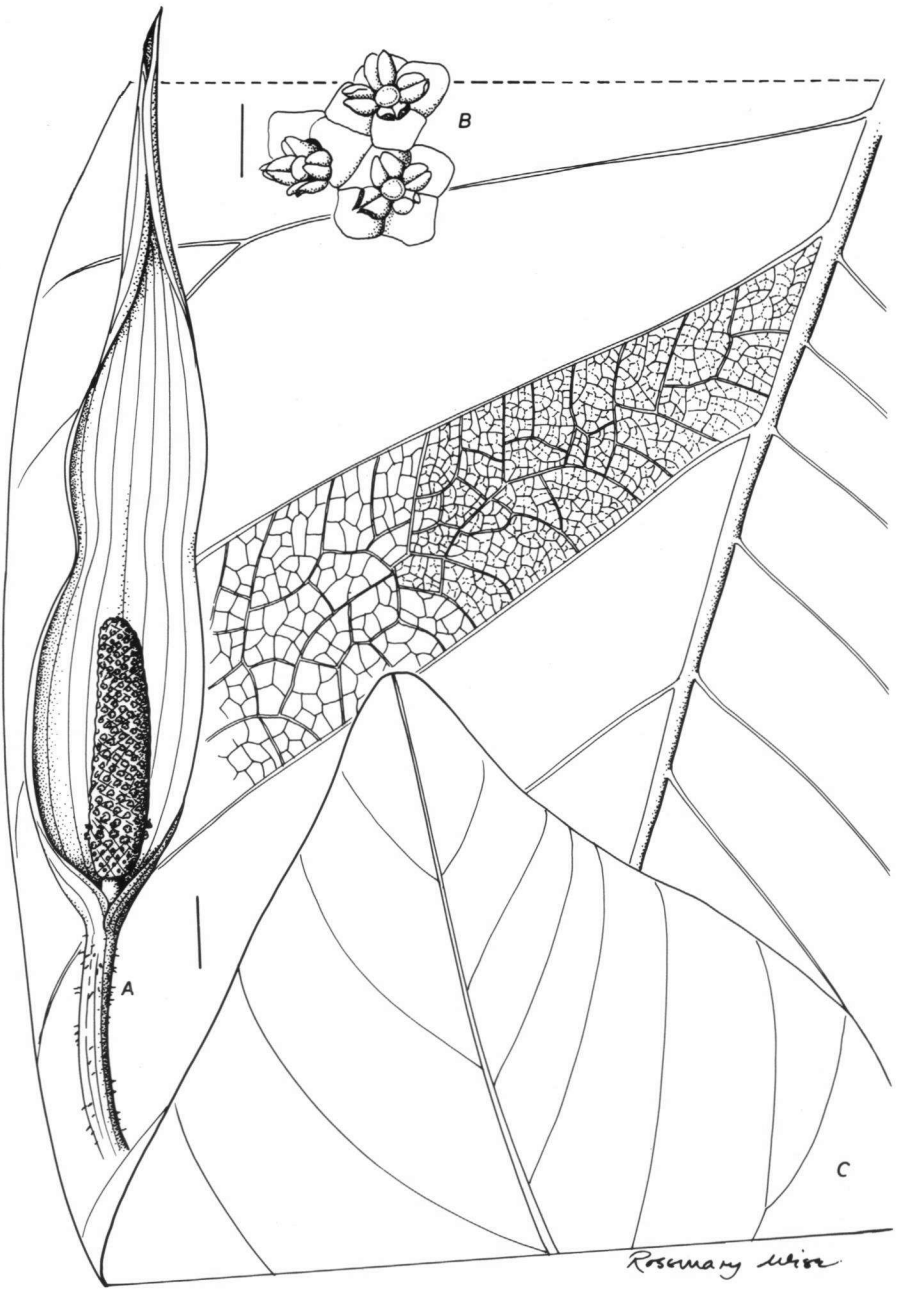

Fig. 5. *Cyrtosperma brassii* A. Hay. – *Hay s.n.*: A, C, bar = 2 cm; B, bar = 4 mm.

grown plants this state disappears to be replaced by dark blotching. Inflorescence size is also variable, dependent on the maturity of the crown, and in well established clumps the full range of inflorescence size may be observed simultaneously amongst crowns of different sizes. Fruiting material of this species is unknown. Eyde et al. (1967) reported abortive anthers, though I have not noted this to be the case. Marchant (1973) notes that the plant is diploid with 2n = 26. Inflorescences of all species studied are self-sterile through protogyny. Plants of this species bearing several inflorescences at once fail to set seed. It would seem then that *C. johnstonii* is either sterile, or that it is physiologically self-sterile. In either case it is highly likely that all the cultivated plants of this species represent a single clone. It is widely distributed in living botanical collections, but is too slow growing to be of much commercial horticultural interest.

Specimens seen: Java, cult. Hort. Bogor., *van Alderwerelt van Rosenburgh 237* (BO). Vietnam, Saigon, *d'Alleizette s.n.* (P). Cult. Hort. Kew, *N.E. Brown s.n.* (K). Cult. Hort. Singapore, *Hay s.n.* (SING). Java, cult. Hort. Bogor., *Nicolson 976* (BO, US). Malaysia, cult. Penang, *Nicolson 1012* (US). Thailand, cult. Katsetsut University, *Nicolson 1696* (US).

3. Cyrtosperma gressittorum A. Hay, *spec. nov.* – Fig. 4.

A speciebus ceteribus *Cyrtospermatis* spatha cocullata differt. — Typus: *L.J. Brass 28049*, Papua New Guinea, Milne Bay Prov., Sudest (= Tagula) Isl., Rambuso, 11 Sept. 1956 (L, holo; A).

Herb to 70 cm high. *Leaves* with petiole to 60 cm, sheath papery, c. 15 cm long, spines sparse, straight, needle-like, to 3 mm long; petiole variegated green and white; lamina hastate-sagittate, sparsely armed below, c. 30 cm long; anterior lobe subequalling the posterior ones; posterior lobes slender, to 6 cm wide, their midribs naked in the sinus for c. 3 cm, lesser venation somewhat prominent below; costae of the anterior lobe arising near the sinus, curvinerved, running to the margin near the tip; peduncle similar to but exceeding the petiole, to 90 cm long. *Spathe* lanceolate, c. 7 cm long, hood-forming in the upper quarter, green, major venation parallel, distant, secondary venation reticulate; spadix orange, 4 cm long with a 5 mm stipe adnate to the spathe. *Flowers* tetramerous; anthers exserted from the tepals at male anthesis, apparently retracting afterwards; stigmas hardly exceeding the tepals; ovule solitary; fruit and seed unknown.

Distribution. Known only from the type collection from rainforest on the crest of a ridge at 150 m altitude (fig. 3).

Notes. The specific epithet commemorates the distinguished entomologist and biogeographer J. Linsley Gressitt and his wife Margaret who died together in an air crash in China in April 1982. It was through J.L. Gressitt that I was first introduced to tropical vegetation at Wau Ecology Institute, Papua New Guinea.

4. Cyrtosperma brassii A. Hay, *spec. nov.* – Fig. 5.

A *C. merkusii* (Hassk.) Schott floribus tetrameris, seminibus laevibus, foliis asperis siccatis, differt. — Typus: *L.J. Brass 28282*, Papua New Guinea, Milne Bay Prov., Rossel Island, Abaleti, 1 Oct. 1956 (L, holo; A, LAE).

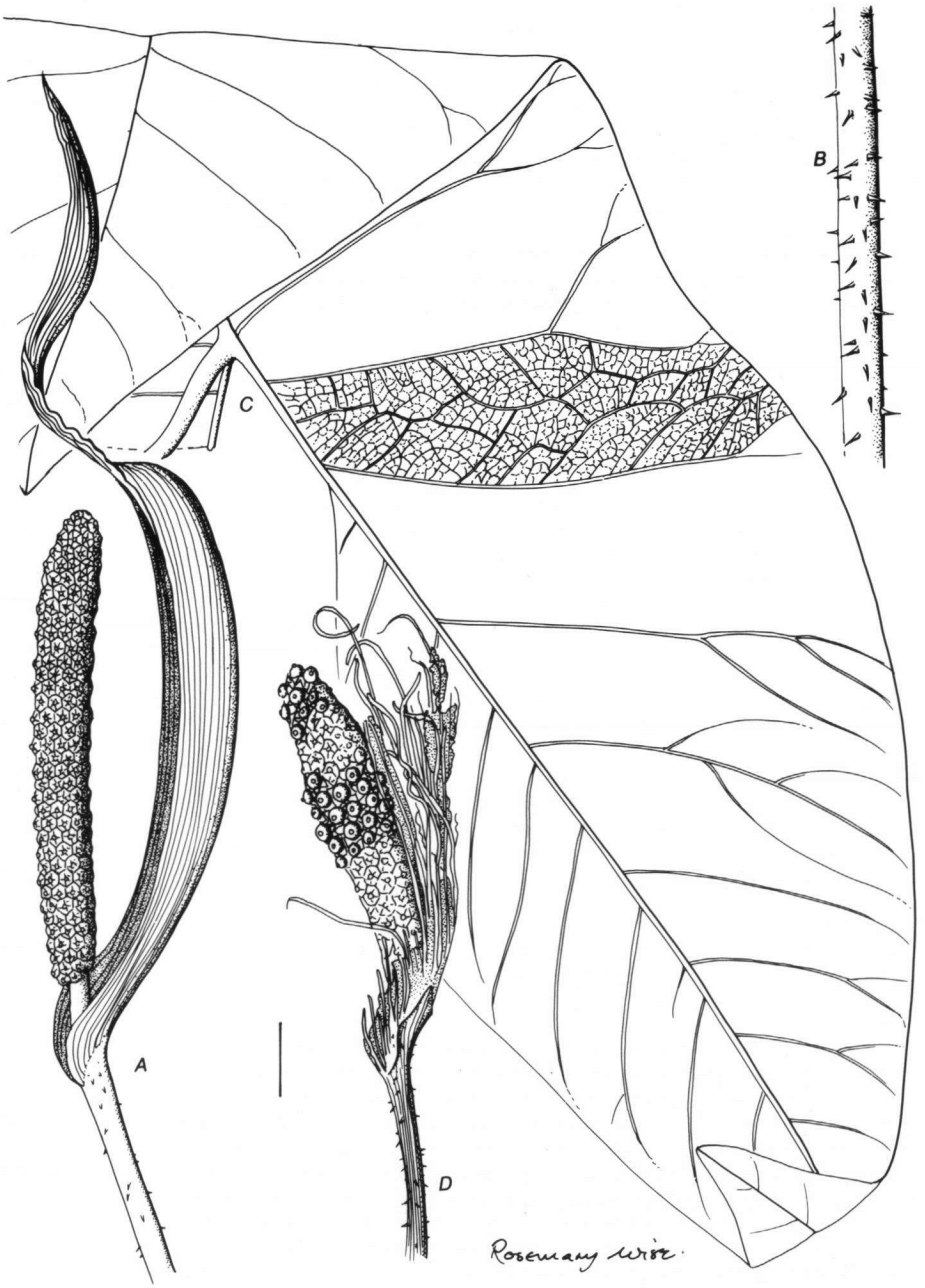

Fig. 6. *Cyrtosperma bougainvillense* A. Hay. – A–D *Hay 2051*; B, peduncle. Bar = 2 cm.

Robust herb to 2.5 m high. *Leaves* 2–several; petioles spreading out from the base, very prickly with small spines arranged in combs at least towards the base, mottled green and white; lamina sagittate, to 120 cm long, held with the anterior lobe up, the posterior ones down; costae of the anterior lobe pinnate, spreading; posterior lobes with the midribs naked in the sinus for c. 6 cm, to 30 cm wide at the widest point, with acuminate tips; upper and lower surfaces of the lamina asperous in the dry state (not so when fresh); peduncle similar to but usually somewhat shorter than the petioles. *Spathe* ovate lanceolate, to 18 cm long, remaining somewhat constricted above the level of the apex of the spadix after opening, boat-shaped, blackish purple, with parallel major venation, secondary venation reticulate; spadix with a c. 5 mm long free unarmed stipe, to c. 7 cm long, creamy yellow. *Flowers* tetramerous; ovaries 1(–2)-ovulate; anthers exserted from the tepals at male anthesis; fruit ovoid, orange-red. *Seed* smooth, very faintly longitudinally ridged.

Distribution. Restricted to Rossel Island in rainforest (fig. 3).

Other specimens seen:

PAPUA NEW GUINEA. Rossel Island, *Brass 28251* (L); *NGF 27090* (L, LAE); cult. Hort. Lae, *Hay s.n.* (FHO, LAE).

5. Cyrtosperma bougainvillense A. Hay, *spec. nov.* – Fig. 6.

A *C. merkusii* (Hassk.) Schott spatha plus minusve plana, semine torto lapidoso, stigmate miniato, spadice glauco differt. — Typus: *R. Schodde & L. Craven 3837*, North Solomons Prov., Bougainville Island, Maide Gorge, lower S slopes of Lake Lolosu Crater, c. 15 miles N of Buin, 14 Aug. 1964 (CANB, holo; A, K, L, LAE).

Robust, usually solitary, herb 1–2.4 m high; rhizome often long and creeping. *Leaves* 2–5, sagittate; petioles prickly, green mottled white; spines slender, without conspicuously broad bases, slightly curved, scattered or tending to be arranged in short comb-like clusters; geniculus up to 14 cm long; sheath papery-fibrous, about one fifth of the length of the petiole; posterior lobes of the lamina 40–75 cm long and 20–30 cm wide, tips not acuminate; anterior lobe 35–50 cm long, to c. 60 cm wide, with spreading costae; peduncle to 2 m long, usually shorter than the petioles, prickly. *Spathe* blackish purple to almost white, broadly lanceolate, to 27 cm long, 6.5 cm wide, widely open to base, somewhat deflected from the spadix, not shielding it from lateral view, upper part sometimes falling adaxially over the spadix. *Spadix* stipitate for c. 6 mm, the insertion extended up the spathe for c. 1 cm; fertile part to 11.5 cm long, 1.6 cm wide (in flower), purplish to glaucous-blue. *Flowers* hexamerous; anthers dirty yellow, exserted from the tepals at male anthesis; receptive stigmas bright scarlet; ovules (1 or) 2; fruiting spadix becoming horizontal to pendulous, dark bluish to black. *Fruit* obpyramidal, c. 8 × 8 mm, orange, with the apex truncate. *Seed* tightly curved over on itself; seed-coat very thick, stony, somewhat rough.

Distribution. The species is restricted to the actively volcanic cupriferous island of Bougainville, in montane rainforest and regrowth in moist gullies at 600–2000 m altitude (fig. 3).

Notes. It is curious that the species is not recorded from elsewhere in the Solomon Island chain, for it is locally abundant on Bougainville. Possibly the species is restricted to copper-bearing soils.

The seed is distinctive. As in other members of the genus it is campylotropous, but the micropylar and chalazal ends overlap so that the seed is helical and the funicle enters through what at first sight appears to be a hole in the side. The heavily ornamented seed-coat and the exserted anthers suggest affinity with the variable and widespread *C. merkusii,* a strictly lowland species.

Waterhouse 571 (K) is fragmentary, and may be referable to this species. It is annotated 'Solomon Islands, Iru (Mt. area), Siwai, Sept 1931.' I have not been able to find this locality.

Other specimens seen:

SOLOMON ISLANDS. North Solomons Prov., Bougainville Island, Panguna, *Hay 2051* (FHO, LAE); Arawa plantation, cult., *Nicolson 1510* (B, K, L, LAE, US); near Kieta, Kupec-Arawa Track, *NGF 13380* (LAE); Kapikavi, *NGF 31579* (K, L, LAE, US); Panguna Creek, *NGF 48642* (LAE).

6. Cyrtosperma giganteum Engl.

Cyrtosperma giganteum Engl., Nova Guinea 8 (1910) 249; Pflanzenr. 48 (23C) (1911) 17. — Type: *Versteeg 1818,* Irian Jaya, Lorentz (Noord) River (BO, lecto, selected here).

Translated, Engler's Latin description reads:

"Leaf with petiole to 2.5 m long, adult blade coriaceous, ovate-sagittate, anterior lobe to about 75 cm long, 70 cm wide at the base, obtuse or apiculate at the apex, posterior lobes to 1 m or more long, 50 cm wide, bent back, subacute, separated by a deep acute sinus, with about 8 distant lateral primary nerves joined into a marginal collective vein, posterior costae naked in the sinus for about 10 cm. Peduncle to 4.5 cm diam., smooth. *Spathe* ovate-lanceolate bearing a long acumen, reddish-brown, convolute below, c. 8 cm diam., c. 35 cm or more long; spadix dark rose, stipitate for 2 cm, 21 cm long, about 4 cm thick. Stamens 4–5, filaments to 1 mm long. Pistil 4 mm long, ovary pluriovulate. Perianth with 4–5 tepals 3.5 mm long. Fruiting spadix to 36 cm long, 9 cm thick. Berries ellipsoid, green, 1.5 cm long, 6 mm thick. Seeds several."

Distribution. Irian Jaya; known only from three collections from Lorentz (Noord) River (fig. 3).

Notes. This huge plant is poorly known. Fragmentary spirit material at Bogor and a sterile leaf specimen at Leiden indicate that the leaves are unarmed on the blade and upper part of the petiole, and armed with scattered straight spines in the lower part. Anthers are exserted from the perianth in a preserved fruiting spadix, and the seeds are longitudinally crested like those of *C. merkusii,* hence this species is tentatively placed in the 'Merkusii group'. The infructescence contains some 1,300 fruits and is by far the largest in the genus. Each fruit contains up to five seeds. The latter condition lead Engler to ally this species with the African *Lasiomorpha senegalensis* Schott (q.v.). However, the spathe is marcescent, the peduncle and petiole are geniculate, and the filaments are free in *C. giganteum,* indicating affinity with

Cyrtosperma s.s. In addition to the specimens cited below, Engler cites *von Römer 193*. I have not located this specimen.

Specimens seen:
NEW GUINEA. Irian Jaya, Lorentz (Noord) River, *Versteeg 1141* (BO, L), *1818* (BO).

'Cuspidispathum group'

7. Cyrtosperma cuspidispathum Alderw. – Fig. 7.

Cyrtosperma cuspidispathum Alderw., Bull. Jard. Bot. Buitenz. ser. 3, 1 (1920) 374; Krause & Alderw., Nova Guinea 14 (1924) 215. — Type: *Gjellerup 63*, Irian Jaya, Eta River, Upper Tami, 2 Apr. 1910 (B†?, holo, n.v.; L).

[*Cyrtosperma merkusii* auct. non Schott: Engl. in DC., Mon. Phan. 2 (1879) 271; Pflanzenr. 48 (23C) (1911) 20, pro parte, (?) quoad specim. cit. *Schlechter 14313, 16389, 20363, Hollrung 793, Lauterbach Ramu Expd. 75*; Engl. & Krause, Nova Guinea 8 (1912) 806, pro parte quoad specim. cit. *Gjellerup 63*.]

[*Cyrtosperma edule* auct. non Schott: Engl. in DC., Mon. Phan. 2 (1879) 271; Pflanzenr. 48 (23C) (1911) 17, pro parte, (?) quoad specim. cit. *Hollrung 602, Lauterbach 956*.]

[*Cyrtosperma macrotum* auct. non Engl.: Krause & Alderw., Nova Guinea 14 (1924) 215, quoad specim. cit.]

Moderately robust to gigantic solitary or rarely suckering herbs to c. 4 m tall; rhizome short. *Leaves* 2–several; petiole brown, green, or mottled in various combinations of these and white; armature sparse to dense; spines, at least in the lower parts of the petioles and peduncles, small, squat, abruptly upturned and easily dislodged; petioles standing subparallel, not distinctly diverging from the base; lamina hastate or sagittate, to 1.3 m long, in smaller specimens often with the lobes much narrower than long, held with the posterior lobes down, anterior lobe up, somewhat flaccid, unarmed; peduncle somewhat shorter than the petioles. *Spathe* 17–c. 100 cm long, clasping in the lower quarter, ovate-lanceolate, in smaller specimens erect, with increasing size the apical acuminate portion somewhat reflexed to greatly elongated, spirally twisted and dangling, purple brown, usually with yellow veins outside, and with pale pink to cream streaks towards the midline within; spadix to 18 cm long in flower, with a 2–6 cm long, free, sometimes armed stipe. *Flowers* hexamerous; anthers not exceeding the tepals at male anthesis; stigmas more or less sessile, white turning brown; ovaries predominantly uniovulate, rarely (in any spadix) biovulate. *Fruit* when ripe expelled from the spadix and held there by the stripped-away adaxial epidermis of the tepals. *Seed* slightly and irregularly ridged.

Distribution. Irian Jaya: Jayapura, Eta River. Papua New Guinea: West and East Sepik, Madang, Western, Southern Highlands and Gulf Provinces; in lowland rainforest undergrowth and regrowth, predominantly on alluvial soils; *Jacobs 9187* from lower montane forest on limestone at 500–600 m altitude (fig. 8).

Notes. The stem is creeping, subterranean, and up to 13 cm in diameter. It is, however, very short as the older parts of the rhizome quickly rot. In cultivation at Lae the rhizomes sucker, eventually forming large clumps. I have not observed this in wild plants. In the Gogol Valley (Papua New Guinea, Madang Province) speci-

Fig. 7a. *Cyrtosperma cuspidispathum* Alderw. – A *Brass 931*, flowering juvenile; B *NGF 10241*. Bar = 2 cm.

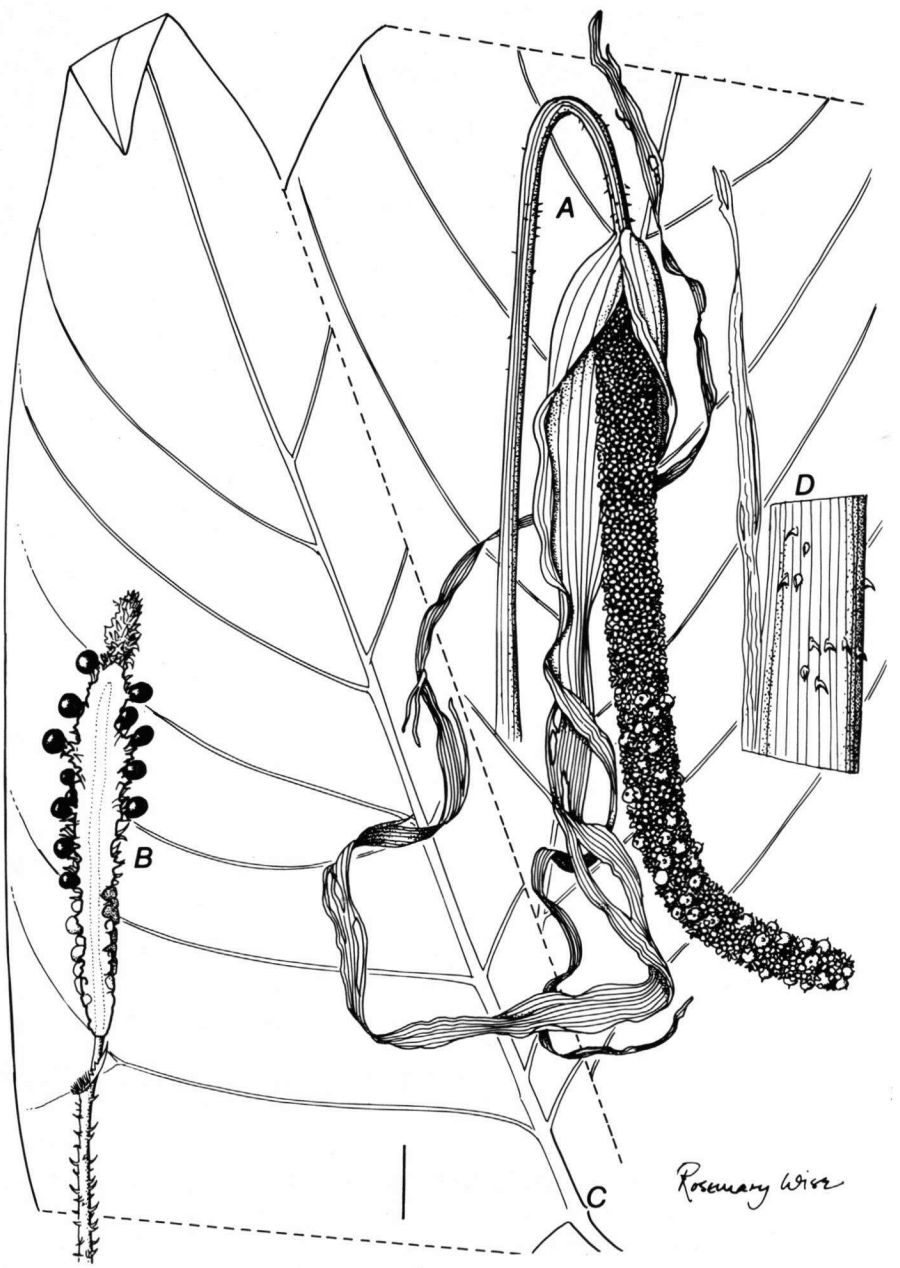

Fig. 7b. *Cyrtosperma cuspidispathum* Alderw. – A *NGF 10241*; B *Brass 7029*, expelling fruits; C, D *Hay 1205*, D, petiole (inverted). Bar = 2 cm.

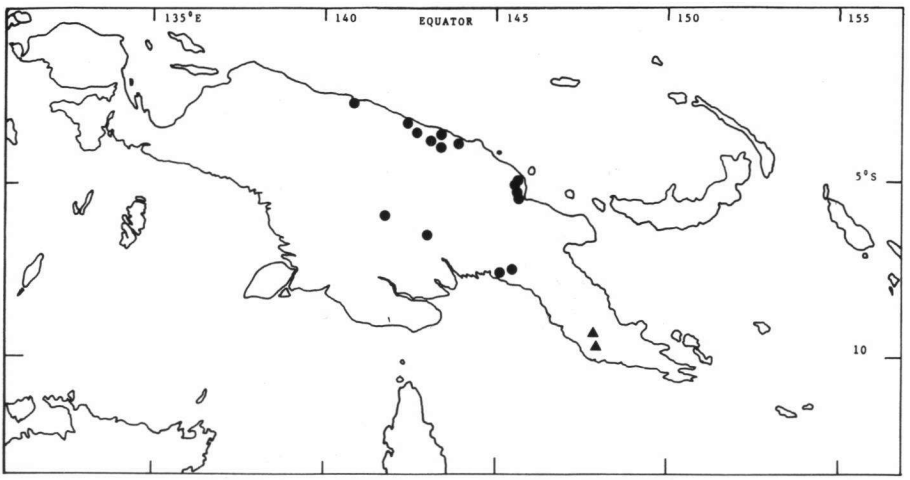

Fig. 8. Distribution of *Cyrtosperma cuspidispathum* Alderw. (●) and *C. kokodense* A. Hay (▲).

mens growing in regrowth after logging had achieved the maximum dimensions recorded for the species seven years after clearing. Seedlings were established in one year old regrowth.

The stigmas become receptive shortly after the spathe unrolls, in a rapid basipetal sequence lasting about two days. They remain receptive, bearing a drop of nectar, for about three weeks, unless pollination has taken place. Pollen is released after the stigmas have ceased to be receptive. The anthers open at apical pore-like slits and pollen is extruded in coherent rope-like masses. Anther dehiscence appears to be simultaneous in any flower, and in a slow basipetal sequence lasting several weeks within any inflorescence. Duration of anthesis is longer the larger the inflorescence. Other than pollen itself, there appears to be no 'reward' for visiting insects after the nectariferous stigmas have ceased activity. However, weevils identified as *Trochorhopalus strangulatus* Gyll. (BISH, det. W. Gagné) – a widespread species occurring from the Indian to the Pacific Ocean – are commonly found feeding on the tissue on the inside of the base of the spathe. The inflorescences emit a faint musty fruity odour day and night, before, during, and shortly after anthesis.

In common with other species of *Cyrtosperma*, the spadix of *C. cuspidispathum* becomes reorientated as inflorescence becomes infructescence; a geniculus at the top of the peduncle turns to spadix from pointing vertically up to pointing vertically down. In other species such as *C. macrotum* the reorientation is to the horizontal.

A feature of this species that is unusual for the genus (and for the tribe) but common in *Anthurium* is the means of presentation of the ripe fruit: in the majority of *Cyrtosperma* species the fruits remain directly attached to the spadix until either they are forcibly removed or the spadix disintegrates. In *C. cuspidispathum*, however, they are expelled from the spadix (presumably by the pressure of their own develop-

ment) and dangle from it attached by their bases to the tips of the tepals by the inner epidermis of the latter which is stripped away as the fruits emerge. They recall arillate seeds dangling by funicles.

The same feature might be expected in the following species, *C. kokodense,* the ripe fruits of which are as yet unknown.

The New Guinea collections cited by Engler under *C. merkusii* and *C. edule,* and cited here in the synonymy of this species, have not been located and may have been destroyed at Berlin. However, from their localities it is almost certain that they are referable to this species. I have seen no material referable to *C. merkusii* collected from mainland New Guinea. The illustration in Engler's monograph (1911, fig. 6) is clearly *C. cuspidispathum,* and not, as the caption would indicate, *C. edule* Schott (= *C. merkusii*).

Specimens seen (in alphabetical order of collector):

NEW GUINEA. Gulf Prov., Vailala River, Akaiuda, *Brass 931* (A, BRI); Western Prov., Palmer River, 2 miles below junction with Black River, *Brass 7029* (A); Gulf Prov., Middle Tauri River, *Craven & Schodde 1031* (CANB); Aitape, along Bliri River, nr. Kaiye village, *Darbyshire & Hoogland 8178* (CANB); Eta River, Upper Tami, *Gjellerup 63* (L); Jaiwa, *Gjellerup 618* (L); Gogol Valley, *Hay 1201 , 1203 , 1204 , 1205* (all BFC, FHO); nr. Ambunti, *Hoogland & Craven 10066* (L, LAE); 20 km SSW of Kutubu, *Jacobs 9187* (L); Wewak, *LAE 53581* (KLU, L, LAE); Gulf Prov., Vailala River, *LAE 61284* (LAE); Maprik, nr. Brikitti and Nynam Bridge, *LAE 73591* (L); Josephstaal, *NGF 10241* (A, BRI, LAE); Gogol Valley, *NGF 12579* (A, K, L, LAE); Madang, Kabriman village, *NGF 34304* (LAE); Angoram, Arafura River, *NGF 35124* (LAE); Ossima, *NGF 39192* (L, LAE, US); cult. Hort. Bot. Lae, *NGF 40838* (LAE), *Nicolson 1485* (LAE); Dagua, *Pulsford & Floyd 5410* (A, LAE).

8. Cyrtosperma kokodense A. Hay, *spec. nov.* – Fig. 9.

A *C. cuspidispatho* Alderw. aculeis vulgo rectis, lamina armata, spatha ad basin haud convoluta, ad apicem haud longe acuminata, differt. — Typus: *C.E. Carr 16194,* Papua New Guinea, Northern Prov., Kokoda, 22 March 1936 (L, holo; B, BM, CANB, SING).

Herb to 1.5 m high; lamina markedly hastate to sagittate, c. 40–100 cm long in flowering specimens; anterior lobe to 30 cm from tip to sinus; posterior lobes obliquely narrowly ovate, to c. 75 cm long, with rather fine and numerous costae divergent from the midribs at c. 35 degrees; petioles sometimes mottled, armature sparse, short, slender, to 4 mm long, straight to upcurved. *Spathe* to 25 cm long, lanceolate, to 2.5 cm wide, in the lower 5 cm the margins clasping the spadix but not overlapping, in the middle part deflected, in the upper part spirally twisted, tip not or hardly acuminate, the whole purple, paler within and with yellowish streaks; spadix stipitate for 1 cm, 4.5–5.5 cm long, c. 6 mm wide (in flower), cylindrical; flowers hexamerous, anthers not exceeding the tepals at male anthesis, stigmas brown (dried), papillate, ovary 1(–2)-ovulate; ripe fruit and seed unknown.

Distribution. Papua New Guinea, Northern and Central Provinces, in rainforest undergrowth and streamsides at around 400 m altitude (fig. 8).

Other specimens seen:

NEW GUINEA. Kokoda, *Carr s.n.* (BM); Kokoda, *Cheeseman 3* (K, L); Central Province, Boridi village, *LAE 60274*; Kokoda Trail, *NGF 23557* (LAE).

Fig. 9. *Cyrtosperma kokodense* A. Hay. – A *NGF 23585*; B *Cheeseman 3*. Bar = 2 cm.

Fig. 10. *Cyrtosperma carrii* A. Hay. – *Carr 12307*. Bar = 2 cm.

'Carrii group'

8. Cyrtosperma carrii A. Hay, *spec. nov.* – Fig. 10.

A ceteribus speciebus *Cyrtospermatis* spatha latissime ovata ad basin convoluta, stylo conoideo differt. — T y p u s: *C.E. Carr 12307*, Papua New Guinea, Central Province, Koitaki, 15 March 1935 (BM, holo; L, LAE, SING).

Herb to 55 cm high. *Leaves* several, hastate, armed on petiole and underside and margins of blade; petioles to 50 cm long with a sheath 11 cm long; lamina to 40 cm long, coriaceous; spines sparse, straight to very slightly curved, to 5 mm long; anterior lobe oblong, gradually acuminate, subequalling the posterior lobes; anterior costae 2, emerging near the sinus, curvinerved, running to the margin near the tip; posterior midribs naked in the sinus for c. 3 cm, broadly lanceolate. *Spathe* broadly ovate, clasping in the lower fifth, c. 12 cm long and to 8 cm wide (flattened), deep reddish brown with yellow, widely reticulate venation persisting as a 'skeleton' around the fruiting spadix; spadix with a 4 mm stipe adnate to the spathe, fertile part c. 25 cm long and 5 mm wide. *Flowers* tetramerous; anthers not exserted from the tepals at male anthesis; stigmas raised c. 1–2 mm on the conical apex of the ovary; fruit ovoid, capped by the style and stigma. *Seed* smooth.

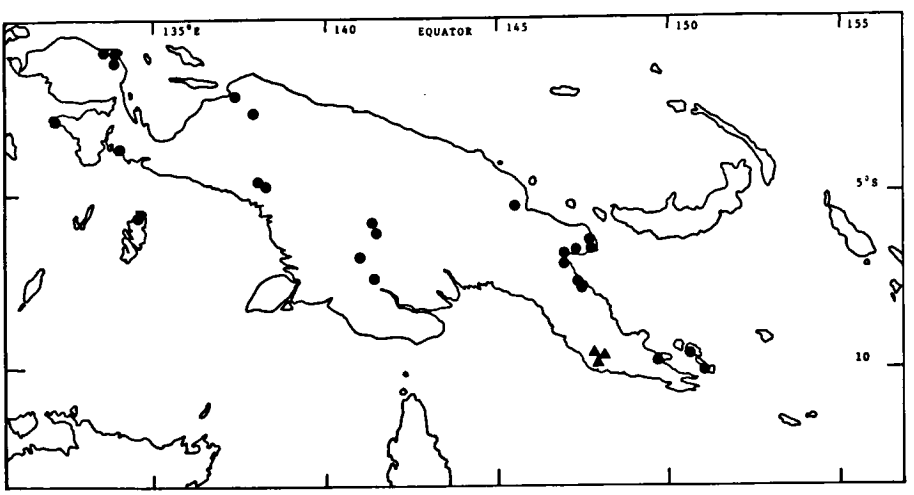

Fig. 11. Distribution of *Cyrtosperma carrii* A. Hay (▲) and *C. macrotum* Becc. ex Engl. (●).

D i s t r i b u t i o n. Papua New Guinea, Central Province, in lowland and lower montane rainforest undergrowth at 200 to 700 m altitude; rare (fig. 11).

N o t e s. The species is named for the collector of the type specimens, Cedric Errol Carr, who died of blackwater fever in Port Moresby in 1936.

Cyrtosperma carrii would seem to have horticultural potential.

Other specimens seen:
NEW GUINEA. Mafulu, *Brass 5256* (LAE, NY); vicinity of Musgrave, *Craven 50* (LAE); Manumu village, *NGF 32475* (LAE); between Subitana and Javereri, headwaters of the Kemp Welsh River, *Nicolson 1436* (K, L, LAE, US).

'Macrotum group'

10. Cyrtosperma macrotum Becc. ex Engl. – Fig. 12.

Cyrtosperma macrotum Becc. ex Engl., Bull. Soc. Tosc. di Ort. 4 (1879) 295, *'macrota'*; in Becc., Malesia 1 (1882) 23, t. 23; Engl., Nova Guinea 8 (1911) 249; Pflanzenr. 48 (23C) (1911) 22. — T y p e: *Beccari P.P. 619*, Irian Jaya, Andai (FI, lecto, selected here).

[*Cyrtosperma merkusii* auct. non Schott: Engl., Pflanzenr. 48 (23C) (1911) 20, pro parte, quoad specim. cit. *Versteeg 1108*, *von Römer 736*; Engl. & Krause, Nova Guinea 9 (1912) 806, quoad specim. cit. *von Römer 72*.]

Cyrtosperma syapense Alderw., Bull. Jard. Bot. Buitenz. ser. 3, 1 (1920) 374; Krause & Alderw., Nova Guinea 14 (1924) 215. — T y p e: *van Alderwerelt van Rosenburgh 248*, cult. Hort. Bogor. (BO, holo).

Cyrtosperma subulispathum Alderw., l.c. 375; Krause & Alderw., l.c. — T y p e: *Versteeg 1108* (L, holo; U).

? Cytosperma hastatum Alderw., l.c.; Krause & Alderw., l.c. — T y p e: *von Römer 136* (n.v.).

? Cyrtosperma consobrinum Alderw., l.c.; Krause & Alderw., l.c. — T y p e: ? cult. Hort. Bogor. (n.v.).

Cyrtosperma janowskyi Krause in Krause & Alderw., l.c. — T y p e: *Janowsky 489* (B†?, holo; L).

Cyrtosperma sp. Hay in Johns & Hay, Stud. Guide Monoc. Papua New Guinea 1 (1981) 53, fig. 20.

Moderately robust herbs to 1.3 m high, rhizome plagiotropic or very short, to 6 cm diameter. *Leaves* 3–several, hastate to sagittate; petioles divergent from the base, prickly, mottled or not; blades to c. 90 cm long, usually less, to c. 50 cm wide, held horizontally or with the posterior lobes down, ± coriaceous, armed beneath (sometimes heavily) and sometimes on the margins, often with all the blades orientated in the same direction, 1° and 2° venation (sometimes very) prominent beneath; costae of anterior lobe curvinerved to pinnately arranged; posterior lobes markedly exceeding the anterior one, asymmetrically ovate to broadly lanceolate, naked in the sinus for up to c. 5 cm. *Inflorescence* solitary, occasionally 2 consecutively, on peduncles similar to and slightly exceeding the petioles. *Spathe* narrowly lanceolate, to c. 15 cm long, 3 cm wide (flat), occasionally spiny at the base and along midline without, white-yellowish green/brown to purple, insertion shallowly cup-like, or with the margins deflected or shortly decurrent on the peduncle; spadix c. 6–12 cm long, c. 5 mm wide (fl.), pale yellow to green, free-stipitate or with a stipe adnate to the spathe or sessile. *Flowers* hexamerous or tetramerous or mixed (then sometimes with some pentamerous); ovule solitary, ± basal; anthers not exserted from the tepals at male anthesis; fruit sessile, ovoid, orange; seed with smooth testa, campylotropous, asymmetrical in lateral view.

Distribution. New Guinea, Aru Islands, d'Entrecasteaux Islands, in lowland swamp forest, lowland rainforest and lower montane forest (fig. 11).

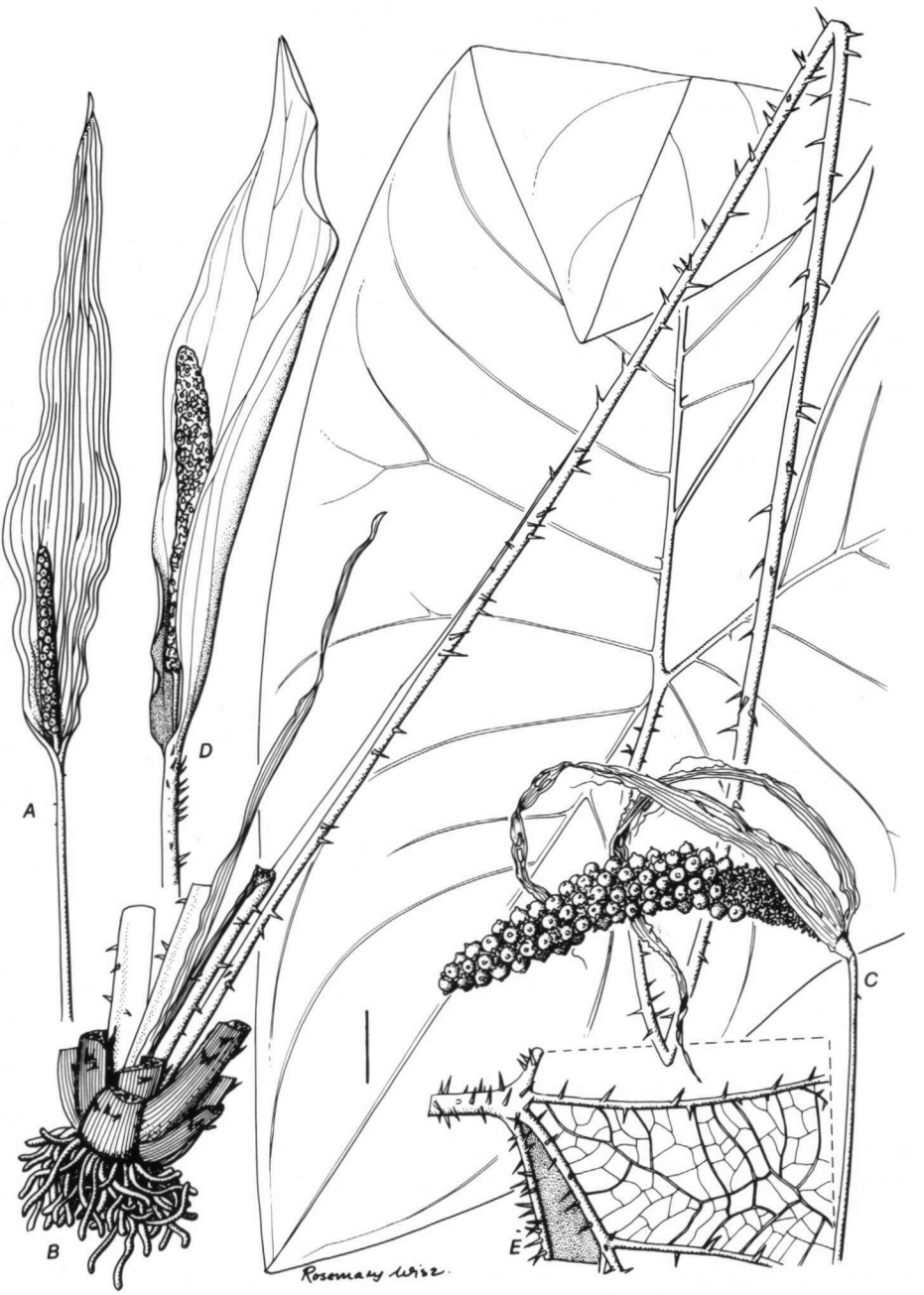

Fig. 12. *Cyrtosperma macrotum* Becc. ex Engl. – A, C *BW 6647*; B *BW 4400*; D, E *Brass 23582*. Bar = 2 cm.

N o t e s. The species is highly variable, and the patterns of variation are complex. It occupies three disjunct geographical areas, viz. of Papua New Guinea Morobe and Madang Provinces, Milne Bay Province, and of Irian Jaya the southern side and western tip , together with the Western Province of Papua New Guinea.

Specimens from Morobe and Madang Provinces have coriaceous leaves, free-stipitate spadices, hexamerous flowers, and the insertion of the spathe such that the base is somewhat cup-like. Specimens from Milne Bay Province have more membranaceous leaves, spadices with a stipe adnate to the spathe, (at least some) tetramerous flowers, and the spathe decurrent for a short distance on the peduncle.

However, these distinctions break down in the representatives from the remaining area, and the characteristics vary independently. Leaves may be coriaceous to membranaceous, spadices may be stipitate or sessile, the stipe may be free or adnate, the flowers may be tetramerous or hexamerous or both in one spadix, and the insertion of the spathe may be cup-like, or the margins may be deflexed to the base, or the insertion may be somewhat decurrent on the peduncle.

Within this part of the geographical range are some incompletely delineated emphases in the morphological variation: towards the eastern end, the plants commonly have coriaceous leaves with very prominent venation on the abaxial side, sessile spadices with tetramerous flowers, and spathes with the margins deflexed at the base.

At the other end, on the Bird's Head Peninsula (Vogelkop Peninsula), are specimens with more membranaceous leaves with less prominent venation and shortly stipitate spadices with (at least some) hexamerous flowers.

Geographically in between are a paucity of morphological intermediates. From the material I have examined I have concluded that it would be misleading to give formal recognition to the entities from Milne Bay and Morobe/Madang Provinces. It seems not unreasonable to postulate that the Morobe/Madang and Milne Bay entities may have resulted from the re-expansion of relics of a formerly more generally variable species ranging throughout lowland New Guinea, fragmented by Pleistocene desiccation. Whether the emphases at either end of the western and south-western part of the area occupied by the species can be explained as a result of reunion of relict populations, incomplete isolation through the Pleistocene period, or merely as artefacts of undercollecting, remains to be seen.

I have tentatively ascribed *C. hastatum* and *C. consobrinum* to the synonymy of *C. macrotum* in spite of not having seen their types, on the basis of their descriptions.

There is some confusion over what Van Alderwerelt van Rosenburgh meant by *C. hastatum*. Engler's chaotic *C. merkusii* is cited as a partial synonym. Engler had determined *von Römer 736* (coll. Sept. 1909) as *C. merkusii*. Van Alderwerelt, however, cites *von Römer 136*, '16 May 1907', and *von Römer 72* 'from the same locality' as syntypes for *C. hastatum*. Von Römer was not in New Guinea in 1907, nor in any May (Van Steenis-Kruseman, 1950). Engler (1911) had already ascribed *von Römer 72* to *C. macrotum*, which is overlooked in the synonymy of *C. hastatum*. I have not located these specimens.

Specimens were cited in the protologue of *C. macrotum* thus: 'New Guinea, Batanta, Beccari Piante Papuane 619; Fly River, D'Albertis.' The D'Albertis collection

Fig. 13. *Cyrtosperma beccarianum* A. Hay. – *van Royen 4792*. Bar = 2 cm.

is a mixture of this species (leaf) and *Lasia spinosa* (L.) Thwaites (inflorescence). *Beccari P.P. 619* was not collected at Batanta but at Andai. Beccari did, however, collect a *Cyrtosperma* at Batanta (*P.P. s.n.*, coll. 1875), but it is a species different from that in *Beccari 619*. *Beccari 619* is chosen as lectotype as this specimen number is clearly cited, and the specimen is in fruit, forming the basis of the illustration of the fruit in Beccari (l.c.). The Batanta specimen becomes the holotype of *C. beccarianum* A. Hay (q.v.).

S p e c i m e n s s e e n (in alphabetical order of collector):

ARU ISLANDS. P. Wokam, Disinamalau, *Buwalda 4932* (A, BO, L).

NEW GUINEA. Fakfak, Soengai River, *Barrau 598* (BISH); Andai, *Beccari 619* (FI); 528 miles up Fly River, *Brass 6626* (A, BRI); Palmer River, 2 miles below junction with Black River, *Brass 7320* (A); N slopes of Mt Dayman, Maneau Range, *Brass 23508* (A), *23582* (A); Gwariu River, Brass' Biniguni Camp, *Brass 23966* (A, LAE); Kwagira River, Peria Creek, *Brass 24092* (A, LAE); Normanby Island, Waikaiuna, *Brass 25401* (A, K, L, LAE); Sidai, 65 km W of Manokwari, *BW 4400* (CANB, L); Masni, 40 km NNW of Manokwari, *BW 6647* (L, LAE); Sattelberg, *Clemens & Clemens 321* (L); 6 km E of Egam Barracks, Lae, *Croat 52798* (MO); Manokwari along track to Ambami, *Gibbs 6211* (K); Triton Bay, *Le Guillou 39* (P); Butibum River, c. 7 miles N of Lae, *Hartley 9624b* (A); above Bakaia, c. 15 miles SE of Garaina, *Hartley 12859* (LAE); Jant logging area, Gogol, *Hay 1202* (BFC, FHO); P. Kurudu, *Janowsky 489* (L); Utakwa, Mt Carstensz, *Kloss s.n.* (BM); Kiunga, *LAE 51788* (L, LAE); Fergusson Island, Salamo, *LAE 52573* (L, LAE); Natter Bay logging area 93 km SE of Lae, *NGF 4647* (LAE); Gabensis, *NGF 9285* (A, BRI, K, L, LAE); Lae, *NGF 29547* (LAE); Wampit, *NGF 30683* (BRI, L, LAE, US); Ingembit village, Kiunga Subdist., *NGF 31989* (LAE); Kiunga, *NGF 33422* (LAE); Suki Creek, 200 miles up Fly River, *NGF 35345* (BRI, CANB, L, LAE); Tafelberg Reserve, 2 km N of Manokwari, *Nicolson 1583* (B, K, L, LAE, P, US); Perameles, *Pulle 424* (L); Mamberamo River, *Thomsen 811* (L); Busu River, N of Lae, *Thorne & Henty 27451* (BRI, US); Noord (= Lorentz) River, *Versteeg 1108* (L, U). Cult. Hort. Bot. Lae, *Nicolson 1396* (B, BO, K, L, LAE, P, US), *1458* (K, L, LAE, P).

11. Cyrtosperma beccarianum A. Hay, *spec. nov.* – Fig. 13.

[*Cyrtosperma macrotum* Becc. ex Engl., Bull. Soc. Tosc. di Ort. 4 (1879) 295, pro parte, quoad specim. cit. *Beccari s.n.*, Batanta, July 1875.]

A *C. macroto* folii lobis posticis erectis, spatha plus minusve plana ovata, differt. — T y p u s: *Beccari P.P. s.n.*, Irian Jaya, Batanta, July 1875 (FI, holo).

Feeble to moderately robust herbs 40–150 cm high. *Leaves* 3–7; sheath papery, fibrous, about one quarter of the length of the petiole; petiole sparsely armed to unarmed, rarely rather densely spiny; lamina variable, held with the anterior lobe down and the posterior lobes up, usually sagittate; anterior lobe triangular, c. 10 cm long, 8 cm wide at the base; posterior lobes lanceolate, c. 25 cm long, 7.5 cm wide at the midpoint; posterior midribs naked in the angle of the sinus for up to 4 cm, sinus 30–100 degrees; peduncle subequalling to exceeding the petioles, mostly with sparser armature, like the petioles variously blotched and marbled green, brown, pink and white in varying proportions, or plain brown or green, often drying greyish. *Spathe* broadly to narrowly ovate, opening broadly boat-shaped to flat, white, pale pink, or pale yellow, tip acuminate, 1.8 × 5 to 4.8 × 9 cm; spadix sessile, adnate to the spathe for c. 5 mm, 4 × 20 mm in flower, 1.5 × 6 cm in fruit, pale yellow. *Flowers* tetra-

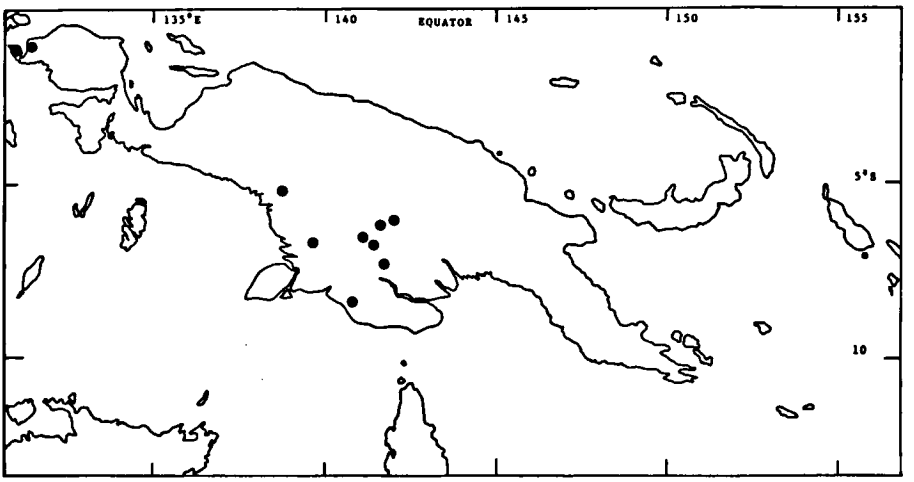

Fig. 14. Distribution of *Cyrtosperma beccarianum* A. Hay.

merous; ovule solitary. *Fruit* orange, globose, protruding from the spadix as it swells. *Seeds* tightly curved, smooth.

Distribution. Southwest and West New Guinea, at low altitude in streams and ditches, swamp forest and gallery forest undergrowth, in shade (fig. 14).

Note. Ecology and leaf form of most individuals of this species combine to make this an example of a rheophyte.

Specimens seen (in alphabetical order of collector):

NEW GUINEA. Batanta, *Beccari P.P. s.n.* (FI); Ramoi, *Beccari P.P. s.n.* (FI); Noord (= Lorentz) River, *Branderhorst 337* (L); Palmer River, 2 miles below junction with Black River, *Brass 7054* (A, BRI, CANB, L); Digul River, nr. Omba, *BW 4879* (CANB, L); Kiunga, *LAE 51780* (A, CANB, K, LAE, US), *LAE 51782* (BRI, L, LAE, US); Ingembit village, Kiunga Subdist., *NGF 31826* (LAE, US), *NGF 33245* (L, LAE, US); Kiunga, *NGF 34114* (LAE, US); Rumgirae, Kiunga Subdist., *NGF 35470* (L, LAE, US); Lake Murray area, Boi River, Upobia village, *Pullen 7489* (CANB, LI, LAE); Ingembit, road to Okpa, *Reksodihardjo 412* (K, L); Merauke area, nr. Bupel Village, *van Royen 4792* (A, CANB, K, L, U); Noord (= Lorentz) River, *Versteeg 1287* (L, U).

SPECIES EXCLUDENDAE

Cyrtosperma afzelii (Schott) Engl. = *Lasiomorpha senegalensis* Schott, q.v.

Cyrtosperma americanum Engl. in Martius, Fl. Bras. 3 (2) (1882) 117, t. 22 = *Anaphyllopsis americana* (Engl.) A. Hay, *gen. et comb. nov. ined.*

Cyrtosperma angustilobum Engl. = *Podolasia stipitata* N.E. Brown, q.v.

Cyrtosperma senegalense (Schott) Engl. = *Lasiomorpha senegalensis* Schott, q.v.

Cyrtosperma spruceanum (Schott) Engl. = *Dracontium sp.*

The type, *Spruce 2406* (K), is clearly a specimen of a plant with highly compound membranaceous leaves and an erect purple spathe. The flowers have more or less disintegrated. Engler separated *Dracontium* from the genus *Echidnium* (in which this species was first described by Schott in Oesterr. Bot. Zeitschr. 8: 350. 1858) on the grounds of the bi- to multilocular ovary of the former, and the unilocular ovary of the latter. In turn *Echidnium* was separated from *Cyrtosperma* solely on the grounds of the prominent parietal placenta in the former seemingly making an incompletely septate ovary. In this particular respect it barely differs from *Lasiomorpha*. In short, unilocular ovaries and prominent placentas cannot be generic characters in the group. Bogner (1985) has also noted the poor distinction between *Dracontium* and *Echidnium*.

Cyrtosperma wurdackii Bunting, Acta Bot. Venez. 10 (1975) 285 = *Urospatha wurdackii* (Bunting) A. Hay, *comb. nov.* — T y p e: *Maguire & Wurdack 36384*, Rio Guainia, Sabanita, along the Caño Pimichin on right bank, 1 km above Pimichin, Terr. Fed. Amazonas, Venezuela (NY, iso).

This is another species apparently forced into *Cyrtosperma* on the grounds of a unilocular ovary: seeds have not been adequately described (those of *Cyrtosperma* being albuminous, of *Urospatha* exalbuminous).

The plant is clearly a Lasiinea, with its multifoliar rhizome and absence of cataphylls. It is excluded from *Cyrtosperma* and transferred to *Urospatha* on the grounds of the very close resemblance of the anterior (and only) lobe of the leaf to that of *U. angustiloba* Engl. [type: *Spruce 3761* (B, holo; BM, K)]. Venation is pinnate and collected into submarginal veins running more or less the full length of the lobe. The elliptic leaf is a unique characteristic of this species. As are other species of *Urospatha, U. wurdackii* is unarmed, in contrast to *Cyrtosperma* s.s., and the petioles retain a spongy texture in the dry state, again in contrast to those of *Cyrtosperma* s.s. in which they are more or less rigid, owing to the greater abundance of sclerenchyma. Bunting had perhaps overlooked Steyermark's *Urospatha savannarum* (Fieldiana Bot. 28: 102. 1951) with unilocular ovaries. The transfer is reinforced by geography, *Urospatha* being entirely Neotropical and *Cyrtosperma* now otherwise Asiatic.

NOMINA NUDA

Cyrtosperma congoense L. Linden, Semaine Hort. 4 (1900) 472, fig. 158, *'congoensis'*; Pl. Nouv. Cong. (1901) 13; *'nom. subnud.'* (photo; sterile = *Anchomanes sp.*).

Cyrtosperma matrieffianum Hort. ex Gard. Chron. 21, 1 (1884) 711, *'nom. subnud.'* (Sumatra).

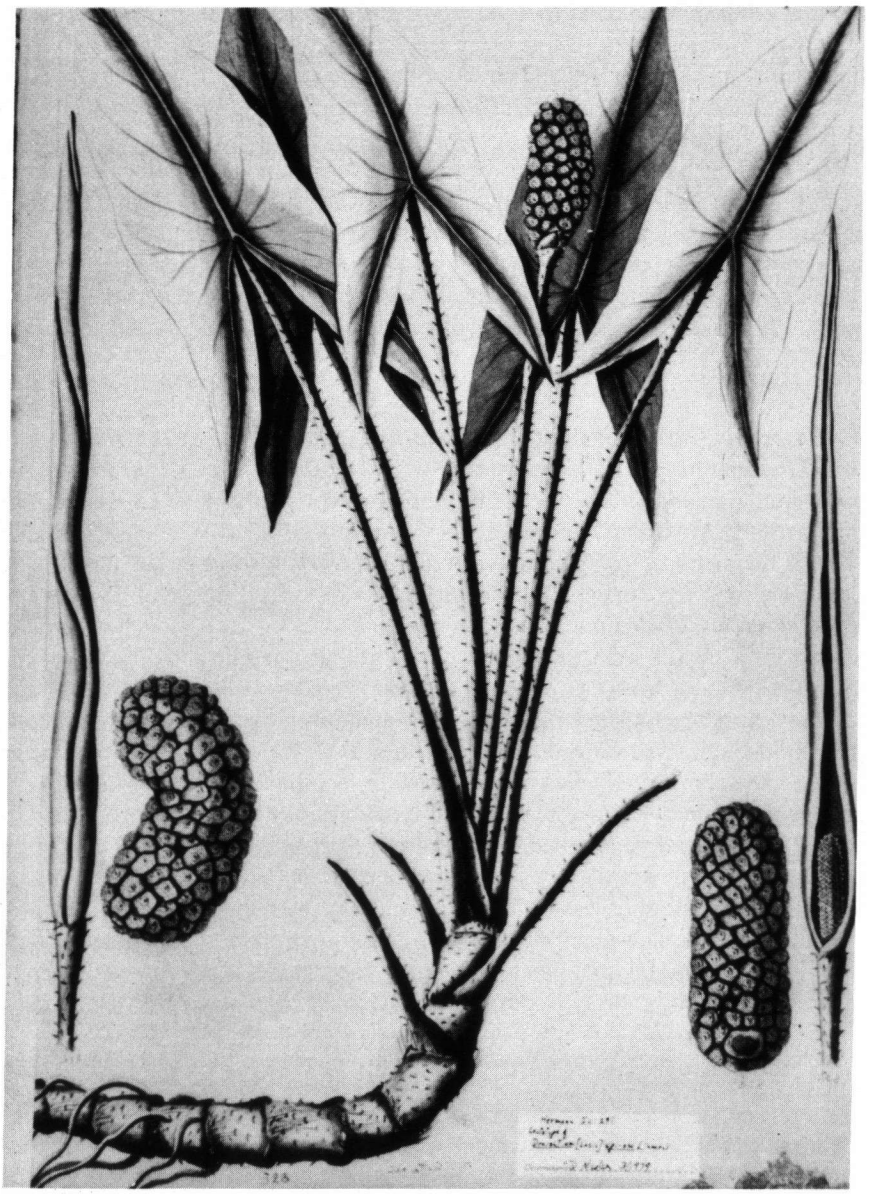

Fig. 15. The lectotype of *Lasia spinosa* (L.) Thwaites. From Herb. Hermann, Vol. 5, fol. 291, No. 328 (BM).

LASIA

Lasia Lour., Fl. Cochinch. (1790) 81, ed. Willd. (1793) 102; Schott, Melet. (1832) 21; Oesterr. Bot. Wochenbl. 7 (1857) 61; Gen. Aroid. (1858) 82; Prodr. Aroid. (1860) 399; Endl., Gen. No. 1701 (1836) 240; Kunth, Enum. 3 (1841) 66; Thwaites, Enum. Pl. Zeyl. (1864) 336; Engl. in DC., Mon. Phan. 2 (1879) 272; in Engl. & Prantl, Nat. Pflanzenfam. 2, 3 (1889) 123; Pflanzenr. 48 (23C) (1911) 23, fig. 9; Hook. f. in Benth. & Hook. f., Gen. Pl. 3 (1881) 995; Fl. Brit. India 6 (1893) 550; Trimen, Handb. Fl. Ceylon 5 (1900) 363; Prain, Bengal Plants 2 (1903) 1115; Ridley, Fl. Mal. Pen. 5 (1925) 125; Fischer in Gamble, Fl. Madras 3 (1935) 1589; Gagnepain in Lecomte, Fl. Gén. Indochine 6 (1942) 1107, fig. 105, 1–4; Backer & Bakh.f., Fl. Java 3 (1968) 110 [non *Lasia* P. Beauv. (1804), i.e. *Forsstroemia* Lindberg (Musci–Cryphaeaceae)]. — T y p e: *Lasia aculeata* Lour.

[*Lasius* Hassk., Cat. Bogor. (1844) 59, sphalm.]

Suffruticose or rhizomatous swamp-dwelling herbs; stems mostly with distinct green armed internodes, or condensed. *Leaves* several together, armed, hastate or sagittate, entire or divided; cataphylls absent. *Inflorescence* solitary, peduncle similar to the petioles. *Spathe* caducous, rarely marcescent, erect, usually drawn out into a spirally twisted, sometimes dangling acumen, with annular insertion on the peduncle; spadix sessile. *Flowers* hermaphrodite throughout its length, tetramerous to hexamerous; filaments free; ovary unilocular, uniovulate; placentation apical. *Seed* large, campylotropous, filling the locule; seed-coat thin, hard, brown with scattered appressed spines; endosperm absent or residual.

D i s t r i b u t i o n. The genus is represented by two species, *L. spinosa* (L.) Thwaites from India to New Guinea, and a second plant, *L. concinna* Alderw., known only from its type taken from a single plant still growing at the botanic garden at Bogor.

KEY TO THE SPECIES

1a. Stem with distinct armed internodes, usually stoloniferous; leaves entire to 1 × divided . . . . . **1. L. spinosa**

b. Stem condensed, unarmed, not stoloniferous; leaves 3 × or 4 × divided **2. L. concinna**

1. Lasia spinosa (L.) Thwaites – Fig. 15.

Lasia spinosa (L.) Thwaites, Enum. Pl. Zeyl. (1864) 336; Engl. in DC., Mon. Phan. (1879) 273; Arac. Exsicc. et Ill. No. 243; Bot. Jahrb. 25 (1898) 14; Pflanzenr. 48 (23C) (1911) 24, fig. 9; Koord., Exkursionsfl. Java 1 (1911) 256; Alderw., Bull. Jard. Bot. Buitenz. ser. 3, 1 (1920) 379, incl. *'forma typica'* [in effect selecting a divided-leafed form as type of the species which is inappropriate when Linnaeus's concept is considered], *forma simplex* (i.e., the typical form sensu Nicolson and Hay] *& forma diversifolia* [no specimen of any of these new forms was cited]; Alston in Trimen, Handb. Fl. Ceylon 6, Suppl. (1931) 297; Fischer in Gamble, Fl. Madras 3 (1935) 1589; Merr., Trans. Am. Phil. Soc. new ser. 24 (2) (1935) 96; Gagnepain in Lecomte, Fl. Gén. Indochine 6 (1942) 1107; Phan Hoang Ho, Fl. S. Vietnam (1960) 692, fig. 268c; Corner & Watanabe, Ill. Guide Trop. Pl. (1969) 1040; Backer & Bakh. f., Fl. Java 3 (1968) 110; Suvatti, Fl. Thailand (1978) 352; Hay in Johns & Hay, Stud. Guide Monoc. Papua New Guinea 1 (1981) 62. — *Dracontium spinosum* L., Sp. Pl. ed. 1 (1753) 967; Moon, Cat.

(1824) 30. — T y p e: Herb. Hermann, Vol. 5, fol. 291, No. 328 (BM, lecto, selected by Nicolson in manuscript).

Lasia aculeata Lour., Fl. Cochinch. (1790) 81; ed. Willd. (1793) 102; Trimen, Handb. Fl. Ceylon 5 (1900) 363; Ridley, Fl. Mal. Pen. 5 (1925) 125. — T y p e: *Loureiro s.n.*, Vietnam, nr. Hanoi (BM, holo).

Pothos heterophylla Roxb., Fl. Ind. 1 (1820) 457; ed. 2, 1 (1832) 437; Wight, Icones 3 (1840) t. 777. — *Lasia heterophylla* (Roxb.) Schott, Melet. (1832) 21; Kunth, Enum. 3 (1841) 67; Miq., Fl. Ind. Bat. 3 (1853) 176; Hook. f., Fl. Brit. India 6 (1893) 550; Prain, Bengal Plants 2 (1903) 1115; Malhotra & Rao, J. Bombay Nat. Hist. Soc. 78 (2) (1981) 417. — T y p e: *Roxburgh s.n.*, India (BM, holo).

Pothos lasia Roxb., Fl. Ind. 1 (1820) 458; ed. 2, 1 (1832) 438, *nom. superfl.* pro *L. aculeata.*

Lasia loureirii Schott, Melet. (1832) 21, *nom. superfl.* pro *L. aculeata.*

Lasia roxburghii Griff., Notul. 3 (1851) 155, *nom. superfl.* pro *L. aculeata.*

Lasia hermannii Schott, Bonplandia 5 (1857) 125, *nom. superfl.* pro *Dracontium spinosum.* — *Lasia spinosa* var. *hermannii* Engl. in DC., Mon. Phan. 2 (1879) 274, *nom. superfl.* pro var. typ.

Lasia jenkinsii Schott, l.c. — T y p e: *Jenkins s.n.*, Assam (K, holo).

Lasia zollingeri Schott, l.c. — T y p e: *Zollinger 347*, Java, Tjikoja (K, holo; P).

Lasia desciscens Schott, Ann. Mus. Bot. Lugd.-Bat. 1 (1864) 127. — T y p e: *Korthals s.n.*, Sumatra (L, holo).

Lasia crassifolia Engl., Arac. Exsicc. & Ill. (1883) n. 194; Bot. Jahrb. 25 (1898) 15; Pflanzenr. 48 (23C) (1911) 25, *'forma angustisecta'*, i.e., *nom. superfl.* pro forma typ. — T y p e: *Grabowsky s.n.*, Indonesia, Borneo, Siong, Duson Timor (B†?, holo; Engl., Arac. Exsicc. & Ill. n. 194, K, neo).

Lasia crassifolia Engl. *forma latifolia* Engl., ll.cc. — T y p e: *Grabowsky s.n.*, Indonesia, Borneo, Siong, Duson Timor (B†?, holo).

[*Pothos spinosus* Buch.-Ham. ex Hook. f., Fl. Brit. India 6 (1893) 550, *nom. in synon.*]

Clump- and colony-forming suffruticose, often stoloniferous herb; stems orthotropic to decumbent, to c. 1.5 m tall/long, with distinct prickly green internodes. *Leaves* several, petioles prickly, drying spongy, not or faintly mottled; blades pinnatifid to hastate, usually armed beneath, membranous to coriaceous. *Inflorescence* solitary, on a peduncle similar to but usually somewhat shorter than the petioles. *Spathe* narrowly lanceolate, convolute at base and usually again above the level of the top of the spadix, often long-acuminate and spirally twisted, erect or recurved, caducous, purplish brown to greenish, with annular, not oblique insertion; spadix sessile. *Flowers* tetramerous. *Fruit* green, minutely spiny in upper part, or spines wanting. *Seed* large, campylotropous, ± pyramidal, c. 1 cm diam.; coat thin, brown, hard, with a few appressed spines; endosperm absent mature seed.

D i s t r i b u t i o n. As for the genus, in open swampy sites, sometimes forming large stands; occasionally in boggy places in forest undergrowth (but not flowering there?), at low altitude, but up to 350 m in Nepal. Malhotra & Rao (1981) record an important range extension in the Indian state of Maharashtra (fig. 16).

N o t e s. Hossain & Sharif (1984) have shown by transplanting experiments that leaf-shape varies with ecological conditions in Bangladesh, increasing dissection becoming apparent with increasing illumination. In New Britain I noticed entire-leafed forms growing in full sunlight, and in Malaysia dissected-leafed forms growing in deep shade. It would seem, then, that there are elements of both phenotypic and genotypic variation contributing to the diversity of leaf form.

Engler's *L. crassifolia* was said to have thick leaves and no spines on the fruit.

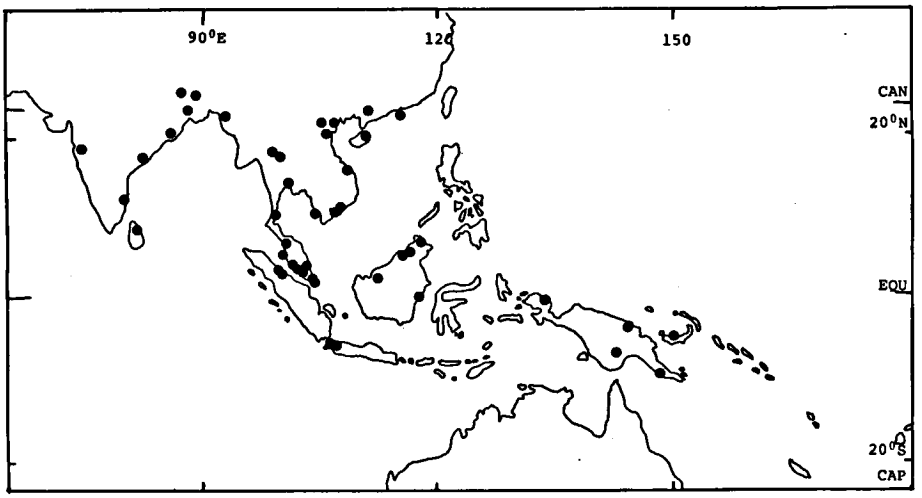

Fig. 16. Distribution of *Lasia spinosa* (L.) Thwaites.

Degree of spininess and of thickness of the leaf blade vary independently in *L. spinosa,* and *L. crassifolia* cannot usefully be recognised as distinct.

Burkill (1935) noted the use of this plant both medicinally and as food (leaves). But et al. (1980) remarked on the anti-rheumatic properties of the 'rhizome'. Pal (1980) noted its use in the treatment of 'Gargati', a throat disease of an unspecified animal. Perry (1982) recorded it as a medicine for elephants.

Specimens seen (in alphabetical order of collector):

Sin. loc.: *Finlayson s.n.* in EIC 4447D (K-W); *Roxburgh s.n.* in EIC 4447A (K-W).

SRI LANKA. Trincomalee, *Burman s.n.* (K); 'Ceylon', *Koenig 1977* (BM), *Thwaites 2979* (P), *Walker 182* (K).

INDIA. Orissa Hills, *Beddome 7874* (BM, K); Orissa, Bunjal, *Clarke 8351* (K); Vicranpore, Barokhalee, *Clarke 7934* (K); Assam, Ducka Phar, *Gamble 474a* (K); Assam, Bux Reserve, *Gamble 7700* (K); Godavari Dist., Madras, *Gamble 15936* (K); Darjeeling, *Griffith 5949* (K, P); Bungpore, *Hamilton 433* (E); Bengal, *Hooker & Thomson s.n.* (E, K, P); Sikkim, *Hooker & Thomson s.n.* (K); Assam, *Jenkins s.n.* (K); Burkhal, Chittagong Hill Tracts, *Lister 314* (E); Rumpa Hills, Peddakonda, Rumpa Dist., *Narajanaswami 171* (K); Assam, Gau Hills Dist., Arbella, *Parry 1132* (K); 'India', *Roxburgh s.n.* (BM, E, K); 'Ind. Or.', *Roxburgh s.n.* (BM); cult. Hort. Bot. Calcutta, EIC 4447F, G (K-W).

BANGLADESH. Nageshwari, *Buchanan-Hamilton s.n.* in EIC 4447C (K-W); Rangpur, *Buchanan-Hamilton s.n.* in EIC 4447C (K-W); Silhet, *de Silva s.n.* in EIC 4447E (K-W).

NEPAL. Ranga Pani-chisa, Pani Loohya Mai-Ghorwa, *Hara et al. 6304244* (BM, E).

TIBET. Southeast Tibet, *Kingdon Ward 6649* (K).

CHINA. Hong Kong, *Bodimer 1170* (P); Hainan, Nan Tai See, *Ford 478* (K); Hainan, Yaichow, *How 70855* (K, P); Hainan, Taam Chau Dist., Sha Po Shan, *Ling Nan Univ. 17315* (B); Hainan, Sha Po Shan, Naking village, *Tsang Wai-tak 553* (L, MO, UC, US), *566* (P, UC).

VIETNAM. Hanoi, *d'Alleizette 211, 506* (P); Tonkin, *Balansa 2042* (P); Tonkin, Trung Nha, *Bon s.n.* (P); Tonkin, Yen Ninh, *Bon s.n.* (P); Tonkin, *Chevalier 39419* (P); Prov. de Chudanmot,

Chevalier 39972 (P); Annam, Tourane, *Clemens & Clemens 3438* (P, UC); Saigon, Honguan, *Evrard 831* (P); River Chanhmyan, *Evrard 2742* (P); North Annam, For. Res. at Go'-Ba, *Fleury 32457*; Île de Phu Quoc, *Lacour 96* (P); Hanoi, *Loureiro s.n.* (BM); Kwang Tung Mau T'aan, nr. Wat Naam, *McClure 1380* (UC); Pagode de Batny, nr. Hanoi, *Pételot 312* (P); nr. Saigon River, *Pierre s.n.* (K, P); Annam, *Poilane s.n.* (P); Haut Douai, Saigon, *Poilane 19783* (P); Saigon, Laithiew, *Poilane 40615* (P); Kinh Gan Binh Dueng, *Vu Van Cuong 18* (P); Saigon, Laithiew, *Vu Van Cuong 1713* (P).

CAMPUCHEA. Mt Purant, *Godefroy-le-Boeuf 390* (E, K); *Harmand 390* (P).

LAOS. Se Noun, *Harmand 287* (BM, P), *3381* (P); *Poilane 20284* (P); *Thorel 207* (P).

BURMA. Taong Dong, *Wallich 924* in EIC 4447 suppl. (K-W); Needaun, R. Ataran, *Wallich 1536* in EIC 4447 suppl. (K-W); Moulmein, *Wallich s.n.* in EIC 4447 suppl. (K-W).

THAILAND. *d'Alleizette 7780* (L); Pong Nam Ron, *Bogner 411* (M); 40 km S of Chumphon, *Bogner 428* (M); Chieng Mai, Doi Chiang Dao, *Bunchuai 399* (L); Khao Rum, *Eryl-Smith 595* (BM); Chieng Mai Prov., *Geesink et al. 5699* (L); Doi Su Tep, *Hosseus 499a* (M); *Kerr 2766* (K, P); Bangkok, *Kerr 3977* (P); *Larsen 329* (P); Pakret, Bangkok, *Marcan 871* (K); Ban Pak Tawan, Phran, *Marcan 2621* (K); Chamburi Prov., Siricha Dist., Kow Kieo, *Maxwell 75-255* (L); Southeast Thailand, Prew, Ag. Station, *Nicolson 1634* (B, BM, BO, L, SING); Doi Su Tep, *Nicolson 1651* (B, BM, BO, L, P); Chiang Mai Prov., Fang Ag. Station, *Nicolson 1678* (K, L); Trang Prov., Khao Chong For. Station, *Nicolson 1714* (K, L); *Schomburgk 220* (K).

PENINSULAR MALAYSIA. Malacca, *Alvins 491* (SING); Johore, 41.5 miles S of Mersing, Kota Tinggi-Mersing Rd., *Bogner 1463* (K); Perak, Tambui area, Hot springs, *Chin 836A* (KLU); Johore, Sungei Sembang Kluang, *Corner s.n.* (SING); Kepong, *Croat 53295* (MO); Pulau Butang, *Curtis 1941* (SING); Kepong, *Hay 2048* (UPM); Pahang, Kotu Glanggi, *Henderson 22487* (SING); Perlis, Bukit Keki, *Henderson 22945* (SING); Selangor, Sermenyih, *Hume 8370* (SING); Penang, *Jack* in EIC 4447B (K); Kedah, Alor Star, *Kiah SF 35429* (BO, SING); Larut, Perak, *King's Collector 4616* (K), *7982* (K); *Maingay 3079* (K); Perak, 6 miles N of Taiping, *Nicolson 1085* (SING); Selangor, Sungei Pun, Gombak, *Ratnasabapathy s.n.* (KLU); Pahang, Ayer Enkam, *Ridley 212* (SING); Pahang, Pekani, *Ridley 1191, 1206* (SING); Selangor, Batu Caves, *Ridley s.n.* (SING); Johore, Sungei Tebran, *Ridley s.n.* (SING); Koh Samoi, *Robinson s.n.* (K, P); Penang, Kampong Sungei Kluang, *Sinclair SF 39056* (E, SING); Perak, Simpang, *Wray 2253* (SING).

SINGAPORE. Cult. Hort. Bot. Singapore, *Nicolson 999* (SING); Sungei Jurong, *Ridley s.n.* (SING); Jurong, Chun Chu Kang, *Ridley s.n.* (SING).

SUMATRA. Asahan, Silo Maradja, *Bartlett 6440* (UC); *Korthals s.n.* (L); Sopsopan, *Rahmat si Boeea ('Toroes') 5556* (L); Asahan, Simgong Kawat, *Yates 1616* (BO, UC).

JAVA. Madjenang, *Backer 18759* (BO, L); Res. Batavia, Depok, *Bakhuizen van den Brink 2191* (BO, L); nr. Bogor, *Blume s.n.* (L); *Junghuhn s.n.* (L); Simarang, Kedundjati, *Koorders 26118* (BO, L); Bantam, Danu Muras, *Koorders 40481* (BO, L); Batavia, Depok, *Koorders 44002* (BO, L); Bantam, G. Kantjana, *Koorders 41505* (BO, L); Batavia, *Korthals s.n.* (L); *Lahaie 2282* (P); Tjitjadas, SE of Batavia, *Lanjouw 11* (BO, L); Bantardjati, *Raap 534* (L); cult. Hort. Bogor., *Teijsmann s.n.* (L); *Zippelius s.n.* (L); Tjikoja, *Zollinger 347* (K, P).

BORNEO. North Borneo, Bukit Sungai Tikung, *Amdjah 964* (BO, L); Sarawak, Binkulu, *Beccari P.B. 4005* (FI); Sarawak, Kapit, Upper Rejan River, *Clemens & Clemens 21927* (BM, BO, K, L, MO); Central East Borneo, W. Koetai, nr. Mt Moentai, *Endert 1994* (BO, K, L); Brunei, Bangar-Sungai Betia, Brunei Tembrong, *Hotta 13461* (L); Sabah, Kinabatangan, Sungei Pin Timber Camp, S of Bt Pin Besar, *Kokawa & Hotta 1512* (L); Lampit, *Kostermans 7916* (L); Kampong Leban, Kapuni R., *Main 1804* (BO, L); R. Limeo Sibak, Central Borneo, *Winkler 3249* (BO, L).

NEW GUINEA. Veiya, *Carr 11641* (BM, L, SING); Koitaki, *Carr 12829* (BM, L, SING); West New Britain, nr. Kimbe, *Hay 1301* (BFC); Kiunga, *LAE 52016* (L, LAE, US); Sogeri Plateau, Kokoda Trail, *Nicolson 1429* (B, K, L); Wewak airfield, *Nicolson 1560* (B, K, L); 25 km S of Manokwari, *Nicolson 1590* (B, K, L).

2. Lasia concinna Alderw.

Lasia concinna Alderw., Bull. Jard. Bot. Buitenz. ser. 3, 1 (1920) 379. — T y p e: *van Alderwerelt van Rosenburgh s.n.*, cult. Hort. Bogor. (BO, holo; L).

Massive rhizomatous herb; rhizome condensed, orthotropic, decumbent, c. 13 cm diameter; stolons wanting. *Leaves* to c. 1.6 m long; sheath short, papery, brown, about a quarter of the length of the petiole; petioles diverging from near the base, mottled white, green, and olive, very spiny with the small spines mostly arranged in oblique, somewhat undulating combs; lamina hastate-sagittate, divided to the third or fourth degree, somewhat coriaceous, dark green, unarmed, c. 60 cm long; peduncle similar to but somewhat exceeding the petioles. *Spathe* erect, narrowly ovate, to c. 30 cm long, very thick and coriaceous, convolute below, constricted at the lower third above the level of the spadix apex, the upper part slightly twisted and gaping, in the lower part bright green with vertical yellow stripes, in the upper part pale brown outside, marcescent; spadix sessile, to c. 7.5 cm long, ± cylindrical, yellow. *Flowers* hexamerous; fruiting spadix c. 18 cm long, 6 cm diameter. *Fruits* ovoid, obtuse at the apex, smooth. *Seed* more or less pyramidal, c. 1.5 cm long, filling the locule, on apical placenta; seed-coat thin, brown, spinulous.

D i s t r i b u t i o n. Known only from a single plant cultivated at Bogor (II Q D5). No field-collected specimen has been located. The earliest reference to it in a catalogue of the plants at Bogor is in that of Boldingh (1916: 112). It is said to have originated in Borneo, with no more precise locality.

N o t e s. The superficial appearance of the plant suggests that this may be a hybrid between *Lasia spinosa* and *Cyrtosperma merkusii* which are sympatric in West Malesia. Placentation and seed form are those of *Lasia,* while the marcescent spathe and condensed rhizome are characteristic of *Cyrtosperma*. However, the fact that the plant has set seed may militate against its being a hybrid.

PODOLASIA

Podolasia N.E. Brown, Gard. Chron. New Ser. 18, 2 (1882) 70; Hook. f. in Benth. & Hook. f., Gen. Pl. 3 (1883) 996; Engl. in Engl. & Prantl, Nat. Pflanzenfam. 2, 3 (1889) 124; Pflanzenr. 48 (23C) (1911) 28; Ridley, Mat. Fl. Mal. Pen. 3 (1907) 46; Fl. Mal. Pen. 5 (1925) 125; Corner & Watanabe, Ill. Guide Trop. Pl. (1969) 1042. — T y p e: *P. stipitata* N.E. Brown.

The genus is represented by a single West Malesian species.

Podolasia stipitata N.E. Brown

Podolasia stipitata N.E. Brown etc., vide supra. — T y p e: *Curtis s.n.*, cult. Hort. Veitch. (K, holo).
Cyrtosperma angustilobum Engl., Pflanzenr. 48 (23C) (1911) 20, fig. 7 L, O. — T y p e: *Raap 494*, Sumatra, Batu Island (B†?, holo; BO).

Rhizomatous herb, solitary or forming small clumps, sometimes gregarious; stem short, erect to decumbent, to c. 2.5 cm diameter, with distinct unarmed internodes to c. 2 cm long, rooting between the persistent leaf-bases, green, bearing prophylls but no cataphylls. *Leaves* several together on long petioles to c. 80 cm long, armed with

mostly downward-pointing rather short spines to 7 mm long; lamina unarmed, somewhat coriaceous, sagittate to hastate, broadly to narrowly triangular in outline, to c. 45 cm long and wide; anterior lobe about equalling the posterior ones with pinnately arranged to curvinerved costae. *Inflorescence* solitary; peduncle similar to and about equalling the petioles. *Spathe* ovate-lanceolate, opening ± flat to the base, purple-brown; spadix ivory-white, usually stipitate, the stipe growing considerably after the spathe opened. *Flowers* hermaphrodite throughout, 4–6-tepalate and staminate; filaments free; ovary unilocular, uniovulate with parietal to basal placentation; receptive stigmas wet. *Fruit* red, smooth, rather large, c. 1.2 cm diameter, thicker than the spadix. *Seed* strongly campylotropous, ± spherical in outline; coat thin, hard, smooth, dark brown; endosperm wanting or very sparse.

Distribution. West Malesia: Peninsular Malaysia, Sumatra, Borneo, lowlands to c. 2000 m, mostly in peaty soils (fig. 17).

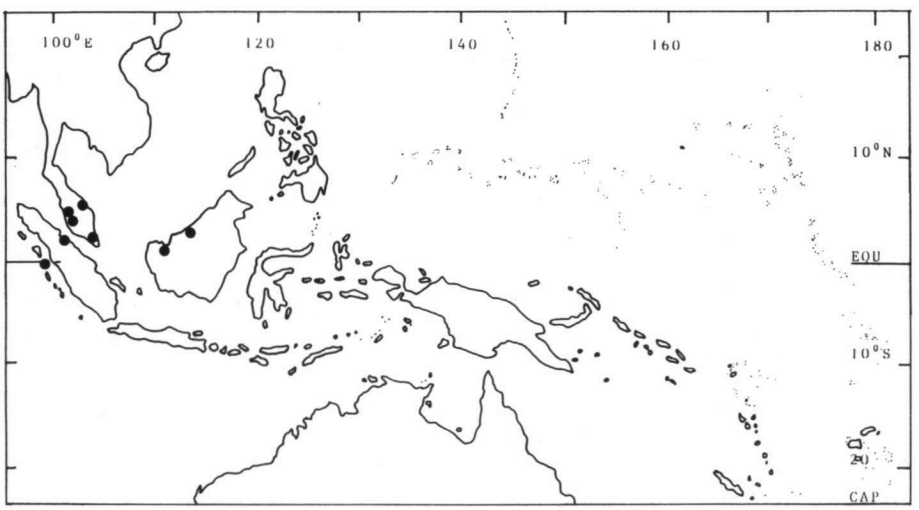

Fig. 17. Distribution of *Podolasia stipitata* N.E. Brown.

Notes. The characteristics which separate *Podolasia* from *Cyrtosperma* are principally vegetative. Nevertheless the genus is maintained, as the reproductive features it shares with *Cyrtosperma* appear to represent the end-product of trends towards unilocular uniovulate ovaries and bract-like spathes manifested in varying degrees in pleiotypic genera such as *Urospatha, Dracontium,* and *Cyrtosperma.* In all species of *Cyrtosperma* examined, endosperm is distinctly present in the seed, while in *Podolasia* there seems not to be more than a trace.

Both external morphology of the rhizome and the venation of the posterior lobes suggest greater similarity to *Lasia* with respect to these characters. Thus *Podolasia* sits between *Lasia* and *Cyrtosperma.*

The isotype of *Cyrtosperma angustilobum* is a seedling and matches seedlings of *Podolasia stipitata*. Engler's illustration (l.c.) of a plant with downward-pointing spines and roots emerging from amongst persistent leaf-bases is clearly of *P. stipitata*, and the locality of this specimen is consistent with this observation.

Specimens seen (in alphabetical order of collector):

PENINSULAR MALAYSIA. Johore, Gunong Panti, *Alphonso 525* (SING); Perak, Tapah Rd., *Burkill 13442* (SING); Johore, Gunong Panti, *Chin 2173* (KLU); *Collenette 2252* (K); Johore, Kota Tinggi-Mawai Rd., *Corner 29943* (B, BO, K, SING); Johore, Gunong Panti, *Corner 30898* (BO, K, L, SING); Johore, Sedili River, *Corner 36966* (SING); Perak, Thaiping Hills, *Curtis s.n.* (SING); Perak, Tea Gardens, *Curtis s.n.* (SING); Gunong Muntahak, *Holttum 19894* (SING); *KEP/FRI 98973* (K, KEP); Johore, Gunong Panti, *King's Collector 233* (K); Perak, Larut, *King's Collector 5324* (K), *5499* (K, L), *5789* (K, P); Johore, Gunong Panti, *Lewis 266* (K, KEP); *Maxwell 81-189* (L, SING); *Ng KEP/FRI 1695* (KEP, SING); Johore, Kota-Tinggi-Mersing Rd., *Nicolson 1224* (L, SING), *1225* (L, SING), *1227* (SING); Dindings, Telok-Sera, *Ridley 1247* (K, SING); Kelantan, Kelantan River, *Ridley 9015* (K, SING); Johore, Gunong Panti, *Ridley s.n.* (SING); Perak, Thaiping Hills, *Ridley s.n.* (SING); Perak, *Scortechini s.n.* (K); Johore, Mawai-Kota Sedili New Rd., *Sinclair 10566* (E, SING); Johore, Gunong Panti, *Stone 14550* (KLU); Perak, Larut, *Wray 598* (K, SING); Perak, Thaiping Hills, *Wray 2702* (SING); Perak, Larut, *Wray 4224* (SING).

SUMATRA. Batu Island, *Raap 494* (BO); Asahan, Silo Maradja, *Rahmat si Boeea 824* (UC); Paragambiran, *Rahmat si Boeea 5873* (L); Lumban River, *Rahmat si Boeea 8137* (L).

BORNEO. Sarawak, Kuching, Setapok For. Res., *Anderson 26757* (BO, K, L, SAR, SING); Loba Kabang, *Anderson S 2818a* (SAR, SING); Kuching, *Beccari P.B. 590* (FI); Kuching, Setapok For. Res., *Blanc S 37043* (SAR); Quarry Hill, *Brooke 8016* (L, SAR); Kuching, *Brooke 8352* (L, SAR); M. Ujan For. Res., *Brunig S 14471* (SAR); cult. in Hort. Veitch ex Borneo, *Curtis s.n.* (K); Setapok For. Res., *Hay 2400* (SAR); *Kiew 35* (UPM); Kapit, 7th Div., *Lee S 40618* (L, SAR, SING); Setapok For. Res., *Mabberley 1627* (K, L, SAR); *Nicolson 1366* (SAR); 4th Div., Ulu Tinjar, nr. Long Kapa, *Richards 1167* (K); Setapok For. Res., *Stevens et al. 156* (BO, L, SAR).

LASIOMORPHA

Lasiomorpha Schott, Bonplandia 5 (1857) 127; Gen. Aroid. (1858) 85; Prodr. Aroid. (1860) 405.

The genus is represented by a single African species, *L. senegalensis* Schott.

Lasiomorpha senegalensis Schott

Lasiomorpha senegalensis Schott, Bonplandia 5 (1857) 127; Gen. Aroid. (1858) 85; Prodr. Aroid. (1860) 405. — *Cyrtosperma senegalensis* (Schott) Engl. in DC., Mon. Phan. 2 (1879) 270; in Engl. & Prantl, Nat. Pflanzenfam. 2, 3 (1889) 123; Mitt. Deutsch. Schutzgeb. 2 (1889) 150; Pflanzenr. 48 (23C) (1911) 16; Durand & Schinz, Consp. Fl. Afr. 5 (1894) 472; Hook., Bot. Mag. Ser. 3, 54 (1898) t. 7617; N.E. Brown in Thistleton-Dyer, Fl. Trop. Afr. 8 (1902) 198; Chevalier, Expl. Bot. de l'Afr. Occid. Franç. (1920) 679; Holland, Useful Pl. of Nigeria 4, Kew Bull. Add. Ser. 9 (1922) 759; Hutch. & Dalz., Fl. W. Trop. Afr. 2, 1 (1931) 357; Hepper, Fl. W. Trop. Afr. ed. 2, 3, 1 (1968) 113; Knecht, Phanerog. Monogr. 17 (1983) 142; Raadts, Englera 4 (1984) 516. — Type: *Perrottet 763*, Senegal (P, lecto, selected by Knecht, 1983).

Lasiomorpha afzelii Schott, Gen. Aroid. (1858) 85; Prodr. Aroid. (1860) 405. — *Cyrtosperma afzelii* (Schott) Engl. in DC., Mon. Phan. 2 (1879) 269; in Engl. & Prantl, Nat. Pflanzenfam. 2, 3 (1889) 123; Durand & Schinz, Consp. Fl. Afr. 5 (1894) 472; de Wild. & Durand, Contr. Fl. Congo 1 (2) (1900) 64. — Type: *Barter 9*, Cameroon, Bioko (Fernando Po) (K, holo).

Robust to massive colony-forming herb to 3.5 m high; root-stock a short, dense, subterranean, stoloniferous rhizome to 12 cm diameter. *Leaves* to 7 per crown; petiole to 2.8 m long, 4–6-angular in cross section, armed in vertical rows along the edges with stout short spines; sheath short, less than 1/4 of the length of the petiole, persistent; geniculus absent or hardly differentiated; blade hastate to sagittate to 1.1 m long and 55 cm wide, leathery, unarmed, held ± erect with the anterior lobe up. *Inflorescence* solitary; peduncle similar to and about equalling the petioles, without a geniculus. *Spathe* ovate, to c. 40 cm long, with the margins convolute in lower 1/3, open in mid-1/3, incurved to convolute in the upper attenuate 1/3, brownish green without, dirty pale yellow boldly streaked and blotched deep purple within, with a somewhat fragrant odour of decomposing fruit, after anthesis becoming green, persistent into ripe fruit, then marcescent, retaining shape, eventually decomposing with the rest of the inflorescence and peduncle; spadix at anthesis blackish purple, to 18 cm long, 1.5–2 cm diameter, sessile. *Flowers* tetramerous; anthers partially exserted from the tepals at male anthesis, then retracting filaments united into a tube; pollination drops ?absent; stigmas white; ovules 4–6 on a rather prominent basal and parietal placenta. *Fruit* irregularly globose, ± flat-topped; pericarp with white mesocarp and a tough red inner and outer epidermis. *Seeds* 1–4, to 5 × 5 mm, strongly campylotropous, strophiolate; testa brown, warty, and spiny.

Distribution. Tropical West Africa from Senegal to Chad to Angola. In ditches, swamps, ponds, and swamp forest gaps; sea level to c. 700 m altitude. Often very common (fig. 18).

Notes. Knecht (1983) has observed that in free-standing water the stolons may bear tubers. White (1983: 83, 266) notes that this plant is particularly characteristic of gaps in the Guinea-Congolian swamp forest and riparian forest, in the Zaire basin largely replacing *Cyperus papyrus* L. In Liberia, I noted that in shady conditions the crowns are larger but the colonies less prolific than in open places. In open conditions too, in spite of some scorching, the plants are more free-flowering.

The inflorescences emit a stronger odour at female than at male anthesis, and the smell is produced day and night. Although the colour and smell suggest cantharophily, I observed no insect visitors day or night. Spadices in which fruit set had failed to occur outnumbered fruiting spadices by about four to one. The ripe fruits are contained in the marcescent spathe until the whole inflorescence begins to rot when fruits are found scattered on the ground. I found no seedlings.

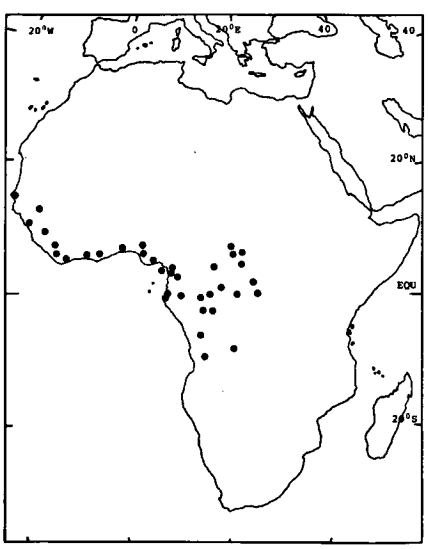

Fig. 18. Distribution of *Lasiomorpha senegalensis* Schott

Lasiomorpha is the only member of the tribe in which the staminal filaments form a tube. It is further distinguished from *Cyrtosperma* s.s. in its stoloniferous colonial habit, the absence of or very weakly differentiated geniculi, the persistent spathe, and the absence of pollination drops on the receptive stigmas.

Dalziel (1937) records that the stems (?petioles) are burned and the ashes extracted with water to yield salt, and that the young leaf is edible, cooked with Palaver Sauce. He adds that a decoction of the bark (*sic*) is dropped in the eye of a fowl or witch, as an ordeal, and that the fruits are ingredients in remedies for gonorrhoea and dysentery.

Specimens seen (in alphabetical order of collector):

SENEGAL. Dakar, *Adam 857* (MO, P); Tambacounda Dist., Niokolo, Koba village, *Adam 17580* (MO); Cap Vert, Dakar, *Berhaut 1319* (P), *3695* (P); *Chevalier 2600* (P); *Heudelot 639* (P); Cap Vert, *Leprieur s.n.* (L, P); *Perrottet 763* (P); Sangalkan, *Raynal & Raynal s.n.* (P).

GAMBIA. *Leprieur s.n.* (P); bords du Rio Compang, *Noury s.n.* (P).

GUINEA-BISSAU. Teixeira Pinto, Cacheu, *d'Ory 137* (K).

GUINEA. Kerema, Njerekore Dist., *Adam 3801* (MO); Boke, *Jacques-Félix 7310* (P); border with Guinea-Bissau, *Maclaud s.n.* (P); Lanfofomo, *Pobeguin 1103* (P).

SIERRA-LEONE. Kabala Dist., Mt Loma, *Adam 23579* (MO); Newton, *Deighton 1513* (K); nr. Ntunga, *Elliot 4333* (BM, K); Samueltown, *Melville & Hooker 261* (K, P); 13 miles N of Bo, *Morton 851* (K); Pendembu, *Thomas 798* (K), *801* (K); Mayoso, *Thomas 1470* (K), *8696* (K).

LIBERIA. Saniguelli, *Adam 27755* (MO); 3 miles NE of Suacoco, Gbanga, Central Prov., *Daniel 411* (MO); nr. Putukan, Grand Gedeh County, *Hay 2701* (FHO); Gbanga, *Linder 779* (K).

IVORY COAST. Nr. Abidjan, *Bernardi 8106* (P); 15 km W of Abidjan, *Leeuwenberg 1873* (K, P); San Pedro, *Thoire 23* (P); Adiopodoume, *de Wilde 926* (P).

GHANA. Mile 85, Mosiaso-Kwahiu, *Bigger 2447* (K); Aiyinase, *Irvine 5000* (K), *5055* (K); Axim, *Johnson 874* (K); 25 miles S of Tarkwa, *Norton 6569* (K).

BENIN. 'Dahomey', *Poisson s.n.* (P).

NIGERIA. Ikeja, nr. Lagos, *Bels 8* (U); Munchi Country, *Dalziel 863* (K); Kabba Prov., Ankpa-Oturkpo-Oban Rd., *Daramola FHI 38024* (K); Cross River State, Calabar-Oban Rd., nr. border with Cameroon, *Gentry & Pilz 32951* (MO); Old Calabar, Bot. Gard., *Holland 64* (K); 2 miles SW of Osho, *Jones & Cnochie FHI 17236* (K, P); Jamieson River, *Kennedy 3056* (K); 'S. Nigeria', *Kitson s.n.* (BM); 22 miles S of Benin, *Lowe 1726* (K); Benin River, *Meikle 642* (K); between Benin & Sapoba, *Meikle 875* (K, P); 3 miles Calabar-Atimbo Rd., *Cnyeachusim & Latilo FHI 48170* (K); Nkpoku, Port Harcourt, *Stubbings 120* (K); Oban Dist., *Talbot & Talbot s.n.* (K).

CHAD. Dou, *Gaston 21225* (P).

CAMEROON. Bioko (Fernando Po), *Barter 9* (K); Gongoroko, *Barter s.n.* (K); Bitye, Ebolowa, *Bates 1927* (BM); Mbet, *Hedin 198* (P); 35 km E of Yaounde, *Leeuwenberg 5787* (P); 22 km S of Douala, *Leeuwenberg 6442* (B, K, MO, P); Bioko (Fernando Po), *Mann 244* (K); Kribi-Edea Rd., *Meurillon 1255* (K, P); nr. Yaoune, *Raynal & Raynal 10514* (P); Nyambe, *Rose 130* (P); Douala-Tiko Rd., *Thomas 2499* (K); Yaounde, *Zenker 689* (P).

CENTRAL AFRICAN REPUBLIC. Carnot-Boda, Km 30, *Badre 248* (P); Krebeoje, Haut-Oubangui, *Chevalier 6010* (P); Chari, Ndonka, *Chevalier 8401* (P); Rombari, nr. R. Bediquemen, *Pandji 65* (P); Bamingui-Banyasau, *Spinage 296* (P); Yalinga, Haut Oubangui, *Le Testu 3886* (P); Boukoko, S. of Ippy, *Tisserant s.n.* (P); Keyorede, 17 km S of Ippy, *Tisserant 1975* (BM).

GABON. Akok, *Bogner 691* (M); Libreville, *Bogner 756* (M); Cape Lopez, *Chevalier s.n.* (P); *Debeaux 379* (K, P); 10 km S of Najole, *Hallé 1874* (P); Ouendo, *Hallé & Villiers s.n.* (P); Latoursville, *Le Testu 7023* (P).

CONGO. Brazzaville, *Babet s.n.* (P); Champ de Tir de Lifoula, *Bouget 94* (P); Leketi, *de Brazza 192* (P); Brazzaville, *Chevalier 11088, 11096, 11210* (all P); Lefini, NE of Brazzaville, *Descoings 6015* (P); Alima-Likouala Basin, Gambora-Ckoyo Km 37, *Descoings 6980* (P); 25 km from Brazza-

ville, *de Nere 1196* (P); *Prévost 168* (P); Brazzaville-Kinkala Km 51, *Sitha 372* (P); Brazzaville, *Tholon s.n.* (P).

ZAIRE. Kakousson, *Chevalier 28249* (P); Mbandake Terr., Eala, *Corbisier-Baland 2059* (K); Stanley Pool, *Hens 15* (P); Mongo, *Louis 148* (K, P); between Yaekela & Yangole, 25 km W of Yangambi, *Louis 3420* (MO); Barumbu, *Louis 8409* (K, P); Yakusu, *Louis 10196* (K, P); Lombo, *de Wispelaere 103* (P); Yakoma, *Fr. Zhomer 250* (K).

ANGOLA. *Gossweiler 1922* (BM); Sumba, *Gossweiler 8598* (BM, P); R. Luechimo, *Young 592* (BM, M).

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