A REVISION OF THE FAMILY TACCACEAE

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CONTENTS

SUMMARY

A historical survey of the family is followed by a discussion of the systematic position, the affinities within the family, the morphology, anatomy, phytochemical characters, flower biology, geographical distribution, dispersal, and growth. A key to the species is given. Each taxon has been described and provided with its full synonymy. All specimens have been cited except in those cases where more than 5 collections were made in one partial area (country, province, district, or small island). A complete identification list will be issued separately.

In this revision of Taccaceae 1 genus and 10 species are accepted; 8 species are restricted to Indo-Malesia (SE. Asia to the Solomons), 1 to tropical South America, and 1 species occurs from the tropical west coast of Africa eastwards to Easter Island in the eastern Pacific.

Two new species have been described, one from Borneo and one from the Solomons and New Guinea, and one new combination has been proposed.

The genus *Schizocapsa* and a large number of specific names have been reduced. The species synonymy is considerable and comprises not less than 49 specific epithets. This situation is due to the fact that some widely distributed species have proved to be very variable. The material which I had at my disposal was considerably larger than previous workers, especially Limpricht, had in hand. As a result of this rich material numerous locally described species could no longer be maintained.

TAXONOMIC HISTORY

The *Taccaceae* were first assigned to family rank and provided with a description by Dumortier (1829).

The type genus of *Taccaceae* is *Tacca* J. R. & G. Forst. with its type species, *Tacca pinnatifida* J. R. & G. Forst. (1775).

The name *Tacca* emanates from Rumphius (1747) who described 4 species. The first description of a member of the family known to me is from Carolus Clusius who described in 1605 in his book Exoticorum vol. 4 a plant as *Pentaphyllum indicum*, a pre-Linnean name of *T. palmata*.

The first validly published species of the family is *Leontice leontopetaloides* L. (1753), based on *Leontopetaloides* Amman (1736). O. Kuntze (1891) was the first to transfer *Leontice leontopetaloides* L. to *Tacca*. The IVth Int. Bot. Congress (1930) conserved the generic name *Tacca* J. R. & G. Forster against *Leontice* L. (now placed in the *Berberidaceae*) and against *Leontopetaloides* Boehmer (1760), as at that time there were some 50 specific epithets and some 30 accepted species within *Tacca*. A few other genera have been assigned to the family, of which only *Schizocapsa* remained in current use until the present. The distinction of these genera was based on leaf characters, except *Schizocapsa* in which features of the fruit were considered of generic value.

SYSTEMATIC POSITION OF THE FAMILY

Limpricht (1928) already remarked upon the lack of unanimity of opinion about the systematic position of the family.

Taccaceae were first placed near *Araceae* by Reichenbach (1828), followed by Lindley (1846), then near *Dioscoreaceae* (Endlicher, 1836), subsequently: between *Amaryllidaceae* and *Dioscoreaceae*, with nearest affinities with *Amaryllidaceae* (Kunth, 1850; Bentham, 1877; Benth. & Hook. *f.*, 1883; Baillon, 1894); between *Velloziaceae* and *Dioscoreaceae* (Pax, 1887; Pulle, 1952); near *Aristolochiaceae* (Süssenguth, 1921); between *Dioscoreaceae* and *Burmanniaceae* (Wettstein, 1924); between *Apostasiaceae* and *Philydraceae* (Hutchinson, 1934), and finally between *Dioscoreaceae* and *Pontederiaceae* (Takhtajan, 1969).

Apparently, most authors are in favour of a relation between *Taccaceae* and *Dioscoreaceae*.

It appears to me that the unisexual flowers, branching habit, racemose inflorescences, and 3-celled ovary of *Dioscoreaceae* make this not very probable.

Among the families mentioned *Amaryllidaceae* appear to be more likely because of the habit, scape-shaped inflorescence, umbellate flower disposition with an involucre, and occasionally 1-celled ovary.

AFFINITIES WITHIN THE FAMILY

Three sections were distinguished on the characters of the leaf and the presence or absence of the filiform bracts. These were section *Ataccia* (Presl) Pax (1887), section *Eutacca* Pax (1887), and section *Palmotacca* Limpr. (1928). As interpreted by Limpricht (1928), section *Ataccia* consisted of the entire-leaved species with filiform bracts and *T. parkeri*, section *Palmotacca* of the simply palmatifid and palmatisect species and *T. ulei* and *T. sprucei*, all without filiform bracts, whilst section *Eutacca* consisted of *T. leontopetaloides* and the present synonyms, with the leaves palmatisect with pinnately divided segments and with filiform bracts.

Limpricht obviously attached too much value to the characters of the leaves which caused him to place the pinnatifid-leaved *T. ulei* and *T. sprucei* in section *Palmotacca* and the entire-leaved *T. parkeri* in section *Ataccia*, though they are similar in the characters of the inflorescence, flowers, and fruit.

The relationships between the species can be explained as follows:

The 4 exclusively entire-leaved Old World species, all with filiform floral bracts and a vertical elongate rhizome with apical growth are distinctly related to each other: *T. integrifolia*, *T. plantaginea*, *T. chantrieri*, and *T. bibracteata*.

The 4 palmate-leaved Old World species without filiform floral bracts also form a distinct alliance; they fall apart into two smaller groups, viz. *T. palmata* and *T. ebeltajae* with a tuberous short rhizome from which the leaves and inflorescences emerge from an

apical cavity and in which the flowers are placed between the involucral bracts, and a second group consisting of *T. palmatifida* and *T. celebica* with a horizontally growing rhizome with the leaves and inflorescences spaced and no distinct apical growth and in which the flowers are inserted on the base of the inner involucral bracts.

T. leontopetaloides, widely distributed in the Old World, occupies an intermediate position between these two groups because of the palmate division of the three main leaf-segments, the presence of filiform floral bracts, and a tuber like that of *T. palmata* and *T. ebeltajae* but differing in regeneration by runners producing new tubers.

T. parkeri, from the New World species, has a rather isolated position: with the first group it shares the sometimes entire leaves, with the second group that it does not possess filiform floral bracts, or only 1 or 2 about filiform but not floral bracts, and with the second subgroup of the palmati-leaved species the horizontal rhizome.

The conclusion is that if sections should be distinguished there should be four of them, two of which consisting of a single species. This seems to me undesirable and I have concluded to reject the recognition of sections.

MORPHOLOGY

Habit. — The family *Taccaceae* is exclusively composed of terrestrial, long-lived, stemless, rhizomatous or tuberous herbs with radical leaves which in *T. leontopetaloides* die off between December and March.

Most species attain a maximum height between 50 and 100 cm; in *Tacca leontopetaloides* individuals of up to 3 m high have been found. The number of leaves and inflorescences in each plant is usually small.

Rhizome and tuber. — The tuberous rhizomes are all naked and cauligenous, starchy, sometimes roundish and tuber-like or elongate. There are three types: (i) a vertical elongate rhizome with apical growth (in spp. 2—4, in sp. 5 yet unknown); (ii) a roundish rhizome with an apical cavity representing the growth centre (in spp. 1, 6, and 7); and (iii) a horizontal elongate rhizome from the upper part of which leaves and inflorescences are emitted in a spaced way hence without apical growth (in spp. 8—10).

The rhizome of *T. leontopetaloides* has the additional peculiarity that the tuber emits from the growth apex thickish runners which grow downward and form a new tuber at apex replacing the original tuber.

Obviously the structure of the rhizome has a distinct systematical value.

Leaves. — The petiole is erect, herbaceous, and has a sheathing base. The leaf-blade is declinate. There are 4 types of leaves: entire, pinnatifid, palmatipartite or palmatisect, and palmatisect with pinnately divided segments. In the palmatipartite and palmatisect leaves the primary nerves are palmate, the secondary and tertiary nerves pinnate. In the entire and the pinnatifid leaves the nerves are pinnate. The venation is reticulate.

Inflorescence. — The peduncle (scape) is erect and herbaceous, terminating in an involucrum consisting of leafy, herbaceous, mostly erect bracts. Between these bracts the umbellately arranged flowers are situated. According to Eichler (1879) the flowers are placed in cincinni. It would only be possible to confirm this statement by anatomical investigations which were beyond the scope of this study. With the exception of the palmately leaved species and *T. parkeri* floral bracts are found between the flowers which are long, filiform, and drooping.

Flowers. — The flowers are usually of a very uniform structure. The flower is epigynous, bisexual, actinomorphic, 3-merous, pedicelled. The perianth is gamophyllous, campanulate with 6 perianth lobes placed in 2 alternating whorls. The aestivation is zygomorphic (one lobe of each whorl covering to both sides, one covering to one side, and one being covered on both sides). The stamens are epitepalous and have filaments highly characteristic for the family. These are short and flattened and are adnate to the perianth tube except for the inflexed margins and a short free part at apex which is helmet-like, with the thecae placed at the inside of the helmet. The anthers are introrse, thecae longitudinally dehiscent. The ovary is obpyramidal, 6-ribbed, 3-carpellate, 1-celled; the 3 placentas are parietal and marginal, each with numerous pendulous, apotropous, anatropous ovules. At the base of the style an annular zone or a disk is sometimes present. In this zone glandular cells are present together with short or long emergences; only in *T. leontopetaloides* a disk is clearly developed and is provided with glandular hairs. The style is simple, provided with 3 wings, each mostly deeply incised; at the top with 3 — generally obcordate — lobes, each provided with a clear stigmatic canal.

Pollen. — Pollen grains 1-sulcate, tenui-exinous, without special characteristics.

Fruit. — The fruits have usually a distinctly fleshy pericarp. In *Schizocapsa* the pericarp is less fleshy than in the *Tacca* species and has been said to be capsular by Hance (1881) and Boynton (1923), copied by Limpricht (1928) and Gagnepain (1934), but none of them has pictured the dehisced capsule and I have found no dehisced capsules in the herbarium sheets examined. This induces me to doubt this statement, in passing the only generic difference between *Schizocapsa* and *Tacca*. The normal way in which the seed is freed in *Tacca* is that after anthesis the peduncle sags — like in many *Amaryllidaceae* — and that the fruit is disintegrating on the soil.

Seeds. — The seeds are mostly ovoid, occasionally reniform. The testa is strongly ribbed, sometimes provided with papillae. The raphe is mostly distinct and fleshy. Endosperm is always present.

Seedlings. — Very little information is available on the life history of the seedlings. In the entire-leaved species the young leaves are not different from the mature stage. In *T. leontopetaloides* the seedling produces young leaves which are palmately incised, alike those of *T. palmatifida*. The mature leaves are separated into 3 lobes which are each pinnately lobed.

Growth. — On labels of *T. leontopetaloides* I found among the field data mentioned that after 2—3 years plants grown from seed set flower. My own observations with *T. chantrieri* in the Leyden Hortus agree in this respect. I have observed that every successive year the leaves gain larger size. In addition I get also the impression from the herbarium that in older plants the scape and bracts show larger size with age. Several species names have been based by previous authors on differences in size and appear to have no systematic value.

The remarkable variability in leaf-shape in *T. parkeri* makes observations on its development during a number of years highly desirable.

Hairs. — Hairs are present on all young parts of the plants; these hairs are extremely small, mostly only to be seen at magnification of × 100, except in fresh material and

material fixed in FAA. They are multicellular and of different length. They are numerous at the top of the scape and on the bracts. The hairs mostly disappear at maturity. In my opinion the presence of hairs and their structure are of no taxonomic value.

ANATOMY

Diagnostic anatomical characters are not known. An extensive account of the investigations on the general anatomy of the family was published by Limpricht (1928).

Rhizome. — In the parenchyma cells simple or complex starch grains almost completely filling the cells are present.

Leaves. — The epidermis shows raphides. The stomata are in the same plane as the epidermal cells.

Anthers. — The anthers have a persistent epidermis and the wall development probably conforms to the Dicotyledonous type. The pollen grains are 2-celled when shed.

Seeds. — The wall has a 2-layered outer integument and a 2-layered inner integument, inside these are the inner cuticle and the endosperm, the latter possessing aleuron grains, fatty oil, and no starch. The formation of the endosperm is nuclear, but later the tissue becomes cellular. The development of the embryo is unknown (Davis, 1966).

Vascular anatomy of the flowers. — (*T. leontopetaloides*). The carpellary dorsal bundles are adnate to the stamen traces opposite them for a considerable distance. The stamen traces arise by a fusion of 2 bundles. The placentas receive their vascular supply from dorsal bundles of the same carpel to which the placentas belong (Rao, 1969).

Chromosome number. — Chromosome investigations have been carried out only in *T. involucrata* from Africa, here reduced to *T. leontopetaloides*; 2n = 30 was found (Darlington & Wylie, 1955).

PHYTOCHEMICAL CHARACTERS

Researches have been carried out by Scheuer c.s. (1963) on *T. leontopetaloides*. From the tubers β-sitosterol, ceryl alcohol, and a bitter principle which was named taccalin were isolated. The molecular structure of taccalin is unknown. It was noted that large tubers were far less bitter than small ones.

According to Hegnauer (1963) a further analysis of the tubers should be valuable, because of the typical alkaloid pattern in the related *Amaryllidaceae* (*sensu stricto*).

FLOWER BIOLOGY

The syndrome of sapromyophily as described by Faegri and Van der Pijl (1966) is clearly apparent in *Taccaceae*. There is an ecological group of *Diptera* attracted to blossoms by the 'impression of decaying substance', no adaptation of the flies for flower visits is present; 'the basis for the visit is deceit'. The adaptations of the plant are found in the inflorescence or in the flowers. Generally, the colours are dull, dark, brown-purple-greenish, these colours having under ordinary circumstances no attraction for this class of

pollinators, viz. the carrion and dung flies, but the same colours do possess a positive attraction value in the presence of the odour of decaying protein. These characters are present in *Taccaceae* (colours) or possible (odour) as we see in the flowers a large number of glandular epidermal cells. The flies find in the flowers openings through which they can crawl inside. An attraction point is here the light inner side of the flowers, which functions as a kind of window, towards which the insects crawl. As, however, the *Tacca* flowers have nothing to offer to the visitors, the latter will soon try to leave the flower. The structure of the flowers makes this difficult, for the pollination units are built as traps — the helmet-like stamens, the obcordate lobes of the stigma — so that the insects cannot leave the flowers without efforts by which they effect pollination. It is not known whether the glandular cells secrete nectar in the flowers.

Besides these points, the filiform floral bracts and the large bracts around the inflorescence also may be attraction points for the insects.

Obviously, the flower biology of *Tacca* may yield interesting points and invites a critical study of observation and experiment yet to be made.

GEOGRAPHICAL DISTRIBUTION AND DISPERSAL

The genus *Tacca* has a pantropical range (maps 1—5) with the main centre in Indo-Malesia (SE. Asia to the Solomons). From this area 9 species are known. The 4 entire-leaved species occur in the area covered by E. India, Bangla Desh, Thailand, S. China, Indo-China, the Malay Peninsula, Sumatra, Borneo and W. Java. The 4 palmate-leaved species occur in the area covered by Indo-China, Malesia, the Solomons, and the Caroline Islands. Lastly, *T. leontopetaloides* has a colossal distribution from the west coast of Africa to Easter Island in the east Pacific. *T. parkeri* is found in tropical South America.

The supposed affinities between the species and the pantropical distribution point to an old origin of the family. The area of origin is unknown, but a centre of recent speciation is the SE. Asian area, because of the number of species there and the close relations within 2 groups.

Dispersal. — The seeds of the coastal *T. leontopetaloides* are assumed to be dispersed by seawater; furthermore it is said that its fruits are eaten by a bird which might contribute to dispersal of seed. In addition its edible rhizomes are distributed by man on a large scale and cultivated far beyond its natural area.

Of the other species which grow inland, no data are known. The berry-like indehiscent fruits are deposited on the soil by the sagging of the scape where they seem to decay. It may be possible that the fleshy raphe of the seed is attractive to ants. Field observations on dispersal are urgently needed.

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TACCACEAE

[Reich., Consp. Regn. Veg. 1 (1828) 44, *nom. nud.*; Presl, Rel. Haenk, 1, 3 (1828) 149 (as *Tacceae*) *nom. nud.*] Dum., Anal. Fam. (1829) 57, 58 (conserved in Code); Bartl., Ord. Nat. Pl. (1830) 82; Bl., Tijd. Nat. Gesch. Phys. 1 (1834) 134; Decne, Nouv. Ann. Hist. Nat. Mus. Par. 3 (1834) 368; Mart., Consp. Reg. Veg. (1835) 9; Endl., Gen. Pl. (1836) 159; Schnizl., Ic. 1 (1843) 58 (as order); Lindl., Veg. Kingd. (1846) 149; Kunth, Enum. 5 (1850) 457; Miq., Fl. Ind. Bat. 3 (1859) 576; Baillon, Adansonia 6 (1866) 248; Benth., Fl. Austr. 6 (1873) 458; Benth., J. Linn. Soc. Bot. 15 (1877) 494; B. & H., Gen. Pl. 3 (1883) 740; Pax in E. & P., Nat. Pfl. Fam. 2, 5 (1887) 127; Hook. f., Fl. Br. Ind. 6 (1892) 286; Baker in Dyer, Fl. Trop. Afr. 7 (1898) 413; Bailey, Queensl. Fl. 5 (1902) 1613; Limpricht[1]), Inaug. Diss. Breslau (1902) 32; Lotsy, Vortr. Stammesgesch. 3, 1 (1911) 826; Hayata, Ic. Pl. Form. 10 (1921) 182; Back., Handb. Fl. Java 3 (1924) 106; Wettstein, Handb. Syst. Bot. (1924) 881; Ridl., Fl. Mal. Pen. 4 (1924) 309; Limpr., Pfl. R. 4, 42 (1928) 8; Limpr. in Hannig & Winkler, Pfl. Areale 2. 4 (1928) t. 31; Gagnep. in Fl. Gén. I.-C. 6 (1934) 691; Hutchinson, Fam. Fl. Pl. 2 (1934) 170; Hegnauer, Chemotax. Pfl. 2 (1963) 439; Takhtajan, Fl. Pl. Orig. Disp. (Engl. ed. 1969) 234.

Terrestrial, erect, perennial, rosulate, scapose herbs with numerous minute pluricellular hairs in the young parts. *Rhizome* tuberous, solid, starchy, globose or elongate (vertical or horizontal), either with apical growth or with spaced growing points. *Leaves* up to 13, appearing together with the inflorescence, either spaced or crowded on the rhizome, petioled, entire, pinnatifid, palmatipartite or palmatisect and palmatisect with

[1]) Subsequently quoted as 'Limpr.'.

pinnately divided segments; herbaceous to chartaceous, shining above, less so beneath; base usually attenuate; apex mostly acuminate; nervation palmate or pinnate, slightly prominent to impressed above, prominent beneath, main nerves ribbed; venation reticulate. *Petiole* erect, ribbed, canaliculate distally, glabrous, with a sheating base, solid, rarely hollow. *Inflorescences* umbellate, involucrate, sometimes bracteate; peduncle(s) (scape) radical, unbranched, solid, very rarely hollow, erect, ribbed, distally canaliculate. *Involucral bracts* mostly 4 in 2 whorls (in *T. leontopetaloides* 4—12, in *T. bibracteata* 2), herbaceous, mostly erect, the outer ones mostly longer persisting after anthesis than the inner ones which are likewise originating later in the young stage of growing, always flattened, with entire margin, parallel- or curvinerved, sometimes also pinnately nerved. *Floral bracts* if present filiform, never flattened, of the same number as the flowers, falling off after anthesis. *Flowers* actinomorphic, bisexual, epigynous, gamophyllous, with 6 perianth lobes placed in 2 whorls, 3 outer ones alternating with 3 inner ones, mostly very dark coloured, parallel- or curvinerved; aestivation zygomorphic mostly resolving after anthesis. *Pedicel* 6-ribbed, elongated and thickened in fruit. *Stamens* 6, inserted on the corolla tube, epitepalous, outer slightly larger than inner ones; filaments short and flattened, at the base — except for the margins, which are inflexed — adnate to the perianth tube, this portion rhomboid in outline; the free portion helmet-shaped; thecae placed at the inner side of the helmet, introrse, longitudinally dehiscent. *Pollen* grains — as far as known — 1-sulcate, tenui-exinous. *Ovary* 1-celled, 3-carpellate, obpyramidal, 6-ribbed; placentas 3, parietal, each with numerous pendulous, apotropous, anatropous ovules; disk sometimes present; style 1, provided with 3 — sometimes deeply — incised wings, its apex with 3 obcordate lobes, each provided with a clear stigmatic canal. *Fruits* berry-like, with a fleshy pericarp, 6-ribbed, irregularly desintegrating. *Seeds* completely filling the fruit, 10 to many, with a strongly ribbed, mostly glabrous testa and a mostly distinct raphe.

Only genus: *Tacca* J. R. & G. Forst.

TACCA

J. R. & G. Forst., Char. Gen. Pl. (1775) 35, *nom. cons.*; G. Forst., Prodr. (1786) 36; Schreber, Gen. Pl. ed. 8 (1789) 229; Juss., Gen. Pl. (1789) 56; Willd., Sp. Pl. 2, 1 (1799) 200; R. Brown, Prodr. Fl. Nov. Holl. (1810) 340; Lamk, Enc. Suppl. 5 (1817) 278; Link, En. Pl. 1 (1821) 343; Bl., En. Pl. Javae ed. 1, 1 (1827) 82; Presl, Rel. Haenk. 1, 3 (1828) 149; Reichb., Consp. Reg. Veg. 1 (1828) 44; Lindl., Intr. Nat. Syst. Bot. (1830) 286; Roxb., Fl. Ind. 2 (1832) 169; Miq., Fl. Ind. Bat. 3 (1859) 576; Pax in E. & P., Nat. Pfl. Fam. 2, 5 (1887) 130; Bailey, Queensl. Fl. 5 (1898) 413; Baker in Dyer, Fl. Trop. Afr. 7 (1898) 413; Limpr., Inaug. Diss. Breslau (1902) 43; Back., Handb. Fl. Java 3 (1924) 106; Limpr., Pfl. R. 4, 42 (1928) 13; Hayward, Baileya 5, 2 (1957) 85; Back. & Bakh. *f.*, Fl. Java 3 (1968) 211. — Type: *T. pinnatifida* J. R. & G. Forst (= *T. leontopetaloides* (L.) O.K.).

Leontopetaloides [Amman, Comm. Ac. Sc. Petrop. 8 (1736) 211, t. 13.] Boehmer in Ludwig, Def. Gen. Pl. (1760) 512, *nom. rejic.* — Type: Amman's plate (reproduced by Merr. in J. Arn. Arb. 26, 1945, 92, pl. II) (= *T. leontopetaloides* (L.) O. K.).

Leontice L., Sp. Pl. 1 (1753) 312—313 *p.p.*, type excl.; Burm. *f.*, Fl. Ind. (1768) 82; Houttuyn, Nat. Hist. 30 (1780) 362.

[*Chaitea* Solander *ex* Parkinson, A Journal of a Voyage to the South Seas (1784) 38, *nom. nud.* — *Chaitaea*, Solander *ex* Seem., Fl. Vit. (1866) 102, orthogr. variant (also written as *Chataea*). — Type: *Chaitea tacca* Sol. *ex* Parkinson (= *T. leontopetaloides* (L.) O. K.).]

Ataccia Presl, Rel. Haenk. 1, 3 (1828) 149; Bartl., Ord. Nat. Pl. (1830) 83; Bl., Tijd. Nat. Gesch. Phys. 1 (1834) 135; Endl., Gen. Pl. (1836) 159; Schnizl., Icon. 1 (1843) 58; Kunth, Enum. 5 (1850) 464; Miq., Fl. Ind. Bat. 3 (1859) 578; Pax in E. & P., Nat. Pfl. Fam. 2, 5 (1887) 130 (as *Tacca* sect. *Ataccia*). — *Atacca* Lemaire, Jard. Fleur. 2 (1852) 186, orthogr. variant. — Type: *A. integrifolia* (Ker-Gawl.) Presl (= *T. integrifolia* Ker-Gawl.).

Schizocapsa Hance, J. Bot. 19 (1881) 292; Pax in E. & P., Nat. Pfl. Fam. 2, 5 (1887) 130; Limpr., Inaug. Diss. Breslau (1902) 58; Pfl. R. 4, 42 (1928) 11; Gagnep., Fl. Gén. I.-C. 6 (1934) 692. — Type: *S. plantaginea* Hance (= *T. plantaginea* (Hance) Drenth).

For the description of the genus, see family diagnosis.

Pantropical; 10 species in SE. & SW. Asia (incl. Ceylon), Australia (Queensland & N. Territory), Pacific, Africa (incl. also Madagascar & adjacent isl.), and tropical S America.

KEY TO THE SPECIES

1. Leaves entire.
   2. Filiform bracts absent or only 1 or 2, then 0.2—0.3 cm thick. . . . . **10. T. parkeri**
   2. Filiform bracts 4 to numerous, up to 0.1 cm diameter.
      3. Involucral bracts 2 . . . . . **5. T. bibracteata**
      3. Involucral bracts 4.
         4. Ripe fruit 1.0 by 0.7 cm. Seeds oblong-ovoid to oblong-ellipsoid, ± terete in cross-section, 2.5 by 1.0 by 0.5 mm. Inner involucral bracts decussate, 0.7—2.5 by 0.3—1 cm. Leaf base cuneately attenuate and decurrent . . . . . **3. T. plantaginea**
         4. Ripe fruit 2—5 by 1—2.5 cm. Seeds 3.5—6.0 by 1—3.5 by 1—2 mm, not terete in cross-section. Inner involucral bracts 2.5—22 by 1—11 cm. Leaf base cuneately attenuate but not decurrent.
            5. Seeds ovate to ovate-oblong in outline, convex-concave, dorsoventrally flattened, more or less shell-shaped. Involucral bracts not decussate, 2 outer ones opposite, 2 inner ones more or less in the axils of one of the outer . . . . . **2. T. integrifolia**
            5. Seeds reniform, laterally flattened. Involucral bracts more or less decussate **4. T. chantrieri**

1. Leaves distinctly shallowly or deeply lobed.
   6. Leaves pinnately incised, lobes simple. Filiform bracts absent or only up to 2, then 0.2—0.3 cm thick **10. T. parkeri**
   6. Leaves palmately incised and/or divided, lobes simple or strongly divided. Filiform bracts either present, then up to 0.1 cm thick and numerous, or absent.
      7. Leaves palmately divided into 3 lobes, each lobe pinnately divided into numerous smaller ones. Filiform bracts present . . . . . **1. T. leontopetaloides**
      7. Leaves palmately incised and/or divided into 3—13 lobes, each lobe simple or only palmately divided into few ± similar lobes. Filiform bracts absent.
         8. Leaves and inflorescence(s) crowded in a hollowed portion of a tuberous, roundish rhizome. Flowers inserted on the end of the scape between the bracts.
            9. Outer involucral bracts oblong-ovate, 1—2.5 by 0.4—1 cm, inner ones cordate, 3—4.5 by 1.5—2 cm. Inner perianth lobes obovate, 5—6 by 3—4 mm, with rounded apex. Fruit obpyramidal, 1.3—1.5 by 0.8—1.2 cm. . . . . **7. T. ebeltajae**
            9. Outer involucral bracts broadly-ovate to ovate, 2.5—9.5 by 2—9 cm, inner ones broadly-ovate to cordate, 4.5—10 by 2.5—6 cm. Inner perianth lobes constricted halfway, 3—5 by 2—4 mm, the apex acuminate. Fruit globose, up to 1 cm in ∅ . . . **6. T. palmata**
         8. Leaves and inflorescence(s) all spaced on an elongated, horizontal, cylindrical, tuberous rhizome. Flowers inserted on the basal portion of the inner two bracts.
            10. Leaves simple, palmately incised for almost ½ of their length. Fruit ellipsoid to obovoid, 2.2—3 by 1 by 1 cm. . . . . **8. T. palmatifida**
            10. Leaves palmately compound, with 5 stalked leaflets of which the outer 2 may be connected at the base. Fruit obpyramidal, 1.8 by 1 by 0.8 cm . . . . . **9. T. celebica**

1. Tacca leontopetaloides (L.) O. K., Rev. Gen. Pl. 2 (1891) 704; Baill., Hist. Pl. 13 (1894) 165, fig. 107—110; Back., Handb. Fl. Java 3 (1924) 107; Heyne, Nutt. Pl. ed. 2 (1927) 452; Lam, in Nieuw Guinee 1 (1935) 189, fig. 37; Merr., J. Arn. Arb. 26 (1945) 93; Back., Bekn. Fl. Java (em. ed.) 10 (1949) fam. 241; Glassman, Bull. Bish. Mus. 209 (1952)

14, 116; Andrews, Fl. Pl. Sudan 3 (1956) 308; Hayward, Baileya 5 (1957) 85; Mansfeld, Die Kult. Pfl., Beih. 2 (1959) 568; Yuncker, Bull. Bish. Mus. 220 (1959) 81; Carter, Fl. Trop. E. Afr. Taccac. (1962) 1; Parham, Pl. Fiji Isl. (1964) 283; Back. & Bakh. *f.*, Fl. Java 3 (1968) 212. — [*Leontopetaloides* Amman, Comm. Ac. Sc. Petrop. 8 (1736) 211, t. 13, 19 (repr. Merr., J. Arn. Arb. 26 (1945) 92, pl. II)]. — *Leontice leontopetaloides* L., Sp. Pl. 1 (1753) 313; Burm. *f.*, Fl. Ind. (1768) 82; Houttuyn, Nat. Hist. 30 (1780) 362. — Type: Amman's plate l.c. (*Amman s.n.*; LE?, not seen. Ind. Or.) — **Map 1; Plate 1: 1—7.**

[*T. phallifera* Rumph., Herb. Amb. 5 (1747) 326, t. 113, *p.p.* is partly *Amorphophallus*; see Merr., Int. Rumph. (1917) 144.]

[*T. sativa* Rumph., Herb. Amb. 5 (1747) 324, t. 112, *p.p.*, is partly *Amorphophallus*; see Merr., Int. Rumph. (1917) 144.]

[*T. littorea* Rumph., Herb. Amb. 5 (1747) 328, t. 114; Roxb., Fl. Ind. 2 (1832) 172; see Merr., Int. Rumph. (1917) 144.]

T. pinnatifida J. R. & G. Forst., Char. Gen. Pl. (1775) 35, t. 35; G. Forst., Pl. Esc. (1786) 59; Lour., Fl. Coch. 1 (1790) 300; Lamk., Enc. Suppl. 5 (1817) 278, t. 232; Spreng., Syst. Veg., ed. 16, 2 (1825) 118; Trevir., Symb. Phyt. 1 (1831) t. 3, f. 54, 55; Roxb., Fl. Ind. ed. Carey, 2 (1832) 172; Decne., Nouv. Ann. Mus. Hist. Nat. Par. 3 (1834) 368; Schnizl., Icon. 1 (1843) 58; Griff., Ic. Pl. As. 3 (1851) t. 272a, 1, 2; Zoll., Syst. Verz. 1 (1854) 69; Filet, Pl. Bot. Tuin Weltevr. (1855) 13; Miq., Fl. Ind. Bat. 3 (1859) 577; Regel, Gart. Fl. (1860) t. 582; Le Maout & Decne., Traité Gén. Bot. (1868) 573; Benth., Fl. Austr. 6 (1873) 458; Baker *f.*, Fl. Maur. & Seych. (1877) 370; Hook. *f.*, Fl. Br. Ind. 6 (1892) 287; Bot. Mag. III, 49 (1893) t. 7299, 7300; Drake del Castillo, Fl. Polyn. Franç. (1893) 224; Kaernbach, Bot. Jahrb. 16 (1893) Beibl. nr. 37, 13; Dur. & Schinz, Consp. Fl. Afr. 5 (1895) 272; Baker *f.* in Dyer, Fl. Trop. Afr. 7 (1898) 413; Bailey, Queensl. Fl. 5 (1898) 1613; Trim., Fl. Ceyl. 4 (1898) 273; Barton & Rendle, Cat. Welw. Afr. Pl. 2 (1899) 36; Limpr., Inaug. Diss., Breslau (1902) 50; Maiden, Proc. Linn. Soc. N.S.W. 29 (1904) 551; Wohltmann, Tropenpflanzer 9 (1905) 120, t. 1—2; Ridl., Mat. Fl. Mal. Pen. 2 (1907) 76; Dur. & Dur., Syll. Fl. Congo (1909) 558; Merr., Fl. Manila (1912) 150; Bailey, Compr. Cat. Q. Pl. (1913) 548, t. 533; Danguy, Bull. Mus. Hist. Nat. Paris (1913) 491; Chevalier, Étude Fl. Afr. Centr. 1 (1913) 308; Merr., Int. Rumph. (1917) 144; Brown, Min. Prod. Philip. For. 2 (1921) 256; Ridl., Fl. Mal. Pen. 4 (1924) 309; Limpr., Pfl. R. 4, 42 (1928) 27; Ridl., Disp. (1930) 318, 470; Sasaki, Cat. Gov. Herb. Form. (1930) 133; Wilder, Bull. Bish. Mus. 86 (1931) 30; Guillaum., J. Arn. Arb. 13 (1932) 110; Gagnep. in Fl. Gén. I.-C. 6 (1934) 697; Perrier de la Bâthie, Cat. Pl. Madag., Hydrocharitac.-Taccac. (1934) 18; Fl. Madag., Fam. 43 (1950) with plate; Quis., Med. Pl. Philip. (1951) 177; Mitra, Fl. Pl. East Ind. 1 (1958) 55; Back. & Bakh. *f.*, Fl. Java 3 (1968) 212; St. John, Nat. Canad. 98 (1971) 575. — Type: *Forster s.n.* (BM, K, P), Tahiti.

[*Chaitea tacca* Solander *ex* Parkinson, A journal of a voyage to the South Seas (1784) 38, *nom. nud.* — Type: *Cook's Voyage s.n.* (BM).]

T. pinnatifolia Gaertn., Fruct. (1788) 43, t. 14. — Type: t. 14.

T. involucrata Schum. & Thonn., Beskr. Guin. Pl. (1827) 197; Hook., Niger Fl. (1849) 535; Darlington & Wylie, Chrom. Atl. ed. 2 (1955) 403; Raponda-Walker & Sillans, Pl. Util. Gabon (1961) 413; Berhaut; Fl. Sénég. ed. 2 (1967) 21. — *T. pinnatifida* J. R. & G. Forst. ssp. *involucrata* Limpr., Inaug. Diss. Breslau (1902) 55. — Type: *Thonning s.n.* (not seen).

T. dubia Schult., Syst. Veg. 7 (1829) 167. — Type: *T. phallifera* Rumph., Herb. Amb. 5 (1747) 326.

[*T. guineensis* G. Don *ex* Loudon, Hort. Brit. 2 (1830) 167, nom. nud. — Type: unknown.]

T. gaogao Blanco, Fl. Filip. (1837) 262. — Type: unknown.

[*T. madagascariensis* Boj., Hort. Maur. (1830) 350, *nom. nud.*] — *T. pinnatifida* J. R. & G. Forst. ssp. *madagascariensis* Limpr., Inaug. Diss. Breslau (1902) 53. — Type: *Boivin s.n.* (P), Comoro Is., Mohéli.

T. oceanica Nutt., Am. J. Pharm. 3 (1838) 305 (not seen); Seemann, J. Bot. 4 (1866) 261. — Type: unknown.

[*T. maculata* Zipp. *ex* Spanoghe, Linnaea 15 (1841) 480, *nom. nud.* — Type: *Zippelius 69a* (L), Timor.]

T. quanzensis Welw., Ann. Cons. Ultr. 1 (1858) 591; Barton & Rendle, Cat. Welw. Afr. Pl. 2 (1899) 36. — Type: *Welwitsch 6475* (BM, phot. in BR), Angola, near Cuanza R.

T. brownii Seem., Fl. Vit. (1866) 100; Benth., Fl. Austr. 6 (1873) 459; Limpr., Pfl. R. 4, 42 (1928) 30. — *T. pinnatifida* J. R. & G. Forst. var. *brownii* Bailey, Compr. Cat. (1913) 548, t. 543. — Type: '*T. pinnatifida* Brown' (BM, E, K (= phot. Bailey Hortorium 8097), P), N. Australia.

T. maculata Seem., Fl. Vit. (1866) 103; Reinecke, Bot. Jahrb. 25 (1898) 595; Limpr., Pfl. R. 4, 42 (1928) 30; Hotta, Act. Phytotax. Geobot. 19 (1963) 154. — *T. pinnatifida* J. R. & G. Forst. ssp. *maculata* Limpr., Inaug. Diss. Breslau (1902) 56. — *T. pinnatifida* J. R. & G. Forst. var. *maculata* Domin, Bibl. Bot. 85 (1915) 534. — Syntypes: *Seemann 632* (A, BM, C, G, P) Fiji; *Seemann 909* (BM); *F. v. Mueller s.n.* (not seen), N. Australia.

T. artocarpifolia Seem., Fl. Vit. (1866) 101; Lamk., Ill. 2 (1797) t. 232 (unnamed); Hook., Bot. Mag. III, 30 (1874) t. 6124; Perrier de la Bâthie, Cat. Pl. Madag., Hydrocharitac.-Taccac. (1934) 18; Fl. Madag. Fam. 43 (1950). — Syntypes: *Lyall 373* (K); *Blackburn 186* (K), Madagascar.

T. pinnatifida J. R. & G. Forst. var. *aconitifolia* F. v. M., in Benth., Fl. Austr. 6 (1873) 459. — Type: *F. v. Mueller s.n.* (A, K), N. Australia.

[*T. abyssinica* Hochst. *ex* Baker in Dyer, Fl. Tr. Afr. 7 (1898) 413; *nom. nud. in syn.* — Type: *Schimper 1946* (BM, K, P).]

T. samoensis Reinecke, Bot. Jahrb. 25 (1898) 595, t. 9. — Type: *Reinecke 188* (G, WRSL-drawing, WU), Samoa.

T. viridis Hemsl., in Hook. Ic. Pl. IV, 6 (1899) t. 2515, 2516; Limpr., Inaug. Diss. Breslau (1902) 50; Ridl., Mat. Fl. Mal. Pen. 2 (1907) 78; Limpr., Pfl. R. 4, 42 (1928) 26; Gagnep., Fl. Gén. I.-C. 6 (1934) 697. — Type: *Goldham s.n.* (K), probably from Mal. Peninsula.

T. pinnatifida J. R. & G. Forst. ssp. *eupinnatifida* Limpr., Inaug. Diss. Breslau (1902) 52. — Syntypes: *Reinecke 101* (G, WRSL, WU), Samoa; *Reinecke 579* (not seen), Samoa; *Naumann s.n.* (1875) (WRSL), New-Ireland; *Gaudichaud s.n.* (G, P), Moluccas; *Bamler 117* (not seen), N. Guinea; *Warburg 21112* (not seen), N. Guinea; *Griffith 6025* (K, P), Mal. Peninsula; *Warburg 14069* (not seen), Luzon.

T. pinnatifida J. R. & G. Forst. ssp. *eupinnatifida* Limpr. var. *obtusata* Limpr., Inaug. Diss. Breslau (1902) 52. — *T. pinnatifida* J. R. & G. Forst. f. *obtusata* Limpr., Pfl. R. 4, 42 (1928) 29. — Type: *Zollinger 2376* (BM, BO, G, P, WRSL), Java.

T. pinnatifida J. R. & G. Forst. ssp. *involucrata* Limpr. var. *acutifolia* Limpr., Inaug. Diss. Breslau (1902) 55. — Syntypes: *Steudner 436*, Abyssinia; *Stuhlmann 6565, 6081*, E. Africa; *Buchanan 1885*, Shiri highlands (not seen).

T. pinnatifida J. R. & G. Forst. ssp. *interrupta* Warb. *ex* Limpr., Inaug. Diss. Breslau (1902) 56. — Syntypes: *Holtze 191* (G, WRSL), Port Darwin; *Warburg 18406* (BM), Queensland.

T. pinnatifida J. R. & G. Forst. ssp. *minor* Limpr., Inaug. Diss. Breslau (1902) 54. — Syntypes: *Hillebrand s.n.* (not seen), Hawaii; *Bennett s.n.* (not seen), Hawaii; *R. Forster s.n.* B†), Pac. Islands.

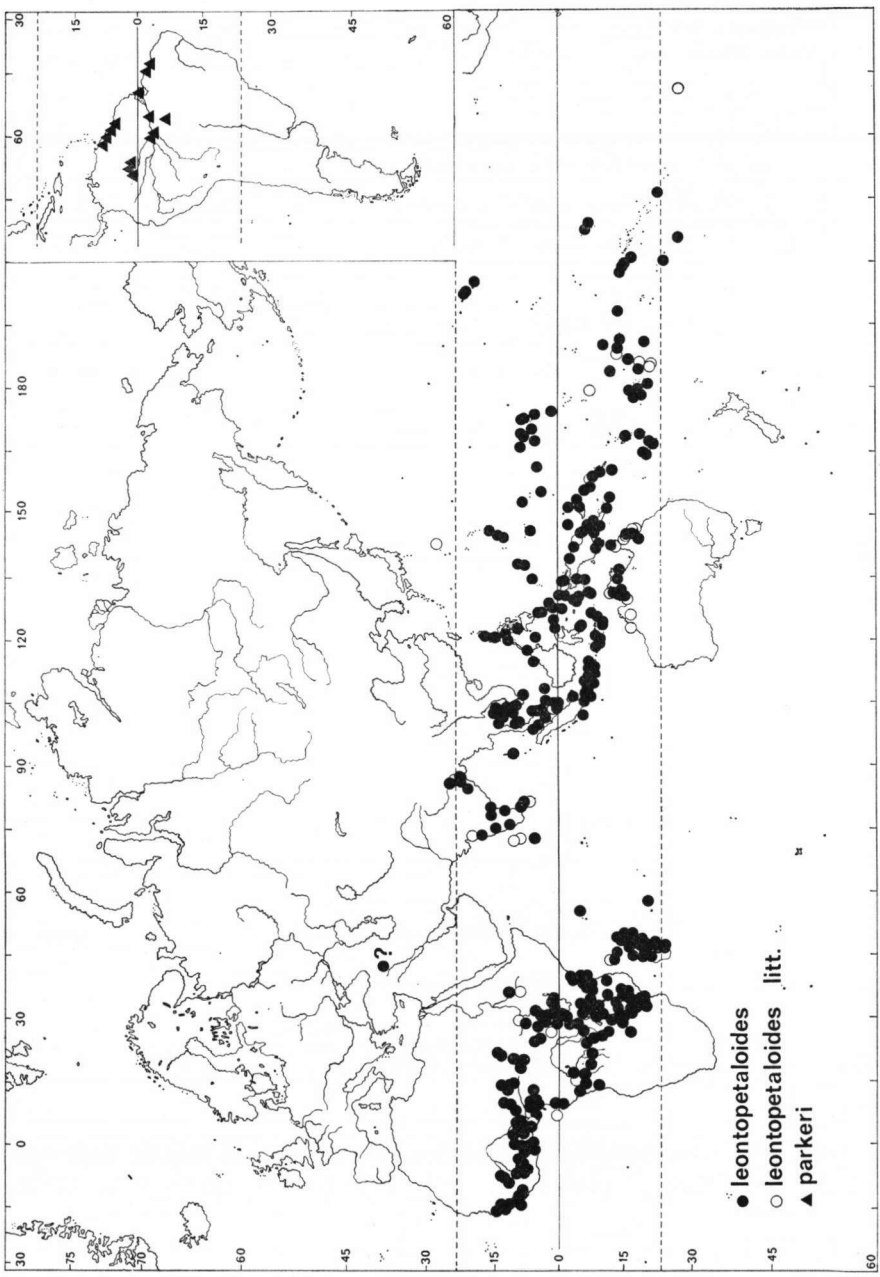
[*T. umbrarum* Jum. & Perr. *ex* Heckel, Ann. Mus. Col. Mars. II, 18, 8 (1910) 97, t. 24 bis & ter., *nom. nud.* — Type: *Perrier de la Bâthie s.n.* (P), Madagascar.]

T. pinnatifida J. R. & G. Forst. var. *paeoniifolia* Domin, Bibl. Bot. 85 (1915) 533, with photos. — *T. brownii* Seem. var. *paeoniifolia* Limpr., Pfl. R. 4, 42 (1928) 30. — Type: *Domin s.n.* (not seen), NE. Queensland.

T. pinnatifida J. R. & G. Forst. var. *permagna* Domin, Bibl. Bot. 85 (1915) 532, with photo. — Type: *Domin s.n.* (not seen), NE. Queensland.

T. hawaiiensis Limpr., Pfl. R. 4, 42 (1928) 30; Degener, New Illustr. Flora Haw. Isl. fam. 72 (1932). — Syntypes: *Hillebrand s.n.* (BM, WU); *Bennett 113* (not seen); *Chamisso 82* (not seen); *Hillebrand s.n.* (not seen), all from Hawaiian Islands.

Tuber depressed-globose or broadly ellipsoid, thin-skinned, smooth, 1.5—5 cm high by 1—8 by 0.5—4 cm, white when young, older dark grey to brown, white within, somewhat juicy, growing near the surface to up to 50 cm deep, provided with an apical cavity emitting the leaves and inflorescences, the tuber is replaced during the year by a new main tuber which arises from a downward-growing runner-like thick rhizome at a lower level and remains dormant after yearly death of aerial parts of the original plant. The base of the leaves and the inflorescences is in young plants (mostly?) surrounded by a special leaf (cataphyll) 8—21 by 1.2—3 cm, linear-lanceolate, subsessile, attenuate at the base, acuminate at the apex, parallel-nerved. *Leaves* 1—3, broadly obovate, ovate, or oblong-ovate in outline, palmately 3-sect, with the 3 segments lobed to dissected, pinnately nerved (main nerves greenish white), up to 70 by 120 cm, lamina of the segments incised as far as the nerve or shallower, lobes of the segments mostly numerous (sometimes only one central lobe present), orbicular, ovate, lanceolate, or linear, in young leaves mostly (much) smaller, sessile or with attenuate base, rounded, obtuse, acute, or acuminate at the apex. Petiole 17—150 by 0.3—2.5 cm, sheath 2—25 by 0.6—3.5 cm, light green, dotted white-green to blackish purple, hollow. *Inflorescences* 1 or 2, 20—40-flowered; scape 20—170 by 0.2—2.5 cm, hollow, green. *Involucral bracts* of different size, large ones 4—9(—12), mostly surrounding the scape, sometimes only on the ribbed side of the scape, in that case with up to 10 small bracts in the canaliculate zone; the large bracts light to dark green, sometimes with fine purplish margin, 2(—4) outer ones sessile, (ob)ovate, oblong, or lanceolate, 2.5—10 by 1.2—3.5 cm, with attenuate or cuneate base, acuminate at the apex, acumen entire or 2—3 dentate; 2—7(—10) inner bracts more or less similar in shape to the outer ones, acuminate at the apex, curvinerved with pinnate side nerves, 2.5—10 by 0.7—5 cm; the small bracts linear lanceolate, sessile, with acute apex, 5—7 by 1—1.5 mm. *Filiform bracts* 20—40, up to 25 cm by 0.5 mm ∅, (dark) purple or dark blackish-brown. *Flowers* 6—17 by 6—13 mm, drooping, light yellow, yellowish green or blackish purplish green; pedicel up to 6 cm by 1 mm (in fruit up to 8 cm by 2 mm); perianth tube 1.5—5 by 4—11 mm. *Perianth lobes*: mostly fleshy with membranous margins, persisting until full ripening of the fruit, then withering, 3 outer ones elliptic or ovate (lanceolate), (1.5—)4—7 by 2—3 mm, 3 inner ones (broadly) ovate or oblong ovate, 5—7.5 by 2.5—5 mm; apices obtuse or retuse, rarely truncate. *Stamens* white or dull yellow to brown or purple, adnate portion of the filaments 1—5 by 2—2.5 mm, free apical portion 1.5—2 by 1.5—2 mm, thecae up to 2 mm long. *Ovary* 2—5 by 2—4 mm; disk annular, ribbed, (always?) with numerous pellucid glandular hairs, ∅ 1.5—3 mm; style 1.5—3 by 0.5—1.5 mm, whitish to green; stigma lobes whitish to purple, 1.5—2 by 2—3 mm, sometimes with their 2 apices emarginate. *Fruit* mostly globose, 1.5—2.5 cm ∅, but sometimes ellipsoid or ovoid, up to 3.5 by 1.5—2.5 cm, pendulous, pale to darker green, finally pale orange; fruit wall up to 1.5 mm thick. *Seeds* many, ovoid to ellipsoid, flattened, 5—8 by 3—5 by 1.5—3 mm glabrous, yellowish brown, with a spongy white testa, 15—19 ribbed.



Map 1.

SENEGAL. 7 collections.
GAMBIA. Bathurst, sea coast: *Frith 114* (K).
PORTUGUESE GUINEA. Nova Lamego, Buruntama: *Alves Pereira 3081* (K).
MALI. Bamako: *Waterlot 1119* (P); Koulikoro: *Vuillet 662* (P).
GUINEA REP. 8 collections.
SIERRA LEONE. 5 collections.
IVORY COAST. 10 collections.
GHANA. 10 collections.
DAHOMEY. Kouendi: *Chevalier 24270* (P); Agouagon: *Chevalier 23538* (P).
NIGER. Gaya: *Cremers 891* (BR).
NIGERIA. 21 collections.
TCHAD. Déli: *Audry 53* (BR, K); Hadjer Arkap: *Gaston 804* (P)
CAMEROUN REP. 11 collections.
REP. CENTRAFRICAINE. 6 collections.
GABON. 6 collections.
CONGO-BRAZZAVILLE. Port Gentil, Cape Lopez: *Linder 1609* (A, K).
ZAIRE. 65 collections.
BURUNDI. Kezinya Hosso: *Michel & Reed 2378* (BR).
ANGOLA. Candumba (Cuanza R.): *Welwitsch 6475* (BM, photo in BR)
SUDAN. 9 collections.
ETHIOPIA. Nué: *Quartin, Dillon & Petit s.n.* (P); *Schimper 1946* (BM, K, P).
UGANDA. 8 collections.
KENYA. 10 collections.
TANZANIA. 35 collections.
ZAMBIA. 23 collections.
MALAWI. 10 collections.
RHODESIA. 8 collections.
PORTUGUESE EAST AFRICA. 9 collections.
COMORO Is. Mayotte, Tamanzi, alt. 50 m: *Lam & Meeuse 6152* (L); *Boivin 3076* (P); Mohéli: *Boivin s.n.*)P); *Humbolt 453* (BM, K, P).
MADAGASCAR. 79 collections.
SEYCHELLES. Mahé, alt. 180 m: *Osborne-Day 185* (BM); *Stanley Gardiner s.n.* (K).
MAURITIUS. 3 collections.
MALDIVE Is. Addu Atoll., Hittadu Islet: *Sigee 96* (K).
INDIA. Bombay. *Dalzell s.n.* (K). — Mysore. Anantapur: *Meebold 6815* (K, WRSL). — Madras. 10 collections. — Bihar. Hazaribagh: *Clarke 20315* (K); *Neary? s.n.* (K). — Orissa. Rampur, Raivalshot: *Mooney 3965* (A, K). — W. Bengal. Serampore: *Voigt s.n.* (C).
CEYLON. *Thwaites 2320* (BM, K, P); Jaffna: *Herb. Rottlerianum s.n.* (K).
ANDAMAN Is. S. Andaman: *Kurz s.n.* (K).
THAILAND. Eastern. Nakhon Ratchasima Distr., Phimai, Ban Khok Sing, alt. 250 m: *Smitinand RFD 21031* (C, K). — Central. Bangkok Distr., Bangkok: *Marcan 2137* (BM, K). — South eastern. Prachin Buri Distr., Aran Pratet, alt. 50 m: *Kerr 19589* (K); Chon Buri Distr., Sriracha: *Collins 671* (K); Trat Distr., Lem Dau Kao, Kaw Chang, alt. 5 m: *Kerr 9288* (K, L); Tungka, Kaw Chang: *Rabil 68* (K). — Peninsular. Kaw Tao: *Kerr 11219* (E, K).
CAMBODIA. Pursat, Compon Chuang: *Harmand 141* (*Herb. Pierre 3349*) (P).
S. VIETNAM. Cochinchina. Honchong near Hatien: *Poilane 27411* (P); *Poilane 27460* (P); P. Condor: *Talmy s.n.* (P); *Wallich 5171D* (K, P).
MALAY PENINSULA. Trengganu. Jambu Bangkok: *J. C. 1538* (K, L, SING); Cherating: *Ridley s.n.* (SING sh. 41568); Bukit Bubus, Besut: *Sinclair & Kiah bin Salleh SF 40838* (E, SING); Krelay Plant: *Vesterdal 183* (C). — Pahang. Kwala Pahang: *Ridley s.n.* (SING sh. 41571). — Selangor. Sg. Ujong: *Alvins s.n.* (SING sh. 41569); Teluk Merbau: *C. W. Franck 1303* (C). — Malacca. Pulau Besar, alt. sea level: *H. M. Burkill 2764* (K, L); *Maingay 1592* (K); *Herb. Griffith 6025* (K, P). — Johore. Jason Bay, Sg. Tuenseh: *Corner SF 28462* (BO, K, SING); Jason Bay, Sg. Diman: *Corner s.n.* (SING sh. 41572). — Langkawi. Codh?: *Curtis s.n.* (SING sh. 41567); *Holttum SF 17422* (BO, SING); *Ridley 14967* (K, SING). — Penang.: *Wallich 5171 E* (K, P); cult. from Trang (Thailand): *Goldhaus s.n.* (SING sh. 41647). — Singapore. P. Senang, alt. 3 m: *H. M. Burkill 1225* (K, L); near Tanjong Penyali, P. Semakau: *Sinclair SF 38925* (E, L). — P. Tioman. Ivara Bay: *I. H. Burkill SF 917, 919* (SING); P. Redang: *Jensen s.n.* (C).
SUMATRA. P. Enggano. P. Dua: *Lütjeharms 5283* (L). — Islands in Sunda Strait. Verlaten Eiland, near the coast: *Boedijn 2201* (BO), *2351* (BO); I. Sebesie, on coast: *Docters van Leeuwen-Reijnvaan 5192* (BO). — Banka. SW. coast, near beach: *Bünnemeijer 2475* (BO); *Kobus s.n.* (BO sh. 1248—187). —

Riouw-Lingga Archipelago. P. Pukulai near P. Bintan, alt. 2 m: *Bünnemeijer 6256* (L), *6309* (K, L).

JAVA. West. 13 collections. — Central. 8 collections. — East. 13 collections. — Kangean Archipelago. 11 collections. — Madura. 5 collections. — Karimundjawa Archipelago. Tg. Gelam: *Karta 420* (BO); P. Minjawakan: *Koorders 173* (BO). — Islands in the Bay of Djakarta. 7 collections.

LESSER SUNDA Is. Sumbawa. Sultanate of Dompu, alt. 40—100 m: *Elbert 3966* (L). — Sumba. Waimungura, 18 km S. of Waikelo, alt. 50 m: *Bloembergen 3205* (L); Nabesu, near Waingapu: *Iboet 56* (BO), *84* (BO). — Flores. Rekas-Nunang, alt. 450—600 m: *Schmutz 2036* (L). — West Timor. Niki Niki, alt. 750 m: *Walsh 286* (L); *Zippelius 69a* (L); *Zippelius s.n.* (L sh. 908.247. 566). — East Timor. Kalakuk, Bibiçuçu: *Forbes 4017* (BM, BO, L). — Wetar. Near Fihusus, alt. 485—500 m: *Elbert 4532* (L). — Tanimbar Is. P. Selaru, Namtabung, alt. few m: *Van Borssum Waalkes 3147* (BO); P. Jamdena, Saumlakki: *Buwalda 4093* (L).

BORNEO. Balambangan, Banguey, and Mangsi Is. Banguey I.: *Castro & Melegrito 1473* (BO, G); Mangalum I.: *Kloss s.n.* (BO sh. 1248—191a, SING sh. 41661). — Anambas & Natuna Islands. P. Tudjuh, P. Djemadja, alt. 5 m: *Bünnemeijer 5775* (BO); P. Tudjuh, Tg. Pasir, alt. 5 m: *Bünnemeijer 5864* (BO); Bunguran, S. of Ranai village, alt. ½ m: *Van Steenis 1301* (L, BO).

PHILIPPINES. Calamianes. Busuanga: *March 228* (P), *363* (P). — Mindoro. Base of Mt. Yagaw, SE. slope, sea level: *Conklin PNH 18730* (L), *PNH 39187* (BM, K, L); Pinamalayan: *Ramos BS 41052* (G); Semerara Is.: *Merrill 4132* (K). — Luzon. Solamogue, Ilocos Sur: *Merrill s.n.* (BO sh. 1248—174); Malabon, Manila: *Loher 1619* (K, P). — Panay. Miagao, prov. Ilo-ilo: *S. Vidal 3972* (K). — Sulu Islands. Turtle Is., Langaan I., alt. 40 m: *Santos 4754* (L).

CELEBES. North Peninsula. Menado, alt. 50 m: *Koorders 18920* (L); Amurang, beach: *Koorders 18925* (BO); Gorontalo: *Riedel s.n.* (K). — P. Muna. Alt. 0 m: *Kjellberg 86* (BO). — P. Buton. Distr. Sampolawa, alt. 20 m: *De Boer* (BO).

MOLUCCAS. Talaud and Nanusa Is. P. Karakelang, S. of Beo, alt. 1 m: *Lam 2519* (L); P. Miangas, alt. 2 m: *Lam 3405* (BO). — P. Morotai. Wajabula, alt. 10 m: *Anang 162* (BO); Ngelez, alt. 10 m: *Kostermans 1582* (L). — P. Ternate. Sasa Besar, alt. 1 m: *Beguin 1667* (BO). — Obi Is. P. Santari, alt. 2 m: *Nedi 661* (L). — Sula Is. I. Pas Pagama in Straits Lifumatoli, alt. 3 m: *Bloembergen 4754* (L). — Ceram. Wae Sĕlau, alt. 1 m: *Eyma 2852* (L); Wahai: *Treub 201* (BO). — Ambon: *Labillardière s.n.* (P); Little Hative, beach: *Rant 292* (BO). — Banda. 1 collection.

NEW GUINEA, BISMARCK ARCHIPELAGO, AND NEIGHBOURING ISLANDS. W. New Guinea. Kaimana, alt. 4 m: *Aet 225* (L); Manokwari, Masni coast, alt. 1 m: *Koster BW 11068*; Manokwari, Muni, alt. 2 m: *Kostermans 2864* (L); 4 km N. of Manokwari, alt. 2 m: *Nicolson 1587* (K, L, W); Triton Bay: *Le Guillou s.n.* (P). — N. New Guinea. Tor river, near sea: *Gjellerup 722* (L). — Papua. 6 collections. — Territory of New Guinea. 9 collections. — Louisiade Arch. Rossel I., Bambu near W. point: *Henty NGF 27034* (L); Ouessant I., alt. 2—2½ m: *Mann NGF 43126* (K, L). — New Britain. Ralum, forest sides: *Lauterbach 254* (WRSL). — New Ireland. W. of Kant harbour, alt. sea level: *Coode & Katik NGF 29858* (K, L); Port Sulphur: *Naumann s.n.* (WRSL). — Admiralty Is.: *Moseley s.n.* (K). — P. Waigeo. Kaboei Bay, alt. 2 m: *Van Royen 5366* (K, L); P. Lawak: *Gaudichaud s.n.* (G, P). — Misoöl. Kolok: *Pleyte 1148* (L). — Aru Is.: *Moseley s.n.* (K). — Islets in Torres Strait. Daru I.: *Brass 6371* (A).

AUSTRALIA. N. Territory. 17 collections. — Queensland. 5 collections.

MARIANAS. Guam. Marine beach, Yona: *Stone 4420* (L); *Le Guillou s.n.* (P). — Saipan.: *Marche 14* (P).

CAROLINE Is. Palau Group. S. side of W. penins. of Ngarakabesang (Arakabesan) I., alt. 20—30 m: *Fosberg 32128* (L); Babelthuab I., Ngatpang: *Tuyama 7197* (K). — Yap. Mt. Matade, alt. 160 m: *Fosberg 25550* (L); Oniön, Gagil, alt. ½ m: *Wong 368* (A). — Ulithi Atoll. Fasserai Islet, alt. 2—4 m: *Fosberg & Wong 25445* (L). — Truk Is. Ruk: *Le Guillou s.n.* (P), *Hombron s.n.* (P). — Mortlock Group. Satawan Atoll, Oninuk Islet: *Anderson 950* (L); Satawan Atoll, Ta Islet: *Anderson 1026* (L); Lukunor Atoll, Oneop Islet: *Anderson 2085* (L); Lukunor Atoll, Lukunor Islet: *Anderson 2173* (L). — Mockil & Pingelap. *Hallier s.n.* (L sh. 909.312.109).

MARSHALL Is. Eniwetok Atoll. Iugurin Islet, alt. 3 m: *St. John 23735* (BO); Japtan I.: *Taylor 46-1287* (L). — Bikini Atoll. Namu I.: *Taylor 46-1129* (L). — Rongelap Atoll. Rongelap I.: *Taylor 46-1390* (BM, L). — Rongerik Atoll. Latoback I.: *Taylor 46-1419* (L); Enyaertock I.: *Taylor 46-1430* (BM, L), *Taylor 46-1482* (L). — Utirik Atoll. Utirik Islet, alt. 1—3 m: *Fosberg 33695* (L). — Ailuk Atoll. Ailuk Islet, alt. 1—3 m: *Fosberg 33938* (L). — Ujae Atoll. Ebeju Islet, alt. 1—3 m: *Fosberg 34398* (L). — Kwajalein Atoll. Bigej (Bennett) Islet, alt. 1—3 m: *Fosberg 26493* (L, P). — Arno Atoll. Ine Islet, Jebo village: *Anderson 3713* (L).

SOLOMON Is. Bougainville. Near Tokuaka village, S. of Buin, alt. sea level: *Craven and Schodde 471* (L); beach S. of Toiumonapu plantation: *Van Royen NGF 16360* (L); Suiei: *Waterhouse 323* (K, L);

Shortland I.: *Guppy 333* (K). — St. Isabel. Cockatoo Anchorage: *Hunt 2637* (K). — Guadalcanal. First east-west ridge, Rove to White R. area, alt. 30 m, grassland: *Kere BSIP 4959* (K, L); near Honiara, alt. 100 m: *Whitmore and Womersley BSIP 1021* (K, L). — Rennell. Niupani: *Wolff 3127* (C). — Bellona. Tongomane: *Christiansen 3337* (C), *3332* (C).

New Hebrides. Eromanga. Dillons Bay, alt. 400 m: *Kajewski 345* (A, K, P).

New Caledonia. 13 collections.

Gilbert Is. Turawa. Tearinibai: *Catala 135* (P).

Fiji Is. Viti Levu. 6 collections. — Vanua Levu. 6 collections. — Koro. Niavanga, seashore: *Raiqiso 987* (A), *Tothill 186 C* (K). — Fulanga: *Tothill 186 A* (K).

Wallis Is. *Vedel s.n.* (P).

Samoa. Savai'i. Saleloga: *Vaupel 242* (K). — Upolu. Mulifanua plantation: *Reinecke 101* (G, WRSL, WU); Vailele hill: *Reinecke 188* (G, WRSL, WU); Fangalii: *Christophersen 350* (K). — Ofu. Sea level: *Yuncker 9505* (BO).

Tonga Is. Vava'u Group. Vava'u: *Crosby 252* (K); Pangaimotu: *Ilolahia 48* (K). — Tofua. N. side: *Scarth-Johnson 29* (K). — Tongatapu: *Yuncker 15004* (K).

Niue I. S. of Alofi village, alt. 20 m: *Yuncker 9610* (BO, K).

Tokelau. Swains I., alt. 3 m, near village: *Bryan 923* (BO).

Palmerston Atoll. *Cook's voyage s.n.* (BM).

Society Is. Bora Bora: *de Mou s.n.* (P). — Raiatea. Tetaro I.: *St John & Wight 17216* (BO, P, W); S. of Faoroa Bay: *Moore 281* (L, U). — Tahiti. 15 collections.

Tubuai Is. Raivavae. Low alt.: *Quayle 287* (BO, K); Vaionea, alt. ½ m: *Stokes 31* (BO, P). — Rapa. Mangairai, valley SE. side of Mt. Perahu, alt. 100 m: *St John & Maireau 15719* (P).

Tuamotu Archipelago. Mangareva Is. Aukena I., Koiovae, alt. 8 m: *St John 14665* (BO, K).

Marquesas. Nukuhiva. In valleys of lower belt: *Brown & Delmas 1112* (A, K). — Ua Huka. Along E. crest of Vaipae'e Valley, alt. 180 m: *Decker 1999* (P).

Hawaiian Is. Oahu. 8 collections. — Molokai. Hailan Valley: *Degener & Kazuto Nitta 5561* (A, G); Halawa, near base of upper Moaula Falls: *St John, Baker, Coulter, Fosberg & Yuncker 12696* (BM, K, L). — Hawaii. 5 collections.

Ecology: Usually occurring from sea level to 200 m alt., but sometimes found as high as 1100 m; mostly growing in small groups, not bound to a specific habitat, in open situations or slightly to densely shady places, on and behind the seashore, in grasslands, alang-alang-fields, thickets, savannas, moist or dry primary and secondary forests, (old) coconut grooves, as regrowth in clearings; found on various soils, on sandy or stony substrata, on (white) coral gravel, loam, clay, marl, limestone, red volcanic or laterite ground. Associated variously, in Sumatra e.g. found in *Casuarina* stands on the beach, in Java e.g. on the beach growing together with *Pandanus* and *Scaevola*, in the Barringtonia formation, in the Lesser Sunda Islands e.g. in Eucalypt forests, in the northern part of Australia e.g. in Eucalypt forest, mainly composed of *Eucalyptus papuana*, *E. phoenicea*, and *E. clavigera* with an undergrowth of *Chrysopogon latifolius*, in the Caroline Islands e.g. on burned ridges together with *Lygodium scandens*, in the Marshall Islands e.g. in coastal thickets composed of *Messerschmidia*, *Scaevola*, and *Wedelia*, in coconut groves, in *Cordia* and *Pisonia* bushes.

The natural habitat of *T. leontopetaloides* is distinctly the beach and it is likely that because of the food value of the tuber man has transported it inland from immemorial time, an impression which cannot of course now be proved anymore. This is also Ridley's opinion (1930, l.c. 318).

Flowers and fruits the whole year, dies off mostly in December-March.

Dispersal: Three kinds of dispersal are recorded in the literature. The most widely accepted view is dispersal of the seeds by water. However, nothing is known about the viability of the seeds in sea water, but the presence of a spongy testa might enable them to float for many months. The occurrence of the species in some parts of the Pacific suggests that such a dispersal mechanism has operated at periods. The second way of dispersal might be by birds: it is said that the fruits are eaten by a white-eyed bird,

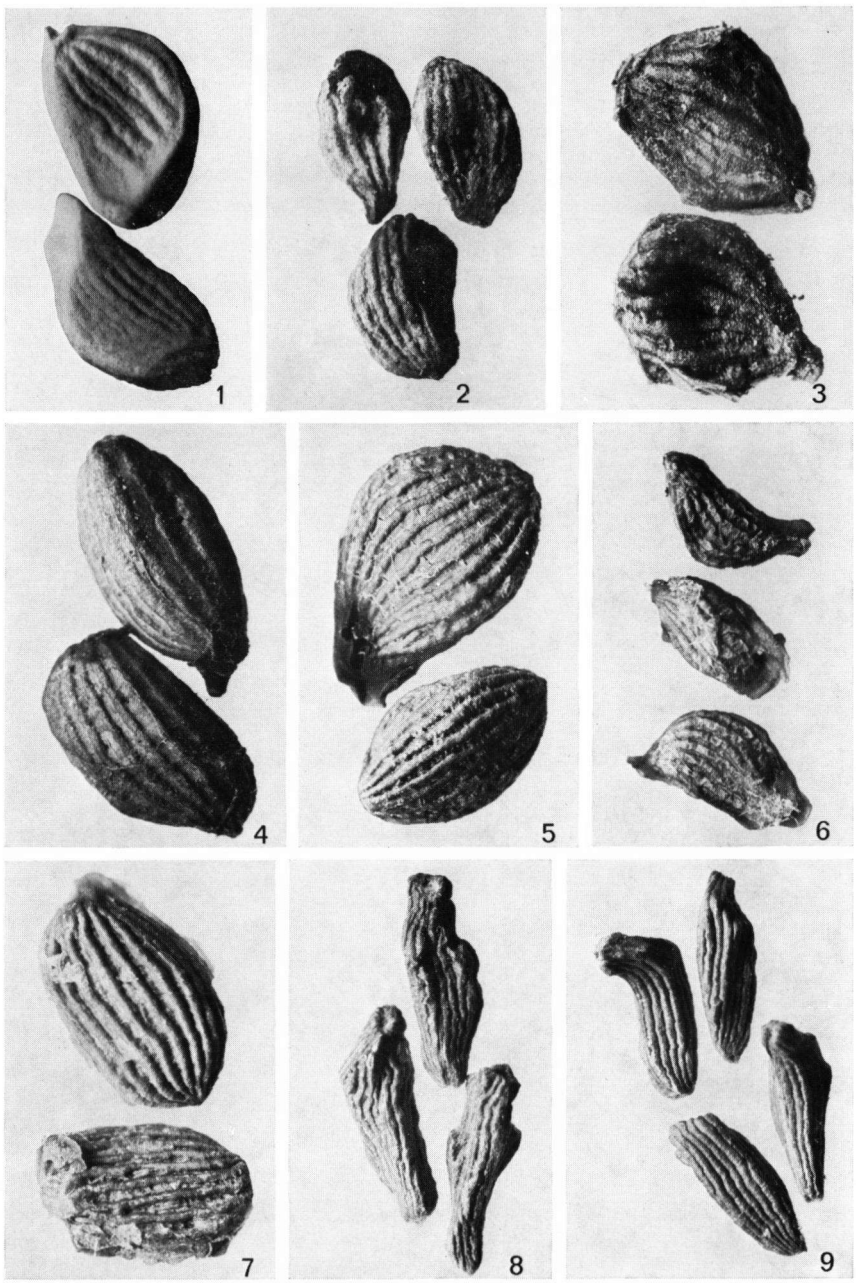


Plate 1. Seeds, all × 5. — *Tacca leontopetaloides*. 1. Ivory Coast (*Geerling & Boldam 170*); 2. Congo-Brazzaville (*Linder 1609*); 3. Thailand (*Kerr 9288*); 4. Java, Bantam (*Backer 1428*); 5. Moluccas, Ternate (*Beguin 1667*); 6. Australia (*Byrnes 588*); 7. Tahiti (*Forster s.n.*). — *T. parkeri*. 8. British Guiana (*For. Dept 5352*); 9. Brazil, Maranhão (*Froes & Krukoff 11784*).

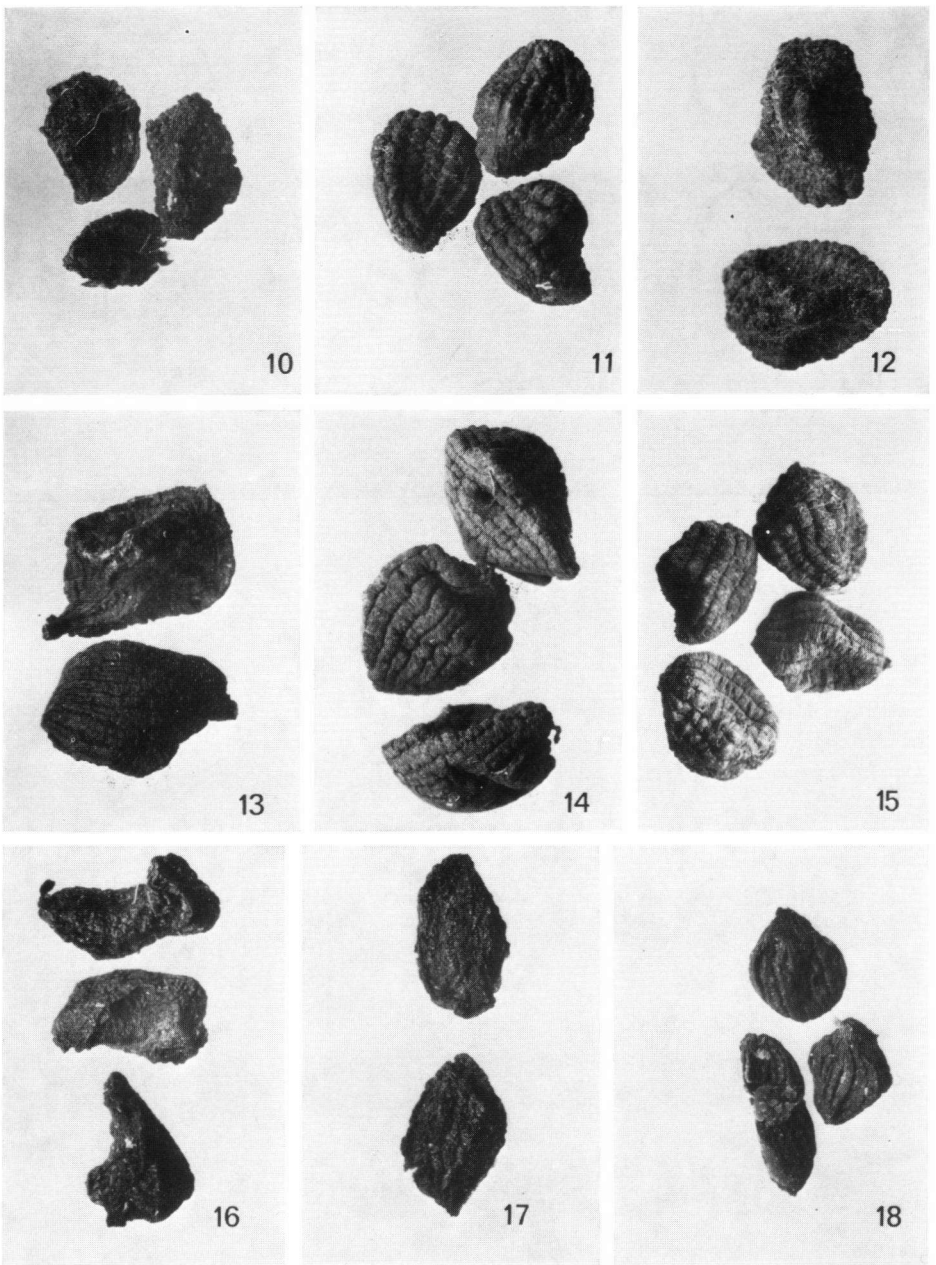


Plate 2. Seeds, all × 5. — *Tacca palmata*. 10. S. Vietnam, P. Condor (*Harmand 689*); 11. W. Java (*Beumée 5682*); 12. E. Java (*Rant 1060*); 13. N. Borneo (*SAN 39603*); 14. Moluccas, Ceram (*Eyma 2491*); 15. Philippines, Mindoro (*PNH 16797*). — *T. ebeltajae*. 16. Territory of New Guinea (*NGF 39331*); 17. Solomon Is., New Georgia (*Waterhouse 25*). — *T. celebica*. 18. N. Celebes (*Wisse 12*).

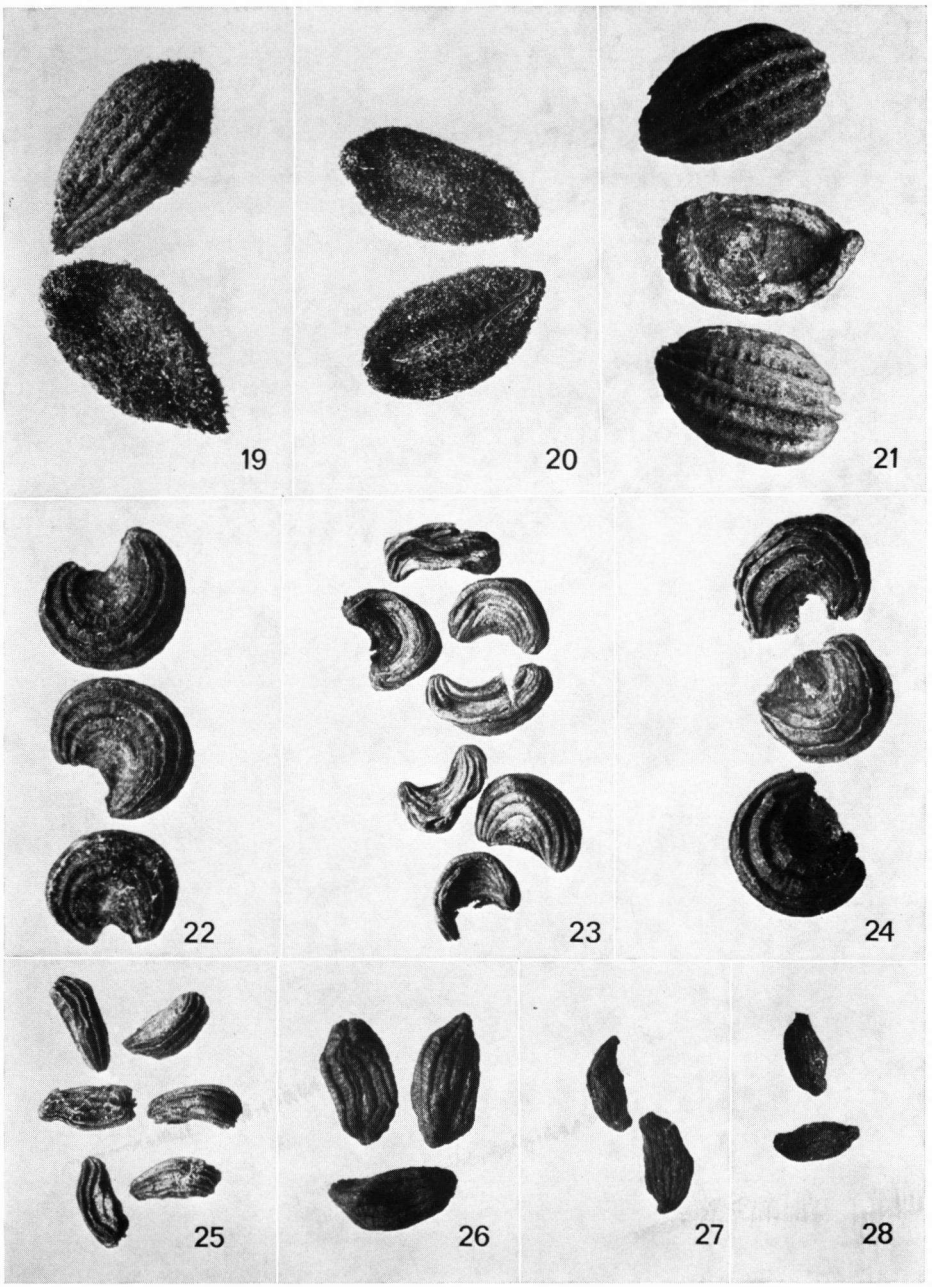


Plate 3. Seeds, all × 5. — *Tacca integrifolia*. 19. W. Java (*Backer 23920*); 20. Sumatra, W. Coast (*Meijer 3397*); 21. NW. Borneo (*Awang Yacup 6546*). — *T. chantrieri*. 22. China, Kwangtung (*Tsang 26661*); 23. Central Thailand (*J. Schmidt 641*); 24. Malay Peninsula, Perak (*Ridley SING sh. 41640*). — *T. plantaginea*. 25. Thailand (*Kostermans 1055*). — *T. palmatifida*. 26. N. Celebes (*Riedel s.n.*); 27. Central Celebes (*Tideman s.n.*); 28. SW. Celebes (*Rahmat 386*).

Zosterops masii (Ridley, 1930, l.c. 470). Dispersal by man is evident (see next paragraph).

U s e s: This plant has been and is generally used for food throughout its area. Sometimes the fruit-pulp is eaten by children (Gabon), otherwise only the tuber is used for the provision of starch. This is generally done by peeling the tubers, grating them, washing several times (with hot or cold water), and after the starch is settled, the water is removed and the starch is dried. The starch is normally used for baking bread, making pastes and puddings, mixed with other ingredients, for example with young coconut juice in order to make '*vai solo*' for sick people (Samoa). Good washing is essential because of the presence of a bitter substance (taccalin) which is said to be poisonous: 'if chickens eat the scrappings of the root, they die' (Fiji), or 'the pia (*T. leontopetaloides*) is the most poisonous of all plants since all the animals who eat of this bush are sure to die' (Niue). The tubers are dug when the aerial parts of the plant die off in December-March. They are also used as a medicine against dysentery and diarrhoea (India, Polynesia). From the scapes fibers are prepared in Polynesian Islands, used for making hats and for fishing. Formerly the plant had been extensively cultivated and Hawaii, Tahiti, and Fiji were exporting over 10.000 pounds rough material per annum. Analyses of the tuber prove 22.3—24.0 % (—30 %) of starch on a wet basis. Cultivation on a large scale has been suggested (Wohltmann, 1905, l.c.).

V e r n a c u l a r n a m e s (language or place in brackets): Africa. Sénégal: *bua bayayo* (*bambara*), *ka kéna* (diola), *ndof ndãng*, *lar*, *ndof rôg* (sérère), *èt i buki*, *bara*, *lar* (volof). — Gabon: *iboloboto* (mpongwè), *bobolya*, *ampwal'intòtò* (nkomi). — Madagascar: *kabitsa*, *kabiza*, *kabitsondolo*, *tavolo*, *tavonola*, *tavoul*. — Comores: *ridi*. — Mauritius and Seychelles: *tavoul*. — Ceylon: *garandikidaran*. — Thailand: *bukror*, *bukraw*. — S. Vietnam: *cây nua* (anamese). — Malay Peninsula: *pokô lûkeh*, *lukeh*. — Sumatra: *leki* (Atjeh), *krubut* (Enggano), *lago leké* (Riouw). — Java: *duda djenggot* (j.), *takka laut*, *katjunda* (m.), *ketjondang*, *tjondang* (s.), *labing*, *totoan* (mad.), *totoan* (kng.). — Timor: *telo*, *tiloh*. — Philippines: *gau-gau*, *yabyâban* (tag.), *kanobang*, *tayóbang*, *panarién*, *tambóbon*. — Celebes: *terong i lawanan* (Minahassa), *katéo* (East Cel.), *katjunda* (Makassar, Salajar I.), *kolopale* (Buton). — Moluccas: *anuwal* (taluna), *nepu*, *huda korano*, *huda ma raka* (Ternate), *taã* (Buru). — New Guinea. Tami: *tavulipum*. — N. Australia, Queensland: *be-ung-gal* (Bloomfield river), *pe-ang-gul* (Butcher's Hill), *ung-ke* (Morehead R.), *niu* (Batavia R.), *an-tith-a* (Red I.). — Solomon Is., Bougainville: *hupio*. — Carolines: *chob-chob*, *cobcob*, *jelo*, *mokamok*, *mokomok*. — Marshall Is.: *makmök*, *mokamok*. — Fiji: *yabia*, *yabia dina*, *yambia*. — Ellice Is., Funafuti: *niupiu* (only for flowers used), *vadia*, *vatia*. — Tonga: *mahoa's*, *mahoa'o*. — Samoa: *masoa*, *pia*. — Niue: *pia*. — Society Is.: *pia*. — Tubuai Is., Raivavae: *pia*. — Marquesas Is.: *pia*, *pia taki oho au*. — Hawaii: *pia*. — English: East-Indian, Polynesian, Sandwich Island, South-Sea, or Tahitian arrowroot.

N o t e s. 1. This species is often confused with *Amorphophallus campanulatus* (Roxb.) Bl. (*Araceae*) and also with other *Amorphophallus* species, all in a vegetative stage. The petiole provides a good differentiating character: smooth and solid in living *Amorphophallus*, ribbed and hollow in *Tacca leontopetaloides*. Moreover, the leaves of *Amorphophallus* always possess an intramarginal nerve, which is lacking in *T. leontopetaloides*.

2. According to Loureiro, the species occurs in China, but evidence is lacking.

3. In Madagascar occurs a form with narrower, lanceolate to linear lobes of the leaves described as *T. artocarpifolia*. As far as I can judge this form occurs in the drier areas of the island and the normal form in the more humid areas. It may be a distinct ecotype.

4. Tuber size in literature cited 'as large as a coconut' and in cultivated plants 5—10 cm long.

5. The runner-like rhizomes from the tuber can grow until 30 cm from the base of the old plant, according to the soil conditions; secondary smaller runners also forming tubers emerge above on the old tuber and spread downwards.

6. Whether the plant growing from a tuber flowers only once or more is not recorded and must be investigated.

7. In BM is one sheet, *F. R. Maunsell s.n.*, said to be from Van, Turkey. This seems very improbable.

2. Tacca integrifolia Ker-Gawl., Bot. Mag. 35 (1812) t. 1488; Lamk, Enc. Suppl. 5 (1817) 278; Roxb., Pl. Corom. 3 (1820) 53, t. 257; Spreng., Syst. Veg. 2 (1825) 118; Bl., En. Pl. Javae 1 (1827) 83; Presl, Rel. Haenk. 1, 3 (1828) 149; Schnizl., Icon. 1 (1843) 58; Zoll., Cat. (1846) 91; Lindl., Veg. Kingd. (1846) 149, t. 97; Pax in E. & P., Nat. Pfl. Fam. 2, 5 (1887) 130; Hook. *f.*, Fl. Br. Ind. 6 (1892) 287; Limpr., Inaug. Diss. Breslau (1902) 44; Pfl. R. 4, 42 (1928) 16; Mitra, Fl. Pl. East. Ind. 1 (1958) 55. — *Ataccia integrifolia* Presl, Rel. Haenk. 1, 3 (1828) 149; Miq., Fl. Ind. Bat. 3 (1859) 578. — Type: *Hume s.n.* (not seen), East Indies. — **Map 2; Plate 3: 19—21.**

T. cristata Jack, Mal. Misc. 1, 5 (1821) 23; Miq., Fl. Ind. Bat. 3 (1859) 578; Hook. *f.*, Fl. Br. Ind. 6 (1892) 287; Baill., Hist. Pl. 13 (1895) 167, fig. 111—113; Limpr., Inaug. Diss. Breslau (1902) 44; Ridl., Mat. Fl. Mal. Pen. (1907) 77; J. Str. Br. R. As. Soc. 49 (1907) 45; Fl. Mal. Pen. 4 (1924) 310; Limpr., Pfl. R. 4, 42 (1928) 20; Merr., Pl. Elm. Born. (1929) 28; J. Arn. Arb. 33 (1952) 247; Henderson, Mal. Wild Flow., Monocot. (1954) 187. — *Ataccia cristata* Kunth, Enum. 5 (1850) 466; Bot. Mag. 57 (1851) t. 4589; Fl. Serres I, 9 (1853) t. 860—861; Oudemans, Neerl. Pl. Tuin 2 (1866) t. 32; Le Maout & Decne, Traité Gén. Bot. (1868) 573; Garden 5 (1874) 219; Gartenflora 30 (1881) 346. — *Atacca cristata* Lemaire, Jard. Fleur. 2 (1852) t. 186, 187, orthogr. variant. — Type: probably *Wallich s.n.* (K, phot. Bailey Hortorium 8067), Singapore.

[*T. rafflesiana* Jack *ex* Wall., Cat. nr. 5172A, B (1831—32) *nom. nud.* — Syntypes: *Wallich, Cat. nr. 5172A = Jack 145* (K), Penang; *Cat. nr. 5172B* (K), Singapore.]

T. aspera Roxb., Fl. Ind. ed. Carey 2 (1832) 169; Limpr., Pfl. R. 4, 42 (1928) 20. — *Ataccia aspera* Kunth, Enum. 5 (1850) 464. — Type: *Mr. J. R. s.n.* (not seen), Chittagong.

T. laevis Roxb., Fl. Ind. ed. Carey 2 (1832) 171; Graham, Cat. Bomb. (1839) 230; Hook. *f.*, Fl. Br. Ind. 6 (1892) 288; Hallier, Bull. Herb. Boiss. 6 (1898) 613; Limpr., Inaug. Diss. Breslau (1902) 47; Pfl. R. 4, 42 (1928) 17; Gagnep. in Fl. Gén. I.-C. 6 (1934) 695; Mitra, Fl. Pl. East. Ind. 1 (1958) 55; Smitinand, Nat. Hist. Bull. Siam Soc. 20 (1961) 60. — *Ataccia laevis* Kunth, Enum. 5 (1850) 466. — Type: *Wallich Cat. 5173B* (BM, BR, K, P), Silhet.

T. lancaefolia Zoll. & Mor. in Mor., Syst. Verz. (1846) 91; Miq., Fl. Ind. Bat. 3 (1859) 578; Limpr., Inaug. Diss. Breslau (1902) 48; Beumée, Trop. Natuur 8 (1919) 47, fig. 7; Back., Handb. Fl. Java 3 (1924) 106; Limpr., Pfl. R. 4, 42 (1928) 19; Back., Bekn. Fl. Java (em. ed.) 10 (1949) fam. 241; Back. & Bakh. *f.*, Fl. Java 3 (1968) 212. — *Ataccia lancaefolia* Kunth, Enum. 5 (1850) 465; Zoll., Syst. Verz. 1 (1854) 69 (as *Atacca*). — *T. lancifolia* var. *genuina* Limpr. (on labels mentioned as *T. zollingeri* var. *lancifolia* Limpr.), Pfl. R. 4, 42 (1928) 19. — Type: *Zollinger 1710* (BM, BR, G, K, P), Java.

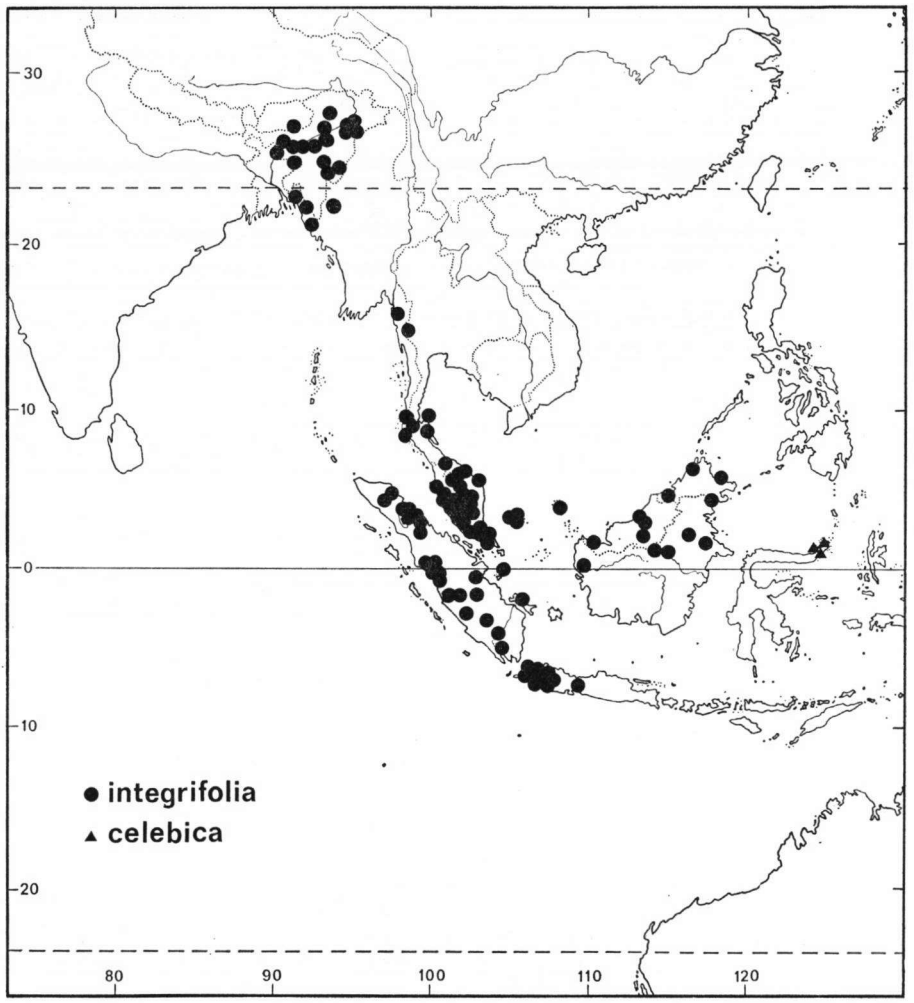
[*T. minor* Ridl. (*p.p.*, type excl.), Mat. Fl. Mal. Pen. 2 (1907) 78, *quoad Gimlette s.n.* (SING sh. 41638), Kelantan; Ridl., Fl. Mal. Pen. 4 (1924) 311; Limpr., Pfl. R. 4, 42 (1928) 18. —] *T. laevis* Roxb. var. *minor* Ridl., J. Str. Br. R. As. Soc. 49 (1907) 45. — Type: *Gimlette s.n.* (SING sh. 41638), Kelantan, Kwala Lebir.

T. borneensis Ridl., J. Str. Br. R. As. Soc. 49 (1907) 45; Limpr., Pfl. R. 4, 42 (1928) 21. — Type: *Ridley s.n.* (SING sh. 41649), Sarawak.

T. chantrieri auct., non André: Ridl., Fl. Mal. Pen. 4 (1924) 309.

T. integrifolia Ker-Gawl. var. *pseudolaevis* Limpr., Pfl. R. 4, 42 (1928) 17. — Syntypes: *Wallich, Cat. 5173A p.p.* (specimen on left side of one sh, K), Gualpara; *Hooker & Thomson 58* (B, not seen), NW. Burma.

T. laevis Roxb. var. *angustibracteata* Limpr., Pfl. R. 4, 42 (1928) 18. — Type: *Meebold 6308* (K, WRSL), Assam.



Map 2.

T. laevis Roxb. var. *latibracteata* Limpr., Pfl. R. 4, 42 (1928) 17. — Type: *Machado 1134* = *Griffith 6022* (K), Khasia.

T. lancifolia Zoll. & Mor. var. *laeviformis* Limpr. (on labels mentioned as *T. zollingeri* var. *laeviformis* Limpr.), Pfl. R. 4, 42 (1928) 19. — Syntypes: *Korthals s.n.* (L sh. 908.246.490), Sumatra; *Lobb s.n.* (K), Java.

[*T. roxburghii* Limpr. (*p.p.*, type excl.), Pfl. R. 4, 42 (1928) 18, *quoad Wallich 5173B* (BM, BR, K, P), Silhet; *Wallich s.n.* (prob. *5173A*) (K, P), Gualpara.]

T. sumatrana Limpr., Pfl. R. 4, 42 (1928) 18. — Syntypes: *Korthals s.n.* (L sh. 908.247.598); *Beccari PS 830* (K, L), both from Sumatra.

T. sumatrana Limpr. var. *ovalifolia* Limpr., Pfl. R. 4, 42 (1928) 19. — Syntypes: *Korthals s.n.* (L sh. 908.246.472—474; 908.247.558), Sumatra.

T. choudhuriana Deb, Ind. For. 90 (1964) 241, t. 1, 2. — Type: *Choudhuri 36457* (CAL, not seen), NE. India.

Rhizome cylindric, growing vertically, up to 12 cm long by up to 3 cm ⌀, with apical leaves. *Leaves* 2—13, very variable, usually oblong(-ovate) or lanceolate, more rarely elliptic, oblong-obovate or linear-lanceolate, greyish green, 7.5—65 by 3—24 cm, base attenuate, rarely cuneate or rounded, apex acuminate; nerves pinnate. Petiole 4.5—41 by 0.2—0.6 cm, sheath 2.5—17 by 0.5—1.5 cm. *Inflorescences* 1—4(—5), up to 30-flowered; scape 9—65(—100) by 0.2—0.7 cm, dark violet, blackish purple, red, or rarely brown. *Involucral bracts* 4, very variable, 2 outer bracts opposite, 2 inner ones inplanted together more or less in the axil of one of the outer bracts; the outer ones sessile, elliptic, oblong, (narrowly) triangular, or (ovate) lanceolate, 1.5—14 by 0.5—7 cm, green to purple, veined black, apex acute, acuminate, rarely cuspidate; the inner bracts thinner than the outer ones, sessile or with attenuate to cuneate base, (ob)ovate, oblong-(ob)ovate, (ob)lanceolate, or spatulate, rarely orbicular, 2.5—22 by 1—11 cm, white, shaded purple, veined black, apex acuminate or cuspidate. *Filiform bracts* 5—27, up to 25 cm by 0.2—1 mm, white or bright yellow green, on base darker. *Flowers* 1.4—2.7 by 0.6—3.2 cm; buds pale greenish, flowers green, greenish-violet, brownish-purple, or blackish-violet, the colour becomes darker as the flowering proceeds; pedicel 0.5—4.0 cm by 1—2 mm, dark red or blackish-purple; perianth tube 3—8 by 9—15 mm. *Perianth lobes* mostly reflexed during anthesis and caducous; 3 outer ones elliptic, triangular or oblong, 6—15 (—20) by 4—9 mm, inner ones broadly obovate or broadly ovate, 5—15 by 5—16 mm; at apex emarginate, retuse, rounded, acute, acuminate, or mucronate; veins inside prominent. *Stamens*: adnate portion of the filaments 2—3 by 0.5—1 mm, free apical portion up to 3 by 1.5 mm, thecae up to 2 mm long. *Ovary* 3—15 by 2—7 mm, yellowish green with sepia-purple ribs; disk absent; style 1—3 by 1—3 mm; stigma lobes 1 by 1.5 mm. *Fruit* triangular to circular in cross-section, 2.5—5.0 by 1.0—2.5 cm, green to black, tinged with purple, fruit wall up to 2 mm thick. *Seeds* ovoid convex-concave, 3.5—6 by 1—3.5 by 1—2 mm, glabrous to strongly papillose, 6—16-ribbed.

BHUTAN. Repjan: *Griffith 6022* (*Machado 1134*) (C, K, L, P).

ASSAM. 15 collections.

BANGLA DESH. Silhet: *Wallich 5173B* (BR, K, P), *5196C* (P); Chittagong: 5 collections; Cox's Bazar: *Sinclair SF 38500* (E, SING).

BURMA. Moulmein: *Falconer 279* (E); Kachin Hills: *Shaik Mokim s.n.* (G).

THAILAND. Peninsular. Chumphon Dist., Pato, Langsuan, alt. 100 m: *Kerr 12919* (K); Surat Thani Dist., Ban Tong Tao, alt. 10 m: *Kerr 13392* (K); Kaw Samui: *Put 1284* (K); Nakhon Si Thammarat Dist., Kiriwong, alt. 300 m: *Smitinand RFD 6064* (K); Songkhla Dist., Klawng Ton, alt. 100 m: *Kerr 14615* (K); Satun Dist., Puket, P. Rawi: *Ridley s.n.* (SING sh. 41639); Yala Dist., Betong: *Kerr 10084* (K); Narathiwat Dist., Kaw Samui: *Put 1301* (K); Bukit: *Put 3613* (K); Chatwarin: *Smitinand BKF 46893* (K); Pattani Dist., Bachaw Pattani, alt. 50 m: *Kerr 7223* (K, L).

MALAY PENINSULA. Perak. 16 collections. — Dindings. *Ridley s.n.* (SING sh. 41635). — Kelantan. Kuala Lebir: *Gimlette s.n.* (SING sh. 41638); Batu Panjang: *Nur & Foxworthy SF 12109*. — Pahang. 9 collections. — Selangor. 14 collections. — Negri Sembilan. 11 collections. — Johore. Kluang: *Holttum SF 9422* (K, L, SING); G. Muntahak, alt. 180 m: *Holttum SF 1994* (SING); G. Pulai: *Nur & Kiah SF 7770* (SING); Palatu Balu Pahat: *Ridley s.n.* (SING sh. 41600). — Penang. Waterfall: *I. H. Burkill SF 6529* (SING); Goot Hill: *Curtis 336* (K, SING); Back of W. Hill: *Curtis s.n.* (SING sh. 41614); Pinara Bukit: *Curtis s.n.* (P). — Singapore. 15 collections.

SUMATRA. Atjeh. Langsa: *Froidemont s.n.* (SING sh. 41652); Gajo Lands, between Pendeng and bivouac Aer Poetih, alt. 400—500 m: *Van Steenis 8870* (BO). — Sumatra West Coast. Ajer Mantjur, alt. 360 m: *Beccari PS 830* (K, L); W. slope Talamau, alt. 600 m: *Bünnemeyer 450* (L); Padang, alt. 750 m: *Jacobson 188* (BO); N. slope of Mt. Sago, Pajakumbuh, alt. 1000 m: *Meijer 3397* (L). — Sumatra East Coast. 11 collections. — Indragiri. S. of Pekan Heran, alt. few m: *Buwalda 6785* (BO, K, L). — Djambi. Between Sg. Sharing and Ds. Baru, alt. 140 m: *Posthumus 665* (L); Sg. Lesing, alt. 30 m: *Posthumus 1005* (*Saimoendt 94*) (BO). — Benkoelen. Lebong Tandai: *Tauw s.n.* (BO); *Brooks s.n.*

(BM); Bukit Payong: *Teysmann s.n.* (BO). — Palembang. Tjaban For. Res. near Muara Enim: *Kostermans 12086* (L); Muara Enim: *Teysmann s.n.* (BO); Muaradua, alt. 300 m: *De Voogd 24* (BO). — Lampong Districts. Kota Agung, Ulu Belu: *Cramer 176* (BO). — Banka. P. Mendo, P. Pinang, alt. 20 m: *Bünnemeyer 1954* (K, L, P); G. Mangkol, alt. 50 m: *Kostermans & Anta 682, 737* (BO). — Riouw-Lingga Archipelago. Lingga, Bukit Sepiendjang: *Teysmann s.n.* (BO).

JAVA. West Java. 54 collections.

BORNEO. Northwest Borneo. 14 collections. — West Borneo. Suka Lanting: *Hallier 71* (L). — East & Northeast Borneo. B. Batu Lesung: *Amdjah 424* (BO); W. Kutai on the Kiau, alt. 700 m: *Endert 4682* (L); Bukit Kassian: *Jaheri 1031* (BO); Berouw, Mt. Ilas Bungaan, alt. 600 m: *Kostermans 13872* (K, L). — British North Borneo. 7 collections. — Anambas and Natuna Islands. 7 collections. — P. Nunukan. *Meijer 1887* (K, L).

Ecology: Occurring from sea level up to 1200, rarely to 1500 m altitude, sometimes abundant; mostly in evergreen moist primary or secondary forests, e.g. on steep slopes, ridges, or near water, sometimes on roadsides, in clearings; found on various soils, on sandy or stony substrata, limestone or red earth. Specimens from the hills are claimed to be larger than those from the plains. Associated e.g. in Java with liverworts, *Ophioglossum*, *Ophiorrhiza*, *Argostemma*, and *Elatostema*. Flowers and fruits in February-August.

Uses: In Malaya dried leaves are used as '*roko*'. In Borneo used against hairfall.

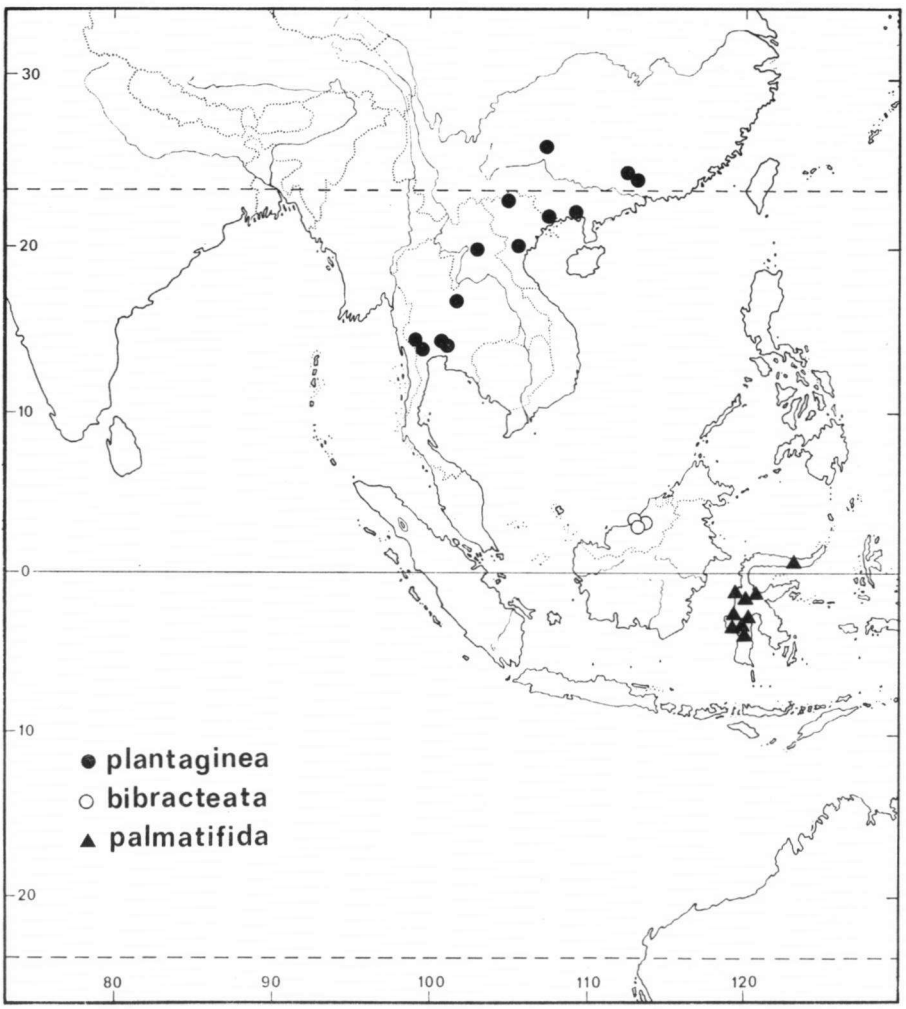
Vernacular names: India: *moti munda* (Silhet). — Malay Peninsula: *bunganbatong, pako bunga subeak, pako iangot baoo, poko subiak, subiak* (Malacca); *lebak tikus, jangut bawo, keladi murai, kladi murai, sebiak* (Negri Sembilan). — Sumatra: *puar lilipan, sa-lipit, si dalimbat, tobabatak* (Asahan); *djangat baung* (Indragiri); *daun patjam, pura gunung* (Djambi); *tambun tambun* (S. Sumatra); *gumba itam* (Banka). — Java: *kumis utjing, tjurug lukur.* — Borneo: *gedang gedang.*

Notes. 1. In the present delimitation I have combined some 10 forms, formerly distinguished as species, by which it is hence a variable entity. I had to take this step as the characters formerly used for distinction, mostly derived from leaves, appeared to be inconstant and intergrading. I could keep it apart, however, from *T. chantrieri* by two clearly distinctive characters, viz. the shape of the seeds and the inplantation of the inner involucral bracts.

2. The seeds may have a papillose surface or not; specimens with papillose seeds occur in Java, Borneo, and Sumatra, those without in Borneo, N. Sumatra, Malaya, and continental Asia.

3. Tacca plantaginea (Hance) Drenth, *nov. comb.* — *Schizocapsa plantaginea* Hance, J. Bot. 19 (1881) 292; Limpr., Inaug. Diss. Breslau (1902) 58; Boynton, Addisonia 8 (1923) 11, t. 262; Limpr., Pfl. R. 4, 42 (1928) 11, fig. 2; Gagnep. in Fl. Gén. I.-C. 6 (1934) 692, fig. 70, 1—5. — Type: *Herb. Hance* (= *Gerlach & Henry*) *21033* (BM), Canton. — **Map 3; Fig. 1 d; Plate 3: 25.**

Rhizome cylindric, growing vertically, 2—3 cm long by 0.7—1.5 cm ⌀, with apical leaves. *Leaves* 3—8, oblong or (ovate-)lanceolate, 8—36 by 2—9 cm, with narrowly cuneate and decurrent base (fig. 1 d) and acuminate apex; nerves pinnate. Petiole 5—30 by 0.15—0.4 cm, sheath 4—8 by 0.5—0.6 cm. *Inflorescences* 1—6, up to 26-flowered; scape 7.5—25 by 0.1—0.2 cm. *Involucral bracts* 4, decussate; the outer ones (oblong-)ovate, sessile, 0.9—3 by 0.5—2 cm, the inner ones (oblong-)ovate, sessile, 0.7—2.5 by 0.3—1 cm; apex acute. *Filiform bracts* 6—20, up to 8 cm by 0.5 mm. *Flowers* 0.9—1.7 by 0.6—0.8 cm, (purplish) green to white, tinged brownish violet or dirty dark violet; pedicel up to 3 cm by 1.5 mm; perianth tube 2—4 by 5—10 mm. *Perianth lobes* after anthesis persistent as a small remnant; 3 outer ones oblong-ovate or triangular, 5—11 by 2—5 mm, apex acute



Map 3.

or acuminate; 3 inner ones broadly ovate, 4—5 by 4—5 mm, apex acuminate or mucronate. *Stamens*: adnate portion of the filaments 2 by 3 mm, free apical portion up to 2 by 1.5 mm; thecae up to 1.5 mm long. *Ovary* 3—6 by 4—7 mm; disk absent, style 2 by 2 mm; stigma lobes 1.5 by 1.5 mm. *Fruit* triangular in cross-section, 1.0 by 0.7 cm, light yellow, white inside; fruit wall up to 1 mm thick. *Seeds* oblong-ovoid, 2.0—2.5 by 0.6—1.0 by 0.4—0.5 mm, glabrous, 12—14-ribbed.

THAILAND. Northern. Phitsanulok Dist., Nakawn Tai, alt. 300 m: *Kerr 8891* (K, L). — Northeastern. Phetchabun Dist., Com Kao, Nam Nao, Huay Sam Pah Bawn, alt. 600 m: *Smitinand RFD 8882* (K). — Central. Saraburi Dist., Muak Lek, alt. 200 m: *Marcan 801* (BM), *Smitinand & StJohn RFD 24625* (K). — Southwestern. Kanchanaburi Dist., Kwai Noi River basin, Kin Sayok, alt.

100—150 m: *Kostermans 1055* (L, P), *Allen s.n.* (SING sh. 41630); Hindato, alt. 100—150 m: *Kostermans 1354* (L).

China. Kweichow. Ra-ouai-lô, alt. 60 m: *Esquirol 2144* (P). — Kwangtung. Lienchow R.: *Ford 1014* (P), *Henry (Herb. Hance) 21033* (BM); North R.: *Gerlach s.n.* (*Herb. Hance 21033*) (BM); Lung Tau Shan, Yeung uk village: *To & Ts'ang 12730* (BM, P).

N. Vietnam. Tonkin. 5 collections.

Laos. Luang Prabang?: *Thorel s.n.* (P).

Ecology: Occurring at 100—300 m altitude, in (dry) mixed forests along rivers, on gravel-like soil or on rocks.

Uses. As medicine (China); locally as vegetable (bitter taste) (N. Thailand).

Vernacular names: Thailand: *phak khee pa* (Phetchabun); *nuat sua* (Muak Lek). — China: *wat tau kai* (Kwangtung).

Notes. 1. *Schizocapsa* has been considered to be a distinct genus because of the presumed capsular fruits. However, I did not find any evidence for that statement. So I have reduced it to *Tacca*.

2. The mentioning of *Schizocapsa* in literature is not reliable. Confusion with *Tacca chantrieri* is common.

4. Tacca chantrieri André, Rev. Hort. 73 (1901) 541, with plate; Limpr., Inaug. Diss. Breslau (1902) 45; *non* Ridl., Fl. Mal. Pen. 4 (1924) 309 (= *T. integrifolia*); Limpr., Pfl. R. 4, 42 (1928) 14; Gagnep. in Fl. Gén. I.-C. 6 (1934) 694; Hayward, Baileya 5, 2 (1957) 85. — Type: *Chantrier frères s.n.* (not seen), Arch. Ind. — **Map 4; Fig. 1e; Plate 3: 22—24.**

T. macrantha Limpr., Inaug. Diss. Breslau (1902) 45; Back., Bekn. Fl. Java (em. ed.) 10 (1949) fam. 241; Back. & Bakh. *f.*, Fl. Java 3 (1968) 212. — *T. chantrieri* André f. *macrantha* Limpr., Pfl. R. 4, 42 (1928) 14. — Type: *Wisly s.n.* (K), Burma.

T. lancifolia Zoll. & Mor. var. *breviscapa* Ostenfeld, Bot. Tidsskr. 26 (1904) 165. — *Schizocapsa breviscapa* Limpr., Pfl. R. 4, 42 (1928) 11; Gagnep. in Fl. Gén. I.-C. 6 (1934) 693. — Type: *J. Schmidt 641* (C), Thailand.

T. vespertilio Ridl., J. Str. Br. R. As. Soc. 49 (1907) 46; Mat. Fl. Mal. Pen. 2 (1907) 77. — *T. chantrieri* André var. *vespertilio* Limpr., Pfl. R. 4, 42 (1928) 16. — Type: *Machado s.n.* (SING sh. 41636), Perak.

T. minor Ridl., Mat. Fl. Mal. Pen. 2 (1907) 78; Fl. Mal. Pen. 4 (1924) 311; Limpr., Pfl. R. 4, 42 (1928) 18. — Lectotype: *Ridley s.n.* (SING sh. 41640), Tambun near Ipoh.

T. garrettii Craib, Kew Bull. (1912) 10, 406. — *T. chantrieri* André f. *garrettii* Limpr., Pfl. R. 4, 42 (1928) 14. — Type: *Garrett 45* (K, L), Thailand.

Clerodendron ('*Cherodendron*') *esquirolii* Lévl., Fedde Rep. 11 (1912) 298; cf. P'ei, Mem. Sc. Soc. China 1, 3 (1932) 162. — *T. esquirolii* Rehder, J. Arn. Arb. 17 (1936) 64; Metcalf, J. Arn. Arb. 26 (1945) 198. — Type: *Esquirol 2802* (E), North Vietnam.

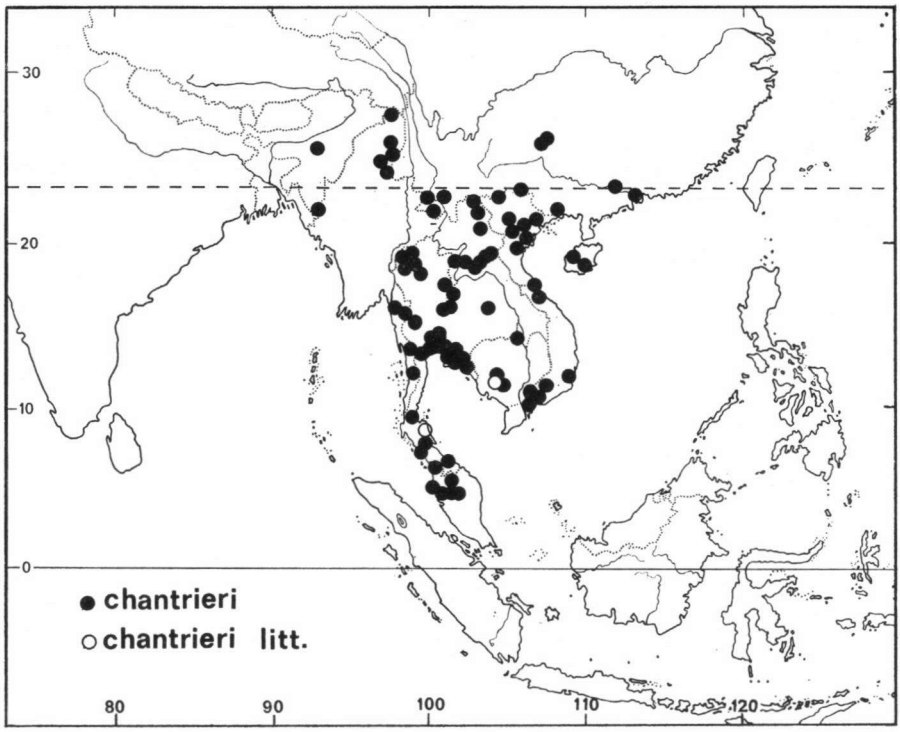
[*T. cristata auct. non* Jack: Velenovsky, Vergl. Morph. Pfl. 4. Suppl. (1913) 52, fig. 19.]

T. paxiana Limpr., Pfl. R. 4, 42 (1928) 16; Gagnep. in Fl. Gén. I.-C. 6 (1934) 694. — Syntypes: *Henry 12174* (not seen), *12592* (A, B, E, K), both from Yunnan; *Balansa 4140* (K, P), North Vietnam.

T. roxburghii Limpr., Pfl. R. 4, 42 (1928) 18; Smitinand, Nat. Hist. Bull. Siam Soc. 20 (1961) 61. — Syntypes: *Clarke 40886 D* (K), Naga Mts.; *Lobb s.n.* (K), Tenasserim; *Helfer 6024* (K), Tenasserim.

T. wilsonii Limpr., Fedde Rep. 38 (1935) 218. — Type: *Wilson 85* (not seen), North Vietnam.

Rhizome cylindric, growing vertically, up to 10 cm long by 1.5 cm ⌀, with apical



Map 4.

leaves. *Leaves* 3—12, variable, elliptic, ovate, oblong-(ob)ovate, or (ovate-)lanceolate, 17—55 by 4.4—22 cm, deep green, paler beneath, base cuneately attenuate but not decurrent (fig. 1 e), sometimes unequal, apex acuminate; nerves pinnate. Petiole 11—43 by 0.2—0.5 cm, sheath 3—15 by 0.3—2 cm. *Inflorescences* 1—2, up to 25-flowered; scape 6—63 by 0.1—0.7 cm. *Involucral bracts* 4, (sub)decussate, variable, green to almost black; 2 outer bracts ovate or triangular to ovate-lanceolate, sessile, 2—9 by 0.8—4 cm, apex acute or acuminate, 2 inner bracts thinner, (broadly) ovate to oblong, sometimes unaequilateral, 2.5—10 by 1.5—9 cm, sessile or with attenuate base, apex acute or acuminate. *Filiform bracts* 6—26, up to 20 cm by 0.2—1 mm, pale green or violet green. *Flowers* 1—2.5 by 0.6—2 cm, buds green, flowers greenish white when young, when older red, violet, purple, or blackish; pedicel 1.2—4 cm by 0.5—2 mm ø; perianth tube 3—7 by 6—15 mm. *Perianth lobes* mostly reflexed during anthesis and persistent as a small remnant afterwards; 3 outer ones (oblong-)ovate or (narrowly) triangular, 5—12 by 3—8 mm, apex acute, acuminate, or mucronate; 3 inner ones (broadly) ovate, or triangular, 4—11 by 4—12 mm; apex acuminate or mucronate, veins prominent at inside. *Stamens*: adnate portion of the filaments 2—3 by 0.5—1 mm, free apical portion 3 by 1.5 mm; thecae up to 2 mm long, greenish yellow. *Ovary* 2—7 by 3—5 mm; disk absent; style 2—3 by 2—3 mm; stigma lobes 1 by 1.5 mm. *Fruit* triangular to round on cross-section, 2—4 by 1—2 cm, (lustrous) green, deep orange-red, or purple. *Seeds* reniform, 3—4 by 2—3 by 1—1.5 mm, glabrous, brown, 9—14-ribbed.

ASSAM. Naga hills, Neechoogard: *Clarke 40886D* (K); Khasia: *Woods 2111* (K).

BANGLA DESH. Chittagong hills: *Wenger 482* (K).

BURMA. N. Burma. 5 collections. S. Burma. Moulmein: *Lobb s.n.* (K), *herb. Bentham s.n.* (K); Amherst Distr., Kyain: *Dickason 6896* (A); Tavoy Dist., Paungdaw: *Keenan, Tun Aung & Rule 1395* (E, K), *1717* (E); S. Tenasserim, Htahpe Chaung, alt. 100 m: *Parkinson 1619* (K).

THAILAND. Northern. Chiang Mai Dist. 7 collections; Lampang Dist., Mt. Ngow, alt. 450 m: *Winit 741* (K). — Northeastern. Phetchabun Dist., Kao Paya Paw, alt. 1—300 m: *Kerr 20433* (K); Nam Nao forest, alt. 600 m: *Smitinand (474) RFD 5107* (P); Nakhon Phanom Dist., Sitthan-Poo, Kradeng foothill: *Floto 7758* (C); Khon Kaen Dist., Dong Lan forest at Chumpae: *Sørensen, Larsen & Hansen 6125* (C). — Central. Saraburi Dist., Muak Lek, alt. 200 m: *Marcan 818* (BM); Nakhon Nayok Dist., Koh Chang, jungle near Klong Son: *Schmidt 641* (C). — Southeastern. Chon Buri Dist. 5 collections; Chanthaburi Dist., Kao Sabap, alt. 50—200 m: *Kerr 18038* (K), *Put 932* (K); Kao Ma Karm: *Lakshnakara 562* (K); Khao Gloea: *Sørensen, Larsen & Hansen 181* (C); Trat Dist., Baw Rai, alt. 200 m: *Kerr 10019* (K). — Southwestern. Kanchanaburi Dist. 7 collections. — Peninsular. Chumphon Dist., Kao Talu, Rayawng: *Kerr 11835* (K); Surat Thani Dist., Tako Langsuan: *Put 1614* (K, L); Phuket Dist., Khao Chiang Khrod and Khao Sa Khu near Thalang, alt. 200 m: *Van Beusekom & Phengklai 614* (K, L); Trang Dist., Paliem, alt. under 50 m: *Kerr 19098* (K, L); Phattalung Dist., Chawng forest station: *Sørensen, Larsen & Hansen 570* (C); Pattani Dist., Banang Sta Pattani: *Kerr 7348* (K, L, P).

CHINA. Yunnan. Sjemao remes, alt. 1200—1500 m: *Henry 12592* (A, B, E, K); Fo Hai, alt. 1070—1300 m: *Wang 74634, 77062* (A); Lan Tsang Hsien, alt. 1300—1500 m: *Wang 76519, 76751* (A). — Kwei-chow. Ta Tham forest: *Esquirol 2802* (E); Ta Thony, alt. 800 m: *Esquirol 3278* (P); Lathong and Talthasy, alt. 700 m: *Esquirol 4089* (P). — Kwangsi. Tai Ching Shan: *Ko 55177* (A). — Kwangtung. Kung P'ing Shan, T'aan Faan, Fang Ch'eng Dist.: *Tsang 26661* (A). — Hainan. 6 collections.

LAOS. 12 collections.

CAMBODIA. Pursat: *Poilane 15066* (P); Kg. Speu, Pum Ho Tet: *Poilane 17739, 17740* (P); Bassac: *Thorel 2559* (P).

NORTH VIETNAM. Tonkin. 12 collections. — Annam. Song Cao and Song Cay near Nhatrang: *Evrard 589* (P); Blao: *Herb. de Pham Hoang Ho 5039* (P); Lang Khoai, Prov. Quang Tri: *Poilane 10749* (P).

SOUTH VIETNAM. Cochinchina. Prov. Bien-Hoa: *Pierre 475* (P), *1943* (A, B, BO, K, P); Mt. de Nui, Chua chang, alt. 200—800 m: *Chevalier 29888* (P); between Quan Loi and Ca Huat near Honquan: *Evrard 856* (P).

MALAY PENINSULA. Perlis. Tebing Tinggi: *Ridley 14782* (SING). — Penang. Mt. Olivia: *Sinclair SF 39024* (E). — Perak. Kuala Kangsa, Estana Gardens: *Haniff SF 14928* (BO, SING); Kamuning: *Machado s.n.* (SING sh. 41636); Temango: *Ridley 14380* (BM, K, SING); Tambun: *Ridley s.n.* (SING sh. 41640).

Ecology: Usually found between 100 and 1400 m, sometimes as low as 30 and as high as 2100 m; in wet shady places on steep hillsides, along wet drainages and river beds, among decayed wood, in primary or secondary forests, mostly in dense shady areas, sometimes in thickets; found on various soils, e.g. humus, sand, or limestone. Associated (Burma) with grasses, ferns, and mosses. Flowering and fruiting from February-October.

Uses: Tender leaves and inflorescences eaten in curries. Bitter rhizome used in medicines (Thailand).

Vernacular names: Burma: *kya-gyi moke seik* (Hopin); *mukawlerypaw iday* (Amherst Dist.); *pyo-kasu* (S. Burma); black lily. — Thailand: *theng nanes* (karieng); *di ngu wa* (Lampong); *bee dhing* (Phetchabun); *klum lia* (Chanthaburi); *sing pa* (Trat); *bang pen* (Chumphon); *di ting*; *kladi klamaw*. — Tonkin: *ha-tuc* (moi).

Note. To be distinguished from *T. integrifolia* by the reniform seeds and the implantation of the involucral bracts, which is nearly always decussate. The distribution of both species is different.

5. Tacca bibracteata Drenth, *nov. spec.* — Type: *Synge 1335* (holo L; iso K), Sarawak. — **Fig. 1 a, b, c; Map 3.**

Herba ad 40 cm alta. *Radix* ignotus. *Folia* 6 vel 7, oblonga, 25—27 cm longa, 9,5—10,5 cm lata, basi attenuata, apice acuminata, nervis pinnatis. Petiolus 12—19 cm longus, 0,2 cm ∅, vagina 3,5—5,5 cm longa,

Fig. 1. *Tacca bibracteata*. a. habit, × ½ (*Synge 1335, Ashton S 18369*); b. fruit, × 1½ (*Richards 1569*); c. flower, × 1½ (*Ashton S 18369*). — *T. plantaginea*. d. leaf base, × ½ (*Kerr 8891*). — *T. chantrieri*. e. leaf base, × ½ (*Kostermans 1148*).

0,8—1,2 cm ∅. *Inflorescentia* (adhuc nota) solitaria, floribus 10; scapus 20—31 cm longus, 0,2—0,5 cm ∅, violascens. *Bracteae involucrales* 2, oppositae, ovatae, 2—2,8 cm longae, 1,3—2,2 cm latae, sessiles, apice acuminatae. *Bracteae filiformes* 12—15, 10(—14) cm longae, 0,4(—2) mm ∅. *Flores* 1—2 cm longi, 0,8—1,6 cm lati, virides, violascentes vel atropurpurei; pedicellus 1—3,5 cm longus, 1—1,5 mm ∅; perianthii tubus 2—5 mm longus, 4—12 mm latus. *Perianthii lobi*: 3 exteriores (late) ovati, 7—12 mm longi, 5—14 mm lati, apice longe acuminati; 3 interiores transverse late elliptici, 4—6 mm longi, 5—8 mm lati, apice mucronati vel acuminati. *Stamina*: filamentorum pars adnata 2 mm longa, 4 mm lata, pars apicalis libera 2 mm longa, 2 mm lata; thecae usque ad 2 mm longae. *Ovarium* 7 mm longum, 7 mm latum; discus nullus; stylus 2 mm longus, 3 mm latus; stigmatis lobi 1 mm longi, 2 mm lati. *Fructus* (immaturus) obpyramidalis, 1,5 × 0,8 × 0,8 cm. *Semina* immatura.

Rhizome unknown. *Leaves* 6 or 7, oblong, 25—27 by 9.5—10.5 cm, with attenuate base and acuminate apex; nerves pinnate. Petiole 12—19 by 0.2 cm, sheath 3.5—5.5 by 0.8—1.2 cm. *Inflorescence* as far as known solitary, up to 10-flowered; scape 20—31 by 0.2—0.5 cm, tinged with violet. *Involucral bracts* 2, opposite, ovate, 2—2.8 by 1.3—2.2 cm, sessile, apex acuminate. *Filiform bracts* 12—15, up to 10(—14) cm by 0.4(—2) mm ∅ (see note). *Flowers* 1—2 by 0.8—1.6 cm, green, tinged violet or very dark purple; pedicel 1—3.5 cm by 1—1.5 mm ∅; perianth tube 2—5 by 4—12 mm. *Perianth lobes*: 3 outer ones (broadly) ovate, 7—12 by 5—14 mm, with a long acuminate apex; 3 inner ones transversally broad-elliptic, 4—6 by 5—8 mm, with a mucronate or acuminate apex. *Stamens*: adnate portion of filaments 2 by 4 mm, free apical portion 2 by 2 mm; thecae up to 2 mm long. *Ovary* 7 by 7 mm; disk absent; style 2 by 3 mm; stigma lobes 1 by 2 mm. *Fruit* (unripe) obpyramidal, 1.5 by 0.8 by 0.8 cm. *Seeds* unripe.

Borneo. Sarawak. S. Tubau above Tubau village, alt. 30 m: *Ashton S 18369* (K, L); Long Kapa, Mt. Dulit, alt. under 300 m: *Synge 1335* (K, L), *Richards 1569* (K).

Ecology: Occurring from 30—300 m altitude, in mixed Dipterocarp and secondary forests; on muddy banks or on shale hillsides.

Note. The measurements of the filiform bracts given in brackets were taken from 2 bracts which as an exception are neither ribbed, nor round, but flattened, and are facing each other and alternating with the involucral bracts. In my opinion they are actually involucral bracts, but for convenience sake I call them filiform bracts in this revision.

6. Tacca palmata Bl., En. Pl. Javae 1 (1827) 83; Schauer, Nov. Act. Nat. Cur. 19 (1843) Suppl. 1, 444; Zoll., Syst. Verz. 1 (1854) 69; Miq., Fl. Ind. Bat. 3 (1859) 577; Limpr., Inaug. Diss. Breslau (1902) 49; Ridl., Mat. Fl. Mal. Pen. 2 (1907) 76; Merr., Fl. Manila (1912) 150; Int. Rumph. (1917) 145; Sp. Blanc. (1918) 100; Beumée, Trop. Natuur 8 (1919) 48; M. E. J., Trop. Natuur 9 (1920) 70, fig. 1; Back., Handb. Fl. Java 3 (1924) 107; Ridl., Fl. Mal. Pen. 4 (1924) 309; Merr., Philip. J. Sc. 29 (1926) 357; Heyne, Nutt. Pl. ed. 2 (1927) 454; Back., Onkr. Suiker. 1 (1928) 190; Limpr., Pfl. R. 4, 42 (1928) 24; Gagnep. in Fl. Gén. I.-C. 6 (1934) 696; Holthuis & Lam, Blumea 5 (1942) 168; Steen., Fl. Scholen Indon. (1949) 144; Back., Bekn. Fl. Java (em. ed.) 10 (1949) fam. 241; Quis., Med. Pl. Philip. (1951) 177; Smitinand, Nat. Hist. Bull. Siam Soc. 20 (1961) 61; Back. & Bakh. *f.*, Fl. Java 3 (1968) 212. — Type: *Blume s.n.* (L sh. 908.247.580), Java, Ilus Kitjil. — **Map 5; Plate 2: 10—15.**

[*Pentaphyllum indicum* Clusius, Exoticorum 4 (1605) 89 & fig. — Type: plate.]

T. montana Rumph. [Herb. Amb. 5 (1747) 329, t. 115] *ex* Schultes, Syst. Veg. 7, 1 (1829) 168; Hassk., Cat. Hort. Bog. 2 (1844) 34. — Type: Herb. Amb. 5 (1747) 329, t. 115.

[*T. integrifolia auct. non* Ker-Gawl.: Schrank, Syll. Pl. Ratisb. 1 (1824) 203.]

T. vesicaria Blanco, Flor. Filip. (1837) 261; Merr., Sp. Blanc. (1918) 100. — Type: unknown, Philippines.

T. rumphii Schauer, Nov. Act. Nat. Cur. 19 (1843) Suppl. 1, 442; Miq., Fl. Ind. Bat. 3 (1859) 577; Scheffer, Nat. Tijd. N. I. 31 (1870) 375; Limpr., Inaug. Diss. Breslau (1902) 49; Elmer, Leafl. Philip. Bot. 6 (1914) 2284; Merr., Sp. Blanc. (1918) 100; Limpr., Pfl. R. 4, 42 (1928) 24; Hosokawa, J. Jap. Bot. 13 (1937) 197. — Type: *Meyen s.n.* (not seen), Philippines.

T. elmeri Krause, Leafl. Philip. Bot. 6 (1914) 2283; Limpr., Pfl. R. 4, 42 (1928) 25; Elmer, Leafl. Philip. Bot. 10 (1939) 3795. — Type: *Elmer 12679* (B, L), Philippines.

T. angustilobata Merr., Philip. J. Sc. 29 (1926) 356. — Type: *Castro & Melegrito 1398* (B, BO, K), Banguey I.

T. palmata Bl. var. *borneensis* Limpr., Pfl. R. 4, 42 (1928) 25. — Syntypes: *Nat. Coll. BS 2664* (P); *Gibbs 2853* (BM); *Clemens* 9878 (not seen); *Winkler 2962* (BM, L), all from Borneo.

T. fatsiifolia Warb. *ex* Limpr., Pfl. R. 4, 42 (1928) 23. — Syntypes: *Sarasin 826* (B), Celebes; *Ramos BS 41152* (G); *McGregor BS 32314* (BM, K, P), both from the Philippines.

[*T. weberi* Elmer, Leafl. Philip. Bot. 10 (1939) 3794, *nom. inval.* — Type: Elmer 17210 (not seen).]

Tuber globose to broadly ellipsoid, 1—2.5 cm high by 1.5—5(—8 cm, once observed) by 1.3—3 cm, fleshy, sordidly light brown, with an apical cavity from which the leaves and inflorescences emerge. *Leaves* 1—3(—5), broadly reniform or cordate in outline, 3—13, usually 4—8-palmatipartite, 7—36 by 7.5—40 cm; base attenuate; lobes (narrowly) obovate, elliptic, or (linear) lanceolate, 6—25 by (0.5—)1—10 cm, with attenuate base and acuminate apex, the outer lobes mostly smaller than the inner ones. Petiole (12—) 15—60(—75) by 0.1—0.4 cm, sheath 2.5—7.5 by 0.3—0.8 cm. *Inflorescences* 1 or 2 (or 3), up to 30-flowered; scape 20—80 by 0.2—0.5 cm. *Involucral bracts* 4, decussate, green tinged with violet; 2 outer ones (broadly) ovate, 2.5—9.5 by 2—9 cm, sessile, apex acuminate; inner ones broadly ovate or cordate, 4.5—10 by 2.5—6 cm, with inflexed margins in the basal part, base attenuate, apex acuminate, sometimes caudate. *Flowers* 6—17 by 5—10 mm, green, tinged violet brown, brown violet, or dark violet; pedicel 10—20 mm by 0.5—1 mm; perianth tube 2—5 by 4—8 mm. *Perianth lobes*: 3 outer ones (broadly) ovate, rarely elliptic, 2—6 by 2.5—6 mm, obtuse or rounded at the apex; 3 inner ones with an acuminate apex, 3—5 by 2—4 mm, inflexed, each composed of a triangular basal portion of 0.5—1.5 by (2—)3—4 mm, connected by a narrower part of 1—2 by 1—2 mm to a (sub) circular apical portion of 1.5—2.5 by 2—3 mm, the side lobes of which are reflexed. *Stamens*: adnate portion of the filaments up to 2.5 by 3 mm, free apical portion up to 2 by 2 mm; thecae up to 2 mm long. *Ovary* 2—5 by 1—4 mm; disk absent; style 2 by 2 mm; stigma lobes 1.5—2 by 2 mm. *Fruit* globose, up to 1 cm ∅, mostly with 3 distinct and 3 indistinct ribs, bright red, fruit wall up to 1 mm thick. *Seeds* up to 11 in each fruit, more or less pyramidal with a rounded base, 3—5 by 2—4 by 2—3 mm, 15—20-ribbed.

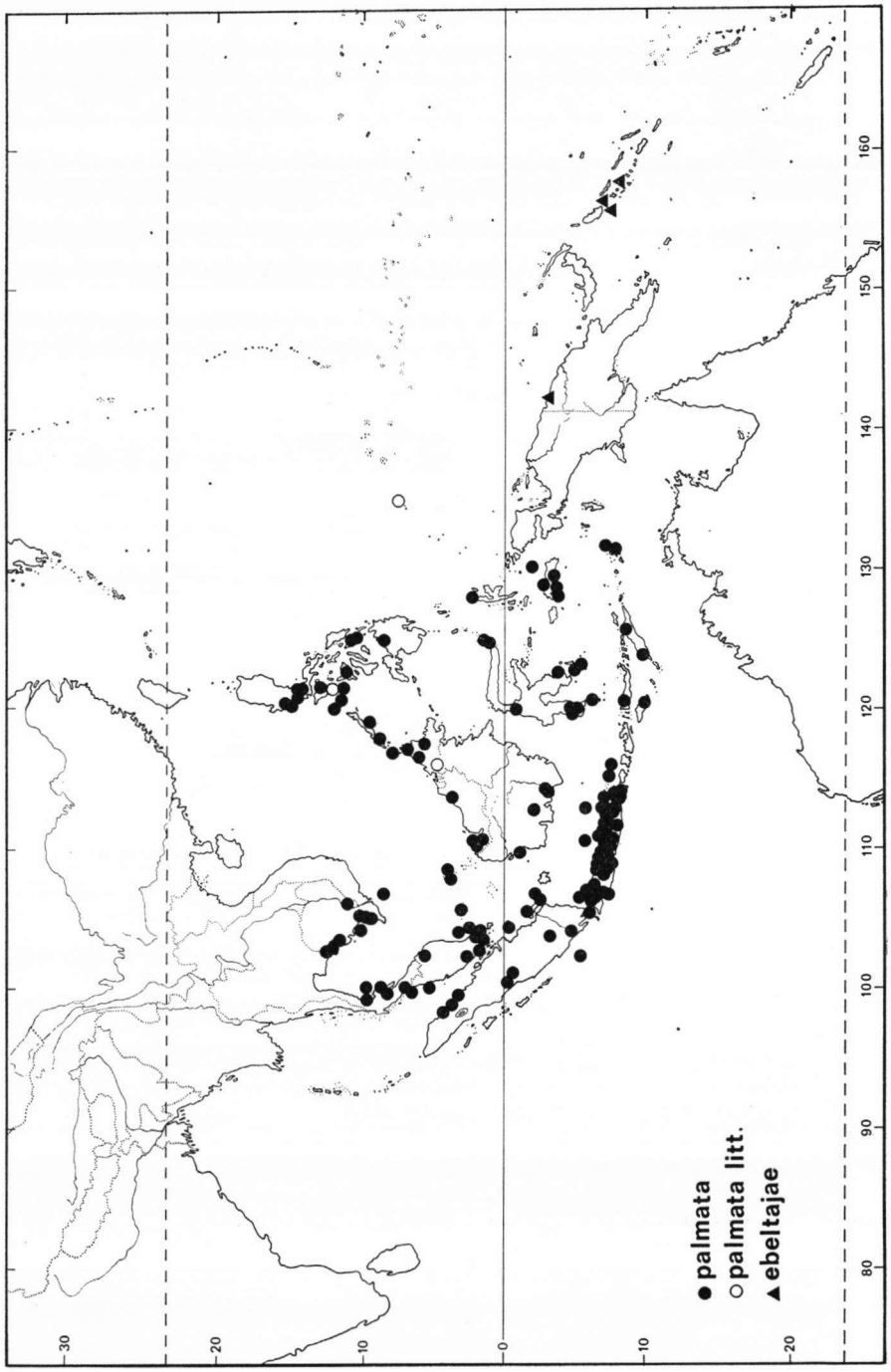
CAMBODIA. Kamchay Mts., alt. 200 m: *Geoffray 400* (P); Phu Quoc forest: *d'Alleizette s.n.* (L sh. 951.65.139).

SOUTH VIETNAM. Cochinchina. 5 collections.

THAILAND. Southeastern. Chanthaburi Dist., Makham, Ban Aug, alt. 120 m: *Bunnak Sangkachand RFD 9711* (C, K), *Vesterdal 13* (SING); Klung, alt. 50 m: *Kerr 10030* (K); Trat Dist., Huaey Raeng, Dong Maduea: *Smitinand RFD 7312* (C, K); S. of Mekam rubber plantation: *Larsen, Smitinand & Warncke 1753* (P). — Peninsular. Chumphon Dist., Langsuan, alt. under 50 m: *Kerr 11930* (K); Surat Thani Dist., Kaw Pa-ngnan: *Put 786* (K); Nakhon Si Thammarat Dist., Tung Song: *Rabil 160* (K); Sichon, alt. under 50 m: *Kerr 15688* (K); Songkhla Dist., Padang Besar, alt. below 300 m: *Kerr 3697* (K); Satun Dist., Satun, alt. 5 m: *Kerr 14377* (K).

MALAY PENINSULA. Kelantan. Kuala Kuai: *Haniff & Nur SF 10121* (BO, K, SING). — Johore. 6 collections. — Penang. Balik Pulau: *Haniff SF 9070* (BO, SING). — P. Tioman. Telok Paya, sea level: *Henderson SF 18290* (BO, SING); P. Tulai: *Kadim & Nur 637* (K, L).

SUMATRA. Sumatra West Coast. Simelungun, Perlanaan, 'Mt. Monkey', alt. 50 m: *Lörzing*



Map 5.

17068 (L); Mt. Singalang: *Korthals s.n.* (L sh. 908.247.555). — Sumatra East Coast. Basar Si Pinggan, Asahan: *Hamel 1171* (A); Indrapura: *Korthals s.n.* (L sh. 908.247.565); Huta Padang, Asahan: *Rahmat Si Boeea 926* (A, E. SING); Pergambiran: *Rahmat Si Boeea 6309* (L). — Bencoolen. Kroë, sea level: *Bouman-Houtman 12* (BO). — Palembang. Muara Enim: *Teysmann s.n.* (BO sh. 1248. 329). — Lampong Districts. G. Sugi: *Elbert s.n.* (L). — P. Enggano. Meok: *Lütjeharms 3858* (L). — Islands in Sunda Strait. P. Rakata, alt. 5 m: *Van Borssum Waalkes 851* (BO). — Banka. Rindik, Toboali: *Bünnemeyer 2314* (BO), *2372* (BO); Djebus, G. Gombong: *Hasskarl s.n.* (BO sh. 1248.369); P. Lepar: *Bünnemeyer 2429* (BO). — Riouw-Lingga Archipelago. Lingga, P. Selajar, alt. 30 m: *Bünnemeyer 7435* (BO).

Java. West Java. 75 collections. — Central Java. 48 collections. — East Java. 14 collections. — Nusa Kambangan. 7 collections. — Kangean Archipelago. 6 collections. — Madura. Bangkalan, alt. 10 m: *Backer 19044* (BO); NW. of Rapa, alt. 150 m: *Backer 20255* (K, L, P); W. of Sumenep, alt. 50 m: *Backer 20937* (BO); Pegantenan: *Vorderman 90* (BO). — P. Bawean. *Dorgelo 67* (BO); *Hoogerwerf 105* (L), *264* (L); G. Tunggangan: *Karta 71* (BO). — Karimundjawa Archipelago. P. Kemudjan, Batulantang: *Karta 410* (BO). — Islands in the Bay of Bantam. P. Babi: *Boerlage s.n.* (BO sh. 1248.206, L sh. 921.34.338, SING sh. 41654).

Lesser Sunda Is. Sumba. Kananggar: *Iboet 555* (BO). — Flores. W. Flores, Sita, alt. 700 m: *Rensch 1359* (BO); Paku-Nunang, alt. 500 m: *Schmutz 2073* (L); Poso-Roko: *Verheijen 2682* (L). — Tanimbar Is. *Riedel s.n.* (K); P. Jamdena, low alt.: *Buwalda 4153* (L). — West Timor. *Zippelius s.n.* (L sh. 908.247.590). — East Timor. Baucau: *Van Steenis 18635* (L).

Borneo. Northwest Borneo. 11 collections. — West Borneo. Njarum, alt. 50 m: *Elsener 80* (L). — South & SE. Borneo. Sampit, sea level: *Alston 13076* (BO); alt. 50 m: *Alston 13466* (BM); Bandjermasin: *Motley 60* (K); P. Lampei: *Korthals s.n.* (L sh. 908.246.498); between Kumam and Salinalhu: *Winkler 2962* (L). — E. & NE. Borneo. G. Pembliangan: *Amdjah 950* (L); Bungalun R.: *Rutten 557* (C). — North Borneo. 5 collections. — Banguey I. *Castro & Melegrito 1398* (B, BO, K). — Anambas & Natuna Is. P. Tudjuh, Tg. Pasir, alt. 5 m: *Bünnemeyer 5856* (BO); Siantan near Terempa, alt. 40 m: *Van Steenis 883* (BO); P. Sedanau, Bunguran, alt. 5 m: *Van Steenis 1065* (BO); Bunguran, near Ranai: *Van Steenis 1305* (L); Ranai, alt. 30 m: *Bünnemeyer 6087* (BO). — Tambelan Is. St. Barbe Isle: *Langlassé 274* (P), *s.n.* (SING sh. 41658). — Karimata Is. P. Penebangan: *Mondih 107* (BO).

Philippines. Balabac Is. Dalawan Bay, 0—5 m: *Olsen & Hansen 478* (C), *Ramos & Edaño BS 49701* (BR). — Palawan. Talakaigan R., Mt. Apis: *Ebalo & Conklin 1352* (A); Brooks Point, Addison Peak: *Elmer 12679* (B, L); Baraki, alt. 180 m: *Fox PNH 13339* (A). — Calamianes. Busuanga I.: *Ramos BS 41195* (K); Coron I.: *Ramos BS 41152* (G). — Mindoro. Mt. Yagaw: *Conklin PNH 18611* (A), *Sulit & Conklin PNH 16797* (A, L). — Luzon. 15 collections. — Leyte. Palo: *Glassmann 644* (A); Tacloban: *Glassmann 708* (A); Malitbog: *Weber 1522* (A, P). — Panay. Antique Prov.: *McGregor BS 32314* (BM, K, P). — Sulu Is. Turtle Is., Great Bakkungaan I.: *Santos 4759* (L); Tawi Tawi: *Warburg 14959* (E). — Mindanao. Vicinity of Tanculan, Bukidnan Subprov.: *Fénix BS 26022* (P).

Celebes. North Peninsula. Amurang: *Forsten 443* (L); between Amurang and Paku-ure, alt. 10 m: *Koorders 18922* (BO); between Singkel and Buha, Bailan, alt. 10 m: *Koorders 18923* (BO); Menado: *Nielsen 780* (C). — Central Celebes. Sae Wono, alt. 1000 m: *Eyma 1212* (BO); Lariang: *De Vriese & Teysmann s.n.* (L sh. 909.15.210). — SW. Peninsula. Makassar: *Noerkas 13* (L), *Rant 898* (BO), *Sarasin 826* (B), *Weber s.n.* (L). — SE. Peninsula. Kendari, alt. 100 m: *Kjellberg 501* (BO). — Saleijer Group. *Weber s.n.* (L sh. 908.247.568). — P. Muna. Raha, 0—125 m alt.: *Elbert 2864* (6977?) (L). — P. Buton: *Zippelius s.n.* (L).

Moluccas. Talaud & Nanusa Is. P. Karakelong, Mangarang, alt. 150 m: *Lam 3206* (L). — Halmaheira. Gedi, alt. 200 m: *Curran 399* (A); Djiko Djiko, Lelengon, alt. 200 m: *Nedi 349* (BO). — Ceram. Buria Biv., Wae Behai: *Eyma 2491* (K, L). — Ambon. 6 collections. — Saparua. *Herb. Reinwardt s.n.* (L sh. 908.246.494). — Kai Is. Tual: *H. Jensen 87* (C).

New Guinea. Misoöl Group. Misoöl I., Tip, alt. 80 m: *Pleyte 1000* (BO).

Ecology: Occurring from sea level up to 1000 m altitude, growing in small groups or solitary, in moderately dark places, at margins of forests, roadsides, in *Lantana*, bamboo, and djati vegetations, in secondary forests; on red volcanic soil or limestone. Flowering and fruiting from November-July.

Uses. In Malesia in different places used as a drug, generally in the form of scrapings of the tuberous rhizome, which are of a bitter taste. These scrapings are laid on wounds, e.g. caused by snake bites. Crushed petioles and scrapings are laid on the stomachs to prevent aches. In Luzon the drug is also taken by women against menstrual disorders.

Vernacular names: Thailand: *kot din* (Nakhon Si Thammarat); *buk-rue-si* (Trat). — Sumatra: *atjang tjangang* (Krakatau); *gedung tekus, tumbal* (Banka). — Java: *djambean* (Bawean I.); *gadung tikus* (Mal.); *ilĕs-ilĕs, kemendulan, kĕmú dulan* (J.); *kumis utjing, kotok bongkok, obat tjekok kuda* (S.); *pakis uling* (Djember); *suveg letik* (Bantam); *tĕnggiling mĕntik, tjèkèr ajam* (J.); *tobitoan* (Madura); *trĕnggiling mĕntik, tringgiling mèntèk* (J.). — Borneo: *gamah* (Sarawak). — Celebes: *karimenga in sowa; mamèrang* (Minahasa). — Lesser Sunda Is. & Moluccas: *mangattah* (Sumba), *tagomatengo* (Halmaheira), *ilun lĕtek*. — Philippines: *corazon de angel* (Spanish), *kandlong, magsaloro; payong-payongan, payung-payuñgan; tungang-basing, unodunod.*

7. **Tacca ebeltajae** Drenth, *nov. spec.* — Type: *Mauriasi & coll. BSIP 13333* (L), Solomon Islands. — **Fig. 2; Map 5; Plate 2: 16, 17.**

Herba, 40—60 cm alta. *Tuber* globosum ad subcylindricum, 0,8—1,5 cm altum, 1,5—6 cm latum, 1—2 cm crassum cum cavitate apicali, emittente folia atque inflorescentias. *Folia* 1—3, circumscriptione cordata, 7— c. 10 palmatipartita vel pedatipartita, 12—20 cm longa, 18—20 cm lata; basi attenuata; lobi oblongi lanceolati, 6—15 cm longi, 2,5—4,5 cm lati, basi attenuati, apice acuminati; nervi primarii palmati, ceteri pinnati. Petiolus 20—44 cm longus, 0,2—0,4 cm ∅, vagina 3—3,5 cm longa, 0,4 cm ∅. *Inflorescentiae* 1 vel 2, floribus ad 9; scapus 15—38 cm longus, 0,1—0,3 cm ∅. *Bracteae involucrales* 4, decussatae: 2 exteriores oblongo-ovatae, 1—2,3 cm longae, 0,4—1 cm latae, sessiles, apice cuspidatae; 2 interiores cordatae, 3—4,5 cm longae, 1,5—2 cm latae, marginibus in parte basali inflexis, basi attenuatae, apice acutae. *Flores* 6—9 mm longi, 6—12 mm lati; pedicellus 8—20 mm longus, 1—3 mm ∅; perianthii tubus 2—3 mm longus, 6 mm latus. *Perianthii lobi* viridi-canescentes ad obscure rubri: 3 exteriores ovati, 4—5 mm longi, 3—4 mm lati, apice acuti vel acuminati; 3 interiores late obovati, 5—6 mm longi, 3—5 mm lati, apice rotundati. *Stamina* pallida vel virescentia: filamentorum pars adnata 2,5 mm longa, 3 mm lata; pars apicalis libera 2 mm longa, 1 mm lata; thecae 2 mm longae. *Ovarium* 3 mm longum, 2—4 mm latum; discus nullus; stylus 2 mm longus, 2 mm latus; stigmatis lobi 1 mm longi, 2 mm lati. *Fructus* obpyramidalis, 1,3—1,5 cm longus, 0,8—1,2 cm latus; obscure violaceus ad ruber, pericarpis usque ad 1 mm ∅. *Semina* ad 15, commatiformia, 4—5 × 2—3 × 2 mm, 12 vel 13 costata.

Tuber globose to subcylindrical, 0.8—1.5 cm high by 1.5—6 by 1—2 cm, provided with an apical cavity from which the leaves and the inflorescences emerge. *Leaves* 1—3, cordate in outline, 7—*c.* 10-palmatipartite or pedatipartite, 12—20 by 18—20 cm, base attenuate; lobes oblong lanceolate, 6—15 by 2.5—4.5 cm, with attenuated base and acuminate apex. Petiole 20—44 by 0.2—0.4 cm, sheath 3—3.5 by 0.4 cm. *Inflorescences* 1 or 2, up to 9-flowered; scape 15—38 by 0.1—0.3 cm. *Involucral* bracts 4, decussate, 2 outer ones oblong ovate, 1—2.3 by 0.4—1 cm, sessile with cuspidate apex; 2 inner ones cordate, 3—4.5 by 1.5—2 cm, with inflexed margins at the basal part, base attenuate, apex acute. *Flowers* 6—9 by 6—12 mm; pedicel 8—20 by 1—3 mm; perianth tube 2—3 by 6 mm. *Perianth lobes* greenish grey to dark red; 3 outer ones ovate, 4—5 by 3—4 mm, apex acute or acuminate; 3 inner ones broadly obovate, 5—6 by 3—5 mm, apex rounded. *Stamens* pale or greenish: adnate portion of the filaments up to 2.5 by 3 mm, free apical portion up to 2 by 1 mm; thecae up to 2 mm long. *Ovary* 3 by 2—4 mm; disk absent, style 2 by 2 mm; stigma lobes 1 by 2 mm. *Fruit* obpyramidal; 1.3—1.5 by 0.8—1.2 cm, dark violet to red, fruit wall up to 1 mm thick. *Seeds* up to 15, comma-shaped, 4—5 by 2—3 by 2 mm, 12 or 13-ribbed.

NEW GUINEA. Territory of New Guinea. Krisa-Vanimo road, W. Sepik Dist.: *Streimann & Kairo NGF 39331* (K, L).

SOLOMON Is. Ovau I. Savaava area, alt. 120 m: *Mauriasi and coll. BSIP 13333* (L). — E. Treasury I. Maloaini area: *Mauriasi and coll. BSIP 14243* (K, L). — New Georgia: *Waterhouse 25* (K, L).

Ecology: In well drained primary or secondary forests. Flowering and fruiting from February-May.

Note. The epithet alludes to the name of my mother, Ebeltje Drenth-Fokkens.

Fig. 2. *Tacca ebeltajae*. a. inflorescence, × ½ (*BSIP 14243*); b. habit, × ½ (*NGF 39331*, *BSIP 14243*); c. flower, × 2½ (*BSIP 14243*).

8. Tacca palmatifida Baker, J. Linn. Soc. Bot. 15 (1876) 100; Limpr., Inaug. Diss. Breslau (1902) 58; Merr., Philip. J. Sc. 29 (1926) 357; Limpr., Pfl. R. 4, 42 (1928) 30. — Type: *Riedel s.n.* (K), Celebes. — **Map 3; Plate 3: 26—28.**

T. flabellata J. J. Smith, Bull. Jard. Bot. Btzg III, 6 (1924) 79. — Type: *J. J. Smith s.n.* (L sh. 924.325.861, 874), Celebes (cult. in Hort. Bog.).

T. breviloba Warb. *ex* Limpr., Pfl. R. 4, 42 (1928) 22. — Syntypes: *Sarasin 685* (not seen), *873* (B), both from Celebes.

Rhizome cylindric, growing horizontally, 8.5 cm long by 1.5 cm ∅, with the leaves and the inflorescences spaced. *Leaves* 1—3(—4?), cordate in outline, palmatifid, 12—35 by 18—50 cm, base attenuate; lobes 5—11(—13?), ovate, 2.5—14 by 1—9.5 cm, with acuminate apex. Petiole 36—60 by 0.3—0.5 cm, sheath 2.5—10 by 0.4—0.7 cm. *Inflorescences* (1—)3—4, up to 25-flowered; scape 26—60 by 0.2—0.4 cm. *Involucral bracts* 4, decussate, 2 outer ones (broadly) ovate, 1—2.2 by 1—1.3 cm, sessile, with acute, acuminate, or cuspidate apex; inner ones ovate or cordate, 6.5—12.5 by 4.5—7 cm, with inflexed margins at the basal part, base attenuate, apex acuminate or cuspidate. *Flowers* 15—17 by 12—15 mm; pedicel 15—30 by 0.5—1.5 mm, inserted on the basal portion of the inner bracts; perianth tube 4—5 by 9—10 mm. *Perianth lobes*: 3 outer ones broadly elliptic, 6—8 by 8—11 mm, with a rounded, reflexed apex; 3 inner ones with an acuminate apex, 5—6 by 4—5 mm, each composed of a triangular basal portion of 0.5—2 by 4—5 mm, connected by a narrower part of 1—1.5 by 1—2 mm to an obtriangular apical portion of 3—4 by 4—5 mm, the side lobes of which are reflexed. *Stamens*: adnate portion of the filaments up to 2 by 4 mm, free apical portion up to 3 by 1.5 mm; thecae up to 2.5 mm long. *Ovary* 5—6 by 3—4 mm; disk absent, style 2 by 2 mm; stigma lobes 2 by 2 mm. *Fruit* ellipsoid to obovoid, 2.2—3 by 1 by 1 cm, fruit wall 1 mm thick. *Seeds* many, ovoid to ellipsoid, 2—3 by 1—1.5 by 1—1.5 mm, 11—13-ribbed.

CELEBES. Northern Peninsula. Gorontalo: *Riedel s.n.* (K). — Central Celebes. Palu, Kampong Siadunta, alt. 600 m: *Bloembergen 4223* (L); Menado, Lindu, alt. 1000 m: *Donggala 9* (BO); Palu Kulawi, alt. 900 m: *Posthumus 2397* (BO); Palopo: *Sarasin 873* (B); Mamudju: *Steup 139* (BO); Tawaeli-Tobali, alt. 300 m: *Tideman s.n.* (BO sh. 1248.27). — Southwest Peninsula. Enrekang near Kabere, alt. 200 m: *Eyma 369* (BO); Alo caves near Kalosi, alt. 600 m: *Van Steenis 10332* (BO); G. Soliwatang: *Rahmat (exp. Van Vuuren) 386* (BO).

Ecology: Occurring from 200—1000 m, sometimes in groups, in moderate dark humid places at margins of forests, roadsides, especially in thickets; on limestone, clay soil. Flowering and fruiting from December-July.

Vernacular names: *Tilu-tilu* (Mamudju); *totilu*.

9. Tacca celebica Koord., Med. Lands Pl. Tuin 19 (1898) 641,311; Limpr., Inaug. Diss. Breslau (1902) 48; Pfl. R. 4, 42 (1928) 31. — Type: *Koorders 18919* (BO), Celebes. — **Map 2; Plate 2: 18.**

T. minahassae Koord., Med. Lands Pl. Tuin 19 (1898) 641, 311 (also as *T. minahasae*); Limpr., Inaug. Diss. Breslau (1902) 48; Pfl. R. 4, 42 (1928) 31. — Type: *Koorders 18918* (BO), Celebes.

Rhizome cylindric, growing horizontally, up to 18 cm long by 1 cm ∅, with the leaves and the inflorescences spaced. Leaves 2—6, in outline broadly ovate, palmati-3- or -5-sect, 18—25 by 25—30 cm, lobes entire, or when there are 3 lobes the outer ones deeply incised, (ob)lanceolate, 9—31 by 3—8 cm, stalked, stalk of the central lobes 1.5—2.5 cm long, of the other lobes 0.5—1.5 cm, base attenuate, apex acuminate. Petiole 25—45 by 0.2—0.4 cm, sheath 1.5—4 by 0.3 cm. *Inflorescences* 1—5, up to 30-flowered; scape 55—65 by 0.3—0.5 cm. *Involucral bracts* 4, decussate, 2 outer ones ovate, 1—1.5 by 1 cm,

sessile, with acute apex; 2 inner ones ovate or cordate, 6.5—8 by 3.5—5 cm, with inflexed margins at the basal part, base attenuate, apex acuminate. *Flowers* 14—18 by 9—10 mm; pedicel 10—20 by 0.5 mm, inserted at the basal portion of the inner bracts; perianth tube 3—5 by 8—9 mm. *Perianth lobes*: 3 outer ones elliptic or ovate, 8—10 by 6—8 mm, with acute apex; 3 inner ones with a rounded to truncate apex, 4.5—5 by 4 mm, each composed of a triangular basal portion of 1—1.5 by 4 mm, connected by a narrower part of 1—2 by 1 mm to a broad elliptical portion of 3—4 by 4—5 mm, the side lobes of which are reflexed. *Stamens*: adnate portion of the filaments up to 1.5 by 2 mm, free apical portion up to 2 by 2 mm; thecae up to 2 mm long. *Ovary* 3 by 2 mm; disk absent; style 2 by 2 mm; stigma lobes 2 by 2 mm. *Fruit* pyramidal, 1.8 by 1 cm, triangular in cross-section, fruit wall up to 1 mm thick. *Seeds* up to 26, (sub)rhomboid, 3 by 2 by 1.5 mm, 13- or 14-ribbed.

CELEBES. Northern Peninsula. Karowa, near Popo Tompaso: *Koorders 18918* (BO); biv. Pinamorongan, near Kajuwatu, alt. 500 m: *Koorders 18919* (BO); Tonsea Lama, alt. 650 m: *Wisse 12* (BO).

Ecology: At 500—650 m altitude in humid shady places, between bamboo and in high thickets, on humous soil and fertile tuff. Flowering and fruiting from December-April.

Vernacular names: *Karumenga intalun, rukut intjusu.*

10. **Tacca parkeri** Seem., Fl. Vit. (1865) 102; Limpr., Inaug. Diss. Breslau (1902) 45; Pfl. R. 4, 42 (1928) 21. — Lectotype: *Parker s.n.* (K, phot. Bailey Hort. 8100). Syntype: *Appun 251* (K), both British Guiana. — **Map 1; Plate 1: 8, 9.**

[*T. lanceolata* Benth. *ex* Seem., Fl. Vit. (1865) 102, *nom. nud.*; Spruce *ex* B. & H., Gen. Pl. 3 (1883) 741; Limpr., Inaug. Diss. Breslau (1902) 57. —] *T. parkeri* Seem. var. *lanceolata* Limpr., Pfl. R. 4, 42 (1928) 21. — Type: *Spruce 3762* (BM, BR, K, NY, P).

T. sprucei Benth. in B. & H., Gen. Pl. 3 (1883) 741; Limpr., Inaug. Diss. Breslau (1902) 58; Pfl. R. 4, 42 (1928) 22. — Type: unknown, possibly *Spruce 1301* (K, phot. Bailey Hort. 8102), Brazil.

T. parkeri Seem. f. *paraensis* Limpr., Pfl. R. 4, 42 (1928) 21. — Type: *Spruce s.n.* (K), Brazil.

T. ulei Limpr., Pfl. R. 4, 42 (1928) 22. — Type: *Ule 5281* (K, L, NY = phot. from B), Brazil.

Rhizome cylindric, growing horizontally, up to 5 cm long by up to 0.5 cm diam., the leaves and inflorescences spaced. *Leaves* 1—5, elliptic, obovate, oblong-ovate, or linear-lanceolate, rarely orbicular, entire or up to 7- (mostly 5—7-)pinnatipartite, 11—39 by 1.8—26 cm, base attenuate, apex acuminate, pinnately nerved; lobes 3.5—17 by 0.8—8 cm, ovate or lanceolate, side lobes narrower than the apical lobe, mostly curved upwardly, acuminate. Petiole 10—40 by 0.2—0.7 cm, sheath 1.5—6 by 0.7 cm. *Inflorescences* 1—3, up to 25-flowered; scape 21—45 by 0.2—0.6 cm. *Involucral bracts* mostly 4, green, decussate, 2 outer ones ovate(-lanceolate), broadly sessile, 1—10 by 0.6—3 cm, with acuminate apex, 2 inner bracts oblong(-ovate) or ovate(-lanceolate), 4—13 by 1—3.5 cm, base attenuate, apex obtuse to acuminate; exceptionally 5 or 6, 4 decussate, the supernumerary 1 or 2 placed between the inner bracts in the same whorl, these additional bracts are linear-lanceolate to filiform, 4—5.5 by 0.2—0.3 cm, sessile, apex obtuse or acute. *Flowers* 7—13 by 6—8 mm, (dark) purple; pedicel up to 2.5 by 1 mm; perianth tube 2—3 by 5.5—7 mm. *Perianth lobes*: 3 outer ones ovate, 3—6 by 2.5—4 mm, apex obtuse or emarginate; 3 inner ones elliptic or obovate, 3—6 by 3—5 mm, inflexed, apex emarginate. *Stamens*: adnate

portion of the filaments 2 by 2 mm, free apical portion 1.5 by 2 mm; thecae 1 mm long. *Ovary* 2—4 by 2—3 mm; style 2 by 2 mm; stigma lobes 1.5 by 2 mm. *Fruit* globose, 1.5 cm ø, green; fruit wall up to 1 mm thick. *Seeds* oblong-ovoid, subtriangular on cross-section, 6 by 2 by 2 mm, 16—18-ribbed.

VENEZUELA. Amazonas. Guainia R. near mouth of Casiquiari R.: *Spruce 3762* (BM, BR, K, NY, P).
BRITISH GUIANA. 8 collections.
COLOMBIA. Vaupés. Rio Negro, El Castillo: *Schultes & Lopez 929* (NY).
BRAZIL. Amazonas. Manaus: *Prance, Peña & Ramos 3863* (NY, P); Rio Negro near Manaus: *Ule 5281* (K, L, NY = phot. from spec. in B). — Pará. Santarem: *Spruce s.n.* (K), *Ginzberger 805* (WU); Amazonia, Rio Mapuá, Lago Bernardinho: *Black, Froes & Ladeux 50—9851* (NY, P); Alto Tapajós, Rio Cururú: *Egler & Raimundo 922* (NY). — Maranhão. Island of São Luiz: *Froes & Krukoff 11784* (NY). — Piaui. Barra: *Spruce 1301* (K).

Ecology: Occurring mostly along creeks, rivers, sometimes in inundated areas, more rarely in dense upland forest, altitude unknown. On sandy soil and rocks. Flowering and fruiting from January-August.

Vernacular names: Brazil: Island of São Luiz: *liryo*.

Note. The leaves are very variable; there is only one specimen with completely entire leaves and some others which are subentire in having some shallow incisions in the margin. It could well be that the variability in leaf incisions depends on the age of the plant. A remarkable parallel situation is found in the Araceous *Lasia spinosa* which shows a similar variability.

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INDEX OF SCIENTIFIC NAMES

New names are in **bold face**, synonyms in *italics*; the numbers refer to the pages.