A Revision of *Rhapis*, the Lady Palms

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1. *Rhapis excelsa* canes from the Economic Botany Collections, Royal Botanic Gardens, Kew. From left to right: unfinished sunshade handle, EBC 37520; walking stick, EBC 37462; walking cane, EBC 37506; sunshade handle, EBC 37553; walking stick, EBC 37500; sunshade handle, EBC 37577; ladies umbrella handle stained green, EBC 37577. (Photo: A. McRobb, RBG Kew.)

The Lady Palms are among the most familiar and widely grown of all ornamental palms, yet, surprisingly, the taxonomy of the genus has often been confused and several species remain poorly known. In this account of *Rhapis*, eight species are recognized, and the complex nomenclatural history of the genus is discussed.

Rhapis, a genus of clustering palms commonly known as Lady Palms, belongs to subfamily Coryphoideae, tribe Corypheae, subtribe Thrinacinae. It is characterized by slender stems, palmate leaves, divided regularly into many-folded segments with truncate or oblique apices; the divisions into segments unusually occurs between the folds, rather than along the folds, a situation known elsewhere only in *Rhapidophyllum*. The flowers are fleshy with sepals and petals united basally, and the six stamens are free but epipetalous. Its palmate, induplicate leaves, and solitary, only slightly dimorphic flowers, are characters that put *Rhapis* into subfamily Coryphoideae, tribe Corypheae, and the presence of free carpels places it in subtribe Thrinacinae. This subtribe shows two main lines of evolution that have produced two distinct groups. One is

entirely New World, the other, which includes *Rhapis*, is mainly Old World and tends towards dioecy and elaboration and fusion of the perianth segments. The genera most closely related to *Rhapis* are *Maxburretia* and *Guihaia*. *Rhapis* differs from these in always having an erect stem, leaf sheaths that never develop into spines, leaf segments usually with many folds, conspicuous veinlets, splits between leaf segments being between folds and the larger fleshy slightly stalked flowers with the sepals and petals united basally with separate epipetalous filaments. The name *Rhapis* comes from the Greek word *rhapis* (rod), alluding to the rod-like canes or stems (Beeler 1960).

The elegant appearance of *Rhapis* along with its modest proportions and ease of cultivation make it horticulturally desirable and it has been widely cultivated and traded since the 17th Century. Yet despite this long history of cultivation, *Rhapis* taxonomy is in confusion and due to its horticultural importance a revised taxonomy is much needed.

Although distinct species can be recognized within *Rhapis* they tend to be separated by few characters. In the past there has been a tendency to use leaf blade dissection to delimit species but this is very variable between populations and with age, and therefore not a reliable character at species level.

Taxonomic history

The genus *Rhapis* has had a complex taxonomic history. It was first described by Linnaeus f. in Aiton's Hortus Kewensis (1789) and included just one species, *R. flabelliformis* L'Hérit ex Aiton (a synonym of *R. excelsa*). This species of *Rhapis* has been extensively cultivated since the mid 1600s with many cultivars selected and registered by Japanese horticulturists, including dwarf and variegated forms (McKamey 1985).

Three further species of *Rhapis* were published by Blume in 1836, *R. humilis*, *R. major* and *R. javanica*. Like *R. excelsa*, *R. humilis* has also been in cultivation since the 17th Century, again with variegated forms developed and registered in Japan (McKamey 1985).

In 1910 three additional species of *Rhapis* were published by Beccari (*R. micrantha*, *R. laosensis* and *R.* subtilis).

In 1930 Burret published an eighth species of *Rhapis*, *R. gracilis*. Also in this year Alfred Rehder published the new combination *R. excelsa* for *R. flabelliformis*, since the taxon was found to have been wrongly placed in *Chamaerops* and have been described as *Chamaerops excelsa* by Thunberg in 1784, predating *R. flabelliformis* by five years (see Rehder 1930).

A revision of *Rhapis* by Odoardo Beccari was published posthumously by Ugolino Martelli in 1931. It included five accepted species, *R. flabelliformis* (synonym of R. *excelsa*), *R. humilis R. micrantha*, *R. laosensis* and *R. subtilis* and listed eleven doubtful ones. Blume's *R. major* and *R. javanica* were placed in synonomy of *R. flabelliformis*. The work seems to have overlooked Rehder's new combination for *R. flabelliformis* and Burrett's *R. gracilis* of 1930.

Six years after Beccari's revision, six more species were added to *Rhapis*, three by Burrett (*R. multifida*, *R. robusta* and *R. filiformis*) and three by Gagnepain (*R. grossefibrosa*, *R. divaricata* and *R. macrantha*). Eight years after the revision (in 1939) Bailey produced a synopsis of *Rhapis*; he included nine species (*R. excelsa*, *R. humilis*, *R. micrantha, R. laosensis*, *R. subtilis*, *R. gracilis*, *R. robusta*, *R. filiformis* and *R. macrantha*) and added his own observations on the two species then in cultivation, *R. excelsa* and *R. humilis*.

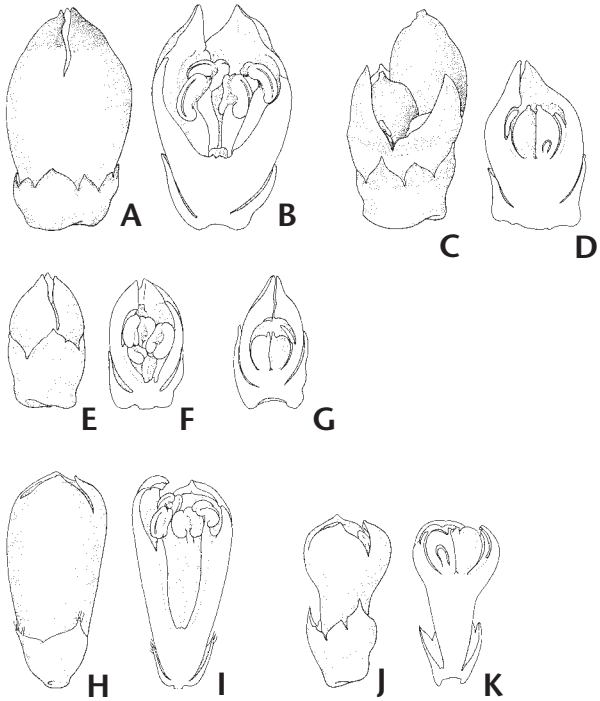
A number of combinations published under *Rhapis* have been transferred to *Sabal minor* (Jacq.) Pers. These include *R. arundinacea* Aiton (1789, see Moore 1975), *R. acaulis* Willd. (1806, see Moore 1963) and *R. caroliniana* Hort. ex Kunth (1841, see Shuey & Wunderlin 1977). Beccari (1931) had previously given *R. arundinacea* and *R. caroliniana* as synonyms of *Rhapidophyllum hystrix* (Pursh) H.Wendl. & Drude.

More recently Dransfield et al. (1985) transferred *R. grossefibrosa* to a new genus *Guihaia*, as *G. grossefibrosa* (Gagnep.) J. Dransf., Lee & Wei, and in 1997 Wei placed *R. filiformis* Burret in synonymy with *G. grossefibrosa*. The most recent species to be described, *R. siamensis* Hodel (1997), is considered in this revision to be a synonym of *R. subtilis*. The present author accepts eight species.

Materials and Methods

The following account is based primarily on the examination of herbarium specimens. In addition a small number of living collections of *R. excelsa* and *R. humilis* were seen at the Royal Botanic Gardens, Kew.

Throughout, all the specimens cited have been seen unless otherwise indicated. Those cited for FI have been critically examined by J. Dransfield (pers. comm.). The sex of the specimens has been recorded where possible. Petiole width is measured at 1 cm below the petiole apex and the inflorescence rachis is measured just below the first branching point. The overall measurement



2. Flowers of *Rhapis*. *Rhapis subtilis*. **A** Staminate flower ×8; **B** Staminate flower in longitudinal section ×8; **C** Pistillate flower ×8; **D** Pistillate flower in longitudinal section ×8. *Rhapis excelsa*. **E** Staminate flower ×8; **F** Staminate flower in longitudinal section ×8; **G** Pistillate flower in longitudinal section ×8. *Rhapis humilis*. **H** Staminate flower ×8; **I** Staminate flower in longitudinal section ×8; **J** Pistillate flower ×8; **K** Pistillate flower in longitudinal section ×8. **A**, **B** from *McKamey s.n.*, **C**, **D** from *Dransfield & Bhoonab 5488*, **E**, **G** from *Rehder s.n.* in 1886, **H**, **I** from Temperate House, Kew, **J**, **K** from *Chow 6249*. Drawn by Lucy T. Smith.

of the rachis length includes the rachillae. The term receptacular-stalk refers to the base of the receptacle and corolla when they are elongated. Fruit is described only if it is available. Fruit colour is taken from herbarium label data or photographs. Author names are abbreviated according to Brummitt and Powell (1992).

This study was limited by the small number of specimens available, of which a high proportion are from cultivated material, and the fact that none of the species has been seen in the wild by the author. Despite being a small palm *Rhapis* are large and fibrous enough to make their collection, and the preparation of specimens from them difficult, and as a result many older herbarium specimens of *Rhapis* are incomplete, often with no stem material. *Rhapis* is distributed in areas which have been politically unstable, with no opportunity until recently for observation in the wild or for re-collection. Therefore, excepting specimens from Thailand, North Sumatra, Vietnam and Laos, no recent wild collections were available for this study. Species habitat in lowland tropical forest makes them particularly vulnerable to deforestation, which may have reduced populations considerably since herbarium collections were made in the late 18th and early 19th Centuries. The species are poorly represented in cultivation; the most commonly cultivated are *R. excelsa*, *R. humilis* and *R. subtilis*. Furthermore *R. humilis* and *R. excelsa* are represented in herbaria by a very small proportion of wild-collected specimens. *Rhapis laosensis*, *R. multifida, R. gracilis* and *R. robusta* are less commonly cultivated, but the author has seen only wild material of these.

Taxonomic Treatment

Rhapis L. f. ex Aiton, Hortus Kewensis 3: 473. 1789. Lectotype: *R. flabelliformis* L'Hérit. ex Aiton (illegitimate name) = *R. excelsa* (Thunb.) A. Henry ex Rehder). Mart., Hist. Nat. Palm 3: 253. 1838; Kunth, Enum. 1, Pl. 3: 251. 1841; Benth. et Hook. f., Gen. Pl. 3 (2): 930. 1883.

Small, clustering, pleonanthic, unarmed dioecious or rarely hermaphrodite palms. Stems slender, erect, covered with persistent leaf sheaths, eventually becoming bare. Leaves induplicate, palmate, marcescent; sheaths sparsely tomentose when young, pale brown to dark brown; petiole elongate, slender, elliptic in cross-section, margins smooth or minutely scabrid and brown papillate; adaxial hastula small, more or less triangular, sometimes tomentose, abaxial hastula absent; mature blade glabrous, divided between folds into several-ribbed segments with minutely scabrid margins, major splits from between 1/3 radius to near the base, apices divided along and between the folds to form secondary splits. Inflorescences interfoliar, male, female and hermaphrodite sexes superficially similar, branching to 1–3 orders;

prophyll tubular, 2-keeled, usually sheathing, splitting along the abaxial midline; peduncle usually entirely enclosed in leaf sheath, peduncular bracts absent; rachis usually longer than the peduncle, bearing 1–3(4), large, sheathing, single-keeled bracts subtending first order branches, distal rachis bracts smaller, split to the base, small narrow triangular bracts subtending second order branches; rachillae formed from secondary and tertiary branches; rachis and rachillae glabrous or tomentose; rachillae lax, spreading, male sometimes more crowded than the female, bearing spirally arranged solitary, or rarely paired flowers in the axils of minute apiculate bracts. Flowers: male, female and hermaphrodite symmetrical, sexes superficially similar, size increasing with maturity; calyx cup-shaped, 3-lobed, lobes sometimes irregular; corolla fleshy, tubular, 3-lobed, usually with a stalk-like base comprising extended receptacle and corolla (receptacular-stalk), lobes triangular, valvate; stamens and staminodes 6, biseriate, the taller row in-between the corolla lobes. Male flowers with filaments ± adnate along the entire length of the corolla tube, free at their tips, anthers basifixed, short, rounded; pollen elliptic, monosulcate, with finely reticulate, tectate exine (Uhl & Dransfield 1987); pistillode minute, 3-lobed. Female flowers with staminodes, carpels 3, distinctly wedge-shaped, each with a short apical style and cylindrical stigma; ovules 1 per carpel, basally attached, hemianatropus, with a basal fleshy aril. Fruit developing from one carpel, sometimes 2 or 3 carpels developing, stalked or sessile (stalk appearing to develop from the receptacular-stalk of the flower), stigmatic remnants persist at apex, epicarp papillose, mesocarp fibrous, endocarp thin, brittle. Seed with short lateral raphe; endosperm homogeneous, laterally penetrated by the seed coat, embryo sub-basal or lateral (Uhl & Dransfield 1987). Germination remote-tubular; eophyll entire slender, strap-shaped, plicate (Uhl & Dransfield 1987).

Distribution. South China (5 species.), Japan (2 spp. possibly originating from the wild), Laos (3 spp.), Vietnam (2 spp.), central and southern Thailand and northern Sumatra (1 sp.). The recorded distribution suggests that *Rhapis* is likely to occur in Myanmar (Burma), but the author has not seen any collections from there.

Habitat. Undergrowth palms of tropical evergreen, lowland forest. In Thailand and Sumatra *R. subtilis* is confined to limestone hills. Where *R. subtilis* occurs in North Sumatra at Lho'Nga, North Aceh, the limestone forms a characteristic landscape called cockpit (or labyrinth) karst which has regular series of conical or hemispherical hills and hollows with moderately steep sides (30–40°, Whitten et al. 1987). In Laos *R. laosensis* occurs on alluvial river levées over underlying sandstone (J. Dransfield, pers. comm.).

Anatomy. *Rhapis* is anatomically the best-known palm; it has been chosen for studies because of its moderate size and wide availability. Detailed anatomical studies have been undertaken on leaf (Tomlinson 1961, Kaplan et al. 1982), stem (Zimmermann & Tomlinson 1965) and flowers (Uhl et al. 1969). For discussion of these studies see Uhl and Dransfield (1987).

Genetics. *Rhapis excelsa* and *R. humilis* are the only two species to have been investigated and as they are often mislabelled as each other, the results must be viewed with caution. Both species are reported to have a gametic chromosome number n=18 (Read 1966, Sharma & Sarkar 1957). This is at the upper limit of the range of chromosome numbers for Palms (n = 13–18 excluding polyploids) and is a characteristic of most members of the Coryphoideae, which is congruent with the view that they may be one of the oldest palm groups (Uhl & Dransfield 1987). Sharma and Sarkar (1957) also concluded that, due to a similarity in karyotypes indicating an origin from a common ancestor, *Rhapis* and *Corypha* could be grouped together as members of a similar evolutionary line. *Rhapis flabelliformis* (= *R. excelsa*) and *R. humilis* are reported sometimes to show polyploidy in cultivation with n = 36 (Sharma & Sarkar 1957).

Conservation status. *Rhapis divaricata* (= *R. excelsa*) is listed as rare in Vietnam (Walter & Gillett 1998 citing Nguyen Nghia Thin 1991). Despite their being widely cultivated there is no other published information on the status of species in the wild. *Rhapis laosensis* is abundant in Laos, but *R. subtilis* in Sumatra is virtually extinct (J. Dransfield, pers. comm. 2001).

Uses. The main use of *Rhapis* is as ornamental plants. According to Burkill (1935), Kaempfer saw *R. flabelliformis* (synonym of *R. excelsa*) in cultivation in Japan during his voyages in 1690–92. In 1774, James Gordon introduced male plants into Europe, probably by seed. Commonly known as Lady Palms, *R. excelsa*, *R. humilis* and *R. subtilis* are now widely grown in the USA and elsewhere as ornamentals, highly prized and of significant economic importance (Jones 1994). Good illustrations of the dwarf and variegated varieties of *R. excelsa* and *R. humilis* developed in Japan can be seen in Ellison and Ellison (2001). *Rhapis subtilis* and *R. laosensis* were brought into cultivation in the 1960s (McKamey 1989). *Rhapis laosensis* and *R. gracilis* are essentially collectors'

items. *Rhapis robusta* is cultivated only in China, and *R. multifida* has become well established in cultivation (Jones 1994).

Rhapis laosensis shoots are edible; the leaf sheaths are peeled away to reveal the shoots which are sold for food in local markets in Laos (J. Dransfield & Evans, pers. comm.). In Chinese medicine the petiole, leaf sheath and fruits are used to stop bleeding and the root to treat rheumatism and stimulate blood circulation (Chin & Keng 1992). Herbarium specimen labels record *Rhapis excelsa* being used as chopsticks and bowstrings and its stems being used for sticks and canes, including in the construction of sedan chairs. Examples of *R. excelsa* canes imported from China for sunshade and umbrella handles and walking sticks, can be found in the walking stick collection of the Economic Botany Collections (EBC) at Kew (Fig. 1). They form part of the 'Partridge Canes' of 19th Century commerce and have handles fashioned from the stem-base and roots. One sunshade has an elaborately curved handle with an extra piece of cane twisted into it and one walking stick has a patterned top section studded with mother of pearl. Despite their narrow diameter these canes are solid and very strong.

Key to Species of *Rhapis*

1. Mature flowers up to 6.1 × 4 mm, rachis glabrous; male ovoid, female cylindrical, both coriaceous; calyx margins irregular, usually with darkly pigmented bands . . . . . *R. subtilis*

   Mature flowers usually smaller, if as large, then rachis not glabrous; flowers obovoid, obtriangular or clavate, fleshy; calyx margins regular or irregular, evenly pigmented . . . . . 2.

2. Inflorescence with large conspicuous, usually coriaceous, boat-shaped, almost entirely overlapping bracts, not sheathing the rachis; leaf segment tips distinctly cucculate . . . . . *R. laosensis*

   Inflorescence with less conspicuous papyraceous, tubular, rarely overlapping bracts, sheathing the rachis; leaf segment tips sometimes cucculate . . . . . 3.

3. Leaf segments with all primary splits reaching very close to the blade base, within 3–5 mm when viewed from below . . . . . 4.

   Leaf segments with at least some primary splits not reaching 3–5 mm from the blade base when viewed from below . . . . . 5.

4. Leaf segments 5–7 . . . . . *R. micrantha*

   Leaf segments 2–4 . . . . . *R. gracilis*

5. Segments up to 375 mm long with relatively straight sides, apices usually truncate with regular dentate secondary splitting; inflorescence with rachis pale brown, glabrous; filaments keeled . . . . . *R. excelsa*

   Segments up to 450 mm long with slightly curved sides, apices usually oblique, secondary splitting with irregular appearance; inflorescence with rachis pale or dark brown, glabrous or tomentose; filaments terete . . . . . 6.

6. Leaf segments 5–20; inflorescence greatly exceeding the bracts . . . . . 7.

   Leaf segments 2–4; inflorescence not greatly exceeding the bracts . . . . . 8.

7. Leaf sheath with coarse outer fibers and fine inner ones; inflorescence branching to 2 orders; bracts large thick, dark brown; rachis pale brown with pale brown tomentum; flowers with calyx irregularly lobed; fruit receptacular-stalk to 5 mm . . . . . *R. multifida*

   Leaf sheath with outer and inner fibers similar in thickness; inflorescence branching to 3(–4) orders; bracts of relatively medium thickness, pale brown with darker patches; rachis dark brown and bearing rusty brown tomentum; flowers with calyx regularly lobed; (fruit not seen) . . . . . *R. humilis*

8. Inflorescence with bracts distant, not overlapping, very thin-textured; rachis tomentose; flowers small 1.8 × 1 mm; corolla with a receptacular-stalk to half the flower length . . . . . *R. robusta*

   Inflorescence with bracts close, the tips of one overlapping the base of the next; rachis usually glabrous; flowers to 3.1–4.3 × 2.1–2.2 mm; corolla with a short receptacular-stalk less than one quarter the flower length; calyx lobes acute . . . . . *R. gracilis*

1. Rhapis excelsa (Thunb.) A. Henry in Rehder, J. Arnold Arb. 11: 153. 1930. *Chamaerops excelsa* Thunb. Fl. Jap. 130. 1784. *Trachycarpus excelsus* (Thunb.) H. Wendl., in J. Gay, Bull. Soc. Bot. France 8: 429–430. 1861. Non *C. excelsa* Mart., Lectotype (chosen here): *C.P. Thunberg*, sheet no. *24386* (UPS, photo K).

Rhapis flabelliformis L'Hérit ex Aiton, Hortus Kewensis 3: 473. 1789; Mart., Hist. Nat. Palm. 3: 253, 254. 1838; Becc., Ann. Roy. Bot. Gard., Calcutta 13: 244. 1931. Superfluous illegitimate name. Lectotype: *C.P. Thunberg*, sheet no. *24386* (UPS, photo K).

Rhapis major Blume, Rumphia 2: 55–56. 1836. Type: *Blume s.n.* no date (L).

Rhapis Kwamwonzick Siebold (*Chamaerops Kwanwortzick* Hort.), in Linden, Illustration Horticole 34: 39. 1887.

Rhapis divaricata Gagnep., in Humbert, Not. Syst. 6(3): 158. 1937, Indo-China (Vietnam); in Lecomte, Fl. Gén. Indo-Chine, 6(8): 996. 1937. Type: *Chevalier 37823* (P).

Stems to 2.5 m tall, with sheaths 15–21 mm diam., without sheaths 8–12 mm. Leaf sheath loosely sheathing the stem, usually with outer and inner fibers of similar thickness, producing a squared mesh, some young sheaths with flatter, coarser outer fibers and tomentum, ligule not remaining intact at maturity; petiole to 4 mm wide, margin often smooth, rarely minutely scabrid, often bearing brown papillae; blade with V-shaped or semi-circular outline, variable in size, often with a conspicuous palman, segments (1)4–13, folds 11–25, to 375 mm long, broad, relatively straight-sided, narrowing slightly at base and apex, apices sometimes cucculate, usually truncate, with regular dentate secondary splitting, primary splits to within 2.5–61 mm of the blade base, sometimes with brown papillae at the base and along the ribs, sometimes scabrid along the adaxial ribs, thick in texture, adaxial and abaxial surfaces similar in colour, often with a yellow tinge, adaxial occasionally darker, transverse veinlets conspicuous. Inflorescence, male and female similar in general appearance, branching to 2 or 3 orders; prophyll tubular, overlapping the base of the first rachis bract, relatively thin in texture, reddish brown, sometimes darker at the base, inner surface smooth, outer surface with tomentum often only at the distal end; rachis bracts 2(–3), sometimes with a distal incomplete rachis bract, similar in appearance to prophyll; rachis overall length to 260 mm, 4–8 mm diam., rachillae 7.5–110 mm long, 0.8–1.9 mm diam., usually glabrous, pale brown, sometimes with small patches of caducous tomentum. Flowers densely packed on the rachillae. Male flowers globose when young, elongating when mature to 5.2 × 3.8 mm; calyx to 2.8 mm, lobes to 2 mm, usually with a regular margin; corolla sometimes narrowed into a short receptacular-stalk to 1 mm; filaments, shorter row to 2.2 mm, longer row to 2.5 mm, broad, to 0.4 mm, with adaxial keel, triangular in cross section; pistillode sometimes present. Female flowers to 3.6 × 3.2 mm; calyx to 2.3 mm; corolla with a receptacular-stalk to 1.1 mm; staminodes present. Fruit sometimes with 3 carpels developing, often only one reaching maturity, to 8–10 × 8 mm, borne on a short receptacular-stalk to 2 mm, epicarp shiny translucent, minutely papillose, with conspicuous black lenticels. (Fig. 2 E–G).

Distribution. China, Yunnan; South Central China, Hainan; South East China, Guangdon, Fujian, Hongkong; Japan.

Habitat. woods, 3080 ft (939 m); river valley; wooded mountain side.

Representative specimens. CHINA: Herb Forsyth *s.n.* 1835 male (K); Yunnan, *Henry 10173* (K); SOUTH CENTRAL CHINA: Hainan, *I.P. Yuk Shing L.U. 18346* (K); SOUTH EAST CHINA: Guangdong, *T.M. Tsui 249* immature probably male (A, K); Fujian (Nantai Island) *Tang Chung–Chang 4258* male (A); Hongkong *Urquhart sn* 1861 (K), Happy Valley woods, *Wilford 1301* female (in fruit) (K, A) JAPAN: Nagasaki *Lgt Fakmouti s.n.* 1928 male (L); *C.P. Thunberg sheet 24386* (UPS, photo K,). CULTIVATED: *Blume s.n.* no date (type of *R. major* Bl.) (L); Australia, Queensland, Brisbane Botanic Garden, *M. Strong Clemens 42997* male (A); *N. Goom s.n.* 1844 (L.); Bermuda, Pembroke, *E.A. Manuel 973* (A); France, Jardin de Cels *s.n.* 1819 male, *s.n.* 1821 male (K); Germany, Frankfurt, *A.S. Rehder s.n.* 1886 male and female with well developed anthers (A); Hongkong Botanic Garden, *C. Ford 566* male (K); *s.n.* 1895 female in fruit (K), *Shiu Ying Hu, 12934* 1973 female in fruit (K); India, Chitpur, Adzar *J.S.Gamble 17612* male (K), Herb. Hort. Bot. Calc. *s.n.* 1891 male (K), Madras *A.G. Bourne s.n.* 1900 (K); North Vietnam, Son Tay, *Aug. Chevalier 37823* female (P), Hanoi Botanic Garden, *herb. Ch. d'Alleizette 7706* 1909 male (L); Malay Peninsula, plant house in a tub *s.n.* 1929 female or hermaphrodite (K); South East China, Fujian, (Nantai Island) *H.H Chung 2709* male (A, K); Sri Lanka, Bot.Gard., Peradeniya, *S. Rutherford & M.M.P. Bandard R-75* (K); Taiwan, *Jih-ching Liao 10637* (L); UK, Herb J. Gay, Dr Gordon s.*n.* 1776 (BM), Kew, Royal Botanic Gardens, Kew *s.n.* 1856 male and female or hermaphrodite (K), Acc. no. 1987-2573, *s.n.* 1998 (K).

Two specimens [Malay Peninsula, plant house in a tub *s.n.* 1929 (K) and Kew, Royal Botanic Gardens, Kew *s.n.* 1856 (K)] have flowers that appear female but have well developed anthers and may be hermaphrodite.

Rhapis excelsa differs from *R. humilis* in having outer leaf sheaths loosely sheathing the stem, ligule not remaining intact at maturity producing many detached fibers; blade varying from both semi-circular to V-shaped in outline, thicker in texture and a paler, more yellow-green in colour in dried specimens, often with fewer segments, segments straighter sided with truncate apices and more regular dentate secondary splitting, palman less conspicuous. While individual differences in the vegetative characters are difficult to pinpoint between *R. excelsa* and *R. humilis*, when all the vegetative characters are taken as a whole the

leaves can be distinguished easily. Inflorescence characters are more noticeably different. *Rhapis excelsa* differs in having glabrous rachis and rachillae at maturity, tomentum often present on the bracts and stamens with broader keeled filaments; not more than three rachis bracts were recorded, while four were recorded for *R. humilis*.

Rhapis excelsa may be of Chinese and Japanese origin, as suggested by the herbarium specimens, or from China introduced to Japan and from there to the West. The long history of cultivation probably accounts for the selection of many variants within the species including dwarfism and variegation.

A short description is given for the name *Rhapis flabelliformis* L'Hérit ex Aiton in Aiton, Hort. Kew 1(3): 473. 1789. It includes a reference to a plate of the species: L' Hérit., Stirp. nov., 2. Plate 100, which has not been located, despite thorough searching through the copies of L' Héritier's Stirpes Novae in the libraries at Kew (K), the Linnean Society (LINN), the Natural History Museum, London (BM) and the New York Botanic Garden (NY). In each of the copies in these libraries plate 100 is *Solanum xanthocarpum,* and *R. flabelliformis* does not appear in the book. In the BM copy of Hortus Kewensis "[ined]" has been added next to the *R. flabelliformis* reference, and it could be that the author in Aiton was basing his statement on unpublished material that was later not included (Judith Magee, librarian, pers. comm.). L' Héritier did not finish Stirpes Novae due to misfortune during the French Revolution; he had planned to issue two volumes (Bucheim 1966). The author of *Rhapis flabelliformis* in Aiton (1789) may have seen the unpublished plate which subsequently may have been separated from the other loose plates (later some of these were collected together) during the distribution of L' Héritier's estate after he was murdered in 1800 (Stafleu & Cowan 1981).

Aiton's Hortus Kewensis (1789) was written by Solander and continued by Dryander, both scholar librarians employed by Joseph Banks (Stearn W. T. pers. comm.; Carter 1988). The Solander boxes at BM contain the detailed descriptions of all the species described in Aiton (W. T. Stearn pers. comm.). Solander's description of *R. flabelliformis* (Pages 317–321, Solander boxes BM) was located and when translated from the Latin indicates that the specimen on which *R. flabelliformis* was based was collected from a plant growing in Dr. James Gordon's garden at Mile End, London, in 1776. This specimen is at the Natural History Museum (BM) and has been identified by the author as *R. excelsa*.

The nomenclatural and taxonomic history of *R. excelsa* is inextricably linked with that of *R. humilis* and so these aspects of the two species are discussed together here. The type specimen of *R. excelsa* is Thunberg's *Chamaerops excelsa* which comprises two sheets in the Thunberg collection at Upsala, Sweden – collection number 24385, consisting of a leaf and partial inflorescence, and 24386, comprising a single leaf. Good close-up photographs enabled the author critically to examine the type. The type is a mixed collection and thus lectotypification is necessary. Sheet 24385 matches the widely accepted application of the name *R. humilis*, while 24386 matches *R. excelsa*. In order to maintain nomenclatural stability for these two very widely grown horticultural plants, I have selected Thunberg sheet number 24386 (U) to represent the type of *R. excelsa*. This mixed collection type specimen has bedevilled the taxonomy from the very beginning (Beccari referred to "Un grande imbroglio di nomenclatura") and has been responsible for much of the past confusion between these two species.

A short description is given for the name *Rhapis flabelliformis* L'Hérit ex Aiton in Aiton, Hort. Kew 1(3): 473. 1789. It includes the name *Chamaerops excelsa* Thunb. in synonymy, which was published five years earlier and following modern nomenclatural rules the correct name for the taxon is therefore *Rhapis excelsa* (Thunb.) A. Henry, resulting in the name *Rhapis flabelliformis* being superfluous and the type specimen for it being Thunberg sheet number 24386 (U), the type of *Rhapis excelsa*. For full details of *Rhapis flabelliformis* L'Hérit ex Aiton see Text Box.

The species epithet for *Rhapis Kwamwonzick* Siebold has several different spellings in the literature but *Kwamwonzick* is the only one that is validly published. It does not appear to be represented by a type specimen; however, the description and illustration match *R. excelsa*.

2. Rhapis micrantha Becc., Webbia 3: 220. 1910; and 5 (la): 60. 1920; Becc., Bull. Mus. Hist. Nat. Paris, 17(3): 157. 1911; Becc., Ann. Roy. Bot. Gard., Calcutta 13, 249. 1931; Gagnep., in Lecomte, Fl. Gén. Indo-Chine 6(8): 996. 1937. Lectotype (chosen here): Vietnam, Dong Ban mountains, Kien Khe, *R.P. Bon 2345*, staminate component (P, FI isolectotype).

Stems to 1–2 m tall, with sheaths 17–18 mm diam., without sheaths 8–9 mm. Leaf sheath tightly sheathing the stem producing a neatly flattened appearance with coarse flattened outer fibers and finer inner ones at maturity, producing a diagonal lined mesh, ligule not remaining intact at

maturity; petiole to 2.5 mm wide, margin smooth or sometimes minutely scabrid; blade with wide V-shaped almost semicircular outline, without a conspicuous palman, segments 5–7, folds 17–21, to 220 mm long, sides curved, tapering slightly towards base and apex, apices sometimes cucculate, usually oblique, with regular secondary splitting, primary splits to within 3–5 mm of the blade base, adaxial ribs smooth, abaxial surface of blade noticeably paler than adaxial. Inflorescence, male branching to 2 orders, female to 3; prophyll similar to rachis bracts; rachis bracts 3, sometimes with a distal incomplete rachis bract, bracts tubular more expanded in male than in female, overlapping the base of the next bract, reddish brown, darker at the base, in the male with tomentum on the outer surface, in the female with tomentum on the outer surface at the distal end only; rachis overall length to 190 mm, 4–5 mm diam., rachillae 16–60 mm long, 0.5–0.8 mm diam., in the male with tomentum, sparser on the rachillae, in the female glabrous. Male flowers to 3.8 × 2.4 mm; calyx to 1.6 mm, lobes to 0.8 mm, margin regular or irregular; corolla sometimes without a receptacular-stalk or with a short receptacular-stalk to 0.8 mm; filaments, shorter row to 1.6 mm, longer row to 2 mm, to 0.2 mm diam.; pistillode present. Female flowers, only immature available, small, globose to 2.2 × 2.3 mm; calyx to 1.5 mm, lobes to 1 mm, margin regular; corolla with a receptacular-stalk to 0.9 mm; staminodes present. Fruit not seen.

Distribution. Laos, Vietnam.

Habitat. Mountainous regions.

Representative specimens. LAOS: *Dr. M. Spire 5929* male (P). VIETNAM: Dong Ban Mountains, Kien Kha, *R.P. Bon 2045* (P), *2345* male (P, FI), *U. Martelli* photo probably of *2345* (Ann. Roy. Bot. Gard., Calcutta 13 plate 55), 2545 (P, FI).

This species can be recognized by the few segments that split close to the blade base and the inflorescence bracts and rachis on the male specimens with tomentum, contrasting with the glabrous rachis and almost completely glabrous bracts on the female inflorescence. Fruit is said to be white when fresh (Beccari 1910). The male inflorescences examined had more rachillae than the female ones giving a more dense appearance. This species most closely resembles *R. excelsa*; it differs from it in having a neat leaf sheath, tightly sheathing the stem, with coarse outer, slightly flattened fibers and finer inner ones at maturity, smooth adaxial segment ribs, not being brown papillate, segments tapering at both ends, all segments splitting closer to the blade base, male rachis and bracts with much tomentum and stamens being broad but not keeled. There were no mature female flowers or fruits available for study, but those on *Bon 2345* (FI) are described by Beccari (1910,1931) as "flowers prolonged at the base [drawing (1931) indicates 5 mm long and 2 mm wide], into a long columnar solid base, upon which rest the carpels" with fruit 8–9 mm diam. This long receptacular-stalk contrasts with the short receptacular-stalk (to 2 mm) of *R. excelsa*. An illustration of the flowers of *R. P. Bon 2345* (P) and a photograph of the whole specimen were published in Beccari (1931), and so this specimen was chosen by the author as lectotype. Re-collection of this species from Vietnam and Laos, especially of female plants, is necessary to gain a better understanding of its delimitation.

3. Rhapis humilis Blume, Rumphia, 2: 54. 1836; Mart., Hist. Nat. Palm, 3: 254. 1850; Becc., Ann. Roy. Bot. Gard., Calcutta 13: 247. 1931. Type: Japan *C.P. Thunberg s.n.* (L).

Rhapis javanica Blume, Rumphia 2: 56. 1836. Type: Java *Blume s.n.* no date (L).

Stems to 6 m tall, with sheaths 18–40 mm diam., without 15–28 mm. Leaf sheath closely sheathing the stem, fibers narrow, outer and inner fibers of similar thickness, producing a squared mesh, ligule remaining intact at maturity; petiole to 4 mm wide, sometimes minutely scabrid; blade with semi-circular to lunulate outline, with a conspicuous palman, segments 7–20, folds 16–36, to 440 mm long, sides slightly curved, apices oblique with irregular secondary splitting, primary splits to within 19-105 mm of the blade base, with tomentum at the base, brown papillae along the ribs, mostly adaxially, ribs scabrid, thick in texture, adaxial and abaxial surfaces similar in colour. Inflorescence, male and female similar in appearance, branching to 3 orders; prophyll tubular, overlapping the base of the first rachis bract, medium thickness, pale brown with areas of greenish brown, mostly glabrous with patches of tomentum on the outer surface edges; rachis bracts 3(–4), sometimes with a distal incomplete rachis bract, similar in appearance to the prophyll, overlapping the base of the next bract; rachis overall length to 410 mm, to 10 mm diam., rachillae 8–165 mm long, slender 0.2–1.2 mm diam., dark brown with rusty tomentum. Flowers 1.0–3.5 mm apart, large. Male flowers sometimes paired, long, obtriangular to 6.6 × 2.8 mm; calyx to 1.8 mm, minutely papillate usually with tomentum on the apices of the lobes, lobes shallow to 0.5 mm with regular margins; corolla narrowing gradually into a receptacular-stalk to 1.9 mm; filaments, shorter row to 3.2 mm, longer to 3.8 mm, to 0.4 mm diam. Female flowers to 4.4

3. *Rhapis laosensis*. **A** Habit; **B** Leaf ×1/4; **C** Leaf detail ×3; **D** Portion of stem with inflorescences, showing bracts ×2/3; **E** Staminate flower in longitudinal section ×11; **F** Hermaphroditic flower in longitudinal section ×11; **G** Pistillate flower ×11; **H** Pistillate flower in longitudinal section ×11. **A**–**D**, **G**, **H** from *T. Evans et al. 35*, **E**, **F** from *T. Evans et al. 34*. Drawn by Lucy T. Smith.

× 2.5 mm; calyx to 2.3 mm, tomentose, lobes to 1 mm with regular margin and acute apices; corolla clavate, distinctly narrowed to 1.5 mm in diam., with a receptacular-stalk to 2.5 mm; staminodes present. Fruit unavailable. (Fig. 2 H–K, 3)

Distribution. South China, Sichuan; South Japan, South Kyushu Island.

Habitat. Forest, 100–1000 m.

Representative specimens. SOUTH CHINA: Guangxi, Lungchow, *HB Morse 380* (K); Sichuan, Mt. Omei, *C.L. Chow 6249* female (A); *W.P. Fang 12533* (A). JAPAN: *C.P. Thunberg s.n.* (L); South Kyushu, Kirishma-Omuta National Park, *E.H. Wilson s.n.* 1917 (A); *C.P. Thunberg* sheet number 24385 (U, photo). CULTIVATED: Java, *Blume s.n.* no date (L); UK, Kew, Royal Botanic Gardens, Kew, *s.n.* 1884 male (K), *s.n.* 1858 male (K), *L.H. Fitt 31* male (K), *W. Baker et al. 1151* male (K).

In his revision of *Rhapis*, Beccari (1931) based his description of the flowers of this species on an old collection (*s.n.* 1884) taken from a clump at Kew; thus he must have considered it to be typical *R. humilis*. This clump is still extant at Kew (accession no 1973–12600) (Front Cover).

Rhapis humilis can be distinguished from *R. excelsa* by the leaf sheaths with intact ligule and neat fibers, closely sheathing the stem; blade semi-

circular in outline, segments tapering at the apex with less regular secondary splitting, palman more conspicuous; inflorescence with rachis bracts usually glabrous and rachis with tomentum; calyx usually with tomentum and stamens with more slender filaments. Four rachis bracts were recorded in one specimen. Mt Omei is a Buddhist retreat, and so the specimens from this locality may have been cultivated.

See under *R. excelsa* for comments on nomenclature.

4. Rhapis multifida Burret, Notizbl. Bot. Gart. Mus. Berlin. 13: 588. 1937. Type: China, Guangxi, Chen Bien, *S.P. Ko* 56092 (holotype probably SYS or IBSC, not seen).

Stems recorded to 2.5 m tall, diam. not recorded. Leaf sheath fibers close together with coarse outer fibers partially obscuring finer inner ones, producing a diagonal-lined mesh, ligule often remaining intact at maturity; petiole to 4 mm wide, margin smooth; blade large, with conspicuous palman, segments 14, folds 30, the longest segments to 450 mm, narrow (1 or 2 folds), tapering, apices pointed with secondary splitting, primary splits to within 23–66 mm of the blade base, thick in texture. Inflorescence, male not seen, female branching to 2 orders; prophyll similar in appearance to rachis bracts; rachis bracts 3 or 4, large, tubular, overlapping the base of the next rachis bract, relatively thick in texture, dark brown, lacking tomentum, sometimes also a distal incomplete rachis bract present; rachis greatly exceeding the bracts, overall length to 560 mm, broad 8–10 mm diam., rachillae densely packed on the rachis, those of the second order held at right angles to those of the first order, relatively short and narrow, pale brown with pale rusty brown tomentum. Male flowers unavailable. Female flowers 3–5 mm apart, to 4.5 × 3.0 mm; calyx to 2 mm, tomentose, lobes to 0.8 mm with pale edged irregular margin; corolla darkly pigmented, with a long receptacular-stalk to 2.5 mm; staminodes present. Fruit to 8 mm diam., borne on a receptacular-stalk to 5 mm long; epicarp shiny translucent papillose, apical region with conspicuous lenticels.

Distribution. South China, West Guangxi, South East Guangdong.

Habitat. 1000–1500 m, shrub in mixed forest on rocky slopes.

Representative specimens. SOUTH CHINA: Guangxi, *S.K. Lau 38648* female post-fruit (A); *A.N. Steward & H.C. Cheo 158* female (A); Guangdong, *K.M. Feng 13462* female (in fruit) (A). CULTIVATED: Japan: Honshu, Izu, *M. Mizushima 874* (A).

The specimens seen indicate that this is probably the largest and most robust species of *Rhapis*. Complete stem width, blade shape and colour of abaxial surface were not available from the specimens or recorded on the notes on the sheets. All the specimens seen with inflorescence were female; one was in flower and the others were in fruit. The fruit is yellow according to *Feng 13462*. The distinctive large number of segments which do not split close to the blade base produce a conspicuous palman. A notable characteristic of this species is the relatively long receptacular-stalk of the fruit.

5. Rhapis laosensis Becc., Webbia 3: 225. 1910; Becc., Bull. Mus. Hist. Nat. Paris, 17(3): 157. 1911; Becc., Ann. Bot. Gard., Calcutta 13: 248. 1931; Gagnep., in Lecomte, Fl. Gén. Indo-Chine, 6(8): 997. 1937; Gagnep., in Humbert, Not. Syst., 6(3): 160. 1937. Lectotype (chosen here): Laos, Saraburi, *Dr Thorell 3154* (P, FI isolectotype).

Rhapis macrantha Gagnep., in Humbert, Not. Syst. 6(3): 160. 1937; Gagnep., in Lecomte Fl. Gén. Indo-Chine 6(8): 995. 1937. Type: North Annam, Vinh, *Chevalier 32535* (P).

Stems to 3 m tall, with sheaths, 11–30 mm diam., without sheaths 5–11 mm. Leaf sheath with outer and inner fibers close, fine, producing a squared mesh, ligule sometimes remaining intact at maturity; petiole to 2.5(4.5) mm wide, with a few brown papillae along the margin at the base and apex; blade with V-shaped or semi-circular to lunulate outline, with a conspicuous palman, segments 3–9(12), folds 15–27, to 340 mm long, sides curved, apices distinctly cucculate, oblique, with irregular dentate secondary splitting, primary splits to within 10–87 mm of the blade base, margins scabrid, thick texture, adaxial surface glossier than abaxial and slightly darker, transverse veinlets conspicuous. Inflorescence, the male and female similar in general appearance, branching to 2 orders; prophyll, large boat-shaped, usually completely overlapping the first rachis bract, thick and woody in texture, pale brown, tomentose, rachis bracts 1(–2), first bract, reddish brown, large, boat-shaped, thick in texture, either keeled or with up to 3 distinct ribs, inner surface shiny, outer surface tomentose, not sheathing the rachis, a second incomplete rachis bract present in some specimens, similar to the first bract but thinner in texture; rachis overall length to 90(140) mm, to 5 mm diam., rachillae short 15–45 mm, covered with minute rusty brown papillae. Flowers, male more densely packed on the rachillae than female, similar in size. Male flowers, obtriangular to 3.5 × 2.6 mm; calyx to 1.3 mm, lobes to 0.8 mm with regular margin; corolla, narrowing towards the

base, lacking a receptacular-stalk; filaments, shorter row to 1.8 mm, longer to 2 mm, narrow, to 0.2–3.5 mm diam.; pistillode minute. Female flowers, globose to 3.4 × 2.8 mm; calyx to 1.2 mm, lobes to 0.5 mm; corolla with a receptacular-stalk to 1.8 mm; staminodes present. Fruit with three carpels developing, borne on a short receptacular-stalk to 0.5 mm. Mature fruit not seen. Hermaphrodite inflorescence with male and hermaphrodite flowers to 4.2 × 2.5 mm; calyx to 1.5 mm; corolla with a receptacular-stalk to 1.4 mm; hermaphrodite flower carpels to 1.2 mm. (Figs. 3, 4, 5).

Distribution. Laos; Vietnam.

Habitat. Alluvial river levée, sandstone soil 200 to 530 m, evergreen and degraded semi-evergreen forest.

Representative specimens. LAOS: Saraburi, *Thorell 3154* male, female and possible hermaphrodite or well developed staminodes (P, FI); La-Khon, Mekong valley, *Dr Thorell, s.n.* 1866–1868 (P, FI) Xieng khouang, *Spire 568* (P); Borikhana, Wieng Chan, *A.F.G. Kerr 20762* male (P, K); Savannaket, *Poilane 12005* (P), Nakai, *Evans TDE 34* male and hermaphrodite, *35* female, Khamkheut, *Evans TDE 38,* Pakkading *Evans TDE 61* male (K). VIETNAM: North Annam, Vinh, *Chevalier 32535*, (P).

The large thick overlapping prophyll and first rachis bract, shiny adaxial leaf surface which usually has a pinkish tinge when dried and distinctly cucculate leaf segment tips are characteristic of this species. One inflorescence seen was hermaphrodite with larger male and hermaphrodite flowers to 4.2 × 2.5 mm. Specimen labels give the flower colour as greenish cream (female) and bright yellow (male). Photographs of the male inflorescence of *TDE 34* (Fig. 4 - whole specimen, Fig. 5 - close up of inflorescence) show greenish creamy yellow flowers. Beccari (1931) illustrated the specimen *Dr Thorell 3154* (P), so this specimen was chosen as the lectotype.

6. Rhapis robusta Burret, Notizibl. Bot. Gart. Mus. Berlin. 13: 587. 1937. Type: China, Guanxi, Lungchow, *S.P. Ko 55429* (holotype SYS or IBSC, not seen; isotype IBSC).

Stem height not recorded, with sheaths to 11 mm diam., without to 6 mm. Leaf sheath fibers close together with outer coarse fibers, obscuring finer inner ones, producing a diagonal-lined mesh, ligule remaining intact at maturity; petiole to 1.2 mm wide, smooth; blade, with conspicuous palman, segments 4, folds 17–19, the longest to 218 mm, broad, sides curved, tapering at base and apex, apices oblique, with shallow secondary splitting, primary splits to within 16–37 mm of the blade base. Inflorescence, male unavailable, female branching to 2 orders; prophyll unavailable, rachis bracts 2, sometimes with a distal incomplete rachis bract, tubular, not overlapping the base of the next bract, relatively thin (papery), reddish brown, darker at the base, glabrous, tightly sheathing the rachis; rachis overall length to 220 mm, narrow, 2 mm diam., rachillae few, narrow to 0.5 mm diam., occasionally with sparse rusty tomentum. Flowers, male unavailable, female small to 1.8 × 1 mm; corolla tightly closed with a long receptacular-stalk to 0.9 mm; carpel to 1 mm long. Fruit unavailable.

Distribution. South China, Guangxi.

Habitat. Forest undergrowth.

Representative specimens. SOUTH CHINA: Guanxi, *S.P. Ko 55429* female (IBSC)

Only one specimen of this species was available for study; more specimens are needed in order to gain a more complete picture. A notable characteristic of this specimen is that the apices of the bracts do not overlap with the base of the bract distal to them. The height was not recorded on the specimen label, but it is likely from the other measurements taken that this species is smaller than the other species and the specimen seen was more slender than any of the other specimens of the genus. According to the specimen label, the flowers are light green and the fruit is green.

7. Rhapis gracilis Burret, Notizbl. Bot. Gart. Mus. Berlin. 10: 883–884. 1930. Type: China, Guangdong, Win Foo, *S.S. Sin 5338* (holotype SYS or IBSC, not seen; isotype IBSC).

Stem height not recorded, with sheaths 6–8 mm diam. without sheaths 3–5mm. Leaf sheath with very fine, wavy fibers with a square mesh, ligule sometimes remaining intact at maturity; petiole to 1.8 mm wide, margin usually smooth sometimes bearing minute brown papillae; blade small, with V-shaped outline, without a palman, segments 2–4, folds 11–15, longest to 180 mm, apices oblique with secondary splitting, primary splits to within 3–15 mm of the blade base, both surfaces similar in colour, green with white tinge, transverse veinlets very conspicuous. Inflorescence, the male and female similar in general appearance with few rachillae, branching to 2 orders; prophyll and 2 rachis bracts similar in appearance, tubular, overlapping the base of the next bract, medium thickness, reddish brown, inner surface shiny, outer dull, lacking tomentum; rachis overall length to 200 mm, narrow, to 2 mm diam., few rachillae, occasionally with sparse tomentum where the rachis is adnate to the

peduncle, medium brown. Flowers, 2–3 mm apart. Male flowers obovoid, to 4.3 × 2.2 mm; calyx to 2 mm, lobes acute to 1.1 mm with regular margin; corolla with a receptacular-stalk to 1 mm; filaments, shorter row to 1.2 mm, longer to 1.6 mm, to 0.3 mm diam. Female flowers only immature seen, to 3.1 × 2.1 mm; calyx to 2.6mm, margin regular, lobes acute to 1.1 mm; corolla with a receptacular-stalk to 0.2 mm. Fruit to 8 mm diam., borne on a receptacular-stalk to 2.5 mm; epicarp dull, papillose.

Distribution. South China, Guangdong; Laos.

Habitat. 160 m at the foot of limestone hills.

Representative specimens. SOUTH CHINA: Guangdong, *S.S. Sin, 5338* female (IBSC). LAOS: Cammon (northern part is now Bolikhamsay, southern part is Khammuane) *El Colani s.n.* 1930 male (P).

This species is similar vegetatively to *Rhapis subtilis* but differs in the flowers, notably in possessing acute calyx lobes. Burret recorded a fruit receptacular-stalk to 5 mm, a character which also distinguishes it from *R. subtilis*. Only two herbarium specimens were available for study, including an isotype. The heights of the specimens were not recorded on the labels; however, it is likely from the other measurements taken that this is smaller than *Rhapis subtilis*. According to specimen label data the fruit is green-blue.

8. Rhapis subtilis Becc., Webbia 3: 227. 1910; Becc., Bull. Mus. Hist. Nat. Paris, 17(3): 157. 1911; Gagnep., in Lecomte Fl. Gén. Indo-Chine, 6(8): 997. 1937. Type: Laos, Lakon, Mekong valley, *Thorell 3099* (holotype P).

Rhapis siamensis Hodel, Palm J. 136: 19–20. 1997. Type: Thailand, Phattalung, *Hodel & Vatcharakorn 1652* (holotype BK, not seen).

Stems to 3 m tall, with sheaths (6)8–20 (25) mm diam., without (3)4–15 mm. Leaf sheath often with coarse, flattened outer immature fibers obscuring finer inner ones producing a diagonal-lined mesh, mature inner and outer fibers of similar thickness producing a squared open, often fine mesh, ligule sometimes remaining intact at maturity; petiole to 0.9–3 mm wide, often bearing minute brown papillae along the margin, sometimes only at the base or apex; blade with V-shaped or semi-circular outline, variable in size, sometimes with a conspicuous palman, segments 2–11, folds 7–25, to 380 mm long, sides curved, apices sometimes cucculate, oblique, sometimes truncate, with dentate secondary splitting, primary splits to within 1.5–168 mm of the blade base, brown papillae along the ribs, mostly adaxially and at the base, rather thin-textured, abaxial and adaxial surfaces similar in colour, pale green, transverse veinlets very conspicuous. Inflorescence, the male and female similar in general appearance, branching to 1 or 2 orders; peduncle relatively long, to 220 mm, glabrous; prophyll tubular, overlapping the first rachis bract, relatively thin-textured, pale-brown to reddish-brown, inner surface usually dull, occasionally shiny *(Thorell 30599)*, outer surfaces dull, mostly glabrous, tomentose sometimes on edges and keels; rachis bracts 1–2, similar in appearance to the prophyll, overlapping the base of the next bract; rachis overall length 65–280(340) mm, ca. 2.3 mm diam., increasing up to 4 mm; rachillae few, to 34–238 mm long, 0.5–1.6 mm diam., male rachillae shorter than female, glabrous, pale brown. Flowers, relatively well spaced on the rachillae, large, coriaceous. Male flowers ovoid to 6.1 × 4.0 mm; calyx to 2.5 mm, lobes to 0.7mm with irregular margin, sometimes darkly pigmented; corolla marked with faint vertical lines of darker pigment, with acute lobes, narrowed into a receptacular-stalk to 1.8 mm; filaments, shorter row to 1.5 mm, longer row to 2.0 mm, broad, to 0.5 mm diam., keeled; pistillode present. Female flowers, cylindrical to 5.5 × 3.2 mm, often conspicuously banded; calyx to 2.2 mm with a pale basal rim, lobes to 0.9 mm with a dark, irregular margin; corolla with vertical markings sometimes less distinct than in the male, with acute triangular, black or black-based beak like lobes, with a receptacular-stalk to 2 mm, 3 carpels developing; staminodes present. Fruit to 9.5 × 9.5 mm, 1–3 borne on a short receptacular-stalk to 2 mm, epicarp shiny translucent, minutely papillose, with conspicuous black lenticels. (Fig. 2 A–D).

Distribution. Thailand, Laos, Sumatra.

Habitat. Limestone slopes, evergreen forest, 40–200m.

Representative specimens. THAILAND: Nakhon Ratachasima, *Kerr 8148* male, female (BM, K); Trang, Huay Nod, Khao Nam Prai, *J. Dransfield JD 5447* male (K), *J. Dransfield & C. Bhoonab JD 5448* female (K), Nam Tai *Ch. Charoenphol, K. Larsen & E. Warncke 3663* (K); Huay Nod. *G. Smith & W. Sumawong GC 85* male (K); Phatthalung, *D.R. Hodel & P. & R. Vatcharakorn* 1652 (BK, not seen), *Kerr 15354* female, *19291* male, female (BM, K); Prachuap, *Kerr 10896* female (BM, K), *T. Smitland 8519* (K, L); Songkhla, Hat Yai, *G. Smith & W. Sumawong GC 110* (K) male, GC 145 male (K); Pran, Ban Pak Tawan, *A. Marcan 2634* female (BM, K). Chantaburi, Kao Wong, *W. Sumawong 15797-2* female (K), Phetchaburi, Kaeng Krachan, *A.S. Barford, W. Ueachirakan, T. Burholt, S. Barrow 45205* female (K), *Parnell, Pendry, Jebb & Thirawat Boonthavikoon 95-498* female (K). LAOS: Mekong

4. *Rhapis laosensis, Evans TDE 34,* Laos. (Photo: J. Dransfield)

5. *Rhapis laosensis*, male inflorescence, *Evans TDE 34,* Laos. (Photo: J. Dransfield)

valley, Thakhek (Lakon), *Dr. Thorel 3099* (P holotype, FI isotype). SUMATRA: Aceh, Lhok'nga, *D. Agranoff & W. Fickling s.n.* 1984 (K), *O. Maessen s.n.* 1986 female (K). CULTIVATED: Hongkong, *N.J. Brigham s.n.* (no date but before 1927 - det label) (A); Thailand, Trang, Muang, Khao Chong Botanic Garden (from Kao Nam Prai), *G. Smith & W. Sumawong GC 93* female (K), *G. Dear 13/86* (K); USA, California, Pine Island Nursery, *L. McKamey s.n.* male, female 1984 (K).

This species of *Rhapis* has a relatively fine leaf sheath and prominent cross veins on the leaf segments, and rachis bracts usually with little or no tomentum. The flowers are well spaced on few pale coloured, smooth textured rachillae. It differs from other species in only having first or second order branching in the inflorescence, large coriaceous flowers conspicuously banded with pigment when mature, with vertical lines of pigment on the corolla producing a ribbed appearance and irregularly toothed calyx. The fruit is described as white or whitish on specimen labels. The conspicuous black lenticels on the fruit are often concentrated in the apical half, this is very obvious in *L. McKamey s.n.* 1984 (K).

The large number of specimens seen enabled assessment of the variation in size within this species, from specimens with 2–4, short segments through to specimens with up to 11, relatively long segments. This variation was found to be continuous without distinct subgroups. The largest specimens occur in the peninsular of Thailand and include *D.R. Hodel & P. & R. Vatcharakorn* 1652, described as a new species in 1997 but which in fact represents the extreme end of the range of variation of *R. subtilis*. The smallest specimens come from Northeast Thailand and just over the boarder in Laos. The Sumatran specimens overlap with the smaller ones from Peninsula Thailand.

Index to accepted names, synonyms and excluded names of *Rhapis*

Chamaerops excelsa Thunb. synonym of **Rhapis excelsa** (Thunb.) A. Henry

Rhapis acaulis Willd., Sp. Pl. 4(2): 1093. 1806 = **Sabal minor** (Jacq.) Pers., see Moore (1963).

Rhapis arundinacea Aiton Hort. Kew. 474. 1789 = **Sabal minor** (Jacq.) Pers. , see Moore (1975).

Rhapis aspera Hort ex Baxter, Loud. Hort. Brit. Suppl. 3: 624 1850 4th edition. Based on *Chamaerops aspera* Siebold. This is a name without a description and thus with no botanical standing – *nomen nudum*.

Rhapis cochinchinensis Mart., Hist. Nat. Palm. 3: 254. 1838; Becc., Webbia 3: 245. 1910. From Vietnam. According to the description this species has petioles with short upright spines, so this is not *Rhapis*. It has dioecious flowers, so it is unlikely to be *Licuala* which is predominantly hermaphrodite. According to Beccari (1910) it is possible that the species has been classified from a mixed specimen with the flowers of a *Rhapis* and the young leaves of *Livistona saribus*.

Rhapis caroliniana Hort. ex Kunth, En. Pl. 3 in index (non p. 246) 1841 = *Rhapidophyllum hystrix* H. Wendl. & Drude. ex Ind. Kew. (Becc 1931) = **Sabal minor** (Jacq.) Pers., see Shuey & Wunderlin (1977).

Rhapis cordata Hort ex Baxter, Loud Hort. Brit. Suppl. 3: 624 1850 4th edition. This is a name without a description – *nomen nudum*.

Rhapis divaricata Gagnep. synonym of **Rhapis excelsa** (Thunb.) A. Henry

Rhapis excelsa (Thunb.) A. Henry

Rhapis filiformis Burret, Notizbl. Bot. Gart. Mus. Berlin. 13: 586. 1937 = **Guihaia grossefibrosa** (Gagnep.) J. Dransf. Lee & Wei, see Wei (1997).

Rhapis flabelliformis L'Hérit ex Aiton synonym of **Rhapis excelsa** (Thunb.) A. Henry

Rhapis gracilis Burret

Rhapis grossefibrosa Gagnep., in Lecomte, Fl Gén. IndoChine 6(8): 994. 1937 = **Guihaia grossefibrosa** (Gagnep.) J. Dransf., Lee & Wei.

Rhapis humilis Blume

Rhapis javanica Blume synonym of **Rhapis humilis** Blume

Rhapis Kwamwonzick Siebold synonym of **Rhapis excelsa** (Thunb.) A. Henry

Rhapis Kwannontsik pictured in Dai 1895. This is a name without a description and thus with no botanical standing – *nomen nudum*.

Rhapis Kwanwon Siebold, listed in the Von Siebold and Company Catalogue 7. 1856. This is a name without a description and thus with no botanical standing – *nomen nudum*.

Rhapis kwanwortsik H. Wendl., Ind. Palm 34. 1854; Seeman 416. 1857; Becc., Webbia 60, 61. 1921. Reported to be based on *Chamaerops kwanwortsik* Siebold; Beccari (1921 & 1931) cited it as a synonym or a doubtful species. This is a name without a description and thus with no botanical standing – *nomen nudum*.

Rhapis laosensis Becc.

Rhapis macrantha Gagnep., synonym of **Rhapis laosensis** Becc.

Rhapis major Blume, synonym of **Rhapis excelsa** (Thunb.) A. Henry

Rhapis micrantha Becc.

Rhapis multifida Burret

Rhapis robusta Burret

Rhapis siamensis Hodel, synonym of **Rhapis subtilis** Becc.

Rhapis sirotsik Hort. ex H. Wendl., Kerch. Palm 255. 1878, listed as *R. humilis*. Becc., Ann. Roy. Bot. Gard., Calcutta 13, 244. 1931, listed as *R. humilis*. Based on *Chamaerops sirotsik* Siebold, Wendl., Ind. Palm 34. 1854. No type specimen; unclear drawing. This is a name without a description and thus with no botanical standing – *nomen nudum*.

Rhapis subtilis Becc.

Trachycarpus excelsus Thunb. synonym of **Rhapis excelsa** (Thunb.) A. Henry

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