THE GENUS CYCAS LINN. (CYCADACEAE) IN THAILAND

by

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Introduction

In the course of preparation the *Cycadaceae* for the Flora of Thailand, an interesting plant proves to be a form of *Cycas micholitzii* Dyer, a species not hitherto known to the Thai flora, and thus leads to a revision of the Thai members of this genus, of which classification is not yet satisfactory.

Historical Notes on Thai Cycads

The first record of the genus *Cycas*, in Thailand is credited to F.A.W. Miquel (1863: 334), who described a new species, *C. siamensis*, basing on the collection of J.E. Teijsmann (1863) made during his 1862 collecting trip in Kanchanaburi, southwestern Thailand.

C.H. Ostenfeld (1904: 162) recorded the occurrence of *C. circinnalis* Linn. from Koh Kradat in Trat, basing on the collection of the Danish Expedition to Ko Chang, led by Johannes Schmidt in 1899-1900; this taxon is actually *C. rumphii* Miq.

C.C. Hosseus (1911) reported that *C. siamensis* Miq. also occurred in Lampang, northern Thailand, basing on the collection made during his 1904-1905 trip in Thailand.

W.G. Craib (1912: 434) in the course of his study in Thai–botany, described a new species, *C. immersa*, basing on the collection of A.F.G. Kerr from a locality between Phrae and Lampang, northern Thailand; this taxon later proves to be a synonym of *C. siamensis Miq.* (Schuster 1932: 80).

Kasin Suwatabandhu (1961) enumerated 5 species of Thai cycads, and designated *C. immersa* Craib to an acaulescent plant, a form of *C. micholitzii* Dyer.

The Occurrence of *C. Micholitzii* Dyer in Thailand

The typical *C. micholitzii* Dyer (Fig.1) is not yet come across in Thailand, but only represented by a form with unforked leaflets. As this form is not yet scientifically known anywhere else, a new variety is herewith proposed :

C. micholitzii Dyer var. *simplicipinna* Smitinand *var. nov. foliolis angustioribus non dichotomis, carpophyllis bi-ovulatis differt.*

Thailand. Northern : Chiang Mai, Chiang Dao, 600 m; April 24, 1960; evergreen forest, SMITINAND & ALSTERLUND 6768 (Type ♂ in BKF); Doi Suthep, 1100 m; July 19, 1958; lower montane forest, SMITINAND 4757 (Type ♀ in BKF). Fig. 2.

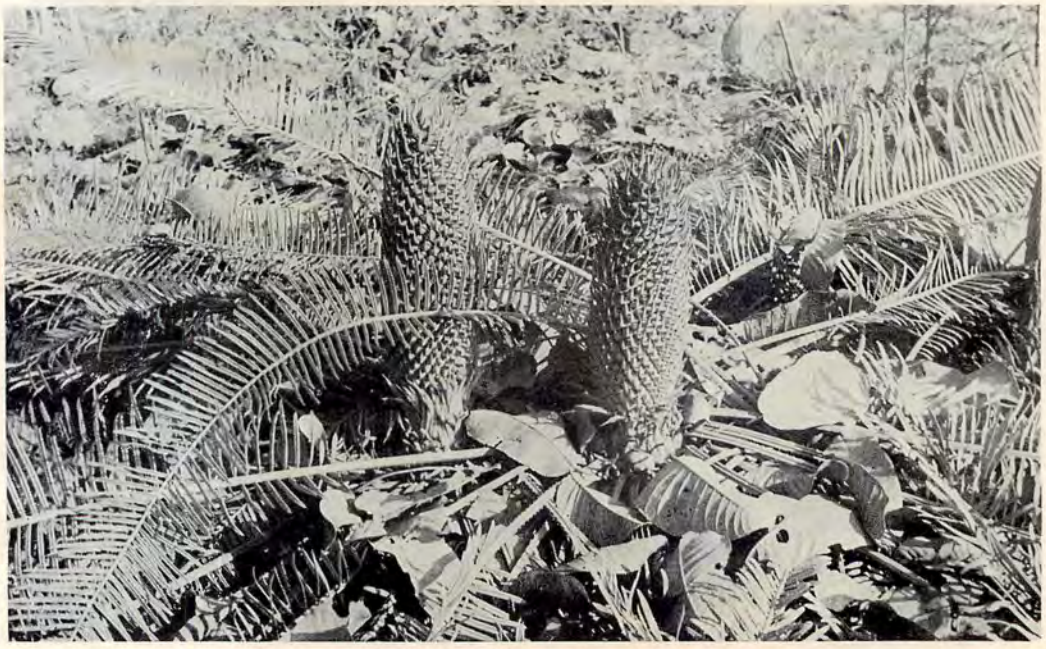
Shrub normally acaulescent, in an extreme condition producing a short stem about 20 cm above the ground. *Leaves* 115-150 cm long, 18-19 leaflets on each side of rachis; chartaceous, alternate, 2 cm spacing on rachis, linear, attenuate towards the sharp pointed tip, 20-22 cm by (0.9)-1.4-1.8-(2.5) cm; margins wavy. *Petiole* about 24 cm long, with alternate short spines. *Scale leaves* long triangular, attenuate towards the tip, with hyaline margins, 4 cm long, 1.3 cm at the widest, outside rusty tomentose towards the base; inside glabrous. *Male cone* subcylindric, more or less attenuate towards both ends, 15-21 cm by 2-4 cm; peduncle 3-3.5 cm by 1.2 cm, with rusty tomentose scales. *Microsporophylls* subspathulate, apiculate, 1.4 cm long, 0.8-1 cm at the widest; outside glabrous, inside rusty tomentose. *Carpophylls* 8-12 cm long with narrower rusty tomentose base, bearing one ovule on each side and rhomboid rusty tomentose terminal blade, 3.5 cm wide, deeply pectinate-lacerate, with long acuminate, glabrous points; median segment broadest. *Nuts* broad elliptic, 2.5-2.7 cm by 2 cm, glabrous, dark green; only one developed.

The new variety is readily recognized by its simple, narrow (1.4-1.8 cm) leaflets, with wavy margins and rather chartaceous texture. It has a wide distribution in Thailand at a rather high altitude (600-1500 m), with one record in western China (K. WILSON 5420, K); it may also occur in Burma along the Dauna and Tenassrim ranges, as well as in Laos.

C. rumphii Miq., whole plant.

C. rumphii Miq., young carpophylls.

C. siamensis Miq., whole plant and carpophylls, among *Arundinaria pusilla*, a grass-like bamboo.



C. siamensis Miq., male cones.

Fig. 1. *Cycas micholitzii* Dyer. a. Sketches of two entire plants; b. Portion of leaf showing an entire pinnae; c., d. microsporophylls; e. Anthers; f. Carpophyll. (from Bot. Mag. Tab. 8242, March 1909)

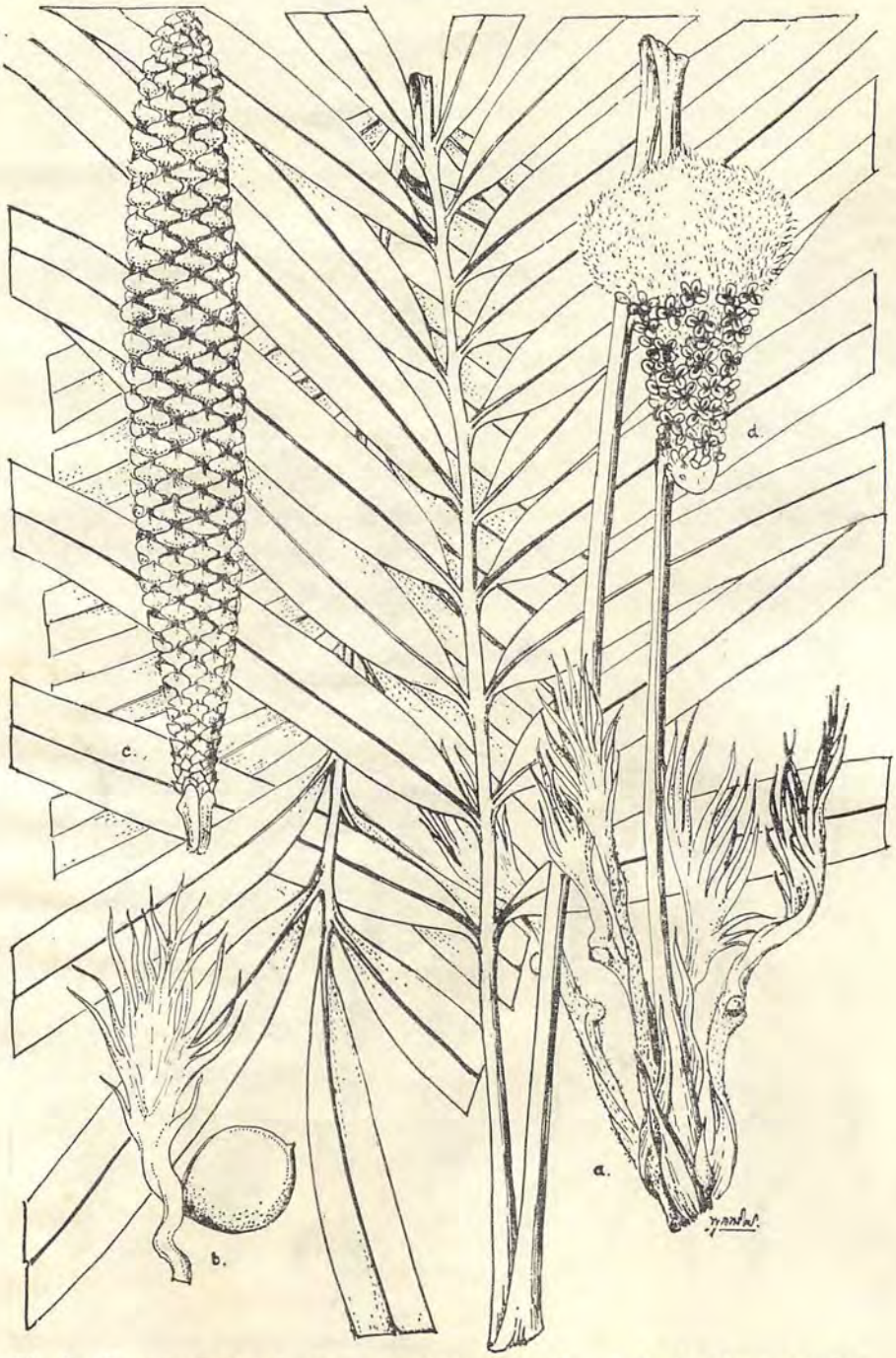


Fig. 2. *Cycas micholitzii* Dyer var. *simplicipinna* Smitin. a. Leaf and carpophylls; (nat. size); b. Carpophyll (nat. size); c. Male cone (slightly reduced); d. Microsporophyll (much enlarged). a. and b. from Smitinand 4757; c. and d. from Smitinand & Alsterland 6768.

Classification of the genus *Cycas* linn. in Thailand

The classification of the genus *Cycas* is not yet satisfactory; PILGER (1926 : 74-75) enumerates 15 species, and divides the genus into 2 groups, basing on the number of ovules on each carpophyll. SCHUSTER (1932 : 64-84) in his elaborate monograph, recognizes only 8 species and classifies the genus into 3 sections, *Lemuricae* (5 spp.), *Indosinenses* (2 spp.), and *Asiorientales* (1 sp.). In so doing *C. pectinata* Griff. is treated as a variety of *C. circinnalis* Linn., and *C. immersa* Craib, a synonym of *C. siamensis* Miq. The reduction of *C. pectinata* complicates matters, but the merging of *C. immersa* is justified.

RAIZADA & SAHNI (1960 : 93-97) enumerate 6 species occurring in India, and recognize *C. pectinata* Griff. as a distinct species closely related to *C. siamensis* Miq.; also the relationship between *C. circinnalis* Linn. and *C. rumphii* Miq. has been observed. His conception is shared by the present author.

After a thorough study of Thai cycads it becomes evident that there exist 6 taxa in Thailand, namely *C. circinnalis* Linn., *C. micholitzii* Dyer var. *simplicipinna* Smitin., *C. pectinata* Griff., *C. revoluta* Thunb., *C. rumphii* Miq., and *C. siamensis* Miq. These 6 species can be easily divided into 2 groups, basing on the character of microsporophylls, i.e. the hard and long spine-tipped (*C. circinnalis, pectinata, revoluta, rumphii,* and *siamensis*), and the soft, short apiculate (*C. micholitzii*).

It is remarkable that the typical *C. micholitzii* in having 2,3 dichotomous leaflets, and soft, short apiculate microsporophylls, is approaching the genus *Stangeria,* which is now treated by JOHNSON (1959 : 65-68) as a monotypic family *Stangeriaceae.* Basing on these characters the following classification of Thai cycads is thus proposed.

Cycas Linn.

Cycas (Linn. Hort. Cliff. 1737 : 482) Linn. Sp. Pl. 1753 : 1188; Linn. Gen. Pl. ed. 5. 1754 : 495; Jussieu, Gen. 1789 : 16; Enlicher, Gen. 1836 : 704; Miq., Monogr. Cycad. 1842 : 680; Benth. & Hook.f. Gen. Pl. 3 : 444. 1880; Pilger in Engl. & Prantl, Nat. Pflanzenf. II. 1 : 21. 1887; Schuster in Engl., Pflanzenr. IV. 1. 99 : 64. 1932.

1. Sectio Cycas : Truncus cylindricus, erectus. Foliolae lineares vel lineari-lanceolatae apice subacuminato. Strobilus oblongus vel oblongo-ovoideus. Microsporophylla acuminata, rostrata, crustacea. (*Typus C. circinnalis* Linn.).

Subsectio Circinnalidae Smitin. *Carpophylli pars sterilis rhombiformis vel lanceolata, acuminata, breviter denticulato-cristata vel in acumine attenuata, dentata.*

Subsectio Pectinatae Smitin. *Carpophylli pars sterilis pectinato-pinnatifida, vel pinnatifida, palmato-cristata.*

2. Sectio Stangerioides Smitin. *Truncus cylindricus nonnunquam subterraneus. Foliolae dichotomae. Strobilus oblongus. Microsporophylla apiculata, coriacea.* (*Typus C. micholitzii* Dyer).

Identification Key to Sections and Species of Thai Cycads

A. Stem cylindric, erect, 150 cm up; leaflets linear or linear-lanceolate; male cone oblong or oblong-ovoid; microsporophylls acuminate, rostrate, crustaceous — Section *Cycas*

B. Sterile part of carpophylls rhomboid or lanceolate, acuminate, short denticulate-cristate or attenuate, dentate towards the tip — Subsect. *Circinnalidae*

C. Midrib prominent on both surfaces; scale leaves rufous tomentose; tip of microsporophylls reflexed; sterile part of carpophylls rhomboid, acuminate, short denticulate-cristate. (Evergreen forests on ridges) — *C. circinnalis*

C. Midrib grooved on both surfaces; scale leaves tawny tomentose; tip of microsporophyll erect; sterile part of carpophylls lanceolate, attenuate, dentate towards the tip. (Sea-shores and Beach forests) — *C. rumphii*

B. Sterile part of carpophylls pectinate-pinnatifid or palmate-cristate, pinnatifid — Subsect. *Pinnatidae*

D. Margins of leaflets flat; carpophylls rhombic-ovate or triangular-cordate, pectinate-pinnatifid, with a broader median stiff spine

E. Stem upto 150 cm, base abruptly swollen; male cone oblong, 30 × 25 cm; sterile part of carpophylls rhombic-ovate. (Dry deciduous forest, lateritic soil) *C. siamensis*

E. Stem upto 300 cm, base not swollen; male cone fusiform, 45 × 50 cm; sterile part of carpophylls triangular-cordate.. (Evergreen forest, limestone outcrops) *C. pectinata*

D. Margins of leaflets curved down; carpophylls palmate-cristate, pinnatifid. (Cultivated) *C. revoluta*

A. Stem cylindric, upto 60 cm or subterranean; leaflets 2, 3 dichotomous or linear; male cone slightly oblong; microsporophylls apiculate, coriaceous Sect. *Stangerioides*

F. Leaflets 2, 3 dichotomous. (Tonkin, Yunnan) *C. micholitzii* Dyer

F. Leaflets linear. (Western China, Thailand, ?Laos,? Burma. Evergreen forests of high altitude) *C. micholitzii* var. *simplicipinna*

Enumeration of Thai Cycas

1. ***C. circinnalis*** Linn. (Figs. 3 c, 4 e).

SOUTHWESTERN: Prachuap Khiri Khan, Khao Luang, 600 m, KERR 10,869 (BK, K); Sam Roi Yot, under 50 m, KERR 10,972 (BK, K), LARSEN, SMITINAND & WARNCKE 1263 (AAU, BKF).

PENINSULAR: Narathiwat, Bacho, Khao Lae Ngaeng, B. SANGKHACHAND 234 (BKF); without exact locality, HAMID (CF 2960 SING).

Distribution: India, Burma, Thailand, Malaysia, Indonesia and South Pacifics.

Local names: Prong (ปรง Prachuap Khiri Khan), Ma phrao sida (มะพร้าวสีดา Prachuap Khiri Khan), ***Prong pa*** (ปรงป่า, preferred).

2. ***C. micholitzii*** Dyer var. ***simplicipinna*** Smitin. (Figs. 2, 3 e, 4 f).

NORTHERN: Chiang Mai, 300 m, KERR 5645 (BK, K); garden, 1,000 m, KERR 324 (K); Doi Suthep, 750 m, KERR 3206 (K); ibid., 1,100 m,

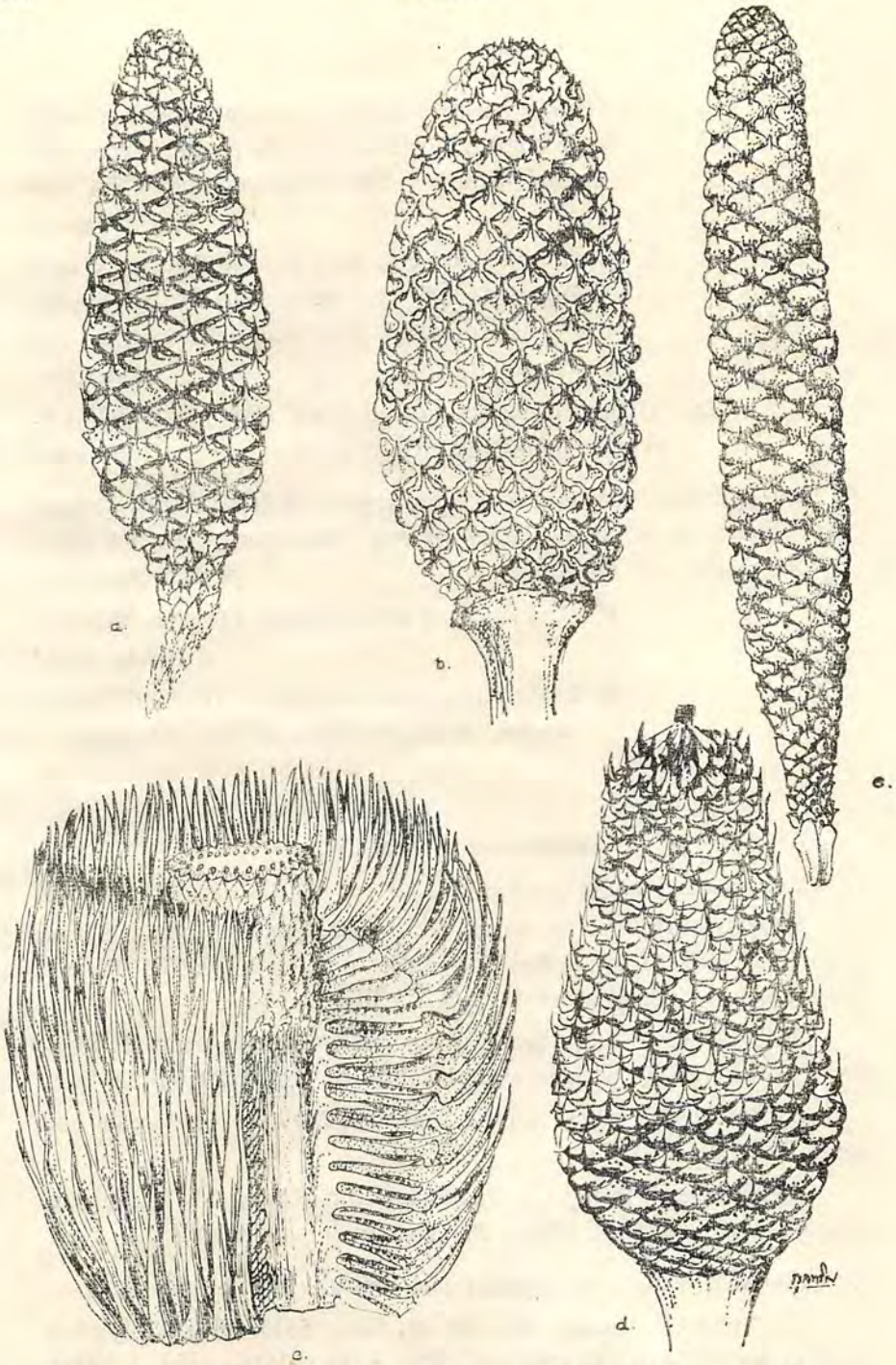


Fig. 3. Male cones of Thai *Cycas*. a. *C. siamensis* Miq.; b. *C. rumphii* Miq.; c. *C. circinnalis* Linn. (from Schuster l.c.); d. *C. pectinata* Griff.; e. *C. micholitzii* var. *simplicipinna* Smitin.

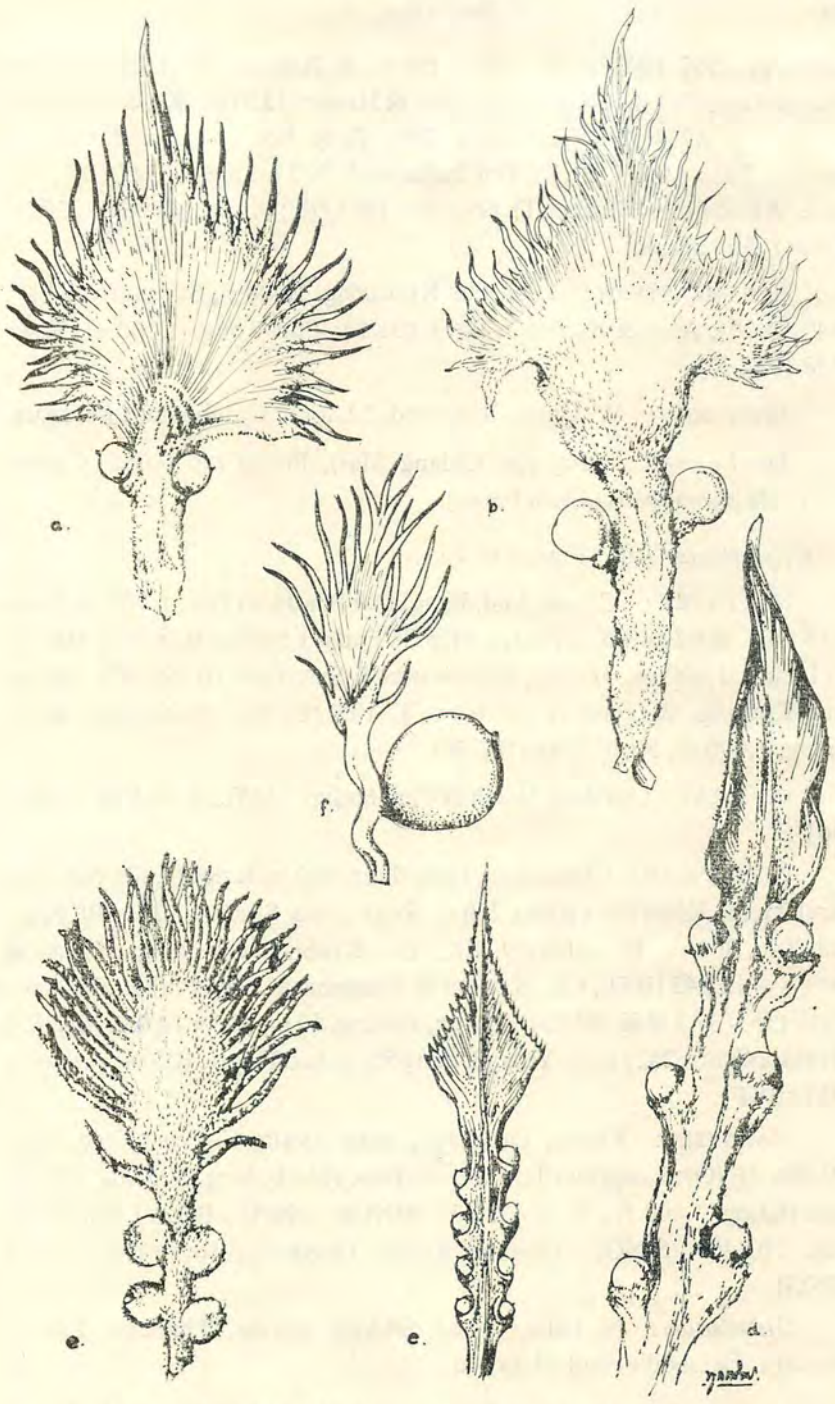


Fig. 4. Carpophylls of Thai *Cycas*. a. *C. pectinata* Griff.; b. *C. siamensis* Miq. c. *C. revolata* Thunb.; d. *C. rumphii* Miq.; e. *C. circinnalis* Linn. (after Schuster l.c.); f. *C. micholiizii* var. *simplicipinna* Smitin.

SMITINAND 4757 (BKF), SMITINAND, POOBE & ROBBINS 7724 (BKF); Doi Chiang Dao, 700 m, SØRENSEN, LARSEN & HANSEN 1320 (C, K), SMITINAND & ALSTERLUND 6768 (BKF); Chiang Dao, Pang Bo, LARSEN, WARNCKE & SANTISUK 2859 (AAU, BKF); Doi Inthanond, 300 m, KERR 5347 (BK, K); Fang, Agricultural Station, D. NICOLSON 1688 (K); Phrae, Mae Sai, 230 m, WINIT 1686 (BK, K).

NORTHEASTERN: Loei, Phu Kradueng, 1,000 m, SMITINAND & ABBE 6349 (BKF); ABBE & SMITINAND 9473 (BKF); Phu Tong, 1,300 m, KERR 8858 (BK, K).

Distribution: W. China, Thailand, ? Laos, ? Cambodia, ? Vietnam.

Local names: Plong (ปลง Chiang Mai), Phrao tao (พร้าวเต่า Chiang Mai), *Ma phrao tao* (มะพร้าวเต่า Phrae).

3. *C. pectinata* Griff. (Figs. 3 d, 4 a).

NORTHERN: Chiang Mai, Fang, Doi Pha Hom Pok, 1,400 m, KERR 5218 (BK, K); Doi Pui, towards Mae Sa Falls, 1,500 m, B. SUKRI 1 (BKF); Bo Luang, 1,000 m, HANSEN, SEIDENFADEN & SMITINAND 10,793 (C). Phrae, Mae Kathing, WILLIAMS & SMITINAND 17,133 (BKF). Sukhothai, Khao Luang, 1,000 m, KERR 5944 (BK, K).

CENTRAL: Lop Buri, North of Chai Badan, 250 ft., ABBE & SMITINAND, 9361 B.

PENINSULAR: Chumphon, Lang Suan, 100 m, KERR 11,873 (BK, K). Surat Thani, Khao Phra Rahu, 250 m, SMITINAND & SLEUMER 1221 (BKF, L); Koh Tao, 300 m, KERR 16,079 (BK, K). Krabi, Laem Nang, HANSEN & SMITINAND 12,343 (BKF, C). Nakhon Si Thammarat, Ron Phibun, KINGDON WARD (SFN 37,538 K, SING). Satun, Butang, 50 m, KERR 14,058 (BK, K); Terutao, CURTIS 2427 (K). Yala, Banang Sta, Khao Kaset, B. SANGKHACHAND 1457 (BKF).

MALAYSIA: Kedah, Langkawi, Batu Ayam, CORNER (Herb. Sing. 503,406 SING); Langkawi Is. BATTEN POOL (Herb. Sing. 503,407 SING). Batu Baling, 1,000 ft., NAUEN 38,032 (SING). Perlis, Bukit Lagi, Herb. Sing. 503,403 (SING). Gunung Runto, Lenggong, HENDERSON 23,826 (SING).

Distribution: N. India, Nepal, Sikkim, Burma, Thailand, Laos ?, Vietnam, Cambodia, and Malaysia.

Local names: Plong (ปลง Sukhothai), ***Prong Khao*** (ปรงเขา Chumphon), Bo-ka (บอกะ Malay-Satun).

4. *C. revoluta* Thunb. (Fig. 4 c).

CENTRAL: Phra Nakhon, cultivated.

Distribution: China and Japan

Local names: ***Prong yipun*** (ปรงยี่ปุ่น Phra Nakhon).

5. *C. rumphii* Miq. (Figs. 3 b, 4 d and Plt. XXVI)

SOUTHEASTERN: Trat, Koh Kut, 2 m, SMITINAND 5727 (BKF); Koh Chang, HANSEN & FLOTO 7196 (C), SCHMIDT 548 (C).

PENINSULAR: Chumphon, Ban Thung Maha, KERR 11,355, 11,355A (BK, K), Surat Thani, Koh Tao, KERR 16,087, 12,768 (BK, K). Ranong, Koh Chang, KERR 16,569 (BK, K). Phang Nga, Takua Pa, ABBE, SMITINAND & ROLLET 9684 (BKF); Koh Ngai, HANSEN & SMITINAND 12,242 (BKF, C). Trang, off the coast, H.C. ROBINSON s.n. (K); Kantang, under 50 m, cultivated, SMITINAND 2947 (BKF).

Distribution: Andaman Is., S. Burma, Thailand, Cambodia, Vietnam, throughout Malesia, New Guinea, N. Australia, Mauritius, Comore Is., N. & E. Madagascar, and E. Africa.

Local names: Prong (ปรง Trat, Chumphon), ***Prong Thale*** (ปรงทะเล, preferred).

6. *C. siamensis* Miq. (Figs. 3 a, 4 b and Plt. XXVII).

NORTHERN: Lampang, Pang Puai, 420 m, KERR 999 (E, type of *C. immersa* Craib); Ban Mae Wang, 300 m, HOSSEUS 360 (K). Phrae, Mae Ban, FRANCK s.n. (C). Tak, Thoen, 200 m, SMITINAND 3785, 4411 (BKF), SØRENSEN, LARSEN & HANSEN 864 (BKF, C, K), LARSEN & HANSEN 1942, 6463 (BKF, C, K).

NORTHEASTERN: Phetchabun, Lom Sak, 200 m, KERR 5737 (BK, K). Sakon Nakhon, Ban Kusuman, LAKSHNAKARA 999 (K).

EASTERN: Chaiyaphum, 200 m, KERR 19,963 (BK, K); Nong Bua Daeng, 200 m, KERR 20,299 (BK, K). Nakhon Ratchasima, Huai Thalaeng, PUT 2187 (BK, K): Pak Thong Chai, 200 m, SMITINAND 3785 (BKF), SONO s.n. (BKF), LARSEN, WARNCKE & SANTISUK 3167 (AAU, BKF).

SOUTHWESTERN : Kanchanaburi, Kaeng Lawa, Khao Laplae, P. BUNKHRONG s.n. (BKF); Khao Tong, 100 m, KERR 19,763 (BK, K); Sisawat, 200 m, KERR 10,208 (BK, K). Suphan Buri, WINIT s.n. (BKF). Prachuap Khiri Khan, Hua Hin, 20-50 m, KERR 16,198 (BK, K).

Distribution: Burma, Thailand, Laos, S. Vietnam, and Yunnan.

Local names: Prong (ปรง Sakon Nakhon, Phetchabun), Phong (ผง Chaiyaphum), Ma phrao tao (มะพร้าวเต่า Lampang), Phrao tao (พร้าวเต่า Tak), ***Talapat ruesi*** (ตาลปัตรฤาษี Suphan Buri).

Acknowledgement

The study of *Cycadaceae* is made possible under the auspices of the National Research Council of Thailand, in so kindly providing a subsidiary fund for the Flora of Thailand Project, with its commencement in 1965.

Besides living and herbarium specimens of the Forest Herbarium, Bangkok, collections & references in other herbaria, i.e. Department of Agriculture, Bangkok (BK); Royal Botanic Gardens, Kew (K); Botanical Museum of the University in Copenhagen (C); Reijksherbarium, Leiden (L); Royal Botanic Gardens, Edinburgh (E); and Botanic Gardens, Singapore (SING) are also made available for this study, and I am very much graetful for directors and their staffs of these herbaria in the courtesies and co-operations extended.

For the advice in taxonomic problems, I owe so much to Drs. R. MELVINE of Kew and C.F. BEUSEKOM of Leiden; to Mr. Bertel HANSEN of Copenhagen and Mr. L.L. FORMAN of Kew, who are kind enough to provide literatures needed for the revision; and to Dr. J.E. VIDAL of Paris, who kindly reads the manuscript and corrects the Latin diagnosis.

I wish also to tender my profound gratitude to the Director-General of the Royal Forest Department, without whose encouragement and support, the present work will be far from completion.

The illustrations are executed to some satisfaction by Mrs. Poonsap SINGHASTHIT, artist of the Forest Herbarium, Bangkok.

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