



A revision of *Chuniophoenix* (Arecaceae)

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Abstract

A revision of the Asian palm genus *Chuniophoenix* is given based on study of 22 herbarium specimens of wild origin from A, BH, FIPI, HN, IBSC, K, LE, MO, NY, and P. Three species are recognized, including a new one, *Chuniophoenix suoitienensis*.

Keywords: dioecy, Palmae, Vietnam, China

The genus *Chuniophoenix* Burret (1937: 583) and species *C. hainanensis* Burret (1937: 583) were based on a single specimen collected by F. C. How in 1935 in Hainan, China. The genus was named after Chun Woon-Young, then director of the Botanical Institute, Sun Yat Sen University, Guangzhou. A second species, *C. nana* Burret (1940: 97), was described from northern Vietnam and a third, *C. humilis* Tang & Wu (1977: 111) from Hainan. Zona (1998), based on cultivated plants, considered that this last name should be a synonym of *C. nana*, and this was followed by Govaerts and Dransfield (2005). Two species were thus recognized, *C. hainanensis* from Hainan and *C. nana* from Hainan and northern Vietnam. Henderson (2009) considered *C. humilis* as distinct from *C. nana* and recognized three species.

The genus is poorly known. There are few specimens in herbaria, and several of these are from cultivated plants. Few other descriptions since the original ones have been published, at least in English. During the last few years the author has collected specimens from China and Vietnam, and studied all types, with a view to more fully distinguishing and describing the species. In 2009 a species of *Chuniophoenix* was collected from southern Vietnam, over 1000 km further south than the previous known locality of the genus. This specimen is here described as a new species and descriptions of the other two species are given.

Despite its obscurity, *Chuniophoenix* is of great interest because of its relationships. It is placed in the tribe Chuniophoeniceae (Dransfield *et al.* 2005), along with *Nanorrhops* Wendland (1879: 148) (Yemen, Oman, Iran, Afghanistan, Pakistan) and *Kerriodoxa* Dransfield (1983: 4) (Peninsular Thailand). These three genera display great morphological diversity and an unusual distribution. An intriguing piece was added to this puzzle by the addition of a fourth genus to the tribe, *Tahina* Dransfield & Rakotoarinivo in Dransfield *et al.* (2008b: 81), recently described from Madagascar.

Chuniophoenix Burret (1937: 583).

Stems clustered, slender to moderate, erect, brown. **Leaves** palmate, induplicate; leaf sheaths open opposite the petiole, densely whitish-brown tomentose, the tomentum early deciduous, not split or split below the petiole to give a central cleft, winged or not winged along the proximal margins; petioles well-developed, channeled adaxially, tomentose as the sheaths; abaxial and adaxial hastulas absent; leaf blades split almost to the base into few to numerous segments, the central ones wider than the lateral ones, the central ones often split again, acuminate or briefly lobed at the apices; veins prominent ad- and abaxially. **Inflorescences** arching to pendulous, emerging from the top of the leaf sheaths, spicate or branched to 3 orders; prophylls short; peduncles well-developed, covered with overlapping, tubular, persistent peduncular bracts; rachis covered with similar bracts; rachillae covered with short, overlapping, tubular, persistent bracteoles; flowers solitary, or borne in short cincinni of 2, rarely 3, flowers per bracteole, borne on long pedicels, purple or yellowish; pedicels subtended by a tubular bracteole; calyces brown, membranous, tubular, 3-lobed at the apex, the lobes splitting and becoming reflexed; corollas pedicelliform below, 3-lobed above with fleshy,

spreading lobes; stamens 6, the 3 antesealous ones free, the 3 antepetalous ones with filaments adnate to corolla lobes; gynoecium elongate, tricarpellate. **Fruits** 1-seeded, globose, obovoid, or pear-shaped; stigmatic remains apical; seed surfaces smooth or grooved and brain-like; endosperm homogeneous or ruminant; eophylls entire, acuminate.

Note:—*Chuniophoenix* is described as “hermaphrodite or occasionally polygamo-dioecious” and flowers as “solitary or arranged in a condensed cincinnus of 1–7 flowers” (Dransfield *et al.* 2008a). The flowers illustrated by Dransfield *et al.*, those of *C. hainanensis*, are shown to be hermaphrodite. Zona (1998) reported that all plants cultivated at Fairchild Tropical Garden were hermaphrodite, and that *C. hainanensis* flower clusters comprised older, pistillate flowers and younger, staminate flowers.

However, all these observations are based on cultivated plants. In all specimens examined here, of wild origin, there are 1–2 (rarely 3) unisexual flowers per bracteole (4–5 were observed in a cultivated plant, the one illustrated by Dransfield *et al.*, *Wei Chao-fen 123194*). Also, observations made here show that *C. nana* and *C. suoitienensis* appear to be dioecious, and the latter sexually dimorphic. *Chuniophoenix hainanensis* may also be dioecious, although there are too few specimens to confirm this.

It seems possible that these discrepancies arose from the much larger size of cultivated plants (hence more flowers per cincinnus), and the similarities between staminate and pistillate flowers, leading previous observers to confuse flower gender. It is possible that all species of *Chuniophoenix* are dioecious with few, unisexual flowers per bracteole. However, studies of wild plants are needed to confirm this.

Key to the species of *Chuniophoenix*

1. Smaller palms with stems 1.0(0.6–1.5) m tall and 1.3(1.0–1.5) cm diameter; leaf sheaths not split, not winged along the proximal margins; Vietnam (Lang Son, Quang Ninh, Vinh Phuc) and China (Hainan) *Chuniophoenix nana*
- Larger palms with stems 2.9(1.5–8.0) m tall and 4.4(1.8–8.0) cm diameter; leaf sheaths split below the petiole to give a central cleft, winged along the proximal margins 2.
2. Leaf blades divided into 24(20–28) segments, the central ones briefly lobed at the apices; endosperm ruminant; China (Hainan) ..
..... *Chuniophoenix hainanensis*
- Leaf blades divided into 6–7 segments, the central ones long acuminate at the apices; endosperm homogeneous; Vietnam (Khanh Hoa) *Chuniophoenix suoitienensis*

1. *Chuniophoenix hainanensis* Burret (1937: 583).

Lectotype (here designated):—CHINA. Hainan: Po Ting, 16 June 1935, *F. How 72912* (lectotype, IBSC!, isolectotypes, A!, P!) (the holotype at B was destroyed) (Fig. 1).

Stems clustered, 3.9(2.0–8.0) m tall and 6.8(6.0–8.0) cm diameter. **Leaf sheaths** split below the petiole to give a central cleft, winged along the margins, densely whitish-brown tomentose, the tomentum early deciduous; petioles length not recorded, tomentose as the sheaths; leaf blades divided into 24(20–28) segments, the central ones 54.4(26.7–67.0) cm long and 3.2(1.6–4.2) cm wide at the mid-point, the central ones briefly lobed at the apices, the lateral ones long acuminate at the apices. **Inflorescences** to 2 m long, branched to 3 orders; prophylls, peduncles, and rachises length not recorded; rachillae number not recorded, 18.4(16.0–22.0) cm long; staminate and pistillate flowers purple, 1–2 per bracteole. **Fruits** pedicellate, obovoid to pear-shaped, 17.1(16.7–17.6) mm long and 15.1(14.2–15.5) mm diameter, red, orange, or purple; seed surfaces shallowly grooved; endosperm ruminant.

Distribution and habitat:—China (Hainan) (Fig. 2) in lowland rainforest on steep slopes at 610(500–750) m elevation.

Taxonomic notes:—Although not all localities on specimen labels have been found on maps, it seems that *Chuniophoenix hainanensis* is confined to only one mountain complex in Hainan, Diao Luo Shan.

Local names and uses:—*qiong zong*. No uses recorded.

Additional specimens examined:—CHINA. Hainan: Diao Luo Shan, 18°45'N, 109°52'E, 600 m, 22 March 2006, *Guo Lixiu et al. 142* (NY, IBSC); Tianshuifenliu, Mt. Diaoluoshan, 16 November 1954, *Diaoluoshan Expedition 2707* (IBSC); same locality, no date, *Diaoluoshan Expedition 2258* (IBSC); Shijingchang, Mt. Diaoluoshan, Lingshui County, 4 September 1981, *Fu Guoai 2645* (IBSC); way to Baishuilong, Mt. Diaoluoshan, 15 May 1986, *Li Zexian s.n.* (IBSC); Baishui Hill, Dali Mountain, Dali village, Chengo District, Qiongzong County, 750 m, 7 December 1956, *Liang Deng 3555* (MO); Minai Hill, Ya County, 600 m, 25 April 1959, *Lianze Chen 30027* (MO).



FIGURE 1. *Chuniophoenix hainanensis*. A. Habit, Diao Luo Shan, Hainan (Guo *et al.* 142). B. Leaf sheaths showing split below petiole (cultivated, South China Botanical Garden). C. Staminate flowers, Diao Luo Shan, Hainan (Guo *et al.* 142). D. Fruits (cultivated, Singapore Botanical Garden).

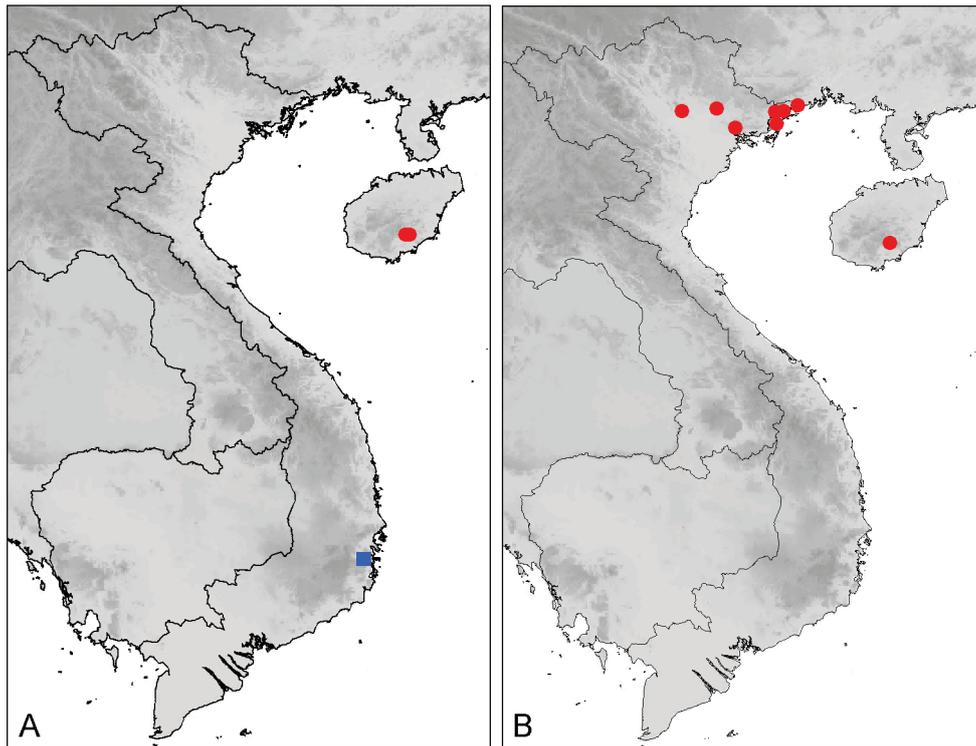


FIGURE 2. Distribution maps. A. *Chuniophoenix hainanensis* (red dots). *C. suoitienensis* (blue square). B. *C. nana* (red dots).

Chuniophoenix nana Burret (1940: 97).

Lectotype (here designated):—VIETNAM. Tonkin, Vinh Jen, Pont des Linhs, May 1935, *A. Pételot 5394* (lectotypes, HN!; isolectotypes, A!, K!, P!) (the holotype at B was destroyed) (Fig. 3.)

Syn.: *Chuniophoenix humilis* C. Z. Tang & T. L. Wu (1977: 111). **Type:**—CHINA. Cultivated plant in South China Botanical Garden, introduced from Hainan, Lingshui, Xian county, s.d., *T. L. Wu 875* (holotype, IBSC!).

Stems clustered, 1.0(0.6–1.5) m tall and 1.3(1.0–1.5) cm diameter. **Leaf sheaths** not split below the petiole, not winged along the margins, densely whitish-brown tomentose, the tomentum early deciduous; petioles 24.1(9.5–44.0) cm long, tomentose as the sheaths; leaf blades divided into 6(4–7) segments, the central ones 27.6(22.5–31.5) cm long and 3.3(2.2–5.0) cm wide at the mid-point, acuminate at the apices, the central ones wider than the lateral ones, the central one sometimes splitting irregularly into 2–3 segments. **Inflorescences** to 0.4 m long, spicate or branched to 1 order; prophylls 3.7(3.0–5.0) cm long; peduncles 15.5(7.0–24.0) cm long, covered with tubular peduncular bracts; rachises 21.0(9.0–33.0) cm long; rachillae 1–4, 15.4(12.0–21.0) cm long; staminate and pistillate flowers yellowish, 1 per bracteole; staminate flowers with well-developed stamens and poorly-developed gynoecia; pistillate flowers with vestigial anthers and well-developed gynoecia. **Fruits** briefly pedicellate, globose, 11.8(9.5–14.5) mm long and 11.9(10.9–12.9) mm diameter, orange or red; seed surfaces smooth, with few grooves; endosperm homogeneous.

Distribution and habitat:—China (Hainan) and northern Vietnam (Lang Son, Quang Ninh, Vinh Phuc) (Fig. 2) in lowland rainforest or disturbed forest at 100–200 m elevation.

Taxonomic notes:—Although Henderson (2009) considered *Chuniophoenix humilis* to be distinct from *C. nana*, based on its “broad and hooded” leaf segments (versus narrower segments in *C. humilis*), no differences in leaves, nor reproductive structures, have been found in this study, and it is included here as a synonym. The status of *Chuniophoenix nana* in Hainan is somewhat doubtful. The only specimen examined here, the type of *C. humilis*, is a cultivated plant said to come from Mount Tiaolo, Lingshui County in Hainan. This is presumably the same place as the only other locality of the palm, Diao Luo Shan. There, a single, possibly cultivated plant was seen during fieldwork in 2006.

Local names and uses:—*ai qiong zong*, *xiao qiong zong* (China); *cha* (Vietnam). No uses recorded.



FIGURE 3. *Chuniophoenix nana*. A. Habit, Yen Tu, Vietnam (*Henderson & Nguyen Quoc Dung 3600*). B. Habit and inflorescences, Tuyen Quang, Vietnam (*Henderson et al. 3797*). C. Staminate flowers, Tuyen Quang, Vietnam (*Henderson et al. 3797*) D. Pistillate flowers, Tuyen Quang, Vietnam (*Henderson et al. 3798*).



FIGURE 4. *Chuniophoenix suoitienensis*. A. Habit, Suoi Tien, Vietnam (Henderson & Bui Van Thanh 3659). B. Immature fruits, Suoi Tien (Henderson & Bui Van Thanh 3659). C. Staminate flowers, Suoi Tien (Henderson & Nguyen Quoc Dung 3866). D. Pistillate flowers, Suoi Tien (Henderson & Nguyen Quoc Dung 3868) (C, D: images by Dr. Luu Hong Truong).

Additional specimens examined:—VIETNAM. Lang Son: Huu Lung, 25 April 1961, *Anon 1283* (LE). Quang Ninh: Dong Trieu District, Yen Tu mountain, 21.11N, 106.72E, ca. 100 m, *Henderson & Nguyen Quoc Dung 3600* (FIPI, NY); Pac-si and vicinity, NE of Mon-cay, 27–30 September 1936, *Tsang 26915* (A, IBSC, K, P); Taai Wong Mo Shan and vicinity, Tong Fa Market, Ha-coi, 1–10 September 1939, *Tsang 29463* (A, IBSC, K); Sai Wong Mo Shan (Sai Vong Mo Leng), Lomg Ngong village, Dam-ha, 18 July–9 September 1940, *Tsang 30364* (A, IBSC, P). Tuyen Quang: road between Bac Quang and Tuyen Quang, 30 km before Tuyen Quang, 21.999N, 105.098E, ca. 200 m, 31 March 2012, *Henderson et al. 3797* (FIPI, NY); same locality, same date, *Henderson et al. 3798* (FIPI, NY). Vinh Phuc: Tam Dao, near National Park headquarters, 21°27'N, 105°38'E, ca. 200 m, 17 July 2007, *Henderson 3478* (NY). Tonkin: Fort Wallut, domaine de Ke Bao, 7 May 1918, *Chevalier 37636* (P).

Chuniophoenix suoitienensis Henderson, *sp. nov.* (Figs. 4 & 5).

Chuniophoenix suoitienensis differs from *C. hainanensis* in its 6–7 (versus 20–28) leaf segments and homogeneous (versus ruminant) endosperm, and from *C. nana* in its larger size and leaf sheaths split below the petiole to give a central cleft, and winged along the proximal margins.

Type:—VIETNAM. Khanh Hoa: Dien Khanh District, Suoi Tien, 12.203N, 109.027E, ca. 50 m, 4 July 2010, *A. Henderson & Bui Van Thanh 3659* (holotype, HN!; isotype NY!).



FIGURE 5. *Chuniophoenix suoitienensis*. Leaf sheaths and petioles showing leaf sheaths split below the petiole to give a central cleft (lower arrows), and winged along the margins (upper arrow), Suoi Tien, Vietnam (*Henderson & Nguyen Quoc Dung 3868*). Image by Dr. Luu Hong Truong.

Stems clustered, 1.8(1.5–2.0) m tall and 1.9(1.8–2.0) cm diameter. **Leaf sheaths** split below the petiole to give a central cleft, winged along the proximal margins, densely whitish-brown tomentose, the tomentum early deciduous; petioles 51.5(42.0–61.0) cm long, tomentose as the sheaths; leaf blades divided into 6–7 segments, long acuminate at the apices, the central ones 38.0(34.0–42.0) cm long and 5.4(1.7–9.0) cm wide at mid-point, the central ones split again for one half to two thirds their length into 2–3 lobes. **Inflorescences** length not recorded, branched to 1 order;

prophylls length not recorded; peduncles 25(10–40) cm long, covered with tubular peduncular bracts; rachises length not recorded; rachillae 6(1–11), 14.6(10.2–18.0) cm long; staminate and pistillate flowers yellowish, 2 per bracteole; staminate flowers with well-developed stamens and poorly-developed gynoecia; pistillate flowers with vestigial anthers and well-developed gynoecia. **Fruits** pedicellate, globose 10.0 mm long and 10.1 mm diameter, green (immature); seed surfaces ridged, brain-like; endosperm homogeneous.

Distribution and habitat:—Southern Vietnam (Khanh Hoa) (Fig. 2) in disturbed forest along steep, rocky river margins at ca. 50 m elevation.

Taxonomic notes:—*Chuniophoenix suoitienensis* appears to be dioecious. Based on notes made at the time of collection of the type specimen, inflorescences of presumed staminate plants have shorter peduncles to 10 cm long, elongate rachises, and 10–11 rachillae, these to 18 cm long. Presumed pistillate plants have longer peduncles 30–40 cm long, shorter rachises, and 3–4 rachillae, these to 15 cm long.

Local names and uses:—*la non*. No uses recorded.

Additional specimens examined:—VIETNAM. Khanh Hoa: Dien Khanh District, Suoi Tien, 12.203N, 109.027E, ca. 50 m, 20 April 2013, *Henderson & Nguyen Quoc Dung 3866* (FIPI, NY); same locality, same date, *Henderson & Nguyen Quoc Dung 3868* (FIPI, NY).

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