Socratea Karstenii F. W. Stauffer & Balslev (Arecaceae), a New Species from Venezuela

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Abstract

STAUFFER, F. W. & H. BALSLEV (2012). Socratea karstenii F. W. Stauffer & Balslev (Arecaceae), a new species from Venezuela. *Candollea* 67: 285-291. In English, English and French abstracts.

Socratea karstenii F. W. Stauffer & Balslev *(Arecaceae),* a new species described from Venezuela, is a morphological well delimited, geographically isolated, and ecologically distinct canopy palm, distributed in the cloud forest of the Coastal Cordillera and the east Andean Cordillera in Venezuela. This paper traces its tortuous taxonomic and nomenclatural history, and discusses its relationship to other species of *Socratea* H. Karst.

Key-words

ARECACEAE – *Socratea* – Neotropics – Venezuela – Taxonomy

Résumé

STAUFFER, F. W. & H. BALSLEV (2012). Socratea karstenii, F. W. Stauffer & Balslev (Arecaceae), une espèce nouvelle du Vénézuéla. *Candollea* 67: 285-291. En anglais, résumés anglais et français.

Socratea karstenii F. W. Stauffer & Balslev *(Arecaceae),* décrite du Vénézuéla, est une espèce de palmier bien délimitée, isolée géographiquement et distincte par son port élevé dans la canopée. Elle est distribuée dans la forêt de brouillard de la Cordillère côtière et dans la cordillère des Andes orientales au Venezuela. Cet article présente sa description, retrace sa tortueuse histoire taxonomique et nomenclaturale et discute de ses relations avec d'autres espèces de *Socratea* H. Karst.

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Introduction

During fieldwork and visits to the cloud forests of the Coastal Cordillera of Venezuela we were struck by the similarity of species of *Socratea* H. Karst. growing there to the montane species of *Socratea* (*S. montana* R. Bernal & A. J. Hend. and *S. rostrata* Burret) found in the Andes of Ecuador and Colombia. We were also uneasy to see, that in the latest monograph of the genus (HENDERSON, 1990), these *Socratea* populations had been identified as *S. exorrhiza* H. Wendl., which is common through most of the lowland Neotropical region but has a quite different appearance. This prompted us to look into the history of *Socratea* species in the Coastal Cordillera in Venezuela. As it turns out, *S. karstenii* F. W. Stauffer & Balslev, which we have selected as the name for the new species, has a long and tortuous taxonomical history that involves a mixed type collection. In fact, this palm represents a very well characterized species with a distinct morphology and a distribution that is disjunct from its closest relatives.

Socratea karstenii F. W. Stauffer & Balslev, **spec. nova** (Fig. 1).

Typus: VENEZUELA. Aragua: 3-7 Km below Paso Portachuelo, on road to coast from Rancho Grande, 27.VIII. 1970, *Moore & al. 9845* (holo-: VEN!; iso-: BH).

Socratea karstenii simillima est S. montanae, sed differt radicibus supraterraneis brevioribus (1.5-2.3 m longis), conum densum, formantibus; petiolis supra canaliculatis; numero maiore pinnarum (26-31 utrinque); prophyllis brevioribus (5-10 cm longis); rachidibus floralibus longioribus (40-42 cm longis), numero maiore rachillarum floralium (20-25), numero minore staminorum (43-47); fructibus rostro inconspicuo.

Description. – Trunk 13-18 m high, 18-24 cm diameter, pale brown to gray, cylindrical; internodes 12-15 cm long; the trunk with a dense basal cone of 30-35 aerial roots, each 1.5-2.3 m high, 8-9 cm diameter, covered by acute protruberances to 0.5 cm long. *Leaves* 6-8; sheath 1.7-2.1 m long, 57-58 cm wide, gray-green, slightly waxy; petiole (10-)20-23(-40) cm long, 6-7 cm, slightly channelled adaxially; rachis 2.10-2.95 (-3.5) m long, 4 cm wide, glabrous to brown-lepidote, prominently keeled adaxially; pinnae 26-31 on each side, arranged in up to 10 different planes, longitudinally divided, pale green adaxially, gray-green abaxially, waxy, slightly arched, with praemorse apex; basal pinnae 0.85-1.05 m, divided into 4-5 segments, each 1-4 cm wide; middle pinnae 0.9-1.15 m long, divided into 7-8 segments, each 1.8-5 cm wide; sub-apical pinnae 30-44 cm long, divided into 2-4 segments, each 1-2 cm wide, apical flabellum c. 30 cm long; veins prominent abaxially, green-yellow. *Inflorescence* infrafoliar, erect in bud, pendulous at anthesis, immediately below the crownshaft; peduncle 30-32(-35) cm long, 5-6 cm wide, dorsi-ventrally compressed, dark green, with a brown-pinkish indumentum; prophyll 5-10 cm long, tubular, laterally keeled, with same indumentum as peduncle, chartaceous, inserted at the base of the peduncle, peduncular bracts 3, usually persistent, with same indumentum as prophyll; first bract 7-12 cm long; second bract 25-30 cm long; third bract c. 80 cm; floral rachis (30-)40-42 cm long, 2-5 cm wide; rachillae (16-)20-25, green-yellow; basal rachillae (66-)84-85 cm long, 1.5-2 cm diameter; middle rachillae 70-75(-87) cm long, 1-1.5 cm diameter; apical rachillae 49-50(-78) cm long, 0.8-1(-1.5) cm diameter. *Flowers* spirally arranged in triads, inserted in pits; staminate flowers 1.3-1.4 cm long, yellow-cream; sepals oblong, 4 mm long, 3-4 mm wide; petals obovate-oblong, 1.2-1.3(-1.5) cm long, 0.8-0.9 cm wide; stamens (38-)43-47(-65), up to 1 cm long; filaments 2 mm long, 0.2 mm diameter; anthers 6-8(-10) mm long, 1-1.5 mm wide; pistillode 2 mm long x 2 mm wide, trilobate; pistillate flowers 6-7 mm long, green; sepals ovate, 5-5.5 mm long, 6-7 mm wide, margins slightly ciliate to the apex; petals ovate-oblong, 6 mm long, 4.5-5 mm wide, margins poorly ciliate; ovary globose-ovoid, 6-7 mm long, 4 mm diameter, style shortly developed; stigma trilobate, papillose; staminodial tube inconspicuous. *Fruits* oblong-ovoid, 2-3 cm long, 1.7-2 cm diameter, pale green in development, light brown when ripe; small apical rostrum; mesocarp fibrous; seeds oblong; endosperm homogeneous; apical embryo. *Eophyll* entire-bifid, with irregularly lacerate margins.

Habitat and distribution. – Socratea karstenii is distributed in northern Venezuela, in the states Aragua, Carabobo, Trujillo and Yaracuy. It grows in very humid cloud forests on steep slopes in the Coastal Cordillera and on the western slope of the eastern Andean Cordillera of Mérida (Fig. 2), usually between 1000 m and 1650 m. Occasionally it reaches down to the ecotone between the cloud forest and the evergreen forest at 350 m altitude. In the Rancho Grande cloud forest the palm flowers during the first three months of the year, normally corresponding with the driest season in the cloud forest; fruiting was observed in the first half of the year; bees *(Trigonidae sp.)* were observed visiting the inflorescences at anthesis (STAUFFER, 1994) and may be regarded as potential pollinators of the species. SERES (1991) counted 3961 male flowers and 1508 female flowers in one inflorescence of this palm collected in the same forest.

Taxonomical affinities. – The Venezuelan palm resembles *Socratea montana* in its similar ecological conditions, elevated number of stamens and the thickness of rachillae; this species grows five hundred kilometers away in the western Andean Cordillera in Colombia and also on the western slopes of the Andes at the border between Ecuador and Colombia (Fig. 2). The study of selected specimens from the latter (*Galeano & Bernal 489* (K); *Bernal & Galeano 631* (NY), isotype; *Bernal & Galeano 633* (NY), *Bernal & Galeano 913* (NY); *Lozano*

Fig. 1. – *Socratea karstenii* F. W. Stauffer & Balslev. **A.** Habitat of the species in the cloud forest of the Henri Pittier National Park (Aragua state); **B.** Habit of the palm growing at the Cerro La Chapa (Yaracuy State); **C.** Well-developed stilt root cone of the palm; **D.** Young infructescence; **E.** Early developing fruits.

[Photo: **A, C-E:** F. W. Stauffer; **B:** W. Meier]

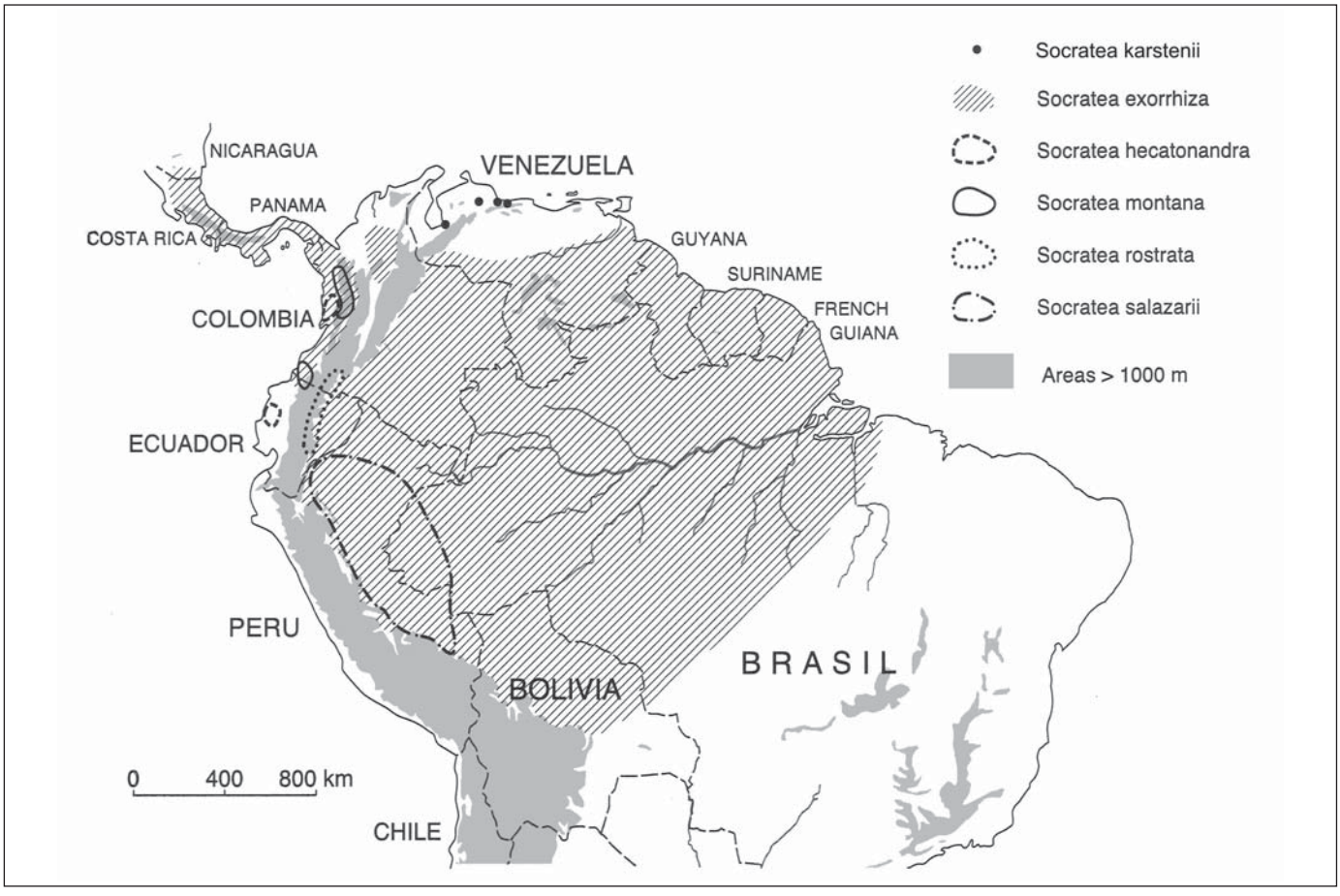

Fig. 2. – Map of distribution of *Socratea exorrhiza* H. Wendl., *S. hecatonandra* (Dugand) R. Bernal, *S. karstenii* F. W. Stauffer & Balslev, *S. montana* R. Bernal & A. J. Hend., *S. rostrata* Burret, *S. salazarii* H. E. Moore, based on HENDERSON (1990).

& al. 4901 (NY); *Balslev & al. 62090* (AAU, NY), *Balslev & al. 62098* (AAU, NY), and *Henderson & Bernal 150* (NY)), provides some characters that clearly differentiate these two taxa as well as the widespread *S. exorrhiza* (Table 1, Fig. 2). *Socratea karstenii* is also strikingly similar in habit to *S. rostrata* from the eastern slopes of the Andes in Ecuador and southern Colombia (Fig. 2). *Socratea hecatonandra* (Dugand) R. Bernal is clearly distinct from *S. karstenii* and is restricted to the Chocó region of western Colombia and Ecuador (Fig. 2).

Taxonomic history. – Socratea karstenii was collected for the first time near Puerto Cabello in the Coastal Cordillera of Venezuela by the German botanist Hermann Karsten (1817-1908), who travelled in South America between 1844 and 1856. The palm grows mixed with *Dictyocaryum fuscum* (H. Karst.) H. Wendl. Karsten collected material of both species, as evidenced by his plate (KARSTEN, 1861: plate LIV) in which figures 1-8 clearly illustrate *D. fuscum*, while figures 9, 10, 11, and 12 show a fruit with an ovoid seed in which the embryo is embedded apically in the endosperm. These features of the seed clearly indicate that it belongs to the genus *Socratea,* and not to *Dictyocaryum* H. Wendl., which has a globose seed with a basal embryo. If we assume that the seeds were collected at the same place as the other plant material shown on the plate (and collectively identified as a single species by the author), these seeds must belong to *Socratea karstenii,* the only species of *Socratea* growing at that locality. The plant illustrated by Karsten in his plate LIV was named *S. fusca* H. Karst., (≡ *Dictyocaryum fuscum*). This palm species is endemic to the Coastal Cordillera of Venezuela.

Only two years after the publication of KARSTEN (1861), WENDLAND (1863) pointed to the mixed nature of the collection depicted in plate LIV of KARSTEN (1861). The collections that were illustrated are kept at the herbarium in LE, where they were examined by the first author. They were designated as lectotype for *Socratea fusca* by HENDERSON (1990), who explicitly excluded the figures 8, 9, 10, and 11. The exclusion of these figures on plate LIV was presumably done to exclude the drawing of the fruits and seed. However, if that was the intention of figure 8, a drawing of the flower of *D. fuscum*, should not have been excluded. On the other hand, the figure 12 which is a

Table 1. – Characters to differentiate *Socratea karstenii* F. W. Stauffer & Balslev from *S. montana* R. Bernal & A. J. Hend., and *S. exorrhiza* H. Wendl.

	Socratea karstenii	***Socratea montana*** [1]	***Socratea exorrhiza*** [2]
Aerial roots	forming a dense cone, 1.5-2.3 m high	forming a relatively open cone, c. 5 m high	forming a loose cone, 2-4 m high
Leaf sheaths [m]	1.7-2.1	2-2.6	0.9-1.8
Petiole	slightly channeled adaxially	subterete	terete
Pinnae [pairs]	26-31	17-24	15-26
Prophyll [cm]	5-10	20-22	10-11
Bracts [cm]	to 80	to 60	to 60-70
Floral rachis [cm]	(30-)40-42	15-20	10-15
Rachillae	(16-)20-25	7-9	6-17
Stamens	(38-)43-47(-65)	84-139	17-45
Filament [mm]	2	1	c. 1
Female flower [mm]	6-7	9-10	4-8
Ovary	6-7	9	4-7
Fruit	poorly rostrate	conspicuously rostrate	not rostrate
Habitat	cloud forest	cloud forest	lowland rain forest
Distribution	northern Venezuela	pacific slopes of the Colombian Cordillera Occidental and northern Ecuador	widespread from Nicaragua to Bolivia

[1] Characters based on Bernal & Henderson (1986), Henderson (1990), and the collections cited in the text.

[2] Characters based on Henderson (1990), Wessels Boer (1988), and Galeano & Bernal (2010).

drawing of the *Socratea* seed should have been excluded, but it was not. We take this as a typographical error, and assume Henderson's intention was to exclude the figures 9, 10, 11, and 12 from plate LIV and hence also the fruit and seed material from the lectotype of *S. fusca.*

Seeds of *Socratea* collected by Karsten in Venezuela made their way to B where probably Klotzsch annotated them as "*Iriartea altissima* leg. Karsten, Venezuela". We assume that these were the seeds of *S. karstenii* collected by Karsten at Puerto Cabello together with material of *Dictyocaryum fuscum.* The name *"Iriartea altissima"*, without any description of the palm and thus a *nomen nudum,* first appeared in 1858 in a publication of K. F. Appun on the cultivation of seeds and plants of tropical South America (Appun, 1858). A decade after Karsten (1861), Appun (1871) included the name in his account on Venezuela and accompanied it with a painting of a group of tall palms against a scenic background. The palms in Appun's plate are the same as in plate LIV of Karsten (1861) but the details including the seeds of *Socratea* shown as figures 9, 10, 11 and 12 in Karsten's plate are painted over and covered by the scenic background. By these unfortunate artistic modifications the name *"Iriartea altissima"* became associated with the palm originally described as *Socratea fusca*. In 1881, in a list of plants introduced into commerce, Linden (1881) published the name *"Iriartea altissima",* mentioning Klotzsch as author of the species, but again it was without any description and this time also without an illustration. Although it is well known that Johann Friedrich Klotzsch was curator of the Berlin herbarium between 1833 and 1860 (Stafleu & Cowan, 1976-1988), we were not able to find out the reason why Linden attributed to him the name of the palm. Jahn (1908) gave a description under the name *I. altissima* that clearly refers to *Dictyocaryum fuscum*. In this way, Jahn (1908) unfortunately validated the name *Iriartea altissima* Al. Jahn but created a superfluous name and synonym for *Dictyocaryum fuscum.*

Burret (1930) referred to the seeds collected by Karsten in Venezuela that were identified as *"Iriartea altissima",* and apparently at that time still extant, in B. He stated that the seeds agree with the illustration in plate LIV of Karsten (1861). He also pointed out that Wendland (1863) had identified the seeds as *Socratea* and referred the rest of the elements illustrated in plate LIV of Karsten (1861) to *Dictyocaryum* which he had described three years before. Burret (1930) concluded that the right name of the species to which the seeds in B belonged should be *"Socratea altissima",* but did not propose any description for the palm. Wessels Boer (1988) described the *Socratea* specimens from the Venezuelan Coastal Cordillera under the name of *"Iriartea altissima"*. Wessels Boer had visited LE and had seen the fruits of the Puerto Cabello palm collected by H. Karsten (Imchanitzkaja, 1986), which he designated as lectotype for *"I. altissima"* in the absence of the original material in B apparently so named by Klotzsch. We reject this lectotypification as it does not agree with the description of Jahn (1908), who validated the name, but did not cite any specimens.

Henderson (1990) regarded *"I. altissima"* as an illegitimate name and cited *"I. altissima* Appun" (1871), *"I. altissima* Linden" (1881), and *"I. altissima* Al. Jahn" (1908) as *nomina nuda* under *Dictyocaryum fuscum.* Henderson was in error, as *Iriartea altissima* Al. Jahn was published with a description, albeit as a superfluous name for *Dictyocaryum fuscum*. Even though Henderson (1986) had suggested that the *Socratea* species from the Venezuelan Coastal Cordillera could represent a new taxon, he identified all the specimens from that locality as *S. exorrhiza* in his monograph of the genus published four years later (Henderson, 1990).

Conservation status. – The populations of this palm are well protected in the Henri Pittier National Park (Aragua State), but those in the La Chapa, Gamelotal and Zapatero mountains (all in Yaracuy State) are heavily threatened by the destruction of the cloud forest due to cattle-ranching and cultivation (Stauffer & Duno, 1998). The conservation status of this species in the Trujillo State remains unknown. Throughout almost its entire range of distribution *S. karstenii* faces a very high risk of extinction due to heavy destruction of its natural habitat, hence it should be considered as endangered (EN) under the A4 criterion, as defined by IUCN (2010).

Etymology. – The name of the *Socratea* species described here honours Hermann Karsten, first collector of the palm and a remarkable botanist of the Neotropical flora. In order to provide a more comprehensive idea of the morphology of the species, we have selected a complete specimen, and not the collection from Karsten at LE, which only consists of fragmentary seeds. The common name is Arauce.

Additional specimens examined. – **Venezuela. Aragua:** P. N. Henri Pittier, 200 m desde el Paso de Portachuelo vía a La Trilla, 10°21'N 67°41'W, 950-1000 m, 10.X.1997, *Stauffer & al. 515* (VEN); P. N. Henri Pittier, primer tramo del camino Paso Portachuelo-Pico Periquito, 10°21'N 67°41'W, 1000-1100 m, 11.X.1997, *Stauffer & al. 516* (VEN). **Carabobo:** road from Puerto Cabello to San Felipe, 28.VII.1920, *Pittier 8988* (BH n.v., NY); Río San Gián, 5-6 km al S de Borburata, vecindades de la Planta Eléctrica, 350-500 m, 7-8.VIII.1965, *Steyermark 94356* (BH n.v., VEN, US, K). **Trujillo:** between Escuque and La Mesa de San Pedro, 1300-1650 m, 20.II.1971, *Steyermark 104745* (NY). **Yaracuy:** Sierra de Aroa, Cerro Negro, above San Felipe, 10°25'N 68°50'W, 1150-1350 m, 14.XI.1967, *Steyermark & Wessels-Boer 100468* (*Wessels Boer-2047*) (U, VEN, NY); El Amparo hacia Candelaria, 7-10 km al N de Salóm, 1100-1300 m, 27.XII.1972, *Steyermark & Carreño 106837* (BH n.v., VEN, NY).

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