

BIOLOGY

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FIELDIANA: BOTANY

A Continuation of the

BOTANICAL SERIES

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FIELD MUSEUM OF NATURAL HISTORY



VOLUME 32



FIELD MUSEUM OF NATURAL HISTORY
CHICAGO, U.S.A.

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REVISION OF THE GENUS VASCELLUM
(LYCOPERDACEAE)

PATRICIO PONCE DE LEON

A CONSPECTUS OF THE PALM GENUS
BUTIA BECC.

S. F. GLASSMAN

STUDIES IN AMERICAN PLANTS, II

DOROTHY N. GIBSON

TROPICAL AMERICAN PLANTS, XI

LOUIS O. WILLIAMS

FIELDIANA: BOTANY

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FIELD MUSEUM OF NATURAL HISTORY

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A Conspectus of the Palm Genus

Butia Becc.*

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The name *Butia* was first used as a subgenus of *Cocos* by Beccari in 1887; and in 1903, Barbosa Rodrigues made a subsection of *Butia* under *Cocos*. In a later paper, Beccari (1916) elevated *Butia* to generic status, and at the same time transferred 10 species of *Cocos* to the genus *Butia*, described four new species and varieties, listed three other species of *Cocos* as possibly belonging to *Butia* (*C. arenicola* Barb. Rodr., *C. amadelpa* Barb. Rodr., and *C. wildemaniana* Barb. Rodr.), and also included a key to the taxa.

Beccari defined the genus by using the following characters: trunk covered with petiole bases for a long period of time, these falling off in older trees and leaving scars on trunk; margins of the petioles conspicuously armed; pinnae elongated and narrow, gradually acuminate in subulate, short bifid tip; spathes of two kinds, a lower, short, narrow one and an upper, larger, wider one, these being coriaceous and glabrous or tomentose and smooth (not sulcate-plicate) on the outer surface; spadices simply branched, rachillae elongated and bearing on the lower part for some distance clusters of one female flower accompanied by two male flowers, the remaining part of each rachilla bearing male flowers only, upper male flowers surrounded by bracteoles; male flowers small, irregularly ovate, calyx consisting of three small triangular sepals which are more or less united at base, pedicellate in some species, corolla much longer than calyx, of three valvate petals, stamens six, with subulate filaments and versatile anthers; female flowers inserted on pulvinuli surrounded by small bracts, globose-ovate or ovate-conical in shape, sepals three, broad and imbricate, with acute or slightly cucullate

* This work has been supported by National Science Foundation Grant No. GB-6899.

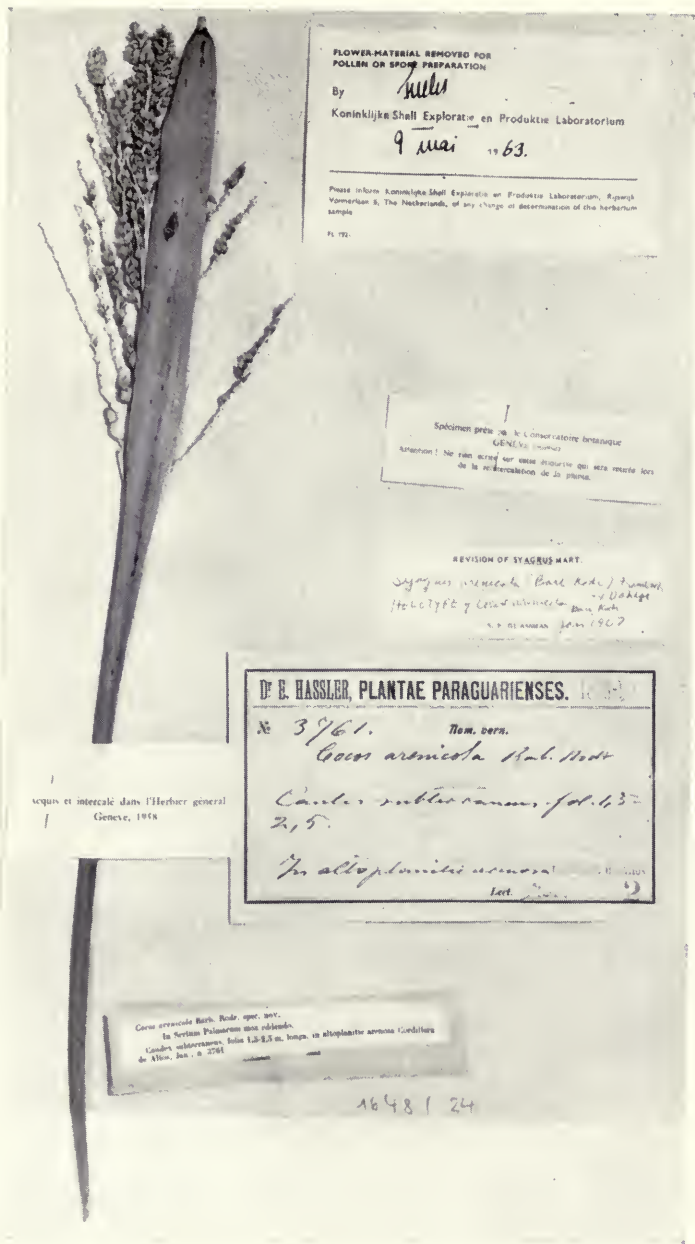
tips, corolla somewhat longer, with three very wide petals, involute-imbriate, with short, triangular tips, ovary ovate, acute, glabrous, stigmas three, small and thick; fruit globose, ovate or ovate-conical, terminating in the remains of the small stigmas, exocarp thin, mesocarp fleshy-fibrous or mucilaginous; endocarp woody-bony, globose, ovate or elliptical, smooth on the surface, normally consisting of three locules separated by woody-bony dissepiments, each containing one seed, the seed of each locule showing a clear band, sometimes the endocarp is two-loculed or even unilocular, and hence one or two seeded, in this condition traces of abortive locules may be present; seeds conforming to shape of endocarp cavities, more or less regular, endosperm homogeneous, oily, with hardly a sign of a cavity in the center, embryo more or less lateral.

In his key to the subdivisions of the genus *Cocos*, Beccari (1916) separated *Butia* from the genera *Barbosa* Becc., *Rhyticocos* Becc., *Arikury* Barb. Rodr., *Arecastrum* Becc., and *Syagrus* Mart. by the upper spathes being smooth rather than plicate-sulcate on the outside. Burret (1953) used essentially the same separation characters in his key to the genera of *Cocoideae*.

In his treatment of the genus *Butia*, Bailey (1936) included a revised description of the genus, with slight modifications from Beccari's and a key to the cultivated species and varieties. He divided the genus into the Major *Butias*, i.e., cultivated species with conspicuous trunks, and the Minor *Butias*, i.e., essentially acaulescent palms and not known from cultivation in North America. Most of the discussion pertained to the cultivated species, with very little new information added to the acaulescent *Butias*.

Bondar (1964), in his *Palmeiras do Brasil*, treated *Butia*, as well as *Syagrus* and other related genera, as a group under the genus *Cocos*. Under "Grupo" *Butia*, he included *Cocos capitata* Mart., *C. eriospatha* Mart., *C. leiopatha* Mart., *C. microspadix* Burret, *C. odorata* Barb. Rodr., *C. pulposa* Barb. Rodr., and *C. yatay* Mart. There are no keys to these species which are merely listed along with their distributions, and almost no descriptive information is given.

I first became interested in *Butia* while working on a revision of the genus *Syagrus*. Several species, *B. amadelpa* (Barb. Rodr.) Burret, *B. arenicola* (Barb. Rodr.) Burret, and *B. wildemaniana* (Barb. Rodr.) Burret were transferred by Frambach (in Dahlgren,



FLOWER MATERIAL REMOVED FOR
POLLEN OR SPORE PREPARATION

By *Hull*
Koninklijke Shell Exploratie en Productie Laboratorium
9 mai 1963.

Please inform Koninklijke Shell Exploratie en Productie Laboratorium, Rijswijk
Voorstraat 5, The Netherlands, of any change of determination of the herbarium
sample
PL 172

Spécimen reçu par le Conservatoire botanique
GENÈVE (Suisse)
Attention! Ne rien écrire sur cette étiquette qui sera recollée lors
de la réincorporation de la plante.

REVISION OF SYAGRUS-MART.

Syagrus arenicola (Bark. Rodr.) J. Winters
Holotype y lect. *arenicola* Bark. Rodr.
J. W. WINTERS, Jan 1967

acquis et intégré dans l'Herbar général
Genève, 1958

Dr. E. HASSLER, PLANTAE PARAGUARIENSES. 1852
N° 3761. Nom. vern.
Cocos arenicola Bark. Rodr.
*Caulis ruber ramosus, fol. 1, 3-
2, 5.*
In allopluvialis arenosa (Hassler)
Lect. *arenicola* (2)

Cocos arenicola Bark. Rodr. spec. det.
In Vertice Palmarum una oblonga.
Caudis ruber ramosus, folia 1.5-2.5 m. longa, in altoplanitie arenae Cordillerae
de Alton. det. a 2761

1648124

FIG. 1. *Syagrus arenicola*. Holotype. Hassler 3761(G).

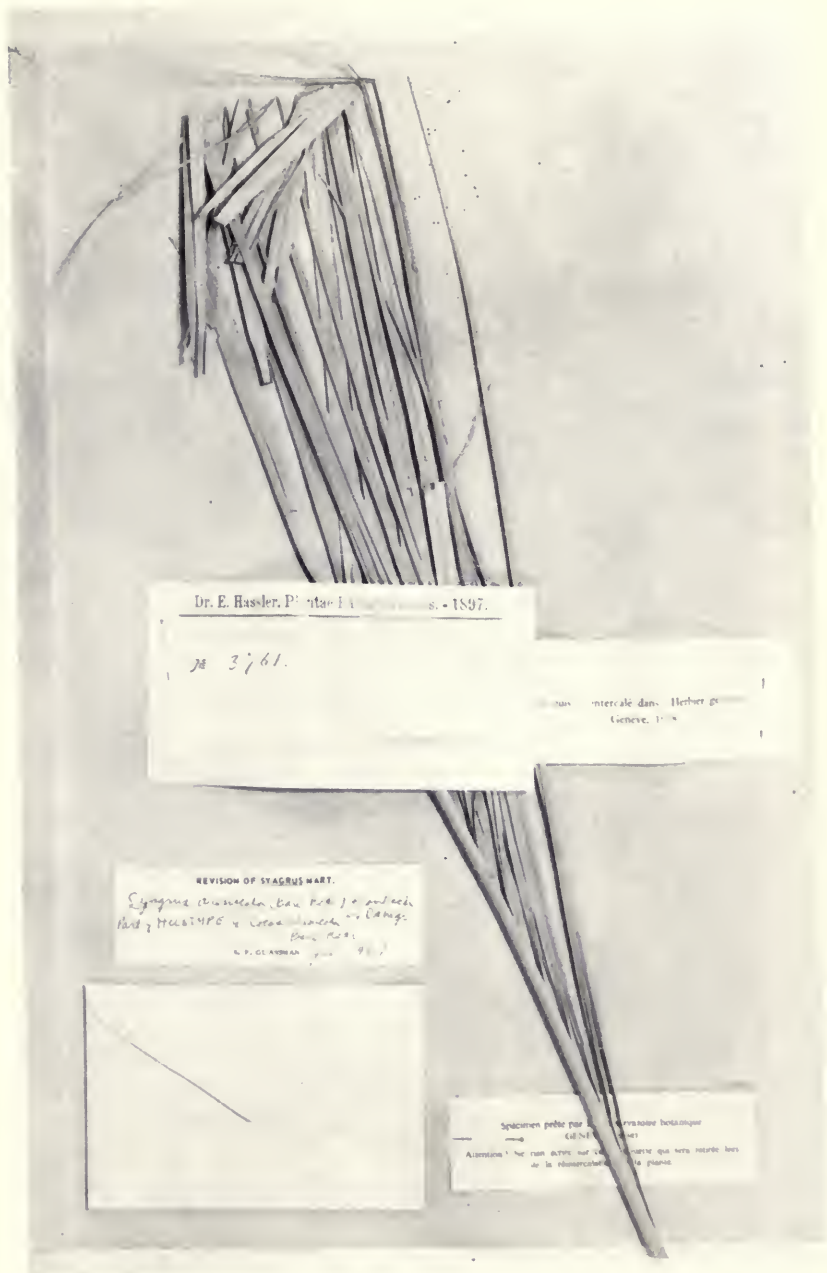


FIG. 2. *Syngnus arenicola*. Part of holotype.

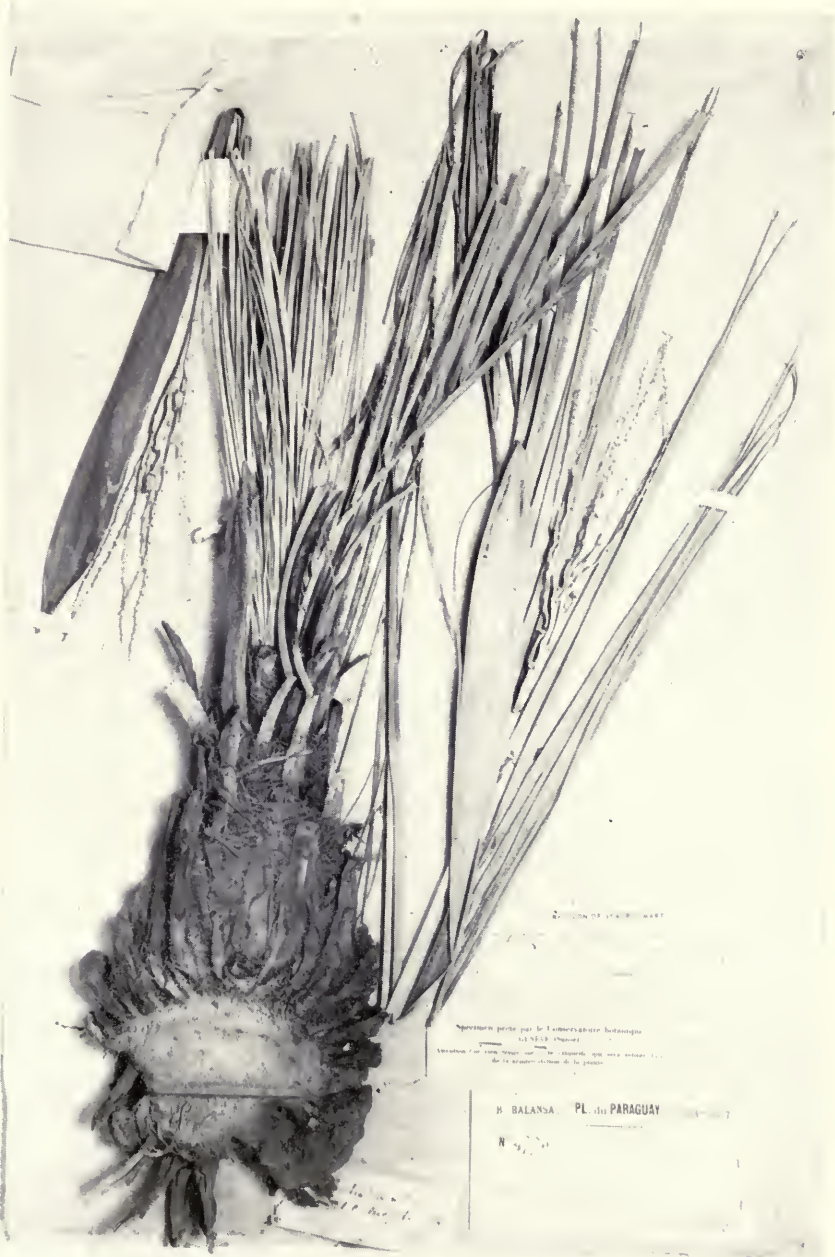


FIG. 3. *Syagrus arenicola*. Showing subterranean stem. Balansa 4773(G).

1936) to *Syagrus* and one species of *Syagrus*, *S. dyerana* (Barb. Rodr.) Becc., was transferred to *Butia* by Burret (1937). Beccari (1916), in his key to the subdivisions of *Cocos*, separated *Butia* from *Syagrus* mainly by non-plicate-sulcate spathes, petioles with conspicuous spines on margins, and three-seeded fruits (1-2 seeded by abortion) rather than plicate-sulcate spathes, petioles with smooth to fibrous margins, and one seeded fruits. Although most of the specimens of *Butia* examined by me seem to have fairly smooth (non-plicate-sulcate) spathes, some others I have seen, *B. arenicola* (Burchell 5799-K), *B. capitata* (Martius s.n.-M; Herter 346a-F, G, S), and *B. paraguayensis* (Hassler 896-G; Fiebrig 4097-K; Pedersen 3030-K), appear to have definite or even rather deep grooves (plicate-sulcate), especially older ones in which the waxy coat has fallen off of the spathes. In at least one species of *Syagrus*, *S. archeri* Glassm., most of the spathes with a waxy coat seem to be fairly smooth, whereas the older spathes without the waxy coat seem to be definitely grooved. In a number of cases, I have examined and re-examined the spathes of several species in both *Butia* and *Syagrus* for long periods of time and still was not quite certain whether they should be considered plicate-sulcate or smooth. It seems to me that many of these so-called smooth spathes become gradually plicate-sulcate with aging and drying. In view of what I have observed, the distinction between smooth and grooved spathes is not always clear cut, therefore, use of this characteristic as a basis for separating *Butia* from *Syagrus* becomes increasingly questionable.

In two previous papers (Glassman, 1965, 1968), I mentioned the presence of spines or flat, spine-like projections on the petioles in several taxa of the genus *Syagrus*, *S. x camposportoana* (Bondar) Glassm., *S. coronata* (Mart.) Becc., *S. x matafome* (Bondar) Glassm., *S. schizophylla* (Mart.) Glassm., *S. x tostana* (Bondar) Glassm., *S. treubiana* (Becc.) Becc., and *S. vagans* (Bondar) Hawkes. Although all of the species of *Butia* have spiny petiole margins, in occasional specimens of *B. arenicola* (Barb. Rodr.) Becc. (*Balansa* 4773-G) and *B. capitata* (Mart.) Becc. (*Macedo* 3321-US) some or all of the petioles are merely fibrous along the margins.

At one time, I believed that the multiple-chambered fruit of *Butia* was a valid characteristic to use for separating this genus from *Syagrus*. I have since changed my mind because I recently discovered (Glassman, 1968) in four different species, *Syagrus archeri* Glassm., *S. campicola* (Barb. Rodr.) Becc., *S. graminifolia* (Drude)

Becc., and *S. leptospatha* Burret, the presence of fruits with 1-2 locules (and 1-2 seeds) separated by firm partitions. As previously stated in the above article, all of these species have plicate-sulcate spathes and fibrous petiole margins, and therefore do not belong to *Butia*.

Other important characteristics of *Butia* not mentioned or emphasized by Beccari are the unclustered pinnae which are usually with oblique, split tips. About one-third of the species of *Syagrus* have unclustered pinnae, and pinnae with oblique tips which are occasionally split is also a common occurrence in the genus.

Other indications of the close affinity of *Butia* with *Syagrus* are reports in the literature of *S. romanzoffiana* (Cham.) Glassm. hybridizing with *B. capitata* by Barbosa Rodrigues (1903), Beccari (1916), and Burret (1940) and with *B. eriospatha* by Bondar (1964).

In view of the fact that the genus *Syagrus* seems to have many diverse elements such as groups with trunks and without trunks, clustered and unclustered pinnae, branched and unbranched spadices, armed and unarmed petioles, two-chambered and one-chambered fruits, seeds with homogeneous and ruminant endosperm, and groups with gibbous-uncinate and regular seeds, there is no sound basis for maintaining *Butia* as a genus distinct from *Syagrus*. Perhaps at this time it would be more appropriate to designate *Butia* as a section of *Syagrus*, but this will be done at a later date when my revision of the genus is completed. At any rate, in this paper I am transferring all species of *Butia* that I believe to be fairly clear-cut to the genus *Syagrus*.

Although Beccari (1916) included 14 species and varieties and three possible species, and Bailey (1936) listed 21 different taxa under the genus *Butia*, I am recognizing only five distinct species in the present paper. Main reasons for such a wholesale reduction of taxa are lack of or incomplete type specimens, incomplete and immature specimens of other collections, and many varieties based on cultivated plants (especially in *B. capitata*) which are usually more variable and often have larger dimensions than plants growing in their native habitats.

KEY TO SPECIES OF *Butia* IN THE GENUS *Syagrus*

1. Female flowers 10-16 mm. long, 6-10 mm. wide, mature fruit 3.0-4.2 cm. long.
2. Acaulescent or trunk 1-2 m. tall, 10-20 cm. in diameter, middle pinnae 8-13 mm. wide, up to 50 cm. long, rachis of leaf up to 76 cm. long, up to 42 pairs of pinnae, spathe up to 43 cm. long and 5 cm. wide . . . *S. paraguayensis*.



FIG 4. *Syagrus capitata*. Lectotype. Martius s.n. (M).

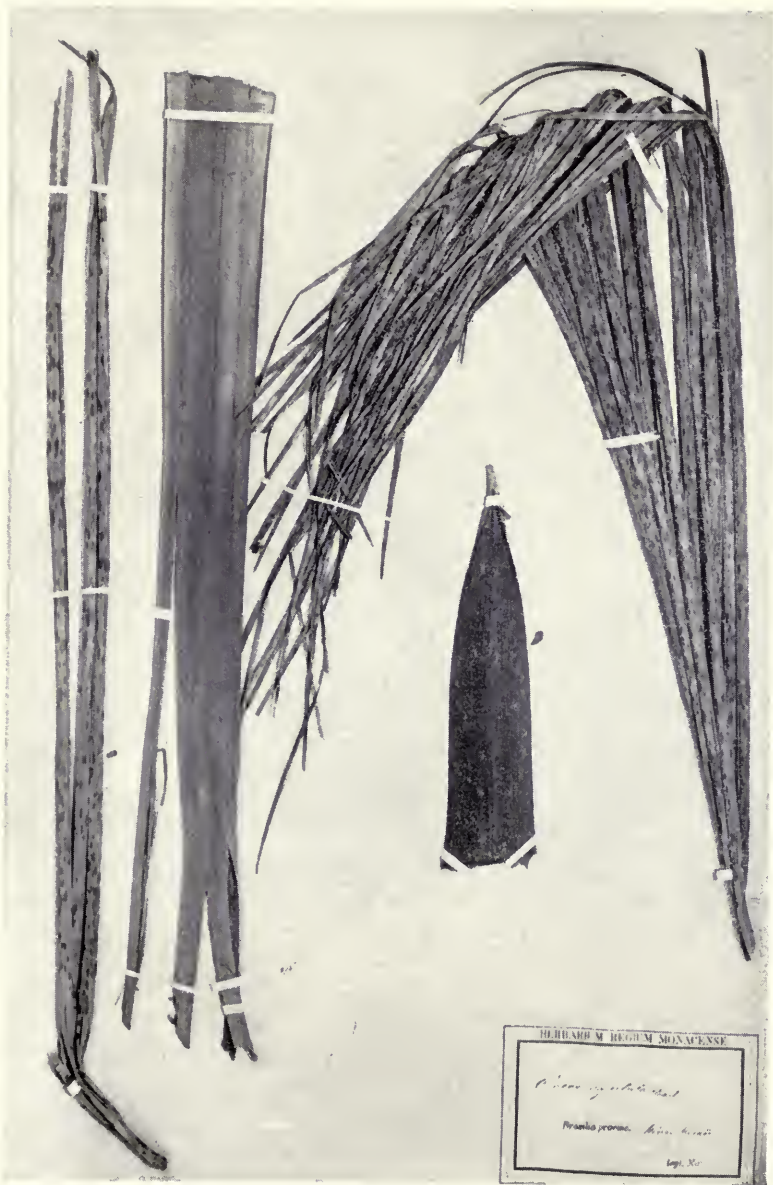


FIG. 5. *Syagrus capitata*. Martius s.n. (M).

2. Tree 8-10 m. tall, up to 40 cm. in diameter, middle pinnae 20-24 mm. wide, up to 81 cm. long, rachis of leaf up to 170 cm. long, up to 72 pairs of pinnae, spathe up to 125 cm. long and 12 cm. wide. *S. yatay*.
1. Female flowers 3-8 mm. long, 4-5 mm. wide, mature fruit 1.5-2.6 cm. long.
3. Tree 3-6 m. tall, middle pinnae 18-27 mm. wide, 60-70 cm. long, spathe up to 135 cm. long, 4-16 cm. wide, spadix with 40-60 branches; petiolar spines frequently only a few mm. long, but in older specimens up to 11 cm. long.
4. Spathe up to 16 cm. wide, densely brownish tomentose on outside, female flowers 3-5(6) mm. long. *S. eriospatha*.
4. Spathe up to 8.5 cm. wide, glaucous on outside, female flowers 4-8 mm. long. *S. capitata*.
3. Acaulescent or with very short trunk, middle pinnae 7-11 mm. wide, up to 40 cm. long, spathe up to 33 cm. long and 3 cm. wide, spadix with up to 22 branches; petiolar spines short, usually not exceeding 2 mm. in length. *S. arenicola*.

Syagrus arenicola (Barb. Rodr.) Frambach ex Dahlg., Field Mus. Nat. Hist. Bot. 14: 264. 1936. Figures 1-3. *Cocos arenicola* Barb. Rodr., Sert. Palm. Bras. 1: 100, t. 75B. 1903. Figure 31B. *Butia arenicola* (Barb. Rodr.) Burret, Notizbl. 10: 1051. 1930; Bailey, Gentes Herb. 4: 46. 1936.

Acaulescent palm or with very short trunk, subterranean woody stem up to 5 cm. long and 8 cm. in diameter (only seen in one specimen). Petiole up to 23 cm. long and 1 cm. wide, margins mostly with short spines, occasionally only fibrous, sheathing base up to 17 cm. long with lateral wings 3 cm. wide; rachis of leaf up to 93 cm. long; pinnae up to 37 pairs, mostly unclustered, more or less glaucous on both surfaces, middle ones up to 40 cm. long, 7-11 mm. wide, mostly with oblique and occasionally split tips; expanded part of spathe up to 30 cm. long and 2.7 cm. wide (33 cm. x 3 cm.—fruiting), mostly with shallow grooves, and glaucous or brownish pubescent on outside, becoming eglaucous or glabrous with age; branched part of spadix up to 28 cm. long, branches up to 22 in number, each up to 18 cm. long; lower male flowers 8-10 mm. long and those above 4-7 mm. long; female flowers 5-8 mm. long and 4-5 mm. wide; fruit (immature) beaked, 2.0-2.3 cm. long and 1 cm. in diameter, partially covered by persistent perianth scales; seeds not seen.

Flowering from May to January.

Type: Paraguay, alto planitie arenosa ad Cordillera de Altos, Jan. 1898-99, Hassler 3761 (G).

Distribution: Paraguay; and Brazil, in the states of Mato Grosso and Minas Gerais?.

Vernacular name: Coquerinho.

Cited specimens: PARAGUAY: Cordillera de Altos, Jan. 1898-99, Hassler 3761 (G, holotype of *Cocos arenicola*; NY); Moquinia Wald, 1914, Chodat 740 (G); Vallee de l'y-acanguazu, pres de Valen-



FIG. 6. *Syagrus capitata*. After Martius (1826, t. 78).

zuela, Nov. 1882, *Balansa 4773* (G). BRAZIL: Mato Grosso-Jaraguay, Campo Grande, Sept. 1936, *Archer & Gehrt 178* (US).

Doubtful specimens: BRAZIL: Minas Gerais-Uberova, July 1855, *Regnell 1288a* (S); Ponte Novo, May, 1950, *Macedo 2401* (US). Without locality, *Burchell 5350, 5799* (K); Oct. 1826, *Riedel 394* (LE).

Syagrus arenicola seems to be a distinct taxon. Some of the specimens examined are fairly complete, especially *Balansa 4773* which is represented by an entire plant with a subterranean stem,



FIG 7. *Syagrus capitata*. After Martius (1826 t. 79).

whole leaves, and spathes and spadices with flowers. Apparently, there are some gaps in distribution, however, between Mato Grosso and Minas Gerais. This may be due to spotty collecting, or to the fact that some immature specimens of *S. capitata* are often indistinguishable from *S. arenicola*. Some specimens, e.g., *Riedel 393* (LE) from Brazil, are not cited here even though the parts repre-



FIG 8. *Syagrus capitata*. Stand of trees in Uruguay. After Herter (1930).

sented are within morphological limits of *S. arenicola* because the trunk is too tall (4-5 feet in this case). Another specimen which I have cited here, *Macedo 2401* (US), has a stem or trunk 1 m. tall. The question is where does one draw the line on the height of the trunk? When fully mature, *S. capitata* is a tree up to 5 m. tall and its pinnae, spathes, and spadices have much larger dimensions than *S. arenicola*. Several specimens I have examined show pinnae within the size range of *S. arenicola*, but spathes and spadices intermediate between the two species or close to the dimensions of either species. Information regarding the trunk size is not always supplied with these collections so that one cannot be sure which species he is looking at. One cannot always be certain that the leaves, or spathes or spadices of a given collection are immature ones from a mature plant (i.e., there is a tendency to collect the smallest leaves or only parts of leaves on a palm because they fit more easily into a plant press), or whether the leaves on a plant are smaller in size because the tree itself is immature. In cases where only portions of the leaf are collected, it is important to determine which section you are examining. Pinnae from the middle part are almost always the widest and often the longest, whereas those from the upper and lower sections are usually much narrower and shorter. Examination of



FIG. 9. *Syagrus capitata*. Note part of plicate-sulcate spathe (upper left) and large petiolar spines (middle left).



FIG. 10. A. *Cocos odorata*. Parts of leaf, petiole, spathe, flowers and part of spadix with fruits. B. *Cocos eriospatha*. External and sectioned view of fruit. C. *Cocos pulposa*. Part of petiole, single pinna, and fruits. After Barbosa Rodrigues, (1903) t. 68.



FIG. 11. *Syagrus eriopatha*. Lectotype. Showing parts of leaf, spadix, and tomentose spathe. Glaziou 8059(K).

large numbers of herbarium specimens and considerable field experience is necessary before some of these problems can be resolved.

Syagrus capitata (Mart.) Glassman, *comb. nov.* Figures 4-9. *Cocos capitata* Mart., Hist. Nat. Palm. 2: 114, t. 78-79. 1826. *Butia capitata* (Mart.) Becc., L'Agric. Colon. 10: 507, t. 5, figs. 7-8. 1916; Bailey, Gentes Herb. 4: 26, fig. 9-15. 1936. Fig. 27, 7-8. *C. elegantissima* Chabaud, Rev. Hort. 77: 516. 1905. *B. capitata* var. *elegantissima* (Chabaud) Becc., l.c. 10: 517, t. 12. 1916. *C. erythrospatha* Chabaud, l.c. 516. *B. capitata* var. *erythrospatha* (Chabaud) Becc., l.c. 515, t. 7A. *C. liliaceifolia* Chabaud, l.c. 516. *B. capitata* var. *liliaceifolia* (Chabaud) Becc., l.c. 518. *B. nehrlingiana* Bailey, Hortus 105. 1930. *B. capitata* var. *nehrlingiana* (Bailey) Bailey, Gentes Herb. 4: 33, fig. 17. 1936. *C. odorata* Barb. Rodr., Pl. Nov. Cult. Jard. Bot. Rio 1: 11, t. 4A. 1891; Sert. Palm. Bras. 1: 92, t. 68A. 1903. Fig. 10. *B. capitata* var. *odorata* (Barb. Rodr.) Becc., l.c. 513, t. 5, fig. 11, t. 8-9, 10B. Fig. 27, 11. *C. pulposa* Barb. Rodr., Pl. Nov. Cult. Jard. Bot. Rio 1: 14, t. 4B. 1891; Contr. Jard. Bot. Rio 2: 38, t. 3f. B, a-c. 1901; Sert. Palm. Bras. 1: 93, t. 68C. 1903. Fig. 10. *B. capitata* var. *pulposa* (Barb. Rodr.) Becc., l.c. 516, t. 5, fig. 10, t. 11. 1916. Fig. 27, 10. *B. capitata* var. *strictior* Bailey, Gentes Herb. 4: 32, fig. 18. 1936. *B. capitata* var. *subglobosa* Becc., L'Agric. Colon. 10: 513, t. 10A. 1916. *B. capitata* var. *virescens* Becc., l.c. 519.

Palm up to 5 m. tall, 40-50 cm. in diameter (fide Beccari). Petiole up to 70 cm. long and 3 cm. wide, margins mostly armed with short teeth, on upper portion, coarse spines up to 11 cm. long on lower part, complete sheathing base not seen; rachis of leaf up to 183 cm. long, pinnae up to 63 pairs, mostly single, but sometimes in loose clusters of 2-3, more or less glaucous on both surfaces, middle ones 60-70 (75) cm. long, 1.5-2.0 (2.7) cm. wide, mostly with oblique, split tips; expanded part of spathe 40-100 cm. long, 4.0-8.5 cm. wide, mostly with shallow grooves, more or less glaucous outside, becoming eglaucous with age; branched part of spadix up to 94 cm. long, branches about 40-60 in number, each up to 62 cm. long; lower male flowers 7-10 mm. long, those above 4-7 mm. long; female flowers 4-8 mm. long and 4-6 mm. wide; fruit ovoid, with short beak, up to 26 mm. long and 22 mm. in diameter (fide Beccari), locules usually two, sometimes one or three, seeds 18-24 mm. long, 10-14 mm. in diameter (fide Beccari).

Flowering from May to September.

Type: Brazil, Minas Gerais, campis, Aug., *Martius* s.n. (M).

Distribution: Endemic to Brazil, in the states of Minas Gerais, Goiás, São Paulo, Paraná, Santa Catarina, and Rio Grande do Sul (where it is common in "campos sablonneux," fide Beccari, 1916); and from Uruguay, fide Herter, 1930 (see Fig. 8).

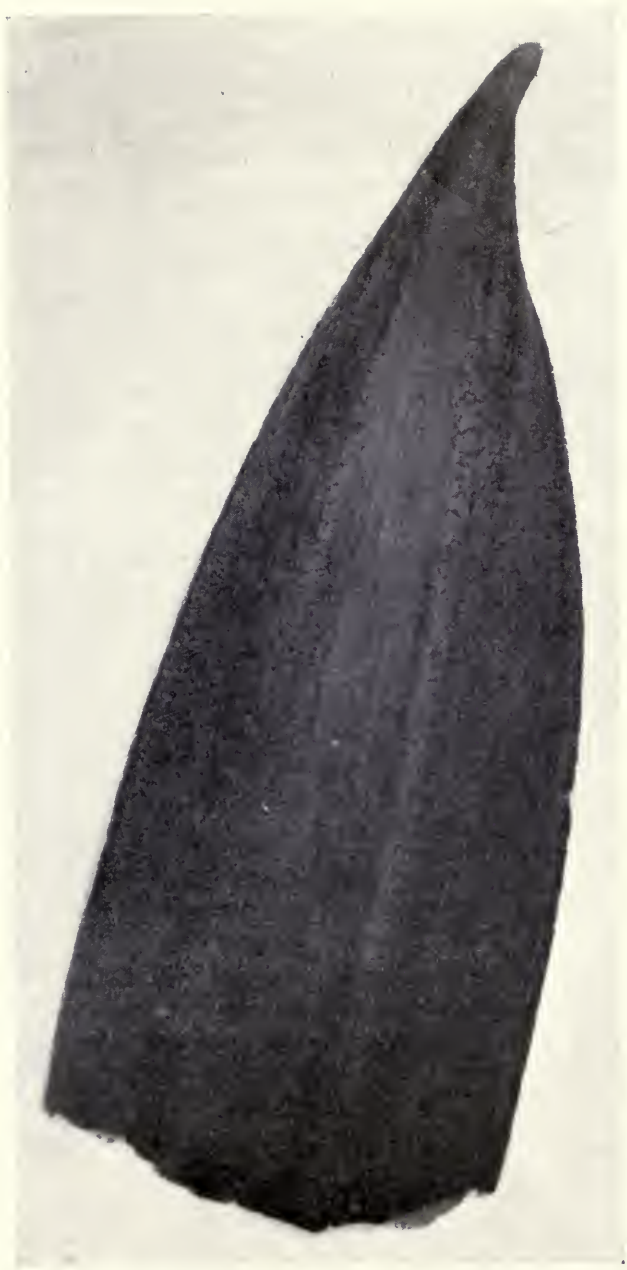


FIG. 12. *Syagrus eriospatha*. Showing part of tomentose spathe. P. J. Greenway 1039(K).

Vernacular names: Cabeçudo, Guariroba do campo.

Cited specimens: BRAZIL: Minas Gerais—*Martius s.n.* (M, lectotype of *Cocos capitata*); Campo Alegre, June 1950, *Macedo 2424* (US). Goiás—Chapada de N.I. d'Adabia, moist wooded places, May 1840, *Gardner 4388* (K); Balsamo, July 1951, *Macedo 3321* (US). Paraná—Tamandaré, in campo, Sept. 1914, *G. Jonsson 985a* (F, G, K, NY, S). Santa Catarina—Sombrio, in campo, Jan. 1949, *P. R. Reitz 2965* (G). Rio Grande do Sul—*Glaziou 8047* (C, K).

Cultivated: Argentina, Tucuman, Nov. 1927, *Venturi 5594* (US); Uruguay, Montevideo, March 1930, *Herter 346a* (F, G, GH, LE, NY, S), Dept. Rocha, Oct. 1930, *346b* (F, G, GH); Brazil, Rio de Janeiro, *Glaziou 9334* (C, LE), *16481* (C, K, LE), *20535* (C, K), *Herb. Saldanha 6516* (R), *Dahlgren & Millar 611648* (F); Italy, La Mortola, Ventmiglia, 1895, *Hanbury s.n.* (K); Texas, Houston, May 1960, *A. Traverse 1520* (GH).

Varieties of this species described or transferred by Beccari and Bailey are not recognized here as being distinct because they are either based on cultivated specimens or merely on illustrations. As mentioned previously, *S. capitata* is very variable in different stages of growth and sometimes it is even difficult to distinguish it from *S. arenicola* because of immature or incomplete herbarium specimens.

Syagrus capitata seems to be most closely related to *S. eriospatha* from southern Brazil because both are trees about the same size, have pinnae approximately the same length and width, and have spadices about the same size. The former species, however, is easily distinguished from *S. eriospatha* in the glaucous, rather than brown tomentose, spathes which are much narrower at maturity, and usually by the longer ovoid fruits rather than shorter, globose fruits (up to 26 mm. long and 22 mm. in diameter rather than 18–19 mm. long and 17–18 mm. in diameter).

Syagrus eriospatha (Mart. ex Drude) Glassman, *comb. nov.* Figures 11–12. *C. eriospatha* Mart. ex Drude, Fl. Bras. 3: 424. 1881; Becc., *Malpighia* 1: t. 9, figs. 10–12. 1887; Lindman, Bih. Sv. Vet. Akad. Handl. 26 III: 23. 1900; Barb. Rodr., Contr. Jard. Bot. Rio 1: 31, t. 3D. 1901; Sert. Palm. Bras. 1: 91, t. 68B. 1903. Fig. 10 *B. eriospatha* (Mart. ex Drude) Becc., L' Agric. Colon. 10: 496. 1916; Bailey, *Gentes Herb.* 4: 44, figs. 24–27. 1936.

Palm up to 6 m. tall, about 50 cm. in diameter (fide Bailey and Beccari). Petiole up to 100 cm. long, margins armed with short teeth or spines up to 2 cm.



FIG. 13. *Syagrus paraguayensis*. Lectotype. Hassler 896(G).

Dr. E. Hassler, Plantae Paraguarienses. - 1885/95.

no 248

Acquis et inter. dans l'Herb. général
Genève, 1904

Paraguayensis Hassler

Spécimen prêt par le Conservatoire botanique
GENÈVE (Suisse)
Attention! Ne rien écrire sur cette étiquette qui sera retirée lors
de la réinstallation de la plante.

1645/62

FIG. 14. *Syagrus paraguayensis*. Part of lectotype.



FIG. 15. *Syagrus paraguayensis*. After Barbosa Rodrigues (1903, t. 82).

or more long, sheathing base partly covered with brownish tomentum; rachis of leaf up to 2.5 m. long, pinnae 50 or more pairs (fide Beccari and Bailey), unclustered mostly glabrous above, more or less glaucous below, middle ones up to 80 cm. long and 2.3 cm. wide, mostly with oblique, split tips; expanded part of spathe up to 135 cm. long and 16 cm. wide, covered with a dense brownish tomentum, becoming glabrous with age; branched part of spadix up to 100 cm. long (fide Bailey), branches numerous, each up to 40 cm. or more long; lower male flowers 6–8 mm. long, those above 4–5 mm. long; female flowers 3–5 (6) mm. long (7–9 mm. long—fide Bailey) and 3.5–5.0 mm. wide; fruit usually globose, with short beak, 18–19 mm. long and 17–18 mm. in diameter (up to 20 mm. long and 26 mm. in diameter—fide Bailey), locules 1–3, seeds globose, 14–16 mm. in diameter, or oblong, 15 mm. long and 10 mm. in diameter (fide Beccari and Bailey).

Flowering from April to December.

Type: Brazil, Rio Grande do Sul, 1876, *Glaziou 8059* (K).

Distribution: Endemic to Brazil in the states of Rio Grande do Sul and Sant Catarina.

Vernacular names: Butia, Macumá.

Cited specimens: BRAZIL: Rio Grande do Sul—1876, *Glaziou 8059* (K, lectotype of *Cocos eriospatha*; C).

Cultivated: Brazil, São Paulo—Ypiranga, Nov. 1907, *Luederwaldt 6.191* (SP); Campinas, April 1942, *A.S. Lima 6748* (SP); Rio de Janeiro, *Glaziou 8050* (G). Cuba, Soledad, Aug. 1931, *Jack 8296* (A, NY). East African Agricultural Research Station, Amani, Dec. 1928, *P. J. Greenway 1039* (K).

In his original description, Drude (1881) lists *Glaziou 296* and *8059*, but I have seen only the latter number. I have designated *Glaziou 8059* from Kew as the lectotype because it represents a more complete collection than those from Copenhagen, and furthermore the Kew specimen was annotated by Drude. Beccari (1916) cites *Glaziou 8059* (FI) with the following data: "Spontané dans les campos de Rio Grande-do-Sul et de Santa Catharina et cultivé dans les jardins publics de Rio-Janeiro ou il fleurit en Novembre et Décembre."

Lindman (1900, fig. 6) illustrates a tree of *Cocos eriospatha*, but Beccari (1916) says that this is actually *Butia yatay*. In t. 1A, the fruits illustrated by Lindman appear to be a mixture of *S. yatay* or *S. capitata* and *S. eriospatha*.

Syagrus eriospatha is a distinctive species characterized by brownish tomentose spathes, relatively small female flowers and globose fruits. As previously stated, it appears to be most closely related to *S. capitata*.



FIG. 16. *Syagrus paraguayensis*. Showing spathe which is partially plicate-sulcate, spadix and spadix branches with flowers. T.M. Pedersen 3030(K).

Syagrus paraguayensis (Barb. Rodr.) Glassman, *comb. nov.*
Figures 13-17. *C. paraguayensis* Barb. Rodr., Palm. Nov. Parag. 9. t. 2. 1899; Palm. Hassler. Nov. 12. 1900; Sert. Palm. Bras. 1: 110, t. 82. 1903. *B. paraguayensis* (Barb. Rodr.) Bailey, Gentes Herb. 4: 47. 1936. *B. yatay* var. *paraguayensis* (Barb. Rodr.) Becc., L'Agric. Colon. 10: 503. 1916. Fig. 27, 3.

Acaulescent or with trunk 1-2 m. tall, 10-20 cm. in diameter. Petiole 45-48 cm. long (fide Barb. Rodr.), margins mostly with short spines, interspersed with fibers, sheathing base about 20 cm. long; rachis of leaf up to 76 cm. long; pinnae up to 42 pairs, mostly unclustered, more or less glaucous above, mostly green below, middle ones up to 50 cm. long, 8-13 mm. wide, mostly with oblique, split tips; expanded part of spathe up to 43 cm. long and 5 cm. wide, mostly with shallow grooves and brownish pubescent on outside, becoming glabrous with age; branched part of spadix up to 38 cm. long, branches up to 43 in number, each up to 23 cm. long; lower male flowers 8-13 mm. long and those above 4-7 mm. long; mature female flowers 10-16 mm. long and 6-9 mm. wide; fruit ovoid, 3.0-3.7 cm. long, 2.1-2.3 cm. in diameter (fide Barb. Rodr.); seeds not seen.

Flowering from January to October.

Type: Paraguay, in rupestribus Cordillera de Altos, Aug. 1885-1895, *Hassler 896* (G).

Distribution: Paraguay, and Argentina in the province of Corrientes.

Vernacular name: Yatay guazu.

Cited specimens: PARAGUAY: Cordillera de Altos, Aug. 1885-95, *Hassler 896* (G, lectotype of *Cocos paraguayensis*; K, NY), Sept. 1902, *Fiebrig 62* (G); Centurion, between Rios Apa and Aquidaban, Oct. 18, 1908-09, *Fiebrig 4097* (G, GH, K, M). ARGENTINA: Corrientes-Loma Alta, Dept. Mburucuyá, April, 1954, *T.M. Pederesen 3030* (G, GH, K, NY, S).

Doubtful specimens: Paraguay, Campos, Jan. 1932, *Jorgensen & Hassler 4185* (A, C, F, S).

In his original publication, Barbosa Rodrigues (1899) lists the type locality as "in Paraguay, ad S. salvador prope Tagatiya" without mentioning any actual specimens. In a later paper (1903), however, he listed *Hassler 896* under *C. paraguayensis*. Therefore, I have designated this specimen from Geneva as the lectotype.

Even though specimens of *S. paraguayensis* which I have examined seem to be distinct from *S. yatay*, it is possible that they came from immature trees of *S. yatay* or represent immature parts from mature trees of *S. yatay*. All of the characteristics used to distinguish the two taxa, i.e., size of trunk, size and number of



FIG. 17. *Syagrus paraguayensis*. Showing whole leaf blade and part of petiole with spines interspersed with fibers. T.M. Pedersen 3030(NY).

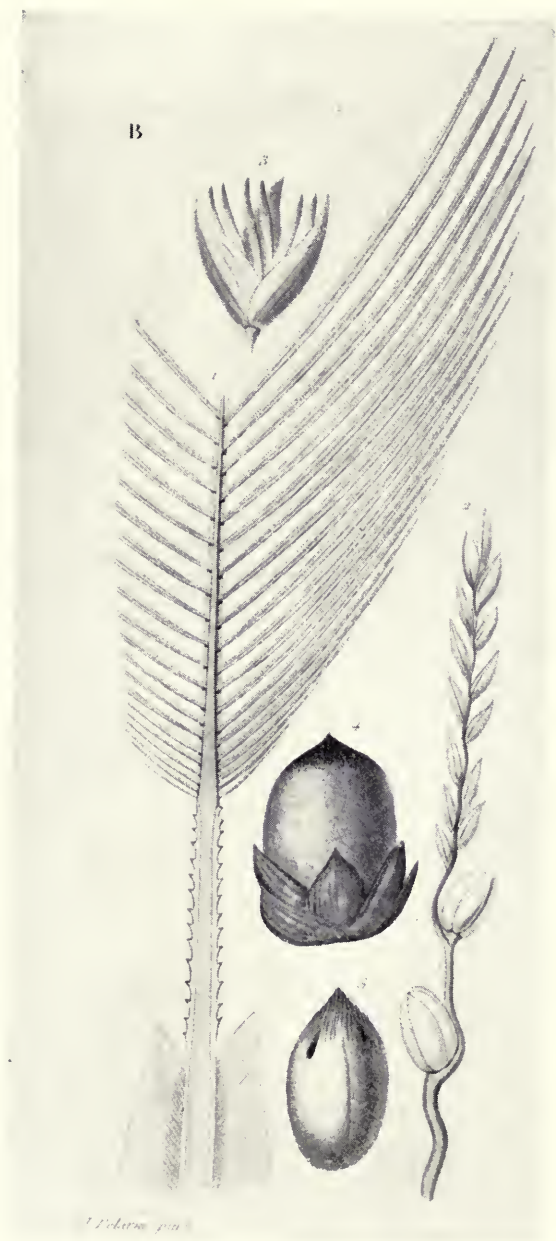


FIG. 18. *Syagrus yalay*. Type. After Martius (1844, t. 30B).



FIG. 19. *Syagrus yalay*. Stand of trees and individual trees in Argentina. After Bailey (1936, fig. 21).



FIG. 20. *Syagrus yatai*. Showing part of sheathing base and parts of petiole.
T.M. Pedersen 4456(NY).

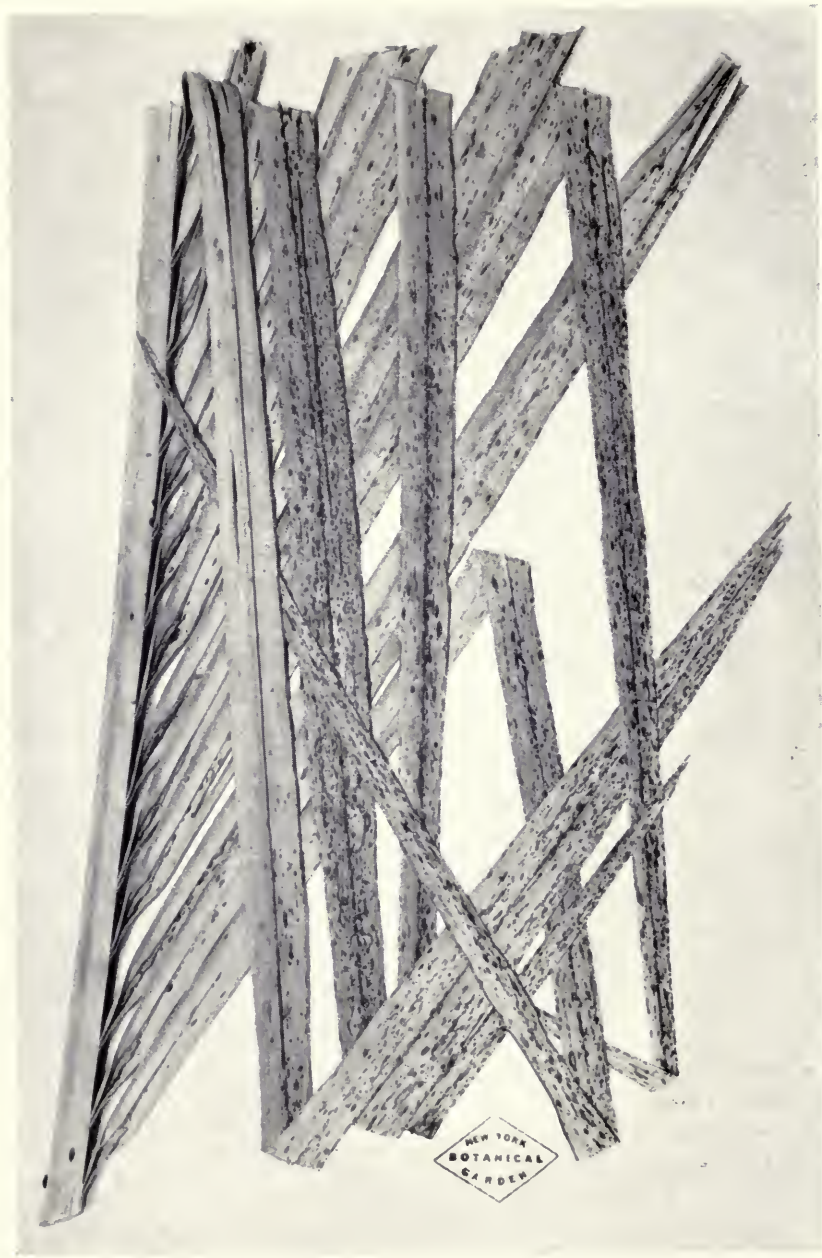


FIG. 21. *Syagrus yatay*. Showing part of leaf. Pedersen 4456(NY).

pinnae, and size of spathes, could vary with age of the plant or degree of maturity of the parts involved. *Jorgensen & Hassler 4185* (A, C, F, S) is a case in point. I have included these collections under Doubtful Specimens because the pinnae are very narrow and relatively short like *S. paraguayensis*, but the label says "(trunk) 4-6 m." which is closer to the size of *S. yatay*. Information on the label of the lectotype says "trunk 1-2.5 m. tall," that of *Fiebrig 4097* says "without stem," whereas the label of *Pedersen 3030* gives no information on the size of the trunk. Until some of the ideas listed above can be substantiated with field observations and until more complete information on the geographic distribution of the two species can be obtained, I am obliged to maintain *S. paraguayensis* as a distinct taxon.

Syagrus yatay (Mart.) Glassman, *comb. nov.* Figures 18-24. *C. yatay* Mart., *Palmet. Orbign.* 93, *t. 1*, fig. 1, *t. 30B*. 1844; Drude, *Mart. Fl. Bras.* 3: 421, *t. 94-95*. 1881. *B. yatay* (Mart.) Becc., *L'Agric. Colon.* 10: 498, *t. 6*. 1916; Bailey, *Gentes Herb.* 4: 41-44, *figs. 21-23*. 1936.

Palm 8-10 m. tall, up to 40 cm. in diameter, old petiole bases persistent on trunk when young, eventually dehiscing completely. Petiole up to 54 cm. long (50-70 cm. long—fide Beccari), margins armed with coarse spines up to 3 cm. or more long on lower part, spines becoming gradually smaller on upper part, sheathing base up to 60 cm. long; rachis of leaf up to 170 cm. long (2-3 m. long—fide Beccari), pinnae up to 72 pairs, mostly single, middle ones up to 81 cm. long and 2.4 cm. wide, mostly with oblique, split tips; expanded part of spathe up to 125 cm. long (fide Bailey) and 12 cm. wide, mostly with shallow grooves, more or less glaucous outside; branched part of spadix up to 82 cm. or more long, branches up to 100 or more in number, each up to 32 cm. or more long; lower male flowers 8-11 mm. long, those above 5-8 mm. long; female flowers 10-14 mm. long, 7-10 mm. wide; fruit ovoid or more or less conical, with prominent beak, 30-42 mm. long, 25-28 mm. in diameter, locules 1-3; seeds 25-30 mm. long, 12-14 mm. in diameter (fide Beccari).

Flowering from November to February.

Type: t. 30B, Martius (1844).

Distribution: Endemic to Argentina in the provinces of Corrientes and Entre Rios (forming great forests in sandy areas of these two provinces—Bailey, fig. 21, 1936); and listed from Paraguay, and Brazil in the state of Rio Grande do Sul, by Bondar (1964), and from Uruguay, in the Department of Rocha where it forms extensive natural stands, by Beccari (1916).

Vernacular name: Yatay.

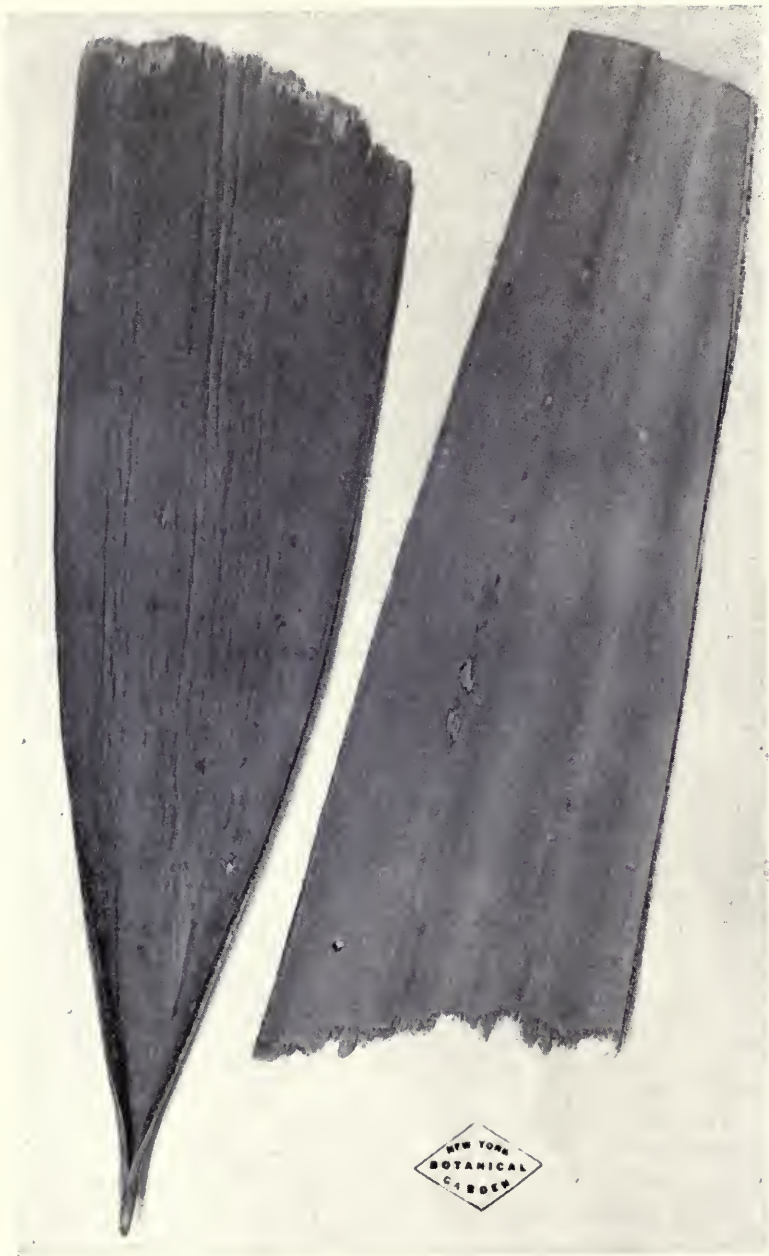


FIG. 22. *Syagrus yatai*. Showing almost complete spathe. T. M. Pedersen 4456(NY).



FIG. 23. *Syagrus yatai*. Showing part of spadix with flowers. T. M. Pedersen 4456(NY).



FIG. 24. *Syagrus yatai*. Mature fruits. After Beccari (1916, t. 6).

Cited specimens: ARGENTINA: Corrientes-Goya, Nov. 1913, *Curran s.n.* (US); Dept. Mburucyua, Estancia Santa Teresa, sandy soil, often forming extensive groves, Jan. 1957, *T. M. Pedersen 4456* (GH, NY, S). Entre Rios-Concordia, Feb. 1937, *Castellanos 31/974* (K).

Cultivated: Uruguay, April 1926 *Herter 346* (F, G, NY, S, SP).

As stated previously, it is not certain whether *S. paraguayensis* represents immature stages of *S. yatay*, or whether it is normally a small plant with smaller dimensions than *S. yatay*. *Syagrus yatay* is very distinct and can be separated easily from mature plants of *S. arenicola*, *S. capitata*, and *S. eriospatha* by the larger female flowers and larger fruits.

No type specimens were listed by Martius (1844) for *Cocos yatay*, however illustrations of the leaf, flowers, and fruits (*t. 30B*), although not exactly diagnostic, can be substituted for a type specimen in this case (see Fig. 18).

DOUBTFUL OR UNCERTAIN SPECIES

COCOS AMADELPHA Barb. Rodr., Palm. Hassl. Nov. 7. 1900; Sert. Palm. Bras. 1: 98, *t. 72*. 1903. Figure 25. *Butia amadelpa* (Barb. Rodr.) Burret, Notizbl. 10: 1050. 1930. *Syagrus amadelpa* (Barb. Rodr.) Frambach ex Dahlgr., Field Mus. Nat. Hist. Bot. Ser. 14: 264. 1936.

Cocos amadelpa was based on *Hassler 6083* from Capibary in Paraguay. Unfortunately, I have not been able to find any specimens at Geneva where most of Hassler's collections were deposited, or any other herbaria. According to Barbosa Rodrigues' description, the plant is acaulescent with arcuate leaves, has narrow pinnae with oblique, split tips, smooth (non-plicate) spathes, and female flowers 14–15 mm. long. Petioles and fruits are not described, but the description and illustration (*t. 72*) of this species seem to fit *Butia*. It appears to be most closely related to *S. paraguayensis*, however, since the type specimen has not been seen, I can't be certain as to its correct identity.

COCOS BARBOSII Barb. Rodr., Sert. Palm. Bras. 1: 86, *t. 67*. 1903; Becc., L'Agric. Colon. 10: 611. 1916. Figure 26.

According to Beccari (1916), this species does not seem to be different from *Butia bonneti* Becc. In his original article, Barbosa Rodrigues does not cite any specimens, but lists the type locality



COCOS AMADELPA

FIG. 25. *Cocos amadelpa*. After Barbosa Rodrigues (1903, t. 72).



FIG. 26. *Cocos barbosaii*. After Barbosa Rodrigues (1903, t. 67).



FIG. 27. Fruits of various taxa of *Butia*. 1-2. *B. yatay*. 3. *B. yatay* var. *paraguayensis*. 4-6. *B. bonneti*. 7-8. *B. capitata*. 10. *B. capitata* var. *pulposa*. 11. *B. capitata* var. *odorata*. 12. *B. leiospatha*. After Beccari, (1916. t. 5).

as Minas Gerais, Alfenas, Cabo Verde. In *t.* 67, the petiole seems to be without spines, the fruits are single chambered, and it cannot be ascertained if the spathe is smooth or grooved because the view is from the inside. Since no type specimen is available for study, *C. barbosii* must be considered a doubtful species.

BUTIA BONNETI Becc., L'Agric. Colon. 10: 504, *t.* 5, fig. 4-6. 1916; Bailey, Gentes Herb. 4: 36, fig. 19. 1936. Figure 27, 4-6.

Originally published under *Cocos bonneti* Linden by Wendland (1878) as a name only. Beccari (1916) validated the specific epithet by including a description of it under *Butia*. This palm was introduced as seeds from Mexico and planted in Hyeres, France by Linden. Beccari's description is summarized as follows: smaller than *B. capitata*, with shorter, arcuate leaves, petiole with more slender spines, pinnae 30-35 cm. long and 12-15 mm. wide, spathe narrow fusiform, glaucescent, flowers small, fruit ovate, 2.0 cm. long and 1.5 cm. in diameter, seeds 14-16 mm. long and 7-9 mm. in diameter. Beccari also includes three illustrations of fruits (Fig. 27, 4-6), but does not list any type specimens. In addition to this, he equates *Cocos leiospatha* var. *angustifolia* Drude with this Taxon. Bailey (1936) discusses *B. bonneti* at length and includes a plate of a tree purporting to be this species, but he essentially follows Beccari's conclusions. It is possible that *B. bonneti* represents an immature growth stage of *S. capitata*, but without type specimens it would be difficult to definitely tell what it may be.

COCOS DYERANA Barb. Rodr., Bull. Herb. Boiss. ser. 2 (3): 626. 1903; Sert. Palm. Bras. 1: 95, *t.* 76B. 1903. Figures 28-29. *Syagrus dyerana* (Barb. Rodr.) Becc., L'Agric. Colon. 10: 466. 1916. *Butia?* *dyerana* (Barb. Rodr.) Burret, Notizbl. 13: 696. 1937.

Specimen examined. PARAGUAY: Concepcion, Aug. 1901-2, Hassler 7166 (G, holotype of *Cocos dyerana*).

Unfortunately, the holotype as well as the illustration by Barbosa Rodrigues (*t.* 76) lack petioles, spathes, and fruits. The size of the trunk (2-4 m.) and female flowers (12-14 mm. long) could place it in *S. yatay*, but the middle pinnae are up to 63 cm. long and only 1 cm. wide. Since the type specimen and description of this palm is incomplete, I cannot be certain where it belongs. From the information I do have, however, *C. dyerana* seems to be closer to *S. yatay* than any other species.

COCOS LEIOSPATHA Barb. Rodr., Rev. Hort. 2: 23, fig. 7. 1877; Sert. Palm. Bras. 1: 81, *t.* 61A, 62B. 1903; Drude, Mart. Fl. Bras.

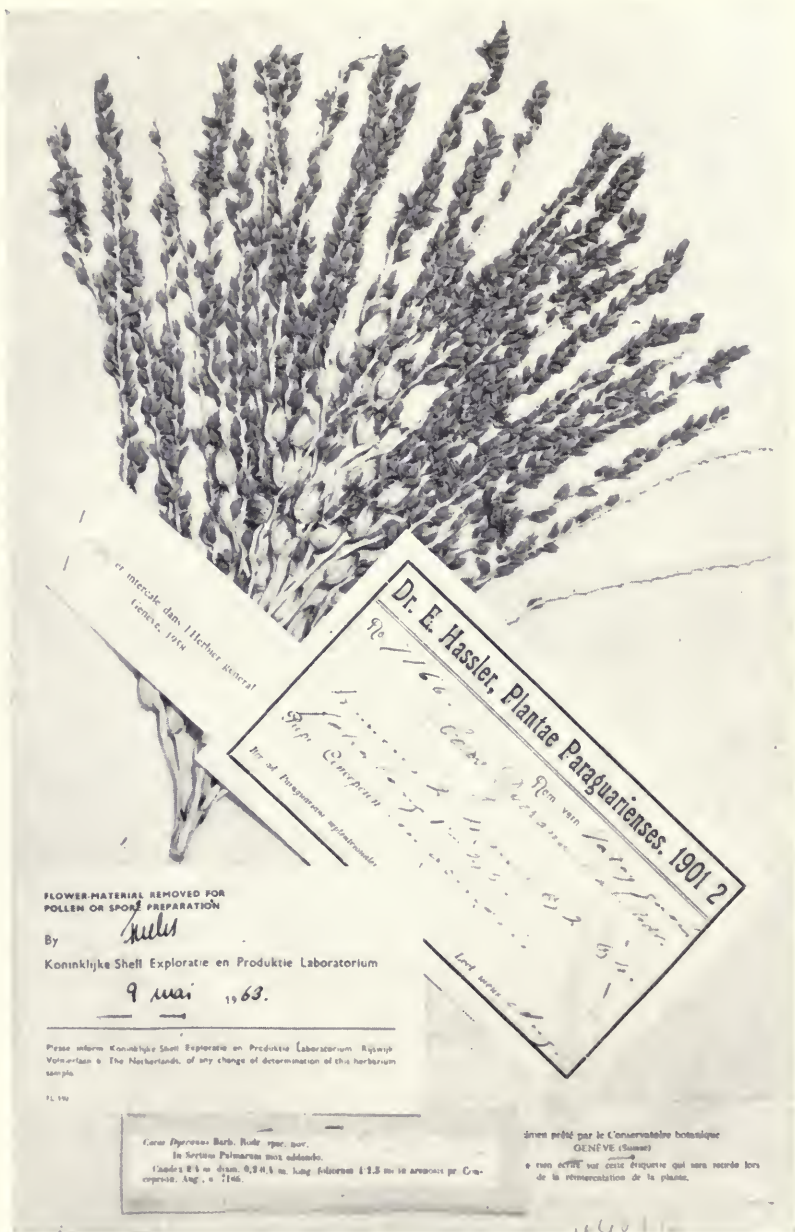


FIG. 28. *Cocos dyerana*. Holotype. Hassler 7166(G).

3: 423, t. 96, fig. 1. 1881. Figure 30, I. *Butia leiospatha* (Barb. Rodr.) Becc., L'Agric. Colon. 10: 520. 1916. Figure 27, 12. *Cocos capitata* var. *leiospatha* (Barb. Rodr.) Berger, Hort. Mortol. 87. 1912.

In neither of his articles does Barbosa Rodrigues cite any specimens, but does mention one locality, Serra do Aguapé, state of Minas Gerais, Brazil. Originally, he described the plant as "acaulescent, rarely with a stem," but illustrated a fairly large tree (his fig. 7). Beccari (1916) considers this species to be a variety of *Butia capitata*. Judging from the descriptions and illustrations I have seen, *Cocos leiospatha* seems to be an immature growth stage of *Syagrus capitata*.

COCOS LEIOSPATHA var. *ANGUSTIFOLIA* Drude, Mart. Fl. Bras. 3: 423, t. 96, fig. 2. 1881. Figure 30, II.

Specimen examined: BRAZIL: Minas Gerais, Lagoa Santa, *Warming 1845* (C, lectotype).

In addition to the above specimen, Drude also cites *Sello*, without locality, but I have not seen this one. The lectotype consists of two leaf parts in which the pinnae are only 31 cm. long and 6 mm. wide. Drude's description is rather brief, but says that the trunk is 2-3 feet tall. As mentioned before, Beccari (1916) equates this variety with *Butia bonneti*. Because of the incomplete description and poor type specimen it is extremely difficult to put a final determination on *Cocos leiospatha* var. *angustifolia*. If I had to hazard a guess, I would say that it is either *S. arenicola* or an immature stage of *S. capitata*.

BUTIA MICROSPADIX Burret, Notizbl. 10: 1050. 1930; Bailey, Gentes Herb. 4: 47. 1936.

This palm has been previously discussed by me in another article (Glassman, 1968). I have been unable to locate the holotype (*Selow s.n.*) and the paratype (*J. Keller s.n.*) of this species, cited by Burret, because they were probably destroyed in the Berlin-Dahlem herbarium during World War II. Burret listed another specimen "very near to this species" which I have seen: BRAZIL. Rio Grande do Sul, *Luederwaldt 12267* (SP). This specimen shows a striking resemblance to *Syagrus hatschbachii* Glassm. from Paraná, Brazil, but it is immature and cannot be determined with certainty. Therefore, I have designated *Butia microspadix* as *species incerta*.

COCOS PONI Hauman, Physis 4: 604, figs. 1-2. 1919. *Butia poni* (Hauman) Burret, Notizbl. 10: 1051. 1930; Bailey, Gentes Herb. 4: 48. 1936.

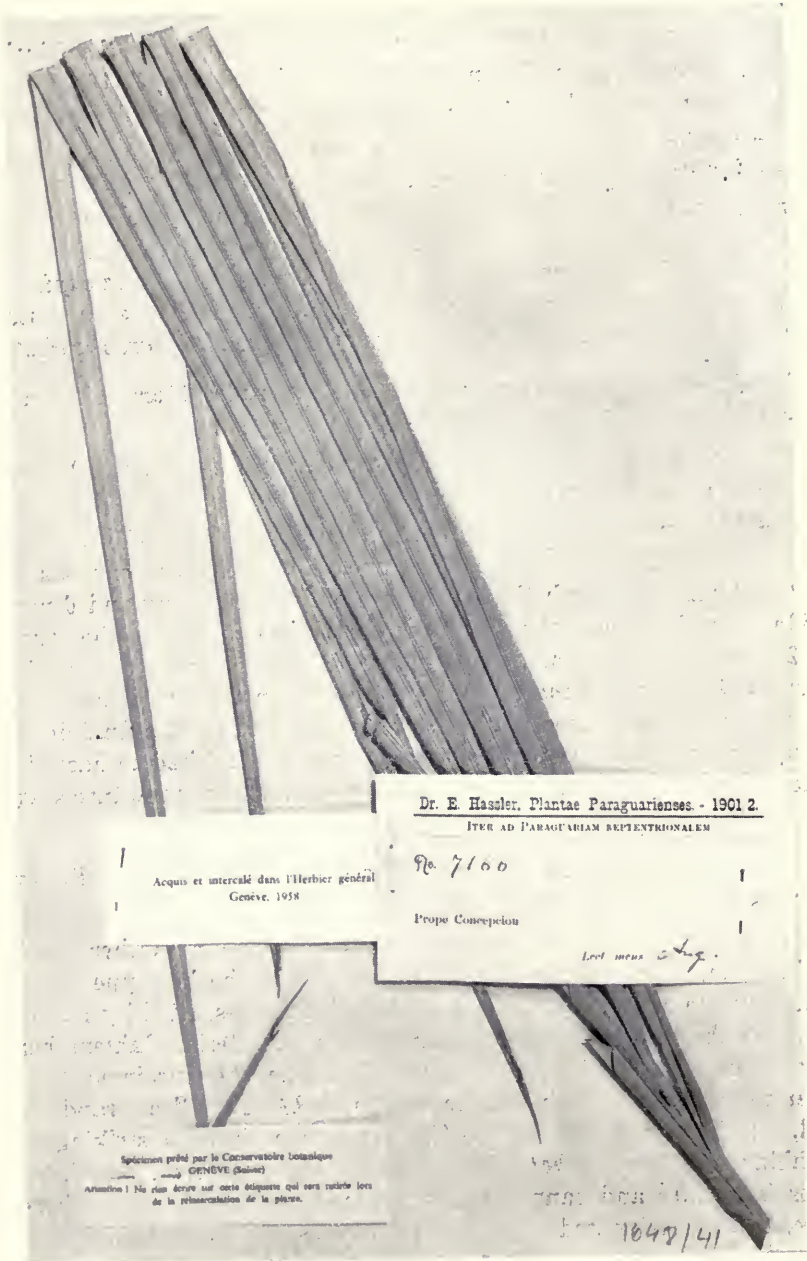
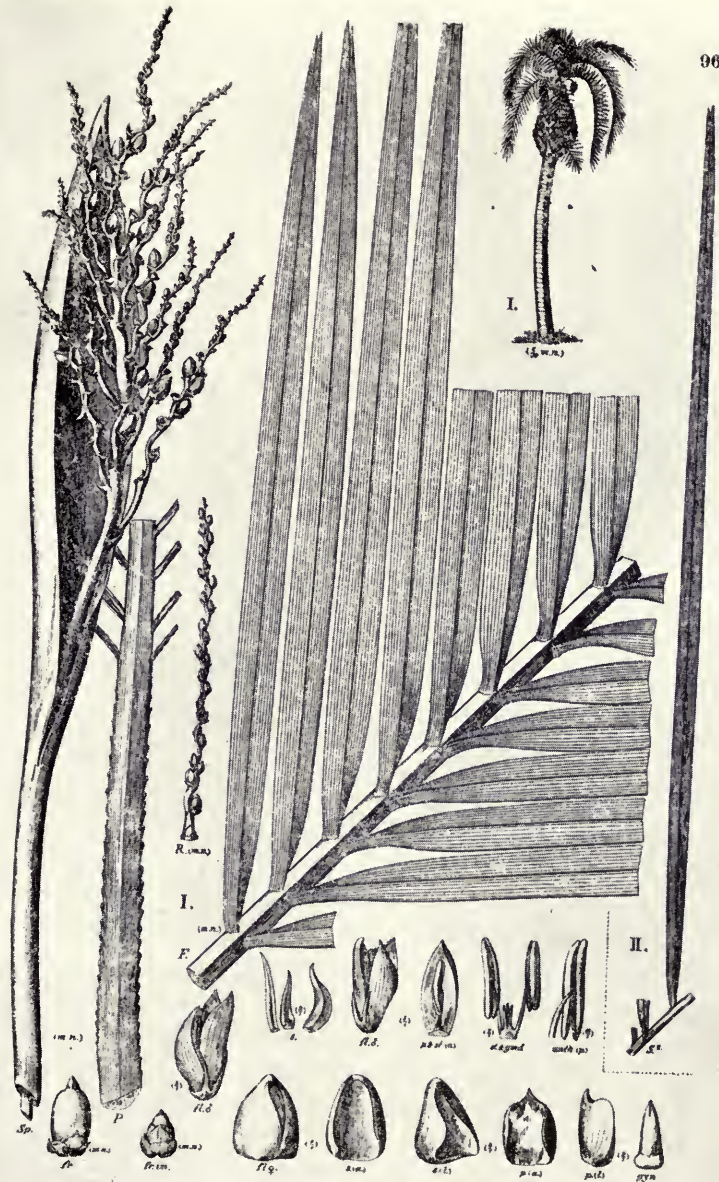


FIG. 29. *Cocos dyerana*. Part of holotype. Hassler 7166(G).



COCOS I. *leiospatha*, II. var. *angustifolia*.

FIG. 30. I. *Cocos leiospatha*. After Drude, (1881, t. 96, fig. 1). II. *C. leiospatha* var. *angustifolia*. After Drude, (1881, t. 96, fig. 2).



FIG. 31. A. *Cocos wildemaniana*. After Barbosa Rodrigues, (1903, t. 75A).
B. *Cocos arenicola*. After Barbosa Rodrigues, (1903, t. 75B).

Hauman's description of this plant is inadequate, but his illustrations show a very small palm with small leaves, narrow pinnae, a small spathe and a spadix with about 30 branches, and a cluster of ovate fruits. He says that the plants grow in savannas in Misiones, Argentina, however no specimens are cited. From the information available it is impossible to tell where to place this palm. If the size of the female flowers were known, I may be able to tentatively identify it as *S. arenicola* or *S. paraguayensis*. It is also possible that *Cocos poni* is an immature stage of *S. yatay*.

BUTIA PUNGENS Becc., L'Agric. Colon. 10: 523. 1916; Bailey, Gentes Herb. 4: 48. 1936.

I have not seen the specimen cited by Beccari: ARGENTINA: Campina de Americo, Feb. 1907, *Spegazzini s.n.* Beccari equates this species with *Cocos acaulis* ssp. *glauca* Drude ex Lindman, but I have shown elsewhere (Glassman, 1968) that this subspecies is probably the same as *Syagrus campylospatha* (Barb. Rodr.) Becc. According to Beccari's description (small palm, rachis of leaf 130 cm. long, pinnae 30-35 cm. long, 10-12 mm. wide, female flowers 13-15 mm. long and 9 mm. in diameter), *B. pungens* is probably close to *S. paraguayensis* or may be an immature growth stage of *S. yatay*.

COCOS STOLONIFERA Barb. Rodr., Contr. Jard. Bot. Rio 2: 40, t. 4, fig. A. 1901; Sert. Palm. Bras. 1: 89, t. 62A. 1903. *Butia stolonifera* (Barb. Rodr.) Becc., L'Agric. Colon. 10: 492. 1916.

Barbosa Rodrigues described this plant as being acaulescent with long subterranean stolons and having short spiny petioles, but apparently the spadices, flowers, and fruits were not seen by him. He lists the following locality: URUGUAY. Pan d' Azucar, pr. Montevideo (cult. Jard. Bot. Rio no. 2259), but does not cite any definite specimens. Because of the lack of information, I am designating this palm as *species dubia*.

COCOS WILDEMANIANA Barb. Rodr., Sert. Palm. Bras. 1: 101, t. 75A. 1903. Figure 31, A. *Butia wildemania* (Barb. Rodr.) Burret, Notizbl. 10: 1050. 1930. *Syagrus wildemania* (Barb. Rodr.) Frambach ex Dahlgr., Field Mus. Nat. Hist. Bot. 14: 270. 1936.

Barbosa Rodrigues cited the following: PARAGUAY. Rio Apa, *Hassler 8554*. Unfortunately, I have not been able to find this specimen at the herbarium in Geneva, Switzerland where most of Hassler's original collections are deposited. Although exact size

of the female flowers and nature of the petiole are not given in the description, the illustration (*t.* 75A), the acaulescent habit and other characteristics indicate that *C. wildemaniana* may be closely related to *S. paraguayensis*.

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