
New Species and Combinations of *Catostemma* and *Pachira* (Bombacaceae) from the Venezuelan Guayana

William S. Alverson

Department of Botany, Birge Hall, University of Wisconsin,
Madison, Wisconsin 53706, U.S.A.

ABSTRACT. Julian A. Steyermark had completed an extensive study of the Bombacaceae of southern Venezuela, but died before he was able to complete a treatment for the *Flora of the Venezuelan Guayana*. This paper lays the final groundwork for publication of this treatment and includes two new species, *Catostemma durifolius* and *Pachira yapacanae*, and nineteen new combinations in *Pachira*, into which all Venezuelan Guayanian species of *Pochota*, *Bombacopsis*, and *Rhodognaphalopsis* are placed.

CATOSTEMMA AND RELATIVES

Catostemma Benthham is a small genus of 10–14 species found in forests of northern Brazil, southern Venezuela, the Guianas, and Colombia (Steyermark, 1987; Paula, 1969). This genus and the closely related *Aguiaria* Ducke (1 species) and *Scleronema* Benthham (4–5 species) are placed in the tribe Catostemmatae of the Bombacaceae, based on their unifoliolate-compound leaves, few(1–4)-seeded fruits, and their largely free staminal filaments (Hutchinson, 1967). After reading a description of the palmately compound juvenile leaves of *Catostemma commune* Sandwith (Sandwith, 1931), Hutchinson surmised that the adult leaves of *Catostemma* were unifoliolate-compound. A more recently discovered species, *Catostemma digitatum* J. D. Shepherd & W. S. Alverson, retains palmately compound (i.e., polyfoliolate) leaves into adulthood (Shepherd & Alverson, 1981). In contrast, no palmately compound juvenile or adult individuals of *Aguiaria* and *Scleronema* are known, but Hutchinson concluded that both genera were unifoliolate because of the swollen distal pulvinus on each petiole, a morphological trait shared by all three genera. However, as fresh material of other genera of Bombacaceae has become available in recent years, it is clear that most neotropical taxa share this trait. Thus, a swollen distal pulvinus cannot be used as a synapomorphy for the Catostemmatae.

Nevertheless, similarities of flower and pollen

structure (cf. Nilsson & Robyns, 1986) probably indicate a close relationship among all three genera. Affinities to other Bombacaceae and Malvales are much less clear.

During preparation of the Bombacaceae treatment for the *Flora of the Venezuelan Guayana*, the following material could not be identified with keys in Paula (1969) or Steyermark (1987).

Catostemma durifolius W. S. Alverson, sp. nov.

TYPE: Venezuela. Bolívar: along Río Sarven between camps 3 and 4, slopes and talus forest, Sarvén-tepuí, 1,400 m, 10 Jan. 1953 (fr), Wurdack 34085 (holotype, WIS; isotype, NY not seen).

Arbor 9–40 m; *petiolis* 2–5.5 cm longis; *foliorum laminis* oblongis ovatis ellipticis vel obovatis duris rigidis corrugatis apice obtusis vel rotundis basi subcordatis vel rotundatis 17–32 cm longis 8–16 cm latis super glabris vel sparsim lepidotis subtus dense lepidoto-tomentulosis pilis munitis; *pedicellis* ca. 3 mm longis; *bracteolis* 2–3; *calyce* ellipsoideo 16–22 mm longo; *petalis* obovatis ca. 22 mm longis 9–10 mm latis albis; *staminibus* minimum 100, tubo staminali ca. 3 mm longo, partibus liberis 10–15 mm longis; *stylo* ca. 23 mm longo infra medium stellato-tomentoso; *fructu* ellipsoideo 4–5 cm longo 2–3 cm lato; *semine* crasso-fusiformi vel ovoideo 4–5 cm longo 2–3 cm lato.

Tree, 9–40 m tall. *Young branches* glabrous or glabrate. *Bud scales* keeled, densely lanate-tomentose with stellate trichomes. *Petioles* 2–5.5 cm long, densely tomentose or tomentulose, glabrate. *Leaf blades* oblong, ovate, elliptic or obovate, rigid, very hard, corrugate between lateral nerves, rounded or obtuse at apex, subcordate or rounded at base, 17–32 cm long, 8–16 cm wide, glabrous or sparsely lepidote with minute, dark brown, stellate trichomes above, densely lepidote-tomentulose with pale golden to dark reddish brown stellate trichomes below; midrib elevated below; basal secondary nerves 3–5; lateral secondary nerves 8–11 per side, deeply impressed above, prominent beneath, uniformly ascending at an angle of 45–50°, 1–4.5 cm distant, conspicuously brochidodromous toward tip of leaf;

tertiary venation impressed above, distinctly elevated beneath, subparallel, forming a somewhat regular pattern. *Pedicels* ca. 3 cm long, densely stellate-tomentose, bracteolate; bracteoles 2–3, subtending calyx, deltate to widely ovate, at tip acute or mucronate, 2–3 mm long and wide, reportedly brownish green when fresh, densely stellate-tomentose except the sometimes glabrous apices. *Calyx* 16–22 mm long, tearing for half or more of length into 2–3 broad lobes, densely stellate-tomentulose without, glabrous within except for the stellate-strigose apex. *Petals* obovate, obtuse or retuse at apex, ca. 22 mm long, 9–10 mm wide, white when fresh, reddish brown when dry, densely stellate-tomentose without, glabrous within except for the stellate-pilose apex. *Stamens* 100 or more, reportedly white when fresh; filaments fused at base into a tube ca. 3 mm long, free above tube for 10–15 mm; anthers ca. 1 mm long. *Ovary* semi-inferior, rhomboid-ellipsoid, densely stellate-tomentose. *Style* ca. 23 mm long, stellate-tomentose in lower $\frac{1}{2}$, glabrous above; style branches 2–3 mm. *Fruit* ellipsoid, faintly to strongly costate longitudinally, apparently unilocular, 1(occ. 2?)-seeded, reportedly chestnut brown when fresh, densely tomentose or tomentulose with dark brown stellate-echinate trichomes. *Testa* 1–2 mm thick, dark brown. *Seed* thick-fusiform or ovoid, 4–5 cm long, 2–3 cm diam., rugulose, ebony, apparently surrounded by thick orange or brown sap produced within the testa.

Known only from upper elevation forests in southeastern Bolívar, Venezuela, *Catostemma durifolius* differs from its congeners by its rigid, very hard, corrugate leaves that are densely lepidote-tomentulose with stellate trichomes beneath. Comments on the collection labels suggest that this species is very common where it occurs, yet few collections have been made to date. Common name: Chimanayek (*Hernández* 500, 520).

Paratypes. VENEZUELA. **Bolívar**: Flanco este del Roraima Tepuy, 05°08'N, 60°43'W, 1,530 m, 29 Apr. 1987 (fl), *Hernández* 500 (MO); unos 6 km al NW del Cerro El Sol, 05°02'N, 60°38'W, 1,450 m, 3 May 1987 (fr), *Hernández* 520 (MO).

PACHIRA AND RELATIVES

For nearly 30 years, André Robyns's monograph of *Bombax* L., sensu lato, has been the authoritative work on the taxonomy of a number of neotropical segregate genera, including *Bombacopsis* Pittier, *Eriotheca* Schott & Endlicher, *Pachira* Aublet, *Pseudobombax* Dugand, and *Rhodognaphalopsis* A. Robyns (Robyns, 1963). Two paleotropical gen-

era, *Bombax* L. and *Rhodognaphalon* (Ulbrich) Roberty, were also included in this work.

Examination of the neotropical genera, however, suggests several problems with the segregation of *Rhodognaphalopsis* from *Bombacopsis*, the segregation of both genera from *Pachira*, and the relationship of *Pseudobombax* and *Rhodognaphalon* to these other genera. The problems stem from three underlying issues: (1) disagreement about the utility of palynological characters; (2) lack of reasonably complete morphological information for each of the taxa; and (3) cladistic concerns.

(1) THE PROBLEM WITH POLLEN

Robyns relied heavily on palynological characters to separate neotropical genera. Of the five neotropical segregates of *Bombax* recognized by Robyns, only *Eriotheca* and *Pseudobombax* were separated on macromorphological characters: small flowers (< 6 cm long) and inarticulate leaflets (i.e., having petiolules without a suture at the point of attachment to petiole), respectively. He distinguished *Bombacopsis* from *Rhodognaphalopsis* solely on palynological characters. Species with colpate or colporate pollen with a reticulate sexine without spines were put in *Bombacopsis*. Species with porate or pororate pollen with a structurally uniform and uninterrupted (tegillate) or minutely perforated (punctitegillate) sexine with projecting spines or rods (baculae) were placed in *Rhodognaphalopsis*.

Steyermark & Stevens (1988) rejected a distinction between the two genera by palynological criteria and argued that the pollen of *Rhodognaphalopsis* could be easily accommodated within the variability of pollen characters seen in the eurypalynous *Bombacopsis*. My view is that these pollen criteria can, but should not, be used to separate the two genera for a number of reasons. Separation of the two genera causes serious practical problems with the identification of specimens while providing little insight into phylogeny or evolution. As pointed out by Steyermark and Stevens, the pollen characters do not correlate with any macromorphological features. Thus, generic keys are nearly impossible to construct for fruiting or sterile material. Removal of *Rhodognaphalopsis* does little to reduce the morphological heterogeneity of *Bombacopsis* or to define the latter as a coherent evolutionary group (i.e., a clade). While it is possible that further studies may demonstrate that "rhodognaphalopsoid" pollen indicates a monophyletic clade within the Bombacaceae, such a clade could just as well be represented at a sectional, rather than generic, level. Until it can be shown that palynological characters are a

superior guide to phylogeny in the group, macro-morphological characters should take precedence for their utilitarian value in classification (cf., Alverson, 1989).

In view of these considerations, I have followed Steyermark and Stevens in rejecting a generic distinction between *Rhodognaphalopsis* and *Bombacopsis*.

(2) THE PROBLEM WITH *PACHIRA*

An additional problem encountered in the preparation of the treatment for Bombacaceae is the separation of the genus *Pachira* from *Bombacopsis*. Robyns's key to genera (1963: 27–28) shows an almost complete overlap in characters between these genera, except in pollen characters and the structure of the seedlings. If *Bombacopsis* is taken in the broad sense (i.e., as inclusive of *Rhodognaphalopsis*), the pollen characters no longer distinguish *Bombacopsis* from *Pachira* (because *Pachira* pollen is intermediate), and only seedling differences remain.

Pachira aquatica Aublet has peculiar seedlings adapted to aquatic float dispersal (figs. 10, 11 in Robyns, 1963: 239, 240; figs. 1–7 in Lynch, 1880: 149). The cotyledons are greatly unequal. One is reduced to a broadly deltoid scale or a small, foliose structure, and the other is a very large, thick, fleshy ring that surrounds the stem axis. Both are photosynthetic and lie on the ground (hypogean) or are slightly elevated (epigeal), and only partially emergent from the testa (partially cryptocotylar). In contrast, the seedlings of *Bombacopsis glabra* (Pasquale) A. Robyns more closely resemble the majority of the seedlings known in the Bombacaceae and related families (fig. 7 in Robyns, 1963: 211; fig. 4 in Piccolo, 1981). The cotyledons are unequal, but less so than those of *P. aquatica*, epigeal, and emergent from the testa (phanerocotylar), though still somewhat fleshy.

Robyns's use of seedling structure as a criterion to separate *Bombacopsis* and *Pachira* was premature, given that his monograph (1963) included data on the seedling morphology of only 2 of the 22 species he attributed to these genera (or 3 of 31, if the species of *Rhodognaphalopsis* are included). A subsequent paper with 10 new species of *Bombacopsis* and *Rhodognaphalopsis* (Robyns, 1967) did not provide additional information on seedling morphology. Sorting species into these genera was not and still cannot be done by using his seedling criteria, because the information is not available. In subsequent years, the seedling morphology of *Pachira insignis* (Swartz) Savigny has

been documented (*de Bruijn* 969, MO). In this collection, one cotyledon is massive and fleshy like its counterpart of *P. aquatica*, but both cotyledons are raised above the ground (epigeal) in contrast to the hypogean cotyledons of *P. aquatica* and, supposedly, of the whole genus.

Seed size within *Bombacopsis* sensu lato appears to co-vary with the quantity of silky or wooly, non-wettable hairs (kapok) produced by the endocarp of the fruit. Small-seeded species have copious amounts of kapok, which is dispersed together with the seeds. Presumably, this is an ecological adaptation to increase the magnitude of seed dispersal, perhaps by increasing buoyancy in wind or water. There also exist a number of large-seeded species of *Bombacopsis*, such as *B. subandina* (Dugand) A. Robyns and *B. speciosa* (Triana & Planchon) A. Robyns. In these species, the kapok has been reduced to a layer of short velutinous hairs on the inner surface of the endocarp; it does not surround the seeds. Given the large dimensions of their seeds and reduction of kapok, these species most likely have seedling morphologies like *Pachira aquatica* or *P. insignis*, contrary to Robyns's key. Phenetically, their overall similarity suggests that they are more closely related to *Pachira* than to other species of *Bombacopsis*. Cladistically, possession of large seeds and little kapok almost certainly represents a derived condition, a synapomorphy for these species and *Pachira*. Practically, flowering specimens of these large-fruited species of *Bombacopsis* cannot be distinguished from *Pachira* without reference to subtle characters of the pollen, or the ability to recognize individual species historically assigned to the two genera, suggesting that the unification of the genera would provide the nonspecialist with an entity that can be recognized much more easily.

In summary, because there are no strong arguments for retaining *Pachira* as a genus separate from *Bombacopsis* sensu lato, all species should be put into synonymy under *Pachira*, the older generic name.

(3) THE PROBLEM WITH PHYLOGENY

There are three potential reasons why generic transfers of all *Bombacopsis* species to *Pachira* should not be made here. First, there is a chance that additional field collections of *Pachira insignis* and the large-flowered, large-seeded species of *Bombacopsis* will demonstrate that the genera are fairly distinct by characters of their seedlings, but this seems unlikely. Second, transfers to *Pachira* sensu lato would include *Bombacopsis quinata* (Jacquin) Dugand, whose nomenclatural stability was deemed

important enough to cause the conservation of *Bombacopsis* over *Pochota* Ramírez Goyena (Proposal 883 in Brummitt, 1990). I find it difficult to believe that transfer of this species to *Pachira* will cause any significant problems in either the scientific or commercial literature, or that any serious attempt might be made to conserve *Bombacopsis* over this well-known, widely used generic name. Third, transfers should not be made if the new combinations are likely to be impermanent. It is difficult to predict the most conservative course from a nomenclatural point of view because the phylogeny of the Bombacaceae is unknown. It is possible that species of *Bombacopsis* or *Rhodognaphalopsis*, if placed into a unified genus, *Pachira* sensu lato, will have to be removed in a few years when a reliable phylogeny is available for the family. However, there is no assurance that the pollen and seedling characters now used to segregate genera will correspond to synapomorphies defining segregate genera in the future. At least as many new combinations may be necessary even if no transfers were made here.

One might argue that no action should be taken without full analysis of relationships to *Rhodognaphalon*, *Bombax*, *Pseudobombax*, and *Eriotheca*, the other genera historically included in *Bombax* sensu lato. For instance, *Pseudobombax* differs from *Pachira* sensu lato primarily by the autapomorphy of inarticulate leaflets (unique in the Bombacaceae). Retaining *Pseudobombax* as a separate entity from *Pachira* sensu lato might make the latter paraphyletic (though many could accept such a genus), or even polyphyletic. Similarly, retaining the African genus *Rhodognaphalon* as a separate entity from *Pachira* sensu lato might also make the latter paraphyletic, but without a cladistic phylogeny of the group this cannot be known. The task at hand, however, is the production of a Flora treatment that includes recognizable genera. Phylogenetic information is desperately needed to produce an evolutionary classification of the family, but the lack of this information does not mitigate against the designation of a workable generic system here.

In conclusion, all 18 Venezuelan Guayanan species of *Bombacopsis*, *Pochota*, and *Rhodognaphalopsis* are here placed in synonymy with *Pachira*, giving a total of 24 species of *Pachira* sensu lato in the Flora area. Outside of the Venezuelan Guayana, there are approximately 25 additional species and varieties of *Bombacopsis* and *Rhodognaphalopsis*, of which 7 have legitimate names under *Pachira* (including the well-known Central American species *Pachira* [*Bombacopsis*] *sessilis* Benth). The other 18 taxa are not transferred here, pending further study.

Pachira amazonica (A. Robyns) W. S. Alverson, comb. nov. Basionym: *Bombacopsis amazonica* A. Robyns, Bull. Jard. Bot. Etat. 33: 186. 1963. *Pochota amazonica* (A. Robyns) Steyermark & W. D. Stevens, Ann. Missouri Bot. Gard. 75: 397. 1988. TYPE: Venezuela. Amazonas: Sta. Cruz, Río Atabapo, near mouth of Río Atacavi, *Foldats 3794* (holotype, US; isotype, VEN not seen).

Pachira aracmuniana (Steyermark) W. S. Alverson, comb. nov. Basionym: *Pochota aracmuniana* Steyermark, Ann. Missouri Bot. Gard. 76: 951, fig. 4. 1989. TYPE: Venezuela. Amazonas: Dept. Río Negro, Cerro Aracamuni summit, 01°32'N, 65°49'W, 1,400 m, *Liesner & Carnevali 22559* (holotype, MO; isotype, VEN not seen).

Pachira coriacea (Martius) W. S. Alverson, comb. nov. Basionym: *Bombax coriaceum* Martius, Nov. Gen. Sp. Pl. 1: 93. 1826. *Rhodognaphalopsis coriacea* (Martius) A. Robyns, Bull. Jard. Bot. Etat 33: 289. 1963. *Pochota coriacea* (Martius) Steyermark & W. D. Stevens, Ann. Missouri Bot. Gard. 75: 397. 1988. TYPE: Colombia. Amazonas: *Martius s.n.* (holotype, M not seen).

This species represents two of the three subspecies of *Rhodognaphalopsis coriacea* designated by A. Robyns, subsp. *coriacea* and subsp. *orinocensis* A. Robyns, which are not distinct from each other. The third subspecies, subsp. *sordida* (R. E. Schultes) A. Robyns, occurs in Venezuela and is included below as *Pachira sordida* (R. E. Schultes) W. S. Alverson.

Pachira cowanii (A. Robyns) W. S. Alverson, comb. nov. Basionym: *Bombacopsis cowanii* A. Robyns, Mem. New York Bot. Gard. 17: 190. 1967. *Pochota cowanii* (A. Robyns) Steyermark & W. D. Stevens, Ann. Missouri Bot. Gard. 75: 397. 1988. TYPE: Venezuela. Amazonas: igneous knob along Caño Asisa, 3 km below Parú savanna camp, 200 m, *Cowan & Wurdack 31534* (holotype, MO; isotype, NY not seen).

Pachira feroensis (Ducke) W. S. Alverson, comb. nov. Basionym: *Bombax feroense* Ducke, Arch. Jard. Bot. Rio de Janeiro 4: 122. 1925. *Rhodognaphalopsis feroensis* (Ducke) A. Robyns, Bull. Jard. Bot. Etat 33: 292. 1963. TYPE: Brazil. Pará: *Ducke s.n.* [MG 15791] (holotype, RB not seen; isotypes, K not seen, MG not seen, S not seen, U not seen).

Pachira fuscolepidota (Steyermark) W. S. Alverson, comb. nov. Basionym: *Pochota fuscolepidota* Steyermark, Ann. Missouri Bot. Gard. 75: 1077. 1988. TYPE: Venezuela. Amazonas: Dept. Atabapo, Cerro Marahuaca, 1–2 km N of Sima Camp, 03°43'N, 65°31'W, 1,100 m, *Liesner 18452* (holotype, MO; isotype, VEN not seen).

Pachira gracilis (A. Robyns) W. S. Alverson, comb. nov. Basionym: *Rhodognaphalopsis gracilis* A. Robyns, Mem. New York Bot. Gard. 17: 199. 1967. *Pochota gracilis* (A. Robyns) Steyermark & W. D. Stevens, Ann. Missouri Bot. Gard. 75: 397. 1988. TYPE: Venezuela. Amazonas: Río Pacimoni, 12 km below mouth of Río Yatua, 100–140 m, *Maguire, Wurdack & Maguire 41653* (holotype, MO; isotype, NY not seen).

Pachira gracilis* subsp. *bolivarensis (Steyermark) W. S. Alverson, comb. nov. Basionym: *Pochota gracilis* (A. Robyns) Steyermark & W. D. Stevens subsp. *bolivarensis* Steyermark, Ann. Missouri Bot. Gard. 75: 1078. 1988. TYPE: Venezuela. Bolívar: Río Kanarakuni, southern base of Cerro Sarisariñama, 400 m, *Steyermark 98206* (holotype, VEN not seen; isotype, NY).

Pachira liesneri (Steyermark) W. S. Alverson, comb. nov. Basionym: *Pochota liesneri* Steyermark, Ann. Missouri Bot. Gard. 75: 1079. 1988. TYPE: Venezuela. Amazonas: Dept. Atabapo, Salto Yureba, Cerro Yureba, lower Ventuari, ca. 04°03'N, 66°01'W, 350 m, *Liesner 18637* (holotype, MO; isotype, VEN not seen).

Pachira mawarinumae (Steyermark) W. S. Alverson, comb. nov. Basionym: *Pochota mawarinumae* Steyermark, Ann. Missouri Bot. Gard. 75: 1079. 1988. TYPE: Venezuela. Amazonas: Dept. Río Negro, near Cerro Neblina Base Camp on the Río Mawarinuma, 00°50'N, 66°10'W, 140 m, *Liesner 16355* (holotype, MO; isotype, VEN not seen).

Pachira obovata (A. Robyns) W. S. Alverson, comb. nov. Basionym: *Bombacopsis obovata* A. Robyns, Mem. New York Bot. Gard. 17: 192. 1967. *Pochota obovata* (A. Robyns) Steyermark & W. D. Stevens, Ann. Missouri Bot. Gard. 75: 397. 1988. TYPE: Venezuela. Amazonas: Ríos Pacimoni–Yatua, Casiquiare, rainforest along Río Yaciba, 2 hours above mouth, 160 m, *Maguire, Wurdack & Bunting 36529* (holotype, MO; isotype, NY not seen).

Pachira orinocensis (A. Robyns) W. S. Alverson, comb. nov. Basionym: *Bombacopsis orinocensis* A. Robyns, Mem. New York Bot. Gard. 17: 193. 1967. *Pochota orinocensis* (A. Robyns) Steyermark & W. D. Stevens, Ann. Missouri Bot. Gard. 75: 398. 1988. TYPE: Venezuela. Bolívar: occasional, Río Orinoco, 100–300 m, *Wurdack & Monachino 39836* (holotype, MO; isotype, NY not seen).

Pachira paraensis (Ducke) W. S. Alverson, comb. nov. Basionym: *Bombax paraense* Ducke, Arch. Jard. Bot. Rio de Janeiro 4: 124. 1925. *Bombacopsis paraensis* (Ducke) A. Robyns, Bull. Jard. Bot. Etat 33: 213. 1963. TYPE: Brazil. Pará: *Ducke s.n.* [RB 18094] (lectotype, RB; isolectotypes, G, K, S, US).

Pachira pseudofaroensis (A. Robyns) W. S. Alverson, comb. nov. Basionym: *Rhodognaphalopsis pseudofaroensis* A. Robyns, Mem. New York Bot. Gard. 17: 201. 1967. *Pochota pseudofaroensis* (A. Robyns) Steyermark & W. D. Stevens, Ann. Missouri Bot. Gard. 75: 398. 1988. TYPE: Venezuela. Amazonas: igneous knob along Caño Asisa, 3 km below Parú savanna camp, 200 m, *Cowan & Wurdack 31547* (holotype, MO; isotype, NY).

Pachira quinata (Jacquin) W. S. Alverson, comb. nov. Basionym: *Bombax quinatum* Jacquin, Enum. Syst. Pl. 26. 1760. *Pochota quinata* (Jacquin) W. D. Stevens, Taxon 36: 463. 1987. TYPE: Panama. Canal Zone: *Fendler 310* (neotype, K not seen; isoneotypes, BM not seen, FI not seen, GH not seen, MO not seen, TDC not seen, US).

Pachira robynsii (Steyermark & W. D. Stevens) W. S. Alverson, comb. nov. Basionym: *Pochota robynsii* Steyermark & W. D. Stevens, nom. nov., Ann. Missouri Bot. Gard. 75: 1586. 1988. Replaced name: *Bombacopsis coriacea* A. Robyns, Mem. New York Bot. Gard. 17: 190. 1967. TYPE: Venezuela. Amazonas: Cerro Neblina, Río Yatua, slopes E of Cumbre Camp, 1,600–1,800 m, *Maguire, Wurdack & Maguire 42182* (holotype, NY).

Pachira rupicola (A. Robyns) W. S. Alverson, comb. nov. Basionym: *Bombacopsis rupicola* A. Robyns, Bull. Jard. Bot. Etat 33: 188. 1963. TYPE: Venezuela. Bolívar: *L. Williams 11630* (holotype, US not seen; isotypes, F not seen, US not seen).

Pachira sordida (R. E. Schultes) W. S. Alverson, comb. nov. Basionym: *Bombax sordidum* R. E. Schultes, Bot. Mus. Leaflet 16: 75. 1953. *Rhodognaphalopsis coriacea* (Martius) A. Robyns var. *sordida* (R. E. Schultes) A. Robyns, Bull. Jard. Bot. Etat 33: 292. 1963. *Pochota sordida* (R. E. Schultes) Steyermark & W. D. Stevens, Ann. Missouri Bot. Gard. 75: 398. 1988. TYPE: Colombia. Vaupes: Río Negro, El Castillo or San Felipe, near confluence of Ríos Guainia and Casiquiare, Schultes & Lopez 9342 (holotype, GH not seen).

Pachira tepuiensis (Steyermark) W. S. Alverson, comb. nov. Basionym: *Pochota tepuiensis* Steyermark, Ann. Missouri Bot. Gard. 75: 1081–1082. 1988. TYPE: Venezuela. Bolívar: Meseta de Jaua, Cerro Sarisariñama, summit, 04°41'40"N, 64°13'20"W, 1,380 m, Steyermark, Carreño Espinosa & Brewer-Carias 108938 (holotype, VEN not seen; photo of holotype, MO).

Finally, in keeping with Steyermark's treatment of the genus *Pochota*, the following species is new for the Venezuelan Guayana:

Pachira yapacanae Steyermark ex W. S. Alverson, sp. nov. TYPE: Venezuela. Amazonas: Cerro Yapacana, savanna number three, 130 m, 1 Jan. 1951 (fr), Maguire, Cowan, & Wurdack 30589 (holotype, NY).

Arbor ad 5 m; *foliolis* 4–5 late ovato-oblongis apice rotundatis basi rotundatis vel late obtusis 8–10.5 cm longis 4.5–6 cm latis conspicue discoloribus subtus indumento farinaceo pallido grisaceo obtectis.

Tree to 5 m tall. *Leaves* 4–5 foliolate. *Petioles* 6.5–7 cm long. *Leaflets* subcoriaceous, broadly ovate-oblong, rounded at apex, rounded or broadly obtuse at base, 8–10.5 cm long, 4.5–6 cm wide; lower surface completely covered by a pale gray farinaceous indument, conspicuously dark brown lepidote beneath; lateral secondary nerves 9–13 on each side, slightly elevated below, anastomosing 3–7 mm from the margin, slightly impressed above; intermediate nerves less prominent; tertiary venation slightly elevated below, loosely reticulate, subhorizontal to 10°-angled. *Petiolule* 5–8 mm long, 2 mm wide. *Pedicel* solitary, axillary, 1.5 cm long, 3 mm wide. *Receptacle* glandular, 0.7 cm long, 1 cm

wide, pale lepidote. *Calyx* tube shortly campanulate, truncate at summit, 0.5 cm long, 1 cm wide at summit, pale lepidote. *Capsule* obovate, truncate at summit, 4 cm long, 2.5 cm wide at summit, glabrous except for the reddish brown lepidote surface.

This species is distinguished from other species of *Pachira* by the combination of a pale gray farinaceous indument on the lepidote lower leaf surface, and the broadly ovate-oblong leaf blades rounded at the apex and rounded or broadly obtuse at the base.

Acknowledgments. I thank Jackie Kallunki, Hugh Iltis, Bruce Holst, and Paul Berry for helpful comments on the manuscript, Kay Yatskievych for aid in locating basionyms, Robert Kowal for advice on nomenclature, and David Baum on matters cladistic.

Literature Cited

- Alverson, W. S. 1989. *Matisia* and *Quararibea* (Bombacaceae) should be retained as separate genera. *Taxon* 38: 377–388.
- Brummitt, R. K. 1990. Report of the Committee for Spermatophyta. 37. *Taxon* 39: 293–296.
- Hutchinson, J. 1967. *The Genera of Flowering Plants, Dicotyledones*, vol. 2. Oxford Univ. Press, London.
- Lynch, R. I. 1880. On the seed structure and germination of *Pachira aquatica*. *J. Linn. Soc., Bot.* 17: 147–149.
- Nilsson, S. & A. Robyns. 1986. Bombacaceae Kunth. In: S. Nilsson (editor), *World Pollen and Spore Flora* 14: 1–59.
- Paula, J. E. de. 1969. Estudos sobre Bombacaceae—I. *Ciência e Cultura* 21(4): 697–719.
- Piccolo, Antonia Lelia Guadagnuci. 1981. Sobre o fruto, semente e estágios iniciais de desenvolvimento de *Bombacopsis glabra* (Pasq.) A. Robyns. *Garcia de Orta, Bot.* 5(1): 1–4, plus three unpaginated plates.
- Robyns, A. 1963. Essai de monographie du genre *Bombax* s.l. (Bombacaceae). *Bull. Jard. Bot. Etat* 33(1/2): 1–316.
- . 1967. Bombacaceae. Pp. 190–201 in B. Maguire et al., *The Botany of the Guyana Highland*, part 7. *Mem. New York Bot. Gard.* 17: 190–201.
- Sandwith, N. Y. 1931. Contributions to the flora of tropical America—IV, The Baromallis of British Guiana. *Kew Bull.* 1931: 46–54.
- Shepherd, J. D. & W. S. Alverson. 1981. A new *Castostemma* (Bombacaceae) from Colombia. *Brittonia* 33: 587–590.
- Steyermark, J. A. 1987. Flora of the Venezuelan Guayana—III. *Ann. Missouri Bot. Gard.* 74: 609–658.
- & W. D. Stevens. 1988. Notes on *Rhodognaphalopsis* and *Bombacopsis* (Bombacaceae) in the Guayanas. *Ann. Missouri Bot. Gard.* 75: 396–398.