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A PHYTOGEOGRAPHICALLY SIGNIFICANT NEW SPECIES OF JATROPHA (EUPHORBIACEAE) FROM COSTA RICA

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Webster, Grady L. (Department of Botany, University of California, Davis, CA 95616) and Luis J. Poveda (Museo Nacional, Apartado 749, San José, Costa Rica). A phytogeographically significant new species of *Jatropha* (Euphorbiaceae) from Costa Rica. Brittonia 30: 265–270. 1978.—**Jatropha costaricensis** is described from Guanacaste, Costa Rica and assigned to sect. *Platyphyllae*. It is most similar to *J. alamanii* of the Isthmus of Tehuantepec in Mexico, and represents part of a secondary Central American radiation of xeric-adapted Euphorbiaceae. Its geographic relationships indicate a formerly more widespread occurrence of a tropical deciduous flora in Mesoamerica, and it is suggested that xeric range disjunctions here and in adjacent South America may be largely due to climatically-induced extinction rather than to long-distance dispersal.

In 1974 the junior author discovered a species of *Jatropha* growing in the dry open woodlands on the low hills near Playas del Coco, in Guanacaste, Costa Rica. The latex of the plant proved to be of interest in experiments on anti-carcinogenic compounds being carried out in collaboration with Dr. Monnie Hudson at the Centro Científico Tropical; but the identity of the plant presented a problem, since there have been no species of *Jatropha* reported from Costa Rica other than the weedy (and probably non-indigenous) *J. gossypiifolia* L. and *J. curcas* L. During the summer of 1977, it was possible for both of us to visit the locality at Playas del Coco and to collect additional ample material. Comparison of these specimens with available taxonomic treatments and herbarium collections clearly shows that the plant from Playas del Coco is a species previously unknown to science, and it is herewith formally described.

Jatropha costaricensis Webster & Poveda, sp. nov.

Sect. *Platyphyllae*, affinis *J. alamanii* Muell. Arg., a qua differt foliis subtus flaccido-villosis non profunde lobatis, calycis laciniis ♂ angustioribus, corolla ♂ majore, petalis ♀ altius coherentibus.

Deciduous shrub or small tree 2–5 m high, trunk to 2 dm in diameter, brownish, not peeling; branches greyish-brown, ferruginous-hirsutulous at growing tips, becoming glabrate, terete, and channelled, exuding reddish latex when cut. Leaves alternate; stipules glanduliform, shortly stipitate (ca 0.5 mm long), deciduous; petioles slender, terete, eglandular, hirsutulous, (2) 4–9 cm long; blades membranous, mostly ovate to shallowly and obtusely 3-lobed or -angled (sometimes indistinctly 5-angled), (4) 9–18 (21) cm long, (4) 7–18 (21) cm broad, lobes obtuse and minutely apiculate at tips, base shallowly to distinctly cordate, felty-tomentose on both sides when young, becoming sparsely hirtellous above, persistently but rather lightly flaccid-villose beneath; blades palmately veined with 5–7 major veins from base, lateral veins prominulous, coalescing into an irregular reticulum; margins entire, plane, non-glandular. Dioecious; staminate cymes (Fig. 1) terminal or subterminal, usually paired, peduncle (1) 1.5–8.5 cm long, several times dichotomous, branches copiously hirtellous; bracts lanceolate, entire, non-glandular, hirtellous, ca 0.5–1.0 mm long; pistillate flowers terminal, solitary (rarely paired). Staminate flower (Fig. 2): pedicel very stout, ca 0.8–1 mm long and broad, hirtellous, distinctly articulated at base; calyx lobes 5, narrowly lanceolate, obtuse or subacute, entire, greenish,

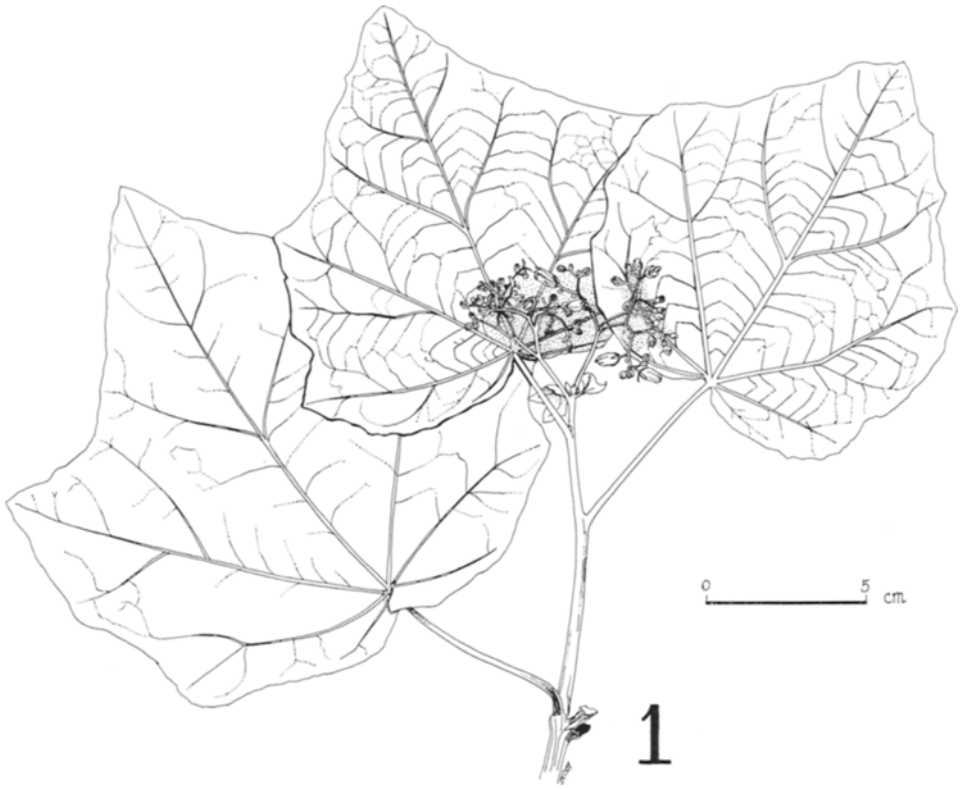


FIG. 1. *Jatropha costaricensis*. Habit (staminate plant).

hirtellous along midstrip, 2.8–4.5 mm long, 0.9–1.5 mm broad; petals 5, creamy white, linear-oblong, glabrous without, sparsely hirsutulous proximally within, firmly coherent into a tube 4.5–6 mm long, the free tips rounded, ca 1.5–2.5 mm long, mid-vein with several sharply ascending laterals (3 or 4 on a side) which dichotomize distally; disk glands 5, subglobose, smooth, glabrous, ca 0.5–0.9 mm across; stamens 10, biverticellate, monadelphous beneath into an angular column ca 2 mm high; outer (lower) stamens with slender filaments 2–3 mm long, the free distal portions 0.7–1 mm long; inner (upper) stamens with filaments 4.5–5 mm long, the free tips 2–3 mm long; anthers blunt, ellipsoidal, flattened, basifixed, glandular at tip of connective, 0.9–1.5 mm long, 0.5–0.8 mm broad. Pistillate flower (Figs. 3 & 4): pedicel stout, densely tomentose, ca 1 mm long at anthesis, becoming 2–6 mm long in fruit; calyx lobes 5, lanceolate, tapering to more or less acute tips, densely tomentose without, entire, 5–7 mm long, 1.8–2 mm broad; petals 5, similar to the staminate, coherent into a tubular corolla 7.5–8.5 mm long, the tube 4.5–6 mm long, glabrous without, hirsutulous within lower half, the lobes 1.8–4 mm long, hirtellous near tip; disk massive, smooth, glabrous, dissected into 3–5 massive lobes; ovary smooth, glabrous, sharply 3-carinate, 2–3 mm high; styles ca 3 mm long, united into a column 1.0–1.2 mm high, bifid, the branches oblong with thickened margins. Capsule somewhat fleshy, tardily dehiscent, smooth, oblate, sharply 3-carinate, 3–3.5 cm in diameter; columella ca 2 cm long, narrowly winged; seeds ellipsoidal-cylindric, plump, smooth, finely brownish-mottled, 1.7–2 cm long, 1.3–1.4 cm thick; caruncle dark brown, fluted, ca 1 mm long, 1.8 mm broad.

TYPE: COSTA RICA. PROV. GUANACASTE: Playas del Coco, deciduous thorn woodland on rocky slopes on south side of bay, alt. 5–25 m, 4 Aug 1977, *G. L. Webster & L. J. Poveda 22160* (HOLOTYPE: DAV; ISOTYPES: CR, other isotypes to be distributed).

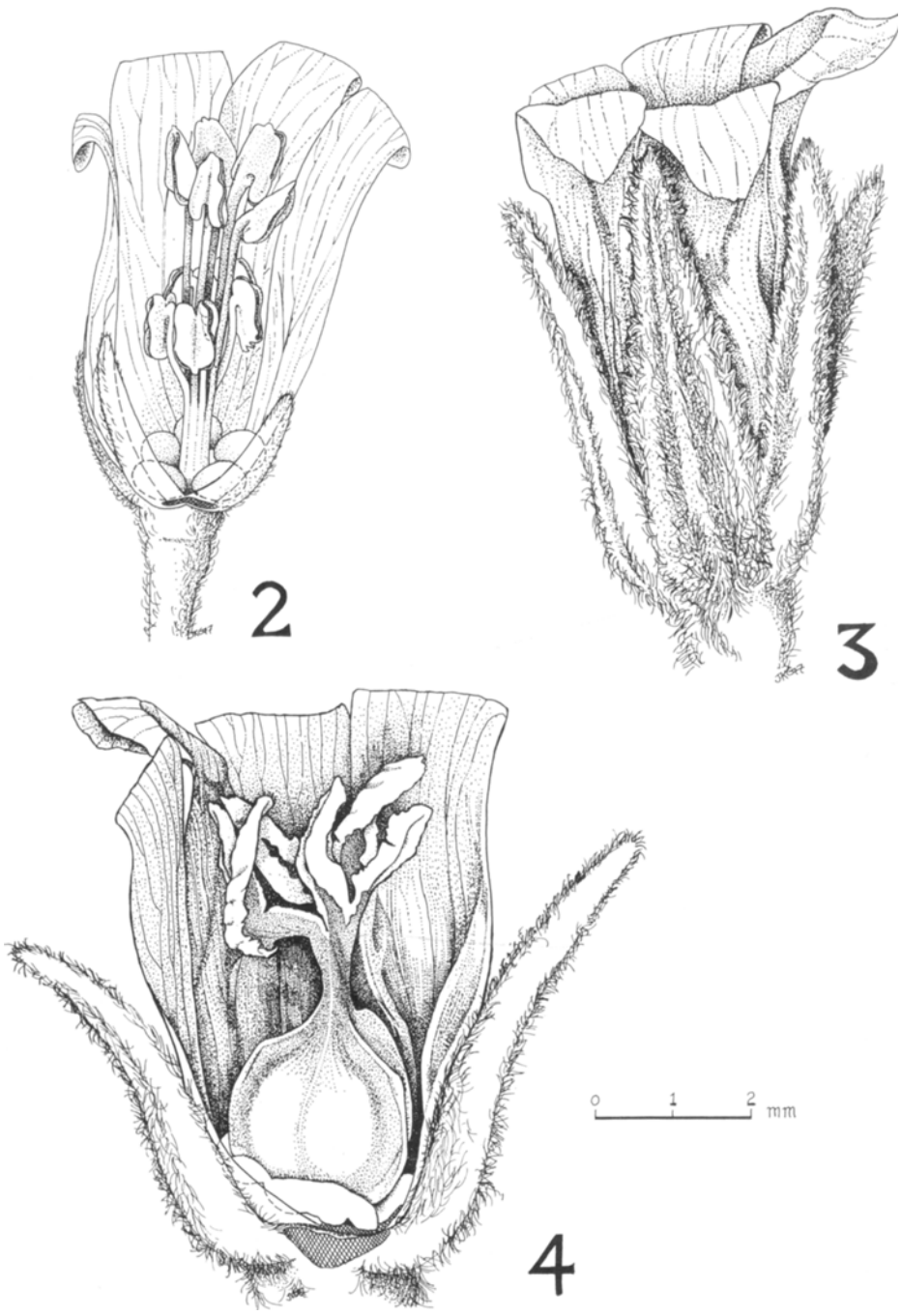
Additional specimen examined: COSTA RICA. GUANACASTE: Playas del Coco, same locality, 0–30 m, 18 Aug 1974, *L. J. Poveda s.n.* (CR).

This new species clearly belongs to subgenus *Curcas* (Adans.) Pax because of its dioecious inflorescences and gamopetalous corollas, and to sect. *Platyphyllae* Dehgan & Webster by virtue of its tricarpellate ovary (Dehgan & Webster, 1978). It is very similar in many respects to *J. alamanii* Muell. Arg., of southern Oaxaca, Mexico, but differs in its less deeply lobed leaf blades (Fig. 1) which are never abruptly acuminate as in *J. alamanii*; and the persistent floccose pubescence of the lower leaf surface contrasts with the glabrate leaves of the Mexican plant. The stipules of *J. costaricensis*, although small, contrast with those of *J. alamanii*, which are obsolete. The staminate flowers of *J. costaricensis* (Fig. 2) tend to be larger than those of *J. alamanii* (corolla tube ca 3–4 mm long) and have narrower calyx lobes (those of *J. alamanii* being mostly 1.5–2 mm broad).

The other species of sect. *Platyphyllae* are all Mexican, and indeed besides the widespread *J. curcas* and *J. gossypiifolia* there are no other native species of *Jatropha* in Central America south of Guatemala except for *J. podagrica* Hook. (collected at Comayagua, Honduras, *Edwards 569*, UC). The discovery of *J. costaricensis* therefore partially fills in the geographic gap between the North American and South American species of *Jatropha*. It is noteworthy that the taxonomic relationships of *J. costaricensis* are all with the North American species (specifically with subg. *Curcas*) and not with the taxa of subg. *Jatropha* from South America. The vegetation at Playas del Coco where *J. costaricensis* occurs is strikingly reminiscent of areas of deciduous woodland in southern Mexico, from Jalisco to Oaxaca, and is floristically similar as well, being dominated by species of *Bursera*, *Chlorophora*, *Cochlospermum*, *Lemaireocereus*, and *Thevetia*. This vegetation suggests a drier aspect than any of the Costa Rican communities described by Sawyer and Lindsey (1971) but is markedly similar to the tropical deciduous forest type described from Jalisco by Rzedowski and McVaugh (1966).

Baker (1963) has noted that the Isthmus of Tehuantepec marks a major faunistic break as far as the distribution of terrestrial mammals is concerned. It is notable that the taxonomically closest species to the Costa Rican *Jatropha, J. alamanii*, occurs in the Tehuantepec area along with *J. podagrica*. It would appear that in many groups of North American tropical Euphorbiaceae the major evolutionary center in Trans-Tehuantepec Mexico has given rise to a minor secondary center of speciation in Central America. Some populations disjunct between southwestern Mexico and Costa Rica or Panama appear to be conspecific, e.g. *Croton pseudoniveus* Lundell and *Garcia nutans* Vahl in Mexico and in Panama (Webster & Burch, 1968). The level of differentiation in these disjunct taxa is mostly not very great, and may possibly represent the effects of Pleistocene climatic fluctuations which have repeatedly dissected the rather narrow strip of arid seasonal woodland which stretches along the Pacific Coast of Mesoamerica.

These deciduous forests in Guanacaste have counterparts in northern South America, where an arid strip that also includes thorn forest and cactus desert stretches along the northern shores of Venezuela and extreme northeastern Colombia; the floristic composition of this vegetation has been recently reviewed by Sarmiento (1976). Most of the genera which grow together with *Jatropha costaricensis* also occur in the thorn forest or bushland formations of Caribbean South America. How-



FIGS. 2–4. *Jatropha costaricensis*. 2. Staminate flower (one petal removed). 3. Pistillate flower. 4. Pistillate flower (one petal and one sepal removed).

ever, we do not think it necessary to follow Sarmiento in hypothesizing island-hopping migrations through the West Indies to populate this xeric strip. In agreement with the arguments of Solbrig (1972, 1976), we suggest that taxa such as *Jatropha* and other Euphorbiaceae (e.g. *Bernardia, Cnidoscolus, Croton,* and *Manihot*) probably dispersed during the Tertiary through tropical drought-deciduous vegetation zones (Solbrig's "Tertiary-Chaco paleoflora"). Raven and Axelrod (1974) and van der Hammen (1974) have summarized the evidence that during both the last and earlier Pleistocene glaciations, the climate in the tropics was much drier than it is today, and the probabilities of migration of xeric taxa consequently even higher than most times during the Tertiary.

It should be emphasized that the population of *Jatropha costaricensis* at Playas del Coco is restricted to a few hectares, and the plant has not been discovered elsewhere along the coast of northwest Guanacaste. A relict species of this nature could easily disappear before it became scientifically known; and conversely, other xeric relicts may remain to be discovered in Mesoamerican Pacific slope sites. A considerable area in some Honduran valleys east of Tegucigalpa supports a highly xeric cactus thorn scrub which may well have supported populations of *Jatropha* at an earlier time (Webster, personal observations); and the apparently native occurrence of *J. podagrica* near Comayagua (to the west of Tegucigalpa) has already been mentioned.

Xeric-adapted Euphorbiaceae such as *Cnidoscolus* (Breckon, 1975) and *Manihot* (Rogers & Appan, 1974) display a complexity of North American/South American distribution patterns which suggests several episodes of migration between continents during an extended period from the early Tertiary into the Pleistocene. *Cnidoscolus multilobus* (Pax) I. M. Johnston and some closely related taxa, for example, extend from eastern Mexico into Costa Rica; their lesser dissection in range than *Jatropha* is perhaps correlated with adaptation to somewhat more mesic habitats (Breckon, pers. comm.). In *Cnidoscolus, Jatropha,* and *Manihot* it also appears that highly xeric taxa may have evolved from more mesic ancestors which were also able to migrate through corridors of deciduous or semideciduous forest. It does not seem necessary, therefore, to postulate either continuous strips of desert through the tropics during the Tertiary, or extensive long-distance dispersal, in order to account for distributions such as those of *Cnidoscolus, Jatropha* or *Larrea.* As a matter of fact, *Larrea* represents an extreme in degree of disjunction among the warm-xeric elements of the neotropical flora; genera such as *Cnidoscolus* and *Phyllostylon* could have reached their present distributions without any significant amount of long-distance dispersal (other than across the narrow Panama strait). The gaps in current desert and semi-desert neotropical distribution patterns, therefore, probably reflect the viscissitudes of Pleistocene environmental fluctuations—and concomitant extinctions—much more than the vagaries of dispersal.

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