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# Studies in the Capparidaceae XVIII. A New Giant-Fruited *Capparis* (*C. muco*) from Eastern Venezuela

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ABSTRACT. *Capparis* (subg. *Calyptrocalyx*) *muco*, an arborescent species from dry tropical semideciduous and deciduous forests northeast and south of Barcelona, Anzoátegui, in northern Venezuela and several islands in Lago de Guri, Bolívar, in eastern Venezuela, is newly described and differentiated by a dense, soft, thin and slender, loosely stellate-echinate leaf pubescence [consisting of simply constructed, sessile, 2-rayed, stellate hairs (1.0–1.4 mm diam.) grading to echinate and complex multirayed, multiangulate “candelabra” or “palmoid” hairs on multiseriate stalks] from the related but tightly stellate-echinate *C. leprieurii*-*C. maroniensis* complex of the Guianas, in which the hairs are minute (0.2–0.3 mm diam.) and distantly dispersed. The large, more or less spherical fruits of “Muco” contain pulp that is eaten by both monkeys and people. Illustrations and a distribution map are provided.

RESUMEN. Se describe *Capparis* (subg. *Calyptrocalyx*) *muco*, una especie arborescente de los bosques secos tropicales deciduos y semideciduos del noreste y sur de Barcelona, Anzoátegui al norte de Venezuela y de algunas islas del Lago de Guri, Bolívar al este de Venezuela. Esta nueva especie se distingue en hojas poseer con una pubescencia laxa de pelos estrellado-equinados suaves y delgados [formada por pelos simples, sesiles, con dos rayos, estrellados (1.0–1.4 mm de diám.) graduando a pelos más complejos equinados, multiradiados, multiangulados “candelabro” o en forma de palma sobre un estipite multiseriado] en comparación con sus afines *C. leprieurii*-*C. maroniensis* del complejo de Las Guayanas, donde los pelos estrellado-equinados

están adpresos, los que son muy pequeños (0.2–0.3 mm de diám.) y muy dispersos. Los frutos grandes subesféricos del “Muco” son comestibles. Se incluyen ilustraciones y un mapa de distribución.

## THE TAXONOMIC HISTORY OF *CAPPARIS MUCO*, A TALE OF UNCOMMON COOPERATION

According to an old African folktale, “It takes a whole village to raise a child.” By the same token, it sometimes takes a whole network of systematists to discover a new species. So it was with the elusive *Capparis muco*, the subject of this paper.

The discovery of this rare species was long in coming and deserves special recounting. Two sterile collections of what seem to be juvenile shoots (stump sprouts?) with exceptionally large, somewhat falcate leaves were the first to be collected, namely by H. M. Curran and M. Haman for the Gray Herbarium of Harvard University, both under number 1197, but one from Bachaco, on July 1, 1917, the other from Guanta, simply stating 1917. While the latter is a well-known coastal town ca. 15 km NNE of Barcelona in the Estado Anzoátegui, Venezuela, we have not been able to locate “Bachaco,” either in the field near Guanta or on any map. Local informants have never heard of it and the Harvard herbaria are unable to locate the collectors’ notebooks. Nevertheless, since both specimens carry the same collection number and look as if coming from the same tree, we must assume they were both collected somewhere near Guanta. Labeled as “*Capparis macrophylla*,” which they are not, the specimens, lacking both flowers and fruit,

could not be placed by Iltis in the 1950s even to genus within the Capparidaceae.

During the 1960s, Iltis let it be known that he was willing to identify any and all New World Capparidaceae collections. As a consequence, Leandro Aristeguieta of the Caracas Herbarium sent him in June of 1969 various specimens of Capparidaceae for identification, including one quite mysterious plant from Curataquiche. This specimen, collected in flower in March 1969, was soon equated with the 1917 collections of Curran and Haman, but nevertheless the identity of the taxon remained a puzzle. Shortly thereafter, Aristeguieta went back to Curataquiche and soon forwarded a fine mature fruit from there, big as an orange and full of large seeds, which just deepened the mystery. Considering that it was indehiscent and had a very short gynophore, and that the flowers had ca. 20 short stamens, the material suggested an undescribed *Morisonia*. The lively correspondence that followed resulted in a few more collections from the same location, but no more insights into its taxonomy.

Curataquiche, as it turned out, is a small village 22 km south of Barcelona, where the plant, locally called "Muco," was reported to be not uncommon in the dry deciduous forests and woodlands, but seems to occur, in fact, at most sporadically.

Then in January 1991 an opportunity arose for Iltis to go to Venezuela and, imposing on the wonderful hospitality of Carmen Benítez de Rojas, plant taxonomist in Maracay, and Thirza Ruiz, the Venezuelan *Cleome* authority, to spend three weeks hunting Capparidaceae in their company. The climax of this highly focused and mostly successful enterprise was to occur near Cumana, a capparidaceous paradise, when, with the generous cooperation of Maestra Rosario Delgado and her associate, the wood anatomist of Capparidaceae, Luis Cumana, of the Universidad de Oriente Herbarium, we all traveled together one day to Curataquiche determined to recollect the mysterious Muco. To make a long story short, everybody there seemed to know Muco, but nobody was willing or able to show us one. Was it perhaps because of its desirable edible fruit that no one wanted to share its whereabouts? Or was it because, in fact, Muco has become indeed very rare in this beat-up landscape that once had seen much better days? The one tree that was reported to grow right in the village, in someone's garden, and one that several people were willing to talk about, had only recently been reduced to a stump to make room for a house, suggesting perhaps that Muco was once upon a time locally semi-cultivated or at least protected. Tan-

talizing to be so close, yet so far, it was all in all a most frustrating wild-goose chase.

Once back in Madison, Wisconsin, and many letters later, Iltis received a package with a mature fruit and a magnificent set of flowering specimens of Muco (now the type collection) from Luis Cumana and Rosario Delgado, who after revisiting Curataquiche twice without any luck, had finally hunted the species down at a different village called El Mucal de Perepecual, 8 km ESE of San Bernardino (where Peter Loeffling collected plants for Linnaeus after 18 January 1754). Here this species is apparently so common that the area itself is named for the tree, Muco, as elsewhere south of Barcelona, being its common name, an epithet we now formally apply to our newly described species. But even in "El Mucal," it took Cumana and Delgado two trips to finally capture specimens of the species in flower! Finally, Cumana and his students collected *C. muco* within San Bernardino itself, in December 1995 in fruit, and in April 1996 in flower, interestingly among the ruins of colonial buildings right next to the church on the main square, and in the patios of houses nearby, growing next to *Crateva tapia* L., another capparid that is sometimes eaten, both species suggesting (perhaps even pre-Columbian?) semi-cultivation, what with Muco here, as elsewhere in northern Venezuela, reported as edible by the human population. Thus, without these extraordinary efforts, we would, to this day, still not have been able to recognize this plant as the unique, and potentially useful, taxon that it is.

During all this time, however, flowering specimens were in hand, but from the freshly flooded artificial Lago de Guri, 300 km southeast of Barcelona, in the state of Bolívar, the first of these collected in 1981 by A. Gonzalez and Ronald Liesner (an extraordinarily capable collector for the Missouri Botanical Garden, and a former Iltis student at the University of Wisconsin), but promptly misidentified by Iltis as *C. maroniensis*, while in 1989 some excellent specimens were made near there by Gerardo Aymard, a field botanist with the Proyecto de Primatología Ecológica de la Guyana Venezolana of the late Warren Kinzey, Suzanne Walker, and Marilyn Norconk, who reported that the young seeds of *C. muco* and later the sweet pulp of its fruits were a major food source for the White-faced Saki monkeys (*Pithecia pithecia*) (Kinzey et al., 1989; Norconk, 1996; Norconk & Kinzey, 1993). Soon thereafter, Aymard obliged Iltis's request by collecting a magnificent fruit, nearly identical to those from near Barcelona. Still, at this point, all Guri and now all Barcelona material continued to be labeled first as a new *Morisonia*, and

then *C. maroniensis*, because the leaves and flowers seemed to match the few available specimens, as did the large fruit, judging only from its published description, what with not a single fruit of that taxon available in any of the American or Venezuelan herbaria. During all this time, there was little focus on studying pubescence beyond looking for stellate hairs, for the leaves of most collections of *Capparis* subg. *Calyptrocalyx* soon become varnished and totally glabrous.

Thus, it was not until 1995 that a detailed epidermal examination of young leaves finally showed the northern Venezuelan specimens to be in agreement with those found at Lago de Guri in their unique, dense, soft pubescence, which, on the one hand, was quite unlike that of the *C. leprieurii-maroniensis* complex, but on the other hand, suggested a fairly close relationship to *C. nectarea* Vellozo of eastern Brazil.

Let no one say that old-fashioned, morphological taxonomy is not without its joys and grand surprises, even in the molecular age of the 1990s!

International collaboration between local field botanists in the tropics and far away monographers in the old herbaria way up North has remained a much treasured theme of systematic botany, today as it has for 200 years, based on mutual cooperation mutually agreed upon, and mutually beneficial to scientific understanding, empowering the spirits of all concerned (Vazquez et al., 1995). But more important than that, it is on the *local* participation, the *local* expertise, that so much taxonomic research depends. In fact, ultimately, the very survival of tropical biota is directly tied to *local* involvement; if science is international, so is extinction (Iltis & Kolterman, 1983). But exploration and collecting need not be restricted to virgin rainforests, for, as we have seen, even in long- and well-settled, and thoroughly disturbed humanized landscapes such as near Barcelona or Cumaná, the town where Humboldt and Bonpland first landed in South America, in July 1799, to collect Cappariaceae (nearly a dozen species!) and a few other things besides, one may discover, often teetering on the brink of extinction, botanical treasures that cry out for protection, and, if that is not possible, at the very least deserve to be brought into cultivation, as surely *Capparis muco* does (Iltis, 1988).

In the face of the worldwide twin demons of human population growth and blind faith in perpetual economic growth and development (sustainable or otherwise), the themes of biologists concerned with the disappearance of life's diversity must continue to be: explore, collect, study, and, especially, *preserve*—truly a case of now or never, for even to-

morrow may be too late. And if now we all do work together, we *all* shall benefit (Lovejoy, 1979; Prance, 1995).

The fieldwork of the Venezuelan collaborators, freely offered and enthusiastically implemented, was as essential a part of this exploration into *Capparis* taxonomy as it was a gratifying and invaluable empowering of the scientific spirit that sustains us all, and deserves recognition. The present paper is but a small yet significant result of this cooperation, and the co-authorship a most highly deserved, if seldom given, appreciation.

#### CAPPARIS SUBGENUS CALYPTROCALYX AND *C. MUCO*

*Capparis* subg. *Calyptrocalyx* Eichler (1863: 269, 278) [sect. *Calyptrocalyx* (Eichler) Pax & Hoffmann, 1936; *Neocalyptrocalyx* Hutchinson, 1967] comprises six species of shrubs to large forest trees and one species that is a liana, all with variously stellate, stellate-echinate, stellate-subpelate to stalked multiangulate pubescence. These may be listed as follows (Iltis, unpublished):

Section *Mesocapparis* (Eichler) Pax & Hoffmann, in Engler & Prantl, Nat. Pflanzenfam. (ed. 2) 17b: 136, 1936, *pro parte*.

1. *Capparis lineata* Dombey ex Persoon, in DC., Prodr. 1: 257. 1824 (lectotype of section).

Section *Calyptrocalyx* (Eichler) Pax & Hoffmann in Engler & Prantl, 17b: 138, 1936.

2. *Capparis muco* Iltis et al., sp. nov., 1996.

3. *Capparis nectarea* Vellozo, Flora Fluminensis V: tab. 107. 1825 [1829] (type of subgenus and section).

3a. *C. nectarea* subsp. *nectarea*.

3b. *C. nectarea* subsp. *eichleriana* (Urban) Iltis, stat. nov. (*C. eichleriana* Urban, Linnaea 43: 265, 1880–1882).

4. *Capparis grandipetala* Maguire & Steyermark, in Mem. N.Y. Bot. Gard. 51: 115–117. 1989.

5. *Capparis leprieurii* Briquet, in Ann. Cons. et Jard. Bot. Genève 17: 393–394. 1914.

6. *Capparis maroniensis* Benoist, in Bull. Mus. Hist. Nat. Paris 25: 296. 1919. *C. surinamensis* J. C. Went, in Rec. Trav. Bot. Néerl. 30: 164. 1933; emend. in Med. Bot. Mus. et Herb. Utrecht 5: 2–3.

7. *Capparis* nom. provis. *nervifolia* Iltis, sp. nov. (*J. M. Pires* 3695, IAN, WIS!).

All these species are native to northern, eastern, and Amazonian South America, and are characterized by usually large, thick-walled, nearly sessile to short-gynophored, spherical or oblongoid fruits and large seeds. In particular, the subgenus has a

2-seriate calyx composed of four sepals in two decussate pairs. The outer, much larger, and hemispheric sepals are valvate-connate and completely enclose the whole of the flower in a seamless spherical bud, but then separate and recurve, together with the narrower, inner free pair, some time before anthesis to allow the corolla to open. This separation and recurving is often straightforward and symmetrical, with all four sepals reflexing individually, but occasionally incomplete, so that one may find the two outer sepals stuck together and, reflexed only to one side of the flower, joined into something like a calyptra (= cap), this then evidently the inspiration for Eichler's poorly chosen subgeneric name.

Already Eichler (1863), in his monumental treatment of the Cappariaceae for Martius's *Flora Brasiliensis*, found the taxonomy of *C. nectarea*, the one, solitary species of his subgenus *Calypetrocalyx*, to be difficult because of grossly inadequate and insufficient collections. Thus, although he (Eichler, 1863: 178) does cite a sterile(?) *Sello* collection (in B) from Rio de Janeiro, but must have had, presumably, a flowering one as well to serve as a model for his illustration (tab. 65, fig. III), his description by his own admission was based mostly on Vellozo's dramatic drawing (Fl. Flum. Ic. V, tab. 107, 1825) and text (p. 230, fide Eichler), with neither he nor Vellozo certainly ever having seen or described the large, lemon-shaped, subspherical to broadly oblongoid, edible *C. nectarea* fruits. In fact, one of his key characters for distinguishing his subgenus VII *Calypetrocalyx* from his subgenus VI *Mesocapparis* (which contains two unrelated species, one of which, *C. lineata*, a liana, is herewith placed next to its somewhat distant relatives into *Calypetrocalyx*) was the shape of the mature fruit, which, Eichler surmised quite mistakenly, "judging from the immature ovary" ("ut ex ovarii indole judicandum"), must be "*siliquiformis*," that is, bean-shaped!

Even today, we work under similar difficulties. First of all, some of the species are large, tropical moist forest canopy trees, and few botanists, except experienced and fearless tree climbers, can collect such specimens. Not only that, but the flowers of some species open at night, only to readily fall apart at the slightest touch the next morning. Thus, Carol Gracie tells us how, early one day, she and Scott Mori (both from The New York Botanical Garden) were trying to collect *Capparis leprieurii* at a nature preserve near Saül, French Guiana. In order to gather a flowering branch, Scott had to climb to the top of a 40-m-tall tree with French telephone pole climbers, and then bring the treasure carefully down to earth tightly clamped in his teeth, where-

upon (and soon after a quick picture-taking session by Carol) the corolla promptly disintegrated. On the other hand, *C. muco* appears to be a day bloomer (10 A.M., fide Aymard), and the persistence of the petals in herbarium specimens supports that notion.

Secondly, the massive indehiscent, internally fleshy, edible fruits of almost all the species of *Calypetrocalyx*, from the size of a ping-pong ball (*C. lineata*) to some as large as a good-sized orange or even a small grapefruit (*C. muco*), are very rarely collected, perhaps in part because of problems with drying, but more likely because they are very rarely produced. Being plants of a seasonal climate, they are hardly ever found associated with flowers. We still do not have fruits of most populations or even of two or three distinct species, perhaps also because in some species they are edible and fall victim to people, or else to monkeys. Thus, of the 17 collections of *Capparis leprieurii* from the nature preserve near Saül, only four were in flower, the rest were sterile, and none were in fruit.

Finally, both flowers and fruits of different taxa can be quite similar and have driven one of us to complete distraction, trying to make taxonomic sense out of what appears to be a much too inclusive, but seemingly indivisible, variability.

While the problem of distinguishing the large- and few-flowered *C. leprieurii* from the smaller- and many-flowered *C. maroniensis* in the Guianas has not yet been completely resolved, a recent insight made it quite clear that the somewhat smaller- and many-flowered, sequentially blooming trees of northern and eastern Venezuela, though very similar in inflorescence structure, can readily be segregated on the basis of a quite distinctive leaf pubescence. Thus, in the two species mentioned above, and examining *fully expanded but still pubescent* leaves, the pubescence consists of minute, distinct, individual stellate-echinate hairs, only 0.2–0.3 mm in diameter, evenly but distantly dispersed (scattered) with much glabrous space between each, which on closer examination (40×) are more or less appressed and circular, echinate or stellate-subpeltate, with ca. 20–30 or more very short arms radiating mostly horizontally but some also in all directions from an irregularly hemispheric center called the umbo (see Roe, 1971, for hair nomenclature). On the other hand, plants of northern and eastern Venezuela (*C. muco*) have, especially on the underside of their young, fully expanded, yet still pubescent leaves, a longer (1–1.5 mm), soft, evenly and more or less densely and continuously distributed, somewhat more persistent, buff-colored pubescence that on closer examination (30–50×) proves to be a complex mixture of several

distinctive stellate hair types, the rather low number of long and slender rays (branches or arms) giving an appearance of "looseness." These include (1) "tufts" of 2 to ca. 5, nearly 1 mm long, thin, single-celled rays (hair branches) arising from a single, more or less sessile to more or less raised base, these on both leaf surfaces (see Roe, 1971: 502, fig. 4, 504, fig. 10); (2) hairs with 2 to 4 or more slender, more or less horizontal to ascending, "Texas long-horn cattle" style, lateral rays as much as 1.4 mm from tip to tip, diverging from a short, multicellular (multiseriate) stalked base (see Roe, 1971: 504, fig. 11); these, finally, grading in many variations to (3) multiangulate hairs with up to 15 or more widely divergent, single-celled, slender rays inserted on or near the top of a 1–1.5-mm-tall multicellular multiseriate stem, resulting in "palmoid" or "Hydra-like" compound structures of considerable complexity (cf. Roe, 1971: 504, fig. 12).

In addition to the pubescence, the flowers (smaller than those of *C. leprieurii* but only a little larger than those of *C. maroniensis*) and the enormous round fruit make *C. muco* an amply differentiated taxon.

In subgenus *Calyptricalyx*, only *C. nectarea*, restricted to the Serra do Mar from Rio de Janeiro to Pernambuco, and an isolated population of what appears to be the same, or a closely related, species far to the north of it on the other side of the Amazonas River in Edo. Amapa, Brazil, has a pubescence and a fruit somewhat similar to those of *C. muco*, and therefore may well be considered its closest relative. But in *C. nectarea* the pubescence is generally more sparse and openly dispersed, the center of the multiangulate hairs with somewhat of an echinate umbo, and is mostly of a less complex architecture than one finds in *C. muco*.

While such heavy reliance on pubescence as a taxonomic character may seem trivial and insufficient to some, one can point to other genera, such as *Solanum* sect. *Brevantherum* (Roe, 1967, 1971, 1972; Seithe, 1962), *Clethra* (L. M. González, pers. comm.), *Lesquerella* (Rollins & Shaw, 1973: 23–27), or *Croton* (Webster et al., 1996), as well as *Capparis* (Vesque, 1882a, b, 1887), where pubescence has proven to be a conservative, reliable, decisive and eminently useful character. In subgenus *Calyptricalyx*, it has proven to be indispensable. And yet, here again, nature has thrown us taxonomists a "foul ball." Almost all the taxa, no matter how pubescent their leaves when young, soon end up glabrous and varnished, making definitive species identification of many of the collections, except by geographic inference, quite impossible.

Finally, by adding still another giant-fruited spe-

cies to the northern South American *Capparis* flora, *C. muco* joins the related *C. nectarea* and *C. maroniensis*, but also the unrelated *C. pulcherrima* Jacquin, *C. stenosepala* Urban, *Belencita nemorosa* (Jacquin) Dugand, and *Morisonia* spp., in raising the question whether these plants developed such giant, indehiscent fruits with large, hard seeds in response to dispersal by a now extinct Pleistocene megafauna (Janzen & Martin, 1982). But that tantalizing question will have to be dealt with another time.

***Capparis*** (subg. *Calyptricalyx*) ***muco*** H. H. Iltis, L. Cumaná, R. Delgado & G. Aymard, sp. nov.  
TYPE: Venezuela. Anzoátegui: Distrito Bolívar, El Mucal de Perepecual, cerca de Campo Alegre, aproximadamente 7 km de San Bernardino, alt. 80 m, 13 mar. 1993 (full flower!), *L. Cumana* C., *P. Vivenes* & *R. E. Delgado* M. 5415 (holotype, WIS; isotypes, BM, CAY, COL, F, G, GH, INPA, IRBR, K, MER, MO, MY, MYF, NY, P, PORT, RB, S, SP, TEX, TFAV, TRIN, U, US, VEN). Figures 1, 2.

Arbor ad 7–16(–20) m alta. Species aspectu foliorum, racemum corymbosum (3-ad 12-florum), et florum *Cappari leprieurii* et *Cappari maroniensi* similis, sed foliis juvenilibus adaxialiter glabrescentibus, abaxialiter ± dense piloso-stellatis, et floribus 22–28 mm diam. divergens.

Trees with dense foliage, 7–16(–20) m tall, to 40 cm DBH, generally softly buff or rusty stellate pubescent on all young growth and especially underside of leaves (see below). Leaves alternate, "leafing" out and membranaceous at flowering time, becoming thinly coriaceous, varnished and shiny, narrowly to broadly elliptic or oblanceolate-elliptic to oblong or obovate-elliptic, the apex sharply acuminate to rounded and minutely apiculate, the base narrowly to broadly cuneate to obtuse or rounded and (rarely) slightly retuse (subcordate), those of the flowering branches mostly 8–19 cm long, 4–8 cm wide, the 6–9 main lateral nerves on each side curved upward, the angle between opposing nerves 90° to 130°, both nerves and midrib ± prominently raised on the leaf underside (juvenile "sprout" leaves larger, to 26 × 12 cm, somewhat falcate, and with up to 11 nerves per side); petioles 6–15 mm, weakly if at all pulvinate. Leaf pubescence distinctive, of long, ascending, and slender-armed, loosely stellate, crinkly white to rust-colored, soft pilose hairs or hair-branches, the upper surface uniformly and loosely covered with few-rayed hairs ± individually discernible (30×), the lower surface with a dense, soft tangle of several types (Roe, 1971), mostly with 2- to 5-rayed, slender, 0.4–0.7 mm long, stellate or multiangulate hairs with strongly

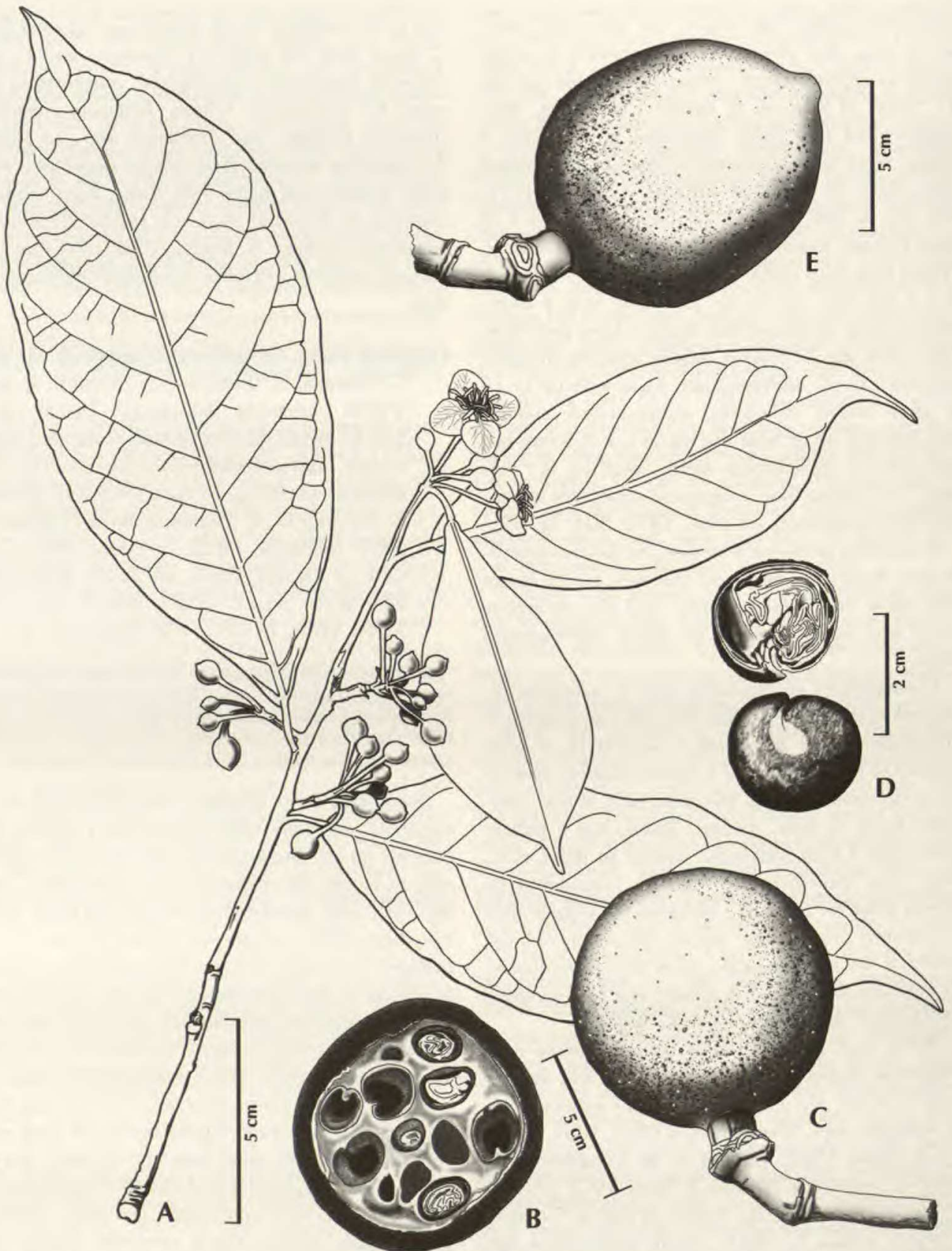


Figure 1. *Capparis muco* Iltis et al. —A. Flowering branch from El Mucal, the type collection (Cumana et al. 5415). —B, C. Fruit from Lago Guri (Aymard et al. 7594). —D, E. Seeds and fruit from Curataquiche (Aristeguieta et al. 7158). All drawings by Kandis Elliot.

ascending arms forming a "V" from a sessile base, or with 2–4 laterally undulating horizontal rays (like the horns of "Texas longhorn" cattle: tip to tip ca. 0.9–1.4 mm), grading to multiangulate hairs with 3–6 or more arms strongly diverging or as-

cending from a short multiseriate stem, grading finally to complex, palmoid or Hydra-like, multiangular or even somewhat echinate hairs with 15 or more arms radiating in all directions from the top of a multicellular, multiseriate stem, the stemmed

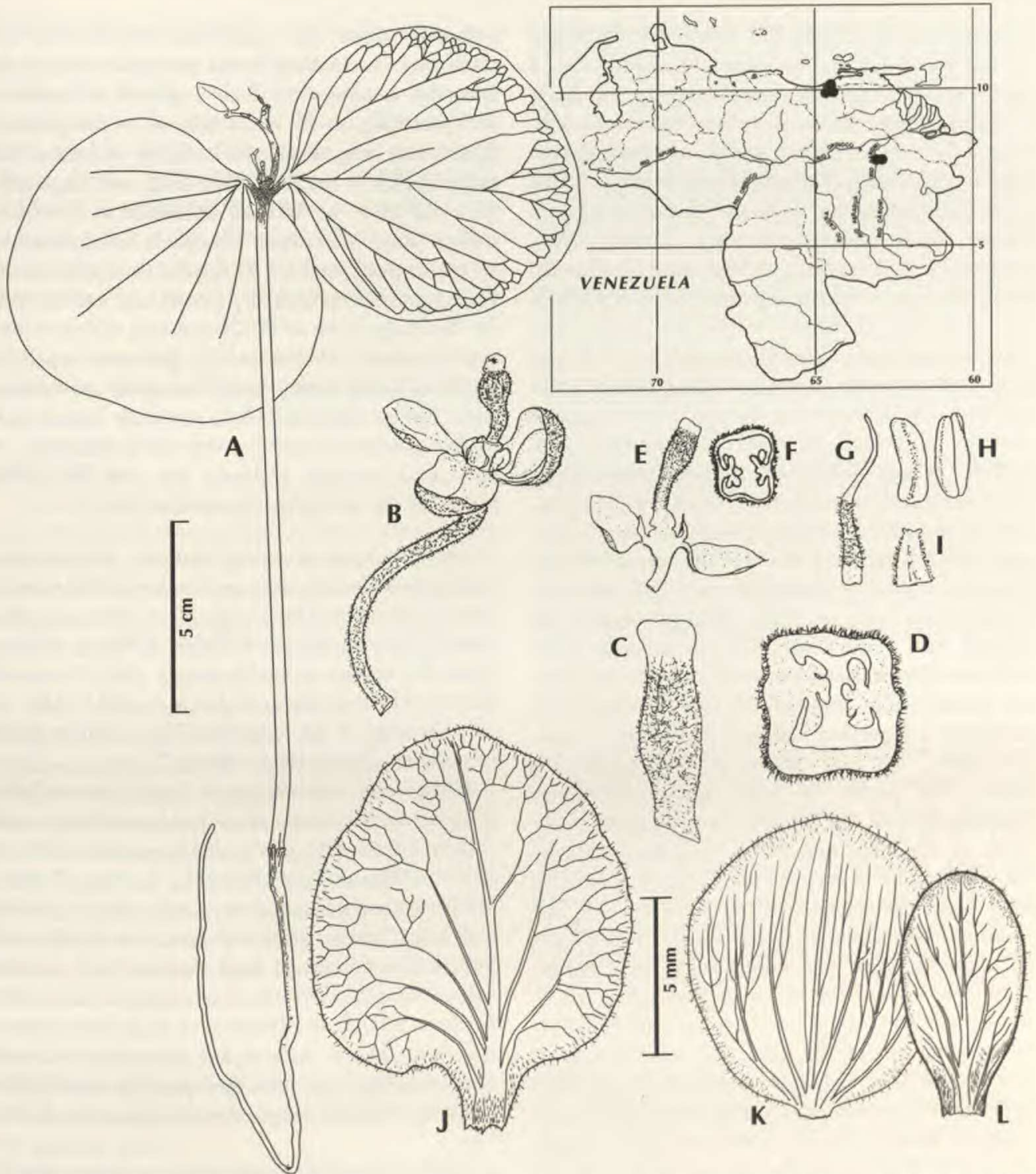


Figure 2. *Capparis muco* Ittis et al. (all from *Cumana et al.* 5415). —A. Seedling. —B. Flower with 1 sepal and 3 petals removed, showing 2 flat nectariferous scales. —C–F. Side view and cross section of pistils. —G. Staminal filament. —H. Anther. —I. Nectariferous scale. —J. Petal. —K. Outer sepal. —L. Inner sepal. Drawings A, and J–L by Kandis Elliot, B–I by Luis Cumana. Map shows distribution of the two meta-populations.

hairs lacking or rare on the upper surface, common on the lower, the leaves soon glabrescent, especially above.

Inflorescences solitary (though sometimes 2 or more in close proximity), mostly corymbose axillary racemes, few to many on a shoot of the previous season, several- to 12-flowered, the flowering sequential within each raceme with only 1 or 2 open flowers at any one time, but these accompanied by 2 to 10 buds of all sizes, their slender pedicels

densely crowded near the ends of 2–3(–13)-cm-long peduncles (“spurs”) of new growth (these are axillary, but in fact often actually terminal by continuing last year’s 1–3-cm-long axillary growth), the peduncle (axis, new branchlet) naked except for minute bracts, or bearing 1–3 leaves with a flower solitary in each leaf axil; new growth terminating a shoot of the previous season to 20 cm long, often also bearing axillary in addition to terminal inflorescences. Pedicels (6–)12–15(–23) mm long, the

lower flowers on a branchlet sometimes subtended by full-grown leaves, the upper by minute (ca. 2 mm), petioled, caducous bracts (clavate, the blade never unfolding), these as well as the leaves subtended by minute, paired, stellate-echinate pubescent to essentially glabrous, sharp-pointed, 1 mm long, linear-triangular, caducous "horns" (stipules). Flower buds spherical-apiculate, densely short-stellate, ca. 6–8 mm long at beginning of calyx anthesis when outer sepals separate. Calyx of 4 sepals in 2 decussate dimorphic series, the larger, outer valvate sepal pair hemispheric-gibbous, 7–9 mm long, 5–8 mm wide, densely stellate without, subglabrous within, enclosing the inner in a seamless bud, the inner sepal pair free, oblong and narrower, 6–8 × 3–4 mm, stellate with stellate-ciliate margin, all separating quite some time before corolla opens, and, eventually, becoming strongly recurved. Nectary scales 4, inserted inside of the sepals between the petal bases, ± triangular, ca. 1.5–2 mm long, 0.5–2.2 mm wide at base, glabrous within but fringed with dense tufts of 5- to 8-rayed, stiffly echinate white hairs, densely stellate without. Flowers creamy white, fragrant, the corolla "rotate" (resembling a 4-petaled malpighioid flower), ± actinomorphic, flat and cruciform, 20–24(–26) mm across, the petals (in bud) sinistrose-contorted (looking on from the outside), broadly ovate to obovate or orbicular, rounded to truncate and somewhat auriculate at base where abruptly contracted to a short down-turned claw, 9–13 × 8–9 mm (northern Venezuela) to ca. 11–14(–17) × 9–13 mm (in Lago de Guri, the flowers to 36 mm across), palmately veined, somewhat wavy-margined, the inner surface glabrous at very base but with few short, white hairs toward the apex, the outer surface ± densely stellate and with simple, twisted, white hairs grading to brownish, stellate hairs at apex and margin. Stamens 16–18, short, essentially equal, fertile and mostly included, the filaments 6–8(–10) mm (northern Venezuela), 6–14 mm (Lago de Guri) long, densely white stellate-tufted on lower half, glabrous distally, the anthers 2–3 mm long. Ovary ovoid-oblongoid to subspherical, 3–5 × 2–4 mm, not constricted below the broad, flat, glabrous, centrally retuse stigma, ± quadrangular, with 4 main longitudinal ribs, densely pubescent, unilocular, the 2 placentae parietal; gynophore densely stellate, (3–)6–9 mm long; androgynophore ca. 1.5 mm, shorter than the nectary scales.

Mature fruit gigantic, subspherical to ovoid and somewhat umbonate, (8 × 6–)10 × 8–12 × 10 cm (or reputed to be even larger, "as big as a grape-fruit"—M. A. Norkong, pers. comm.), the thick, woody-crustaceous rind 7–9 mm thick, green to

yellowish when ripe, glabrous, indehiscent, but fracturing when falling from a tree (with a little help from the monkeys, no doubt); gynophore massive, 3–9 mm long, to 11 mm thick, as is the pedicel, 22–30 mm long, 8 mm thick. Seeds several to 20, suborbicular to reniform, flattened, very large, 28–31 × 22–26 × 11–16 mm, embedded in an edible, orange pulp, in northern Venezuela much attacked by insect pests; embryo white, the cotyledons much convoluted and profoundly folded one into the other. Seedlings with a 10–20-cm-long primary root and an erect, 14–19-cm-long glabrous hypocotyl (stem) bearing large, leafy, emergent cotyledons, these, when fully unfolded, perfectly round, palmately-pinnately veined, 8–10 cm in diameter, on very short petioles, glabrous, but with the young leaves of the emerging plumule stellate.

*Capparis muco* is endozoochorous, the immature young seeds being eaten by monkeys (*Pithecia pithecia*, white-faced Saki) (fide M. A. Norconk, pers. comm.; Aymard, Kinzey & Walker 7594) as well as, later, the orange pulp, by people (fide Curran & Haman 1197; Cumana & Delgado 4912, who report the fruit to be aromatic). The common name in northern Venezuela is "Muco."

*Distribution and ecology.* In highly seasonal, dry, tropical deciduous to semi-deciduous forests and gallery forests ("*bosque tropófilo macrotérmico*" of Huber, 1986; see also Norconk, in press; Parolin, 1993; Aymard, in prep.) on sandy soil with much leaf litter, highly local and rare, but locally well known (see below); at Lago de Guri with average annual rainfall 1100 mm and average yearly temperature 26.9°C, at elevation of 10–240 m; flowering from March into April (sometimes through May), fruiting from late May into September (December), with the leaves deciduous in late February.

*Capparis muco* is known from two meta-populations (Fig. 2), one to the northeast and south of Barcelona in the arid coastal belt of northeastern Venezuela, the other from islands in Lago de Guri south of the dam on the Rio Caroní in central eastern Venezuela, these separated by almost 300 km. The Lago de Guri location has been described in detail by Norconk (1996), Norconk and Kinzey (1993), Parolin (1993), Kinzey et al. (1989), and others. *Capparis muco* was once collected in 1917 at Guanta, northeast of Barcelona, but has not, in that industrialized area, been relocated since, even though xeric forests are still abundant on the hill-sides there.

The three other locations, some 20 to 22 km by air more or less south of Barcelona deserve special



comment. Curataquiche is a small village just west of the main highway from Barcelona to San Mateo (at Km 40). El Mucal de Perepecual is presumably the minute settlement of El Mucal (Dirección de Cartografía Nacional Venezuela, the topographic Hoya 7245 SAN MATEO, 1:10,000, 1963, 9°56'45" N, 64°40'00"W), 10.5 km due W of Curataquiche, 2 km SE of Campo Alegre, 8 km ESE of San Bernardino and 22 km S of Barcelona. San Bernardino is a small village, nestled in a small range of hills that reach 500 m, south by southwest of Barcelona. Only 18 km apart from east to west, all of these three *C. muco* locations are in the headwaters and drainage of Rio Aragua, in rather low to somewhat hilly country at an elevation of 80 to 300(500?) m.

In both the northern and southern meta-populations xerophytic Capparidaceae are common. At the type locality *C. muco* grows along streams in dry forest with *Morisonia americana* L. and *Steriphoma ellipticum* (DC.) Sprengel, while in the nearby xerophytic forest one finds *C. odoratissima* Jacquin, *C. flexuosa* (L.) L., and *Morisonia americana*. At Lago de Guri, associated species include *C. frondosa* Jacquin, *C. osmantha* Diels, and *C. flexuosa*. The meta-populations are not quite identical, with the northern population tending to have thinner, larger, more pointed leaves, with a less dense and more buff or straw-colored pubescence, rather than a rusty brown one as in some collections from Lago de Guri; the inflorescences have more flowers (5–12 rather than mostly 3–6), on shorter peduncles; and the corollas are a little smaller (ca. 22–26 mm across, rather than 24–36 mm). Nevertheless, judging from the span of variability in related taxa, and considering the limited number of specimens that would lead to sampling error, the differences are not great enough to be recognized taxonomically at the present time.

Although the gigantic fruits and seeds are similar to those illustrated for *Capparis maroniensis* by van Roosmalen (1985: 69), and the flowers are only slightly larger, the unique, soft pubescence consistently occurring in two, geographically quite separate populations supports segregation as a well-differentiated species.

**Paratypes.** VENEZUELA. **Est. Anzoátegui:** Distrito Bolívar, "Muco," arbol de flores cremosas, fragantes, Curataquiche, mar. 1969 (fl), *Aristeguieta & Zabala 7010* (VEN, WIS); arbol 7–8 m, follaje perennifolio, fruto seco indehiscente, Hacienda Curataquiche, 6 July 1969 (y. and old fr., seedlings), *Cárdenas de Guevara 967* (MY, photo WIS), same tree as 7010 (see above) and same collection as *Aristeguieta, Liogier & Cárdenas de Guevara 7158* (VEN, WIS); "Muco," frutos comestibles, aromáticos, las semillas son destruidas por predadores, especie poco fre-

quente, abunda en una zona llamada "El Mucal," El Mucal de Perepecual, cerca de Campo Alegre, 9 Sep. 1991 (y. fr. "no flowers this time of the year," seedlings), *Cumana & Delgado 4912* (WIS, topotype); galerias en quebradas rocosas, Perepecual, cerca de Campo Alegre, 13 mar. 1993 (fl.), *L. Cumana, P. Vivenes & R. Delgado 5445* (IRBR, WIS); plaza central cerca de ruinas coloniales y iglesia, San Bernardino, 22 Dec. 1995 (fr), *Cumana 6277* (IRBR, WIS); patios de casas, San Bernardino, 2 Apr. 1996 (fl), *Cumana 6293* (IRBR, WIS); Cambura, via San Bernardino, 1 Apr. 1996 (fl), *Cumana 6291* (IRBR, WIS); Distrito Sotillo, Guanta, 1917 (sterile), *Curran & Haman 1197* (GH, US); Bachaco [presumably near Guanta], "tree 12 inches diam. 50 ft. high. edible fruit," 1 July 1917 (sterile), *Curran & Haman 1197* (GH, NY, US, fragm. WIS). **Est. Bolívar:** 15 m tree, fls. white, forest, Represa Guri, islands 6 to 18 Km S of dam, 220–240 m, 7°38'N, 62°58'W, 2 Apr. 1981 (fl), *Liesner & Gonzalez 11145* (US, VEN, WIS); Municipio Piar, arbol 16 m, fls. blancas, fr. verdes, *Pithecia pithecia* se come los frutos, bosques medio semidecuidos sobre afloramientos de cuarcitas ferrugíneas, con predominio de *Maytenus*, *Peltogyne floribunda*, *Piptadenia leucoxydon*, *Trichilia lepidota leucastera*, Isla en lago de Guri (Sector Las Carolinas), 15 km al E de la Presa R. Leoni, 270 m, 7°40'N, 62°51'W, 23–28 May 1989 (fl., almost mature fr.), *Aymard, Kinzey & Miller 7594* (MY, PORT, VEN, WIS), 13 Mar. 1993 (flowers), *Aymard s.n.* (WIS). [These are from "Round Island," 7°45' N, 62°52'W, according to Parolin, 1993: 140].

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