

CORNUS IN MEXICO, WITH NOTES ON THE EVOLUTION OF THE GENUS

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Though only five species of *Cornus* have been reported in Mexico, these represent three of the sections, subgenera, or genera into which this complex has been divided, and exhibit in a striking way the evolutionary trends within it.

The rank of the subordinate groups has varied with the tastes of the students concerned; general agreement both on the limits and on the nomenclature of the proposed taxa has been wanting. The most recent attempt to divide *Cornus* into a number of genera is that of Hutchinson.¹ In his paper, as in others, the principal basis of the division has been the inflorescence; and certainly in the characters of the inflorescence, particularly in the bracts connected with it, the clue to the relationships of the groups may be sought. Another character of probably equal significance is the shape of the drupe, whether globose or ellipsoidal.

The largest and most widespread group is Sect. *Thelycrania* Endl., for which Hutchinson proposes to retain the name *Cornus*; it has been widely known in the United States as *Svida* Small. It is characterized by a more or less diffuse cymose panicle. In comparison with the more condensed inflorescences of the other groups, this seems primitive; but the absence of bracts subtending the branches of the panicle is certainly a secondary character. There is one species, however, *C. oblonga* Wall. of central and southeastern Asia, which has small bracts at the base

¹ Ann. Bot. II. 6: 84-93. 1942. For the nomenclature of these groups see also N. Am. Flora 32B: 299-311 (1945).

of the primary branches and of some of the secondary branches. Since, as in other species of *Thelycrania*, there are often four main branches of the panicle, representing two pairs of opposite branches approximated by the failure of the internode between them to develop, there may be four bracts subtending the entire inflorescence. In this respect this species would seem to represent a more primitive condition.

The presence of four (or more) bracts at the base of the inflorescence is characteristic of several of the groups, but usually in association with a much condensed flower-cluster. One species, however, *C. volkensis* Harms of tropical Africa, is represented as having a more or less open cyme of staminate flowers subtended by four well developed deciduous bracts; the pistillate flowers are apparently arranged in an umbel (which, however, must certainly be sympodial rather than a true umbel), similarly provided with an involucre. The inflorescence alone would scarcely serve to differentiate this species from *Thelycrania*; but when we consider the ellipsoidal dark-colored drupes, which are contrasted with the globose, usually white or blue fruits of the latter section, the species seems sufficiently distinct to be placed in a separate section (sect. *Afrocrania* Harms; Hutchinson has elevated this to generic rank). Since *C. oblonga* also has ellipsoidal drupes, it also would seem more nearly allied to *Afrocrania* than to *Thelycrania*; an illustration of the real difficulty of making generic segregations in this complex.

If we suppose that a type of *Cornus* resembling *C. oblonga* and *C. volkensis* was ancestral, it is not difficult to derive the remaining groups from it. The rest of *Thelycrania*, ranging across Eurasia and North America, differs chiefly in the absence of bracts. Section *Tanycrania* Endl. (subg. *Macrocarpum* C. K. Schneid., raised to generic rank by Nakai) has an inflorescence which resembles a small umbel but is actually sympodial (a reduced cyme); it is subtended by four deciduous bracts, varying in extent of development. The species of this group are widely (and discontinuously) spread in Europe, the Mediterranean region, China, Japan, and western North America. Sections *Discocrania* Harms and *Cynoxylon* Raf.² occur only in North America, the former being limited to Mexico; but the latter has an Asiatic counterpart, sect. *Cephalocrania* Hance or *Dendrobenthamia* Hutchinson,

2 It is still debatable whether Rafinesque intended the name *Cynoxylon* for a section or a genus: see Torrey 42: 11-14, 130, 131 (1942). If *Cynoxylon* Raf. may be maintained as a generic name (as I think likely), then the same is true of *Eukrania*, which antedates *Chamaepericlymenum*.

which is with some difficulty separable from it on purely morphological grounds. The flowers of these groups are borne in capitula which are actually reduced cymes and not umbellate in origin. In *Discocrania* the bracts are deciduous as in *Tanycrania*; but in the other two groups they undergo development into the familiar petaloid structures of *C. florida* and *C. kousa*. In these groups also traces of the original bracteation of the cymes are found in the much reduced ring of small bracts, presumably prophylls, which subtend the flowers within the involucre.

The foliage also may give some clue to relationships. *C. disciflora* and *C. oblonga* have rather distinctive elliptic leaves in which the veins are more or less evenly distributed along the midrib; in most species of *Cornus* the veins are attached to the basal half of the midrib.

If the derivations outlined above are accepted, an origin in the southern hemisphere is suggested by the occurrence of *C. volkensis* in Africa and the prevalence of the derived types in southern Europe, southern Asia, and southern North America. The scarcity of *Cornus* in South America, is, however, surprising. Two species have been reported, both being as yet imperfectly known. It is interesting and perhaps significant that one of these, *C. peruviana* F. Macbr., has ellipsoidal fruits like those of *Discocrania* and borne in a congested cluster. This species, perhaps too hastily ascribed to *Thelycrania* by Hutchinson and others, may indicate the existence in South America of something corresponding to *C. volkensis* in Africa, something leading from an original paniculate type towards *Discocrania* of Mexico. The significance of the southern continents in the evolution of Angiosperms, and the relationships of their floras, have been recently presented by Camp.³ The other South American species, *C. boliviana* F. Macbr., has globose fruits in an ebracteate cyme, and probably belongs to *Thelycrania*; in its leaves, however, it resembles *C. disciflora* and *C. oblonga*.

The difficulty of separating these groups has been mentioned. It is easy to recognize several distinct genera as long as one disregards some of the species. *C. oblonga* makes distinction of *Afrocrania* and *Thelycrania* difficult. *Discocrania* is evidently separable from *Afrocrania* on one hand and from *Tanycrania* on the other by only slight characters. Hutchinson's inclusion of *C. disciflora* in *Cynoxylon* is the more surprising, for certainly there is as much difference between this species and *C. florida* as there is between *C. oblonga* and *C. volkensis*. Sect. *Cephalocrania* was distinguished by its syncarpial fruit. The drupes

3 Ecol. Monogr. 17: 159-183. 1947.

begin development separately as in other groups, but their surfaces coalesce so that one succulent syncarpium results. Almost the same condition is found in *C. nuttalli* of the Pacific coast of North America, generally referred to *Cynoxylon*, whose fruits form a hard almost syncarpial mass in which they are pressed together without intervening spaces; but their surfaces do not coalesce. The distinction seems a shaky one for the differentiation of genera.

The remaining group, sect. *Arctocrania* Endl., is circumpolar and perhaps the most specialized of these groups. It has a much condensed inflorescence subtended by petaloid bracts; the connection of each bract with one branch of the cyme is particularly clear. In addition it has a "herbaceous" habit, the flowering shoots arising from an underground creeping woody stem.

If we accept South America (with Africa) as a possible center from which types of *Cornus* emanated, the Mexican species are particularly interesting as representing three of the developmental sequences of the complex: reduction of the cyme from the *Thelycrania*-type to that of *Discocrania* and *Cynoxylon*; retention of the bracts of the inflorescence in *Discocrania* and their disappearance in *Thelycrania*; and development of the bracts to the petaloid structures of *Cynoxylon*.

It must be emphasized also that, even if the groups of *Cornus* originated in the southern hemisphere and some of them spread northward through what is now Mexico, others probably entered North America by the familiar Bering Sea bridge. *C. stolonifera* Michx., for instance, probably enters Mexico from the United States, finding its southern limits in Durango and Nuevo León. The Mexican plants are quite typical of the species as it is known across Canada and the northern United States and southwards through the Rocky Mountains. *C. stolonifera* f. *baileyi* and f. *interior* do not reach Mexico; nor does the closely related *C. occidentalis* Coville which in the northwestern United States hybridizes extensively with *C. stolonifera*.

The specimens of Mexican *Cornus* (which are not so numerous as they should be) are scattered through a number of herbaria in Mexico and the United States. It gives me pleasure to express my gratitude to the Director and Staff of the Instituto de Biología, Chapultepec, Mexico, for the courtesies extended me during my visit to Mexico in 1943; to Professor Cassiano Conzatti of Oaxaca, whose collections I examined in his home; and to the Curators of the United States National Herbarium, of the Missouri Botanical Garden, of the Gray Herbarium,

and of the Chicago Natural History Museum, who made their collections available to me. Locations of specimens are abbreviated as follows:

C, herbarium of C. Conzatti.

CM, Chicago Natural History Museum.

G, Gray Herbarium of Harvard University.

IB, Instituto de Biología of the National University of Mexico.

MBG, Missouri Botanical Garden.

NY, The New York Botanical Garden.

US, United States National Herbarium.

KEY TO MEXICAN SPECIES OF CORNUS

Inflorescence cymose, not enclosed by bracts; drupes globose, white or blue when mature.

Veins usually more than 4 on either side of the midrib; leaves minutely papillose below; pith of the youngest branches about half the diameter of a cross section; style cylindric, not dilated beneath the stigma; anthers and drupes white.

1. *C. stolonifera*.

Veins mostly 4 or fewer on either side of the midrib; leaves not papillose below; pith of the youngest branches less than half the diameter of a cross section; style often clavate, dilated beneath the stigma; anthers and mature drupes blue.

Veins 3-4 or more on either side of the midrib; leaves broadly ovate-acuminate, appressed-pubescent or glabrous below; petals 5 mm. long; inflorescence ample, to 5.5 cm. across.

2. *C. lanceolata*.

Veins 2-3 on either side of the midrib; leaves lanceolate or narrowly ovate-acuminate, usually soft-pubescent below with short, curling hairs, these often reddish on the veins; petals 4 mm. long; inflorescence congested, about 2 cm. across.

3. *C. excelsa*.

Inflorescence capituliform, subtended by usually 4 deciduous or persistent bracts; drupes ellipsoid, dark red when mature.

Bracts petaloid, conspicuous, persistent through anthesis; leaves oval or rhombic to obovate; veins 4-5 on either side of the midrib, 3-4 arising from its basal half; appressed trichomes 0.4 mm. long, mixed with longer curling hairs.

4. *C. florida* subsp. *urbiniana*.

Bracts inconspicuous, deciduous at anthesis; leaves elliptic; veins 3-4 on either side of the midrib, about equally spaced along it; appressed trichomes 0.2 mm. long, or (in f. *floccosa*) the lower surface covered with a short rusty tomentum.

5. *C. disciflora*.

1. *Cornus stolonifera* Michx. Fl. Bor. Am. 1: 92. 1803.

C. sericea L. Mant. 199, pro parte. 1771. Nomen ambiguum.

C. Nelsoni Rose, Contr. U. S. Nat. Herb. 8: 54. 1903.

C. Alba subsp. *stolonifera* Wang. in Engler. Pflanzenreich 41 (IV 229): 43. 1910.

Spreading shrubs, the lower branches sometimes rooting and forming new clusters; youngest branches sparingly appressed-pubescent, often bright red, becoming grey, the white pith occupying half their diameter; leaf-blades lance-elliptic to ovate, acute to acuminate at the apex, cuneate at the base, 5-9 cm. long, 1.5-5 cm. broad, paler, minutely papillose and appressed-pubescent beneath, often with longer spreading hairs on the midrib and in the axils of the veins; veins (4-) 5-7 on either side of the midrib, often dark and conspicuous on the pale lower surface; petioles 5-7 mm. long; inflorescence an ample cyme, 3-6 cm. across, sparingly appressed-pubescent; petals about 3 mm. long; style cylindric; drupes globose, white when mature, 7-9 mm. in diameter, the endocarp oblique, furrowed laterally, 1-2 seeded.

Nuevo León: *C. H. & M. T. Mueller* 731, near Galeana, 4 Je 1934 (CM); *C. H. Mueller* 2219, Cerro Potosí, 20 Ji 1935 (CM, IB); *Richard A. Schneider* 1110, Galeana, 7400 ft., 21 Au 1938 (CM); *sine nom.*, sw. of Galeana, Je 1934 (IB); *sine nom.*, Cerro Potosí, Galeana, 1939 (IB).

Coahuila: *C. G. Pringle* 13646, Saltillo, 5 O 1905 (G); *Ernest G. Marsh, Jr.* 824 Del Carmen Mts., 12 S. 1936 (CM).

Chihuahua: *C. H. Townsend & C. M. Barber* 26, near Colonia García, 7500 ft., 9 Je 1899 (G, IB, MBG, NY, US); *C. V. Hartman* 708, Rio San Miguel, 30 Je 1891 (G); *E. W. Nelson* 4927, between

Guadalupe y Calvo and Porral, 7000-8000 ft., 7, 8 S 1938 (G, US-type of *C. nelsoni*); Harde Le Sueur 1403, Salto de Babicora, 20 JI 1937 (CM, G).

Durango: Francis W. Pennell 18529, 2500-2530 m., 31 Au 1934 (US).

2. *Cornus lanceolata* Rose. Contr. U. S. Nat. Herb. 8: 55. 1903.

Shrubs; youngest branches dark red or brown, becoming grey, the narrow pith white; leaf-blades broadly ovate, acuminate at the apex, cuneate to rounded or subcordate at the base, mostly 5.5-11 cm. long, 3-5.5 cm. broad, paler and appressed-pubescent beneath; veins 3-4 on either side of the midrib, prominent, arising mostly from its basal half; petioles 1-2 cm. long; inflorescence an ample cyme, usually 5 cm. across; petals 4 mm. long; style more or less dilated beneath the stigma; drupe globose, blue.

This species, here tentatively recognized, intergrades with the following, presumably by hybridization. Additional study in the field will be necessary to determine its status.

Hidalgo: C. G. Pringle 13008, Trinidad Iron Works, 5200 ft., 24 My 1904 (C, G, US); C. L. Gilly & H. W. Rickett 8, near Tamaunchale, 12 JI 1943 (NY).

San Luis Potosí: P. Maury 6806, Rio de Jilitla, 1220-1920 m., 17 JI 1891 (NY).

Vera Cruz: C. G. Pringle 8199, Jalapa, 17 My 1899 (as *C. toluensis*) (G, IB, MBG, NY, US; cotype); *sine nom.*, Jalapa (G); Bottieri 262, Orizaba (G; cotype); Fred Muller 1340, Orizaba, Au 1853 (G, NY); Schlechtendahl 275, Jalapa, 1839 (NY); E. Matuda 1230, Maltrata, 6 My 1937 (MBY, NY).

Chiapas: Ghiesbreght 808, 1864-1870 (G, MBG).

3. *Cornus excelsa* H. B. K. Nov. Gen. & Sp. 3: 430. 1820.

C. toluensis H. B. K. Nov. Gen. & Sp. 3: 430. 1820.

C. pubescens Willd. ex R. & S. Syst. Veg. Mant. 3: 252. 1827. Non *C. pubescens* Nutt. 1849.

Large shrubs or small trees to 5 m. high (according to Hinton); branches dark red or brown, becoming gray, sparsely appressed-pubescent or hirtellose, the narrow pith white; leaf-blades lanceolate to narrowly ovate, acuminate at the apex, cuneate, rounded, or subcordate at the base, 5-12 cm. long, 2.5-5 cm. broad, sparsely and minutely

strigillose above, paler beneath and commonly pubescent with short curling hairs (these often brown or reddish on the veins), or appressed-pubescent or almost glabrous: veins 2-3 on either side of the midrib, mostly arising from its basal half: petioles 5-15 mm. long: inflorescence compact, convex, almost capituliform, usually 1.5-3 cm. across, or sometimes more ample and umbelliform, to 5 cm. across, strigillose: flowers crowded on short pedicels mostly 1-3 mm. long: petals 3 mm. long: style often clavate, dilated beneath the stigma: anthers blue on the connective: drupes at first whitish, turning blue, about 8 mm. in diameter, the endocarp smooth, nearly globose.

Sinaloa: *H. S. Gentry 6167*, Ocurahui, Sierra Surotato, 6000-7000 ft., 27-30 Au 1941 ["large shrub"] (G, MBG, NY); *H. S. Gentry 6239*, Ocurahui, Sierra Surotato, 6000-7000 ft., 1-10 S 1941 ["small tree"] (G, MBG, NY).

San Luis Potosí: *E. Palmer 86*, Alvarez, 5-10 S 1902 [*As C. lanceolata*] (G, IB, MBG, NY, US).

Guanajuato: *A. Dugès 153*, 1895 (G).

Jalisco: *M. E. Jones 230*, 28 My 1892 (US).

Distrito Federal: *C. G. Pringle 11465*, Eslaba, 8000 ft., 17 N 1903 (C, G); *C. G. Pringle 6305*, Pedregal, 7500 ft., 5 Je 1896 (G, IB, MBG, NY); *C. G. Pringle 10058*, Santa Fe, 8500 ft., 17 S 1905 [*as C. toluensis*] (C, G, IB, MBG, NY, US); *C. G. Pringle 9436*, Eslaba, 8000 ft., 18 My 1901 (G, NY); *J. N. Rose, J. H. Painter & J. S. Rose 9486*, San Angel, 15 Au 1905 [*as C. toluensis*] (G, IB, NY); *J. N. Rose & J. H. Painter 6480*, San Angel, 21 Au 1903 (NY); *J. N. Rose & J. H. Painter 6505*, Santa Fe, Au 1903 (G, NY); *J. N. Rose, J. H. Painter & J. S. Rose 8656*, Santa Fe, 15 J1 1905 (G, IB, NY); *E. Lyonnet 330*, San Bartolo, Amayalco, Je 1928 (MBG, NY); *E. Lyonnet 1982*, S 1937 (US); *M. Urbina s. n.*, Tlalmanalco, 2400 m., 4 My 1890 [*as C. stricta*] (IB); *C. R. Orcutt 3558*, 12 Au 1910 (CM, G, US); *Ed. Seler 5243*, Contreras, 30 Je 1907 (G); *Bourgeau 57*, Pedregal, 23 My 1866 (G).

Puebla: *E. Lyonnet 1041*, D 1934 (US); *G. Arsène 1209*, Puebla, 2170 m., 10 O 1907 [*as var. Hartwegiana*] (MBG, US); *C. A. Purpus 164*, Ixtaccihuatl, Mr-J1 1903 (MBG).

México: *J. N. Rose & J. H. Painter 7141*, 17 S 1903 (US); *G. B. Hinton 905*, Temascaltepec, 2480 m., 30 Je 1932 (G).

Michoacán: *G. B. Hinton 11859*, Zitácuaro, 15 My 1938 ["Tree 5 m."] (G).

Nayarit: *J. N. Rose* 2169, Sierra Madre, Au 1897 (NY).

Morelos: *E. Lyonnet* 2097, 25 My 1938 (US).

Guerrero: *G. B. Hinton* 10168, Mina, 2200 m., 9 My 1937 ["Tree 5 m."] (G).

Oaxaca: *C. Conzatti* 2533, Cuesta de Coyula, 1400 m., 21 Jl 1909 (C); *C. Conzatti* 2408, Coyula-Cujamecalco, 1600 m., 22 Je 1909 (C, CM); *C. Conzatti* 2217, Cerro San Felipe, 2000 m., 12 Ap 1908 (CM, IB); *C. Conzatti* 186, Oaxaca, 1600 m., 26 Ap 1896 (G); *C. G. Pringle & C. Conzatti* 1442, Cerro San Felipe, 1750 m., 27 My 1906 [as *C. tolucensis*] (IB, MBG, NY); *C. G. Pringle* 4825, 6500 ft., 21 Au 1894 (G, IB, MBG, NY, US); *H. Galeotti* 2668, San Pedro Nolasco, 7500 ft., 0 1844 (CM, G, NY); *Lucius C. Smith* 497, San Juan de Estado, 7000 ft., 18 Ap 1895 (G); *W. H. Camp* 2343, Teposcolula-Nochixtlán, 20-23 D 1936 ["shrubby or sometimes tree-like, to 4 m."] (NY).

Chiapas: *E. A. Goldman* 974, 14 My 1904 (US).

Without definite locality: *P. Maury* 3156, 10 Je 1890 (NY); *C. Jurgensen* 668, 1843-1844 (NY); *Sessé, Mociño, Castillo & Maldonado* 607, 531, 492, 1790-1791⁴ (CM); *A. Dugès s. n.*, Montagnes de Santa Rosa, 1907 (G); *Müller* 1305, 1855 (G).

4. *Cornus florida* subsp. *urbiniana* (Rose) Rickett, Bull. Torrey Club 72: 223. 1945.

C. grandis Schlecht. & Cham. Linnaea 5: 171. 1830.

C. urbiniana Rose, Contr. U. S. Nat. Herb. 8: 53. 1903.

C. florida var. *urbiniana* Wang. in Engler. Pflanzenreich 41 (IV 229): 87. 1910.

Benthamidia florida var. *urbiniana* Moldenke. Rev. Sudam. Bot. 6: 177. 1940.

Small, widely branched trees, to about 10 m. high; branches at first brownish, becoming light gray, the narrow pith brown; leaf-blades ovate to obovate, acuminate at the apex, cuneate at the base, commonly about 5 cm. long, 3 cm. broad, sparingly appressed-pubescent above, paler and more thickly appressed-pubescent beneath with forked trichomes about 0.4 mm. from point to point, these mingled with longer curling hairs specially along the midrib and veins; petioles about 5 mm. long; veins usually 4 on either side of the midrib; inflorescence capituliform (a reduced cyme), containing usually 10-20 flowers subtended by small obtuse prophylls; bracts of the involucre normally 4, 5 cm. long, 2.5

4 See footnote under *C. disciflora* f. *floccosa*.

cm. broad, incurved, the margins broadly revolute, pubescent dorsally, not retuse; drupes ellipsoid, about 12 mm. long, 8 mm. broad, dark red (drying black), usually only 5 or fewer maturing in each cluster.

Nuevo León: C. G. Pringle 2409, Sierra Madre near Monterrey, 23 Au 1889 (IB); *sine nom.*, Sierra Madre Oriental, Alamar, 1939 (IB); C. H. & M. T. Mueller 1338, 30 mi. s. of Monterrey, 13 Au 1934 [as *C. florida*] (CM, IB); C. H. & M. T. Mueller 1141, Alamar s. of Galeana, 21 Jl 1934 [as *C. florida*] (CM, IB, MBG); C. H. & M. T. Mueller 211, mountains near Monterrey, Jl 1933 [as *C. disciflora*] (CM, IB); C. H. Mueller 2115, Villa Santiago, 5 Jl 1935 ["small tree"; as *C. disciflora*] (CM, MBG); C. H. Mueller 2945, Villa Santiago, 23 Au 1939 ["tree"; as *C. florida*] (G).

Vera Cruz: C. A. Purpus 8933, Huatusco, Mr 1921 (G, MBG, US); Liebmann 2780, Dos Puentes. ? Au 1841 (US); M. Urbina s. n., Cerro S. Cristóbal, Orizaba, Ap 1891 (IB, US-type).

5. *Cornus disciflora* Moc. & Sessé ex DC. Prodr. 4: 273. 1830.

C. capitata Sessé & Moc. Fl. Mex. 28. 1893. Not *C. capitata* Wall. 1820.

Shrubs and small trees, to 10 m. high (according to Hinton); branches at first reddish-brown, soon becoming light gray, the narrow pith brown; leaf-blades elliptic, cuneate at the base, acuminate at the apex, mostly 7-14 cm. long, 2-6 cm. broad, rather coriaceous, glabrous above, paler beneath and appressed-pubescent with minute forked trichomes about 0.2 mm. from point to point; petioles 5-20 mm. long; veins 3 or sometimes 4, arising at rather equal intervals along the midrib; inflorescence capituliform (a reduced cyme), containing about 20 flowers; drupes ellipsoid, dark red (drying black), about 12 mm. long, 8 mm. broad, usually only 1-4 maturing in a cluster.

Sonora: H. S. Gentry 1410, Rio Mayo, 9 Mr 1935 (CM, IB, MBG); H. S. Gentry 2117, Rio Mayo, 5500 ft., 2 N 1935 (CM, IB, MBG).

Zacatecas: J. N. Rose 2371, Sierra Madre, 18 Au 1897 (G, IB).

Hidalgo: Leslie A. Kenoyer 511, Jacala, 20 O 1927 (CM, MBG); C. L. Gilly & H. W. Rickett 6, near Tamazunchale, 12 Jl 1943 (NY).

México: G. B. Hinton 3554, Temascaltepec, 1500 m., 2 Mr 1933 (CM, NY, US); G. B. Hinton 8837, Temascaltepec, 19 Ja 1936 ["tree 10 m. high"] (G, NY); G. B. Hinton 5758, Temascaltepec,

1960 m., 11 Mr 1934 (NY); *G. B. Hinton* 3292, Temascaltepec, 2500 m., 17 F 1933 (CM); *G. B. Hinton* 906, Temascaltepec, 2480 m., 30 Je 1932 (NY).

Michoacán: *G. Arsène* 8460, Morelia, 2400 m., 11 Mr 1912 (MBG, US); *G. Arsène* 5374, Morelia, 2400 m., 9 Mr 1911 (MBG); *G. Arsène* 5570, Morelia, 1910 (NY, US); *G. Arsène* 5711, Campanoru, 2100 m., 17 Mr 1910 (MBG); *G. Arsène* s. n., Carrindapas, 5 My 1909 (G. NY, US); *C. G. Pringle* 4268, Patzcuaro, 8 O 1892 (G, IB, NY); *C. G. Pringle* 3592, Patzcuaro, 10 N 1890 (G); *E. W. Nelson* 6955, Volcán de Jorullo, Mr 1903 (NY); *E. W. Nelson* 6557, Mt. Patambán, Ja 1903 (NY); *E. W. Nelson* 6893, Tancítaro, 24 F 1903 (G, NY, US); *Wm. C. Leavenworth & H. Hoogstraal* 1091, Tancítaro, 6700 ft. (MBG).

Distrito Federal: *Irene Rivera M. s. n.*, Desierto de los Leones, 1 Mr 1942 (IB).

Guerrero: *E. W. Nelson* 7055, 25 My 1903 (US); *Ynes Mexia* 9013, Petlacala, 22 D 1937 (G, MBG, NY).

Morelos: *C. G. Pringle* 8014, Cuernavaca, 8000 ft., 2 F 1899 (G, IB, MBG, NY); *C. Rerche* 17, Cuernavaca, 1921 (US); *E. Lyonnet* 647, Huitzilac, S 1930 (NY); *E. Lyonnet* 146, Huitzilac, S 1930 (MBG, NY).

Oaxaca: *E. W. Nelson* 697, 8000-10,000 ft., 10 Ji 1894 (US); *E. W. Nelson* 1359, 7500-9500 ft., 10-20 S 1894 (G, US).

Chiapas: *C. A. Purpus* 10542, Fenis, Ap 1925 (NY); *E. Matuda* 2402, Mt. Tacana, 1000-2000 m., Au 1938 (CM, NY); *E. Matuda* 1979, Montecristi, Ja 1938 (CM, IB, NY); *E. Matuda* 4308, Saxchamal, 1 Ji 1941 (IB, NY); *E. Matuda* 811, Siltepec, 4 Ja 1937 (CM); *E. Matuda* 4571, Rodeo, 2800 m., 1 Au 1941 (NY).

Without definite locality: *Schlechtendahl* 276, Chiconquiaco, 1839 (NY); Seeman, nw Mexico (G).

5^a *Cornus disciflora* f. *floccosa* (Wang.) Rickett, Bull. Torrey Club 72: 223. 1945.

C. floccosa Wang. in Engler, Pflanzenreich 41 (IV 229) 171. 1910.

Similar to the typical form but the lower surface of the leaves covered more or less densely with a tomentum of short, curling, reddish hairs. This sort of pubescence may be mixed to various degrees with the typical appressed pubescence, and different leaves on one plant may

differ in this; the relations between this form and the typical form of species are apparently exactly those between *C. stolonifera* and its f. *baileyi*.

Sinaloa: *H. S. Gentry* 6271, Ocurahui, Sierra Surotato, 6000-7000 ft., 1-10 S 1941 ["shrub"] (G, MBG, NY).

Durango: *Jesús González Ortega* 5547, Topia, 1200 m., F. 1924 (G).

Nayarit: *J. N. Rose* 2176, Sta. Teresa, Tepic, 10 Au 1897 (G, IB, US).

Puebla: *C. A. Purpus* 1816, Ixtaccihuatl, F. 1906 (G, MBG, NY, US); *C. A. Purpus* 234, Ixtaccihuatl, Mr-Jl 1903 (MBG, US).

Distrito Federal: *Bourgeau* 998, San Nicolas, 27 S 1865 (G-isotype of *C. floccosa* Wang.)

México: *G. B. Hinton* 13558, Valle de Bravo, 2550 m., 6 Ja 1939 (G, NY).

Michoacán: *G. Arsène* 5353, Morelia, 2100 m., D. 1910 (MBG); *G. Arsène* 5770, Morelia, 2200 m., 1910 (G, MBG); *C. G. Pringle* 4268, Pátzcuaro, 8 O 1892 (MBG); *Wm. C. Leavenworth* 334, Tancitaro, 8500 ft., 24 Jl 1940 (CM, MBG, NY); *E. W. Nelson* 6557, 8500-10,000 ft., 28-31 Ja 1903 (G, US).

Oaxaca: *C. Conzatti s. n.*, Zimatlán, 2900 m., 8, 9 D 1905 (C); *C. Conzatti & J. N. Rose s. n.*, Zimatlán, 2900 m., 8, 9 D 1905 (IB).

Without definite locality: *Sessé, Mociño, Castillo & Maldonado* 604, 1790-1791 (CM)⁵.

5 The label reads "1787-1795-1804." If the collection was indeed made by the persons named, it must have been during 1790 and 1791. Mociño and Maldonado were not members of the Expedition until 1790; in 1792-1793 they were on the voyage to Nootka; Castillo fell sick and died early in 1793. No active collection was done by any member of the Expedition after 1799. The specimens may, of course, have been collected by Sessé and Cervantes in 1788 or 1789. During 1790 and 1791 Sessé's party explored parts of México, Guanajuato, Jalisco, Michoacán, Nayarit, Zacatecas, Durango, and Sinaloa. (See Chron. Bot. III: 1-86.)