

# THE COLOMBIAN SPECIES OF *Cyphomandra*

Por Lynn Bohs \*

The genus *Cyphomandra* includes some 50 species of small trees native to Central and South America, one of which, *C. betacea*, the tomate de árbol or tree tomato, has attained some economic importance as an edible fruit crop. There are two centers of species diversity in the genus, one in the Andean area of South America and the other in the Atlantic coastal rain forest of southeastern Brazil. Like many other members of the Solanaceae, *Cyphomandra* is often found in disturbed sites such as roadsides and forest margins, and also exploits light gaps in the primary forest. The plants are rapid-growing and often short-lived, their presence in any one area being ephemeral. On the other hand, some individuals may become very large and persist in a location until they can no longer tolerate being shaded out by taller canopy trees.

*Cyphomandra* appears to be most closely related to the genus *Solanum* because both share the trait of poricidal anther dehiscence. In 1845, Otto Sendtner segregated *Cyphomandra* from *Solanum* on the basis of the enlarged anther connective, still the most important criterion for recognizing the genus. The connective tissue is much thicker than that of the anther thecae, and the connective stands out as a swollen area running the length of the anthers on the abaxial side; it sometimes protrudes adaxially as well.

Another useful character for recognition of *Cyphomandra* is provided by its distinctive architecture. Growth begins as a single upright axis with 2/5 phyllotaxis. This trunk produces a terminal inflorescence, and the plants begin to branch out laterally from axillary buds on the main stem. These lateral shoots continue to branch sympo-

dially, and result in a spreading crown where all the flowers and fruits are borne. The mature tree thus has an umbrella-shaped appearance that makes it easy to recognize in the field. Further growth in height occurs when a new orthotropic shoot develops from an axillary bud on the old trunk below the branch tier. Most of the species are small trees when full grown, reaching a maximum height of about 10 meters.

The characters most helpful in delimiting species in *Cyphomandra* are leaf shape, type and density of pubescence, corolla color and shape, anther and connective morphology, stigma shape and diameter, and fruit size, shape, and degree of pubescence. Leaf shape in particular must be used with caution, as it can vary considerably on a single plant. The leaves of the trunk and those of the spreading crown may differ in size and shape, as in *C. endopogon* and *C. hartwegii* where the trunk leaves are generally lobed and the crown leaves entire. Leaf size and shape can also vary according to the position of the leaf on a branch. Further discussion of the characters used to delimit species in *Cyphomandra* can be found in Bohs (1986, 1988).

The following is an account of the species of *Cyphomandra* occurring in Colombia, with notes on their differential characters, distribution, vernacular names, and uses. A new subspecies of *C. hartwegii* endemic to Colombia is also described and illustrated. This treatment is based on a taxonomic study of the genus in the western part of its range: Central America and Andean and Amazonian South America. Although *Cyphomandra* includes some of the larger and more obvious members of the Solanaceae and some species have gained importance as economic plants, no comprehensive taxonomic treatment of the group exists, and little is known of its biology. The last taxonomic work of large scope attempted on this

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genus was Dunal's treatment in 1852 for DeCandolle's *Prodromus*, which is now much outdated. A taxonomic account of the entire genus throughout its range is now being prepared. The present article on the Colombian species is intended to serve until an account of the Solanaceae for the Flora of Colombia or a complete systematic treatment of *Cyphomandra* appears.

KEY TO *Cyphomandra* IN COLOMBIA

1. Herbs or shrubs up to about 1.5 m tall, stem not very woody; anther connective not distinct, the thickened region forming a leathery covering over the dorsal surface of the anther thecae; inflorescences 4-6-flowered; flowering pedicels 4-6 mm long. . . . . 1. *C. allophylla*
1. Shrubs or small trees, usually much taller than 1.5 m, stems obviously woody; anther connective distinct, the thickened region much different in appearance than the thin-walled anther thecae; inflorescences usually 10-100+-flowered; flowering pedicels 10-35 mm long . . . . . 2
2. Corolla urceolate, divided about 1/2 its length; leaves often pinnately compound . . . . . 2. *C. chlorantha*
2. Corolla campanulate or stellate, divided more than 1/2 its length; leaves usually simple . . . . . 3
3. Style strongly and abruptly dilated at apex into a peltate or subpeltate stigma 1-3 mm in diameter . . 4
  4. Anthers long and narrow, 6-10 X 1-2 mm; corolla 25-45 mm in diameter, the lobes 15-22 X 1.5-2 mm; corolla margins conspicuously villous; trunk leaves frequently lobed. . . . . 8. *C. endopogon*
  4. Anthers short and broad, 4-5 X 1.5-2 mm; corolla 15-30 mm in diameter, the lobes 7-15 X 2-4 mm; corolla margins tomentose; trunk leaves unlobed. . . . . 3. *C. obliqua*
3. Style not abruptly dilated at apex; stigma clavate to truncate, less than 2 mm in diameter. . . . . 5
  5. Foliage and axes densely pubescent-pilose with very abundant hairs 1-4 mm long; fruits pilose . . . . . 5. *C. pilosa*
  5. Foliage and axes glabrous or pubescent but long hairs (greater than 1 mm) sparse if present; fruits glabrous. . . . . 6
  6. Crown leaves often decurrent at base, basal lobes\* less than 1 cm long; apices of anthers connate into a ring. . . . . 4. *C. fragilis*
  6. Crown leaves (at least some of them) cordate at base, basal lobes\* more than 1 cm long; apices of anthers not connate into a ring . . . . . 7
  7. Fallen pedicels leaving remnants 1-3 mm long on inflorescence axis; corolla pinkish or white; fruits usually orange, red, or purple when ripe, rarely yellow . . . . . 6. *C. Betacea*
  7. Fallen pedicels leaving remnants less than 1 mm long on inflorescence axis; corolla green, purple, or lavender; fruits usually yellow when ripe. . . . . 8

\* Length of basal lobes is measured parallel to the midrib from the lowest point of the lobe to the insertion of the blade on the midrib.

8. Trunk leaves often lobed; corolla usually green; widespread species . . . . . 9. *C. hartwegii*
8. Trunk leaves always unlobed; corolla usually lavender; endemic to Valley of Sibundoy and surrounding areas. . . . . 7. *C. sibundoyensis*

1. *Cyphomandra allophylla* (Miers) Hemsl. Biol. cent.-amer., Bot. 2: 417. 1882.

*Cyphomandra allophylla* differs from all other species in the genus in its small stature and rather herbaceous habit, its membranaceous, nearly glabrous leaves which are either pinnately 3-5-lobed or unlobed with cuneate to decurrent bases, the few-flowered, often extra-axillary inflorescences, and the odd shape of the fruits, which are reported to be laterally compressed at maturity. The taxonomic position of this species is not at all clear. The ill-defined anther connective is anomalous in *Cyphomandra*, but the growth habit and branching pattern (as interpreted from herbarium sheets) exhibits features characteristic of the genus. Perhaps when living material is made available and this taxon is further investigated, it will prove to be a species of *Solanum*.

*Cyphomandra allophylla* ranges from Central America to northwestern South America and occurs in Colombia only at the northern periphery of the country (fig. 1). It is a lowland species found below 300 meters in elevation. There is some evidence that this species prefers seasonally dry areas and may act as an annual or as a perennial which dies back to the roots during each dry season.

The only vernacular names recorded for this species in Colombia are "bleo de gallinazo" and "bleo de golero," but it is known as "hierba de gallinazo" and "hierba gallota" in Panama (Standley 1928). Romero-Castañeda (1965) reports that the leaves are used in salads, broths, and chopped meat dishes. The ripe fruits are also used in stews.

2. *Cyphomandra chlorantha* Rusby, Descr. S. Amer. Pl. 116. 1920.

This species is very similar to *C. diversifolia* of coastal Venezuela and is only weakly segregated from it on the basis of the short-tomentose corollas, the elliptic rather than fusiform fruits, and larger seeds. Both species are distinctive in having purplish urceolate corollas and pinnately compound leaves. Further studies may show that the differences between the two species are too variable to support recognition of separate taxa and that *C. chlorantha* is better regarded as a synonym of *C. diversifolia*.

*Cyphomandra chlorantha* is only known at present from four localities in Colombia (fig. 1). It is also found in Costa Rica, Panama, and the Sierra Nevada de Mérida in Venezuela. This species appears to prefer cloud forest and regions with very high rainfall. It has no recorded vernacular names or uses in Colombia.

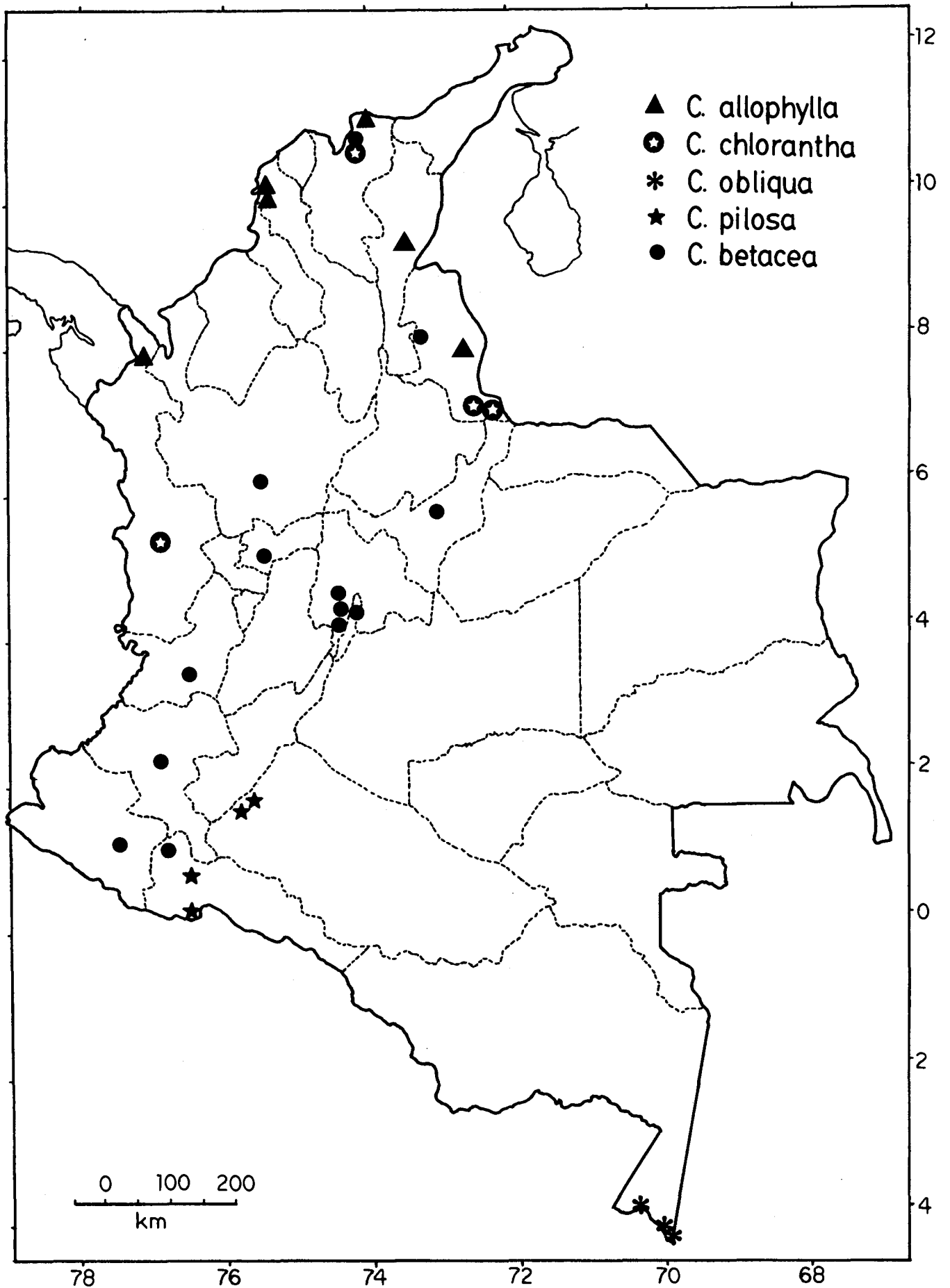


FIGURE 1. Distribution of *Cyphomandra* species in Colombia.

3. *Cyphomandra obliqua* (Ruiz et Pav.) Sendtn. Flora 28: 172. 1845.

This species is easily distinguished from other Colombian species of *Cyphomandra* by the very expanded peltate stigmas with two apical glands, the short anthers with a very gibbous connective, the stellate, coriaceous, greenish corollas with relatively wide and spreading lobes, the inflorescences with nearly contiguous pedicels, and the copious fine puberulence on the leaves and axes. *Cyphomandra obliqua* is abundant in eastern Peru along the Huallaga and Ucayali rivers and its range extends eastward into Amazonian Brazil. It is known so far in Colombia only from the region around Leticia (fig. 1). As this species appears to be of restricted occurrence in Colombia it has no recorded vernacular names or uses. However, in eastern Peru it is known by a number of names (e.g. "chupo sachá") and the leaves and stems are used medicinally in an infusion. The edibility of the fruits is unknown.

4. *Cyphomandra fragilis* Bohs, nom. nov.

*Solanum oxyphyllum* C. Morton, Contr. U.S. Natl. Herb 29: 49. 1944. TYPE: Colombia, Putumayo, Umbría, 0° 54'N, 76° 10'W, 325 m, 13 Nov. 1930, Klug 1776 (holotype, US # 1518016, not seen; isotypes, BM!, F!, GH!, MO!, NY!, US!).

This very distinctive species was first described as a member of *Solanum* section *Geminata* (formerly section *Leiodendron*) by C.V. Morton. However, the prominent anther connective and characteristic branching pattern definitively place it in *Cyphomandra*. Because the name *Cyphomandra oxyphylla* has already been used for a Brazilian species, this taxon is given the new name *C. fragilis*. The epithet reflects the delicate appearance of the foliage and flowers.

*Cyphomandra fragilis* is distinguished from all other species in the genus by its thin, elliptic, nearly glabrous leaves with shallowly cordate to decurrent bases, by the lanceolate buds and slender corolla lobes, and by the very long, slender anthers which are connate by their tips well after anthesis. At present, its relationship to other species within the genus remains obscure.

This species occupies tropical moist forest at elevations from 250 to about 2000 meters on the eastern slope of the Andes in Colombia, Ecuador, Peru, and western Brazil. It is currently known in Colombia from only three sites in Huila, Nariño, and the Putumayo (fig. 2). This taxon has no recorded vernacular names or uses in Colombia.

5. *Cyphomandra pilosa* Bohs, Syst. Bot., 13: 265. 1988.

*Cyphomandra pilosa*, a recently described species (Bohs, 1988), is the only Colombian species of *Cyphomandra* that is densely pilose with long hairs on the leaves, axes, and fruits. In most cases leaf

shape is also useful in recognition, the leaves being all simple and elliptic-ovate to elliptic-oblong with nearly truncate or shallowly cordate bases, the basal lobes generally less than 1 cm long.

This species inhabits tropical wet forest at middle elevations (150-1800 meters) on the eastern slope of the Andes in Colombia, Ecuador, and Peru. Its range in Colombia is restricted to the south central part of the country in Caqueta and Putumayo (fig. 1). It has no vernacular names or uses in Colombia, and the fruits are not known to be edible.

6. *Cyphomandra betacea* (Cav.) Sendtn. Flora 28: 172. 1845.

The familiar tomate de árbol or tree tomato is widely cultivated throughout the world in subtropical regions for its edible fruits. In Colombia this species is commonly planted in dooryard gardens in Andean regions at elevations of 1000 to 3000 meters (fig. 1). The fruits are eaten raw or in salads, and are frequently made into preserves, jellies, desserts, or "jugos"; they may also be cooked or stewed in meat dishes like the garden tomato, *Lycopersicon esculentum*. The plants are usually cultivated only on a small scale, but a few orchards have been established around Cali. Recently, large scale cultivation of this species has been attempted in New Zealand, where the fruits are known as "tamarillos". In spite of the somewhat acid flavor and numerous seeds present in the fruits, *C. betacea* promises to be an interesting potential fruit crop when breeding and improvement work are initiated.

The distinguishing features of *C. betacea* include the entire, deeply cordate leaves covered, like the axes, with a fine velvety puberulence, the usually much-branched inflorescences covered with prominent pedicellar remnants, the sweetly-scented flowers with pink to white, waxy, fleshy, stellate corollas, the cylindrical style with a truncate or subcapitate stigma, and large, glabrous, ellipsoidal or ovoid fruits. Most fruits are red, orange, or purple with orange or reddish flesh when mature, but yellow forms also occur with very light yellow pulp. *Cyphomandra betacea* does not closely resemble other species within the genus, and is apparently known only from cultivation. Further investigations are needed to establish the wild relatives and place of origin of this species.

Aside from "tomate de árbol," other vernacular names for *C. betacea* in Colombia include "tomate," "árbol de tomate," "tomate de agua," "pepino de árbol," and "toronjo." It is known as "chimbal-bé" by Kamsá-speaking people in the Sibundoy region of the Putumayo. In scientific literature, this species has been erroneously referred to as *Cyphomandra crassifolia*.

7. *Cyphomandra sibundoyensis* Bohs, Syst. Bot. 13: 273. 1988.

This newly described species (Bohs, 1988) is restricted to the Valley of Sibundoy and surrounding areas of southwestern Colombia (fig. 2). It is closely related to *C. hartwegii* and resembles it in its stellate corollas, tapered anthers, truncate stigma, and glabrous fruits containing stone cell aggregates. Herbarium material of this species may be difficult to distinguish from *C. hartwegii*, but in the field its large, violet corollas, rather broad fleshy anthers and extremely large fruits and seeds are distinctive. Unlike *C. hartwegii*, no individuals have been found with lobed trunk leaves. The vegetative parts may be sparsely puberulent or pilose when young, but the entire plant is generally glabrous when older.

The fruits of this species are striking, and are among the largest known in the genus. When mature, they are usually creamy yellow outside and contain an abundance of whitish to clear juicy pulp. The watery layer immediately surrounding the seeds is reddish or purplish. These large fruits have a very pleasant flavor and deserve attention by plant breeders as a potential fruit crop. The placenta of the fruit has also been used medicinally as a cure for intestinal worms in Sibundoy (Bohs 2222). This species is also reputed to have furnished a black, blue, or yellow dye in former times (Bohs 2222), but the part of the plant used for this purpose is not known. Names applied to this species in the Putumayo region of Colombia are "tomate salvaje" and "tomate silvestre."

8. *Cyphomandra endopogon* Bitter, Bot. Jahrb. Syst. 54, Beibl. 119: 16. 1916.

This species is found in tropical lowland rainforest at elevations usually well below 1000 meters (fig. 2). It occurs in Colombia only at the southern and eastern periphery of the country. Outside Colombia, its range extends into lowland Amazonian areas of Ecuador, Peru, and Brazil. Disjunct populations also occur in French Guiana and eastern Brazil.

Typical collections of this species are easily recognized by the oblong and obtuse corolla lobes bordered by villous hairs, the obtuse buds, and the broadly expanded stigma at the tip of the filiform, exerted style. Both *C. endopogon* and *C. hartwegii* have long, narrow anthers, often lobed trunk leaves, elongated, sometimes highly branched inflorescences with very short pedicellar remnants, and fruits containing stone cell aggregates. Unlike *C. hartwegii*, this species has a broadly dilated style and peltate stigma. The leaves and axes of *C. endopogon* are usually glabrous, but some fine puberulence may be present and frequently some sparse longer hairs are found on the stem and petioles.

Some collections referable to *C. endopogon* have somewhat smaller flowers with shorter anthers, acute buds and corolla lobes, and less expanded stigmas; in these features they resemble collections of *C. hartwegii*. The fruits of these collections are finely glandular-puberulent, a

character which distinguishes them from both taxa, but as this puberulence may disappear on older fruits it may not be a definitive character for recognition. These collections may represent hybrid derivatives of *C. endopogon* and *C. hartwegii*, and their taxonomic position requires further investigation.

The only vernacular names recorded for this taxon in Colombia are "mee oóm be ta ka" by the Kubeos and "wa só a" by the Tukanos of the Amazonian region (Schultes & Cabrera 13993). *Cyphomandra endopogon* is not noted as being used for any purpose in Colombia.

9. *Cyphomandra hartwegii* (Miers) Sendtn. ex Walp. Repert. bot. syst. 6: 579. 1847.

*Cyphomandra hartwegii* is the most widespread species in the genus, ranging from Mexico to Panama and northern South America. In South America it occurs along the Andes from Colombia to Bolivia with disjunct populations in coastal Venezuela and Suriname. With the exception of the cultivated *C. betacea*, it is the only species of *Cyphomandra* that occurs both east and west of the Andean cordillera. *Cyphomandra hartwegii* is commonly encountered in disturbed areas or light gaps in the forest. It is typically a species of low elevations in Central America, but it can ascend to elevations of 2000 m or more in Andean South America.

*Cyphomandra hartwegii* can be distinguished by its usually pinnately divided trunk leaves and unlobed, cordiform crown leaves, its green, stellate corollas with acute lobes and a very short tube, its long narrow anthers, its prominently exerted style which is not expanded into the stigma, and its large yellow fruits with large seeds and stone cell aggregates. The pinnately lobed trunk leaves are one of the most obvious distinguishing features of this species, but unfortunately are often absent in herbarium material. The only other species with pinnately lobed trunk leaves known to occur in Colombia is *C. endopogon*, which is Amazonian in distribution and can be distinguished from *C. hartwegii* by its floral structure.

This species is composed of two distinctive elements recognized at the level of subspecies and distinguished by the following key.

KEY TO THE SUBSPECIES OF *Cyphomandra hartwegii*

1. Leaves, stems, and inflorescence axes glabrous to puberulent with hairs 0.5 mm long or less; inflorescences simple or branched (if highly branched, then plants nearly glabrous) . . . . . subsp. *hartwegii*

1. Leaves, stems, and inflorescence axes densely pubescent with hairs 1 mm long or more; inflorescences usually highly branched . . . . . subsp. *ramosa*

9a. *Cyphomandra hartwegii* subspecies *hartwegii*

This subspecies is much more widely distributed than subsp. *ramosa*, and occurs a number of

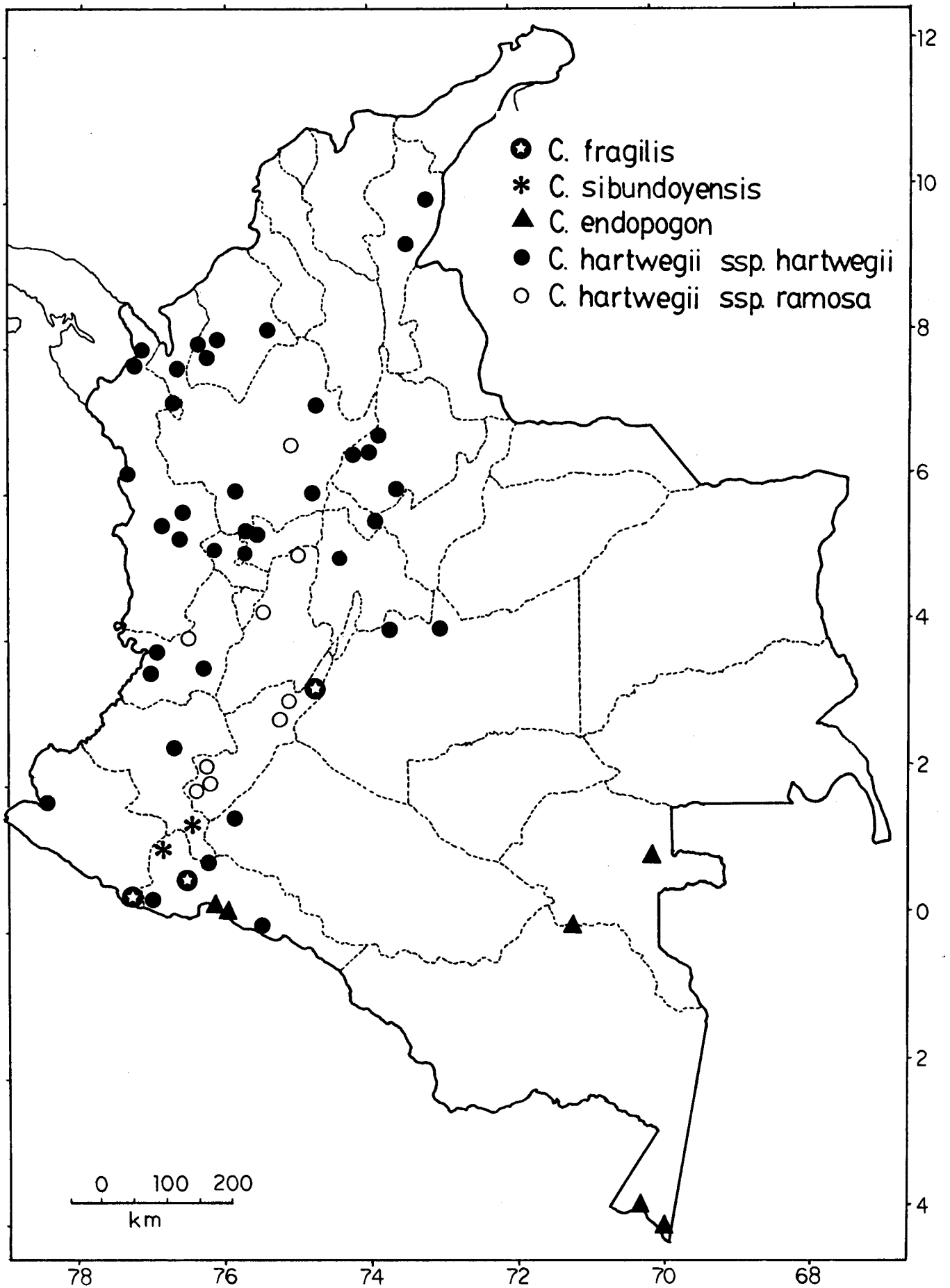


FIGURE 2. Distribution of *Cyphomandra* species in Colombia.

localities in the Andean area and in the coastal lowlands of Colombia (fig. 2). Great variability exists within this taxon, but all members lack the long dense pubescence characteristic of the Colombian subspecies *ramosa* (see below).

Collections of *C. hartwegii* subsp. *hartwegii* from Central America are generally very uniform and have small round fruits. From the Darien south to the interandean valleys of Colombia and Ecuador, however, variation among collections greatly increases, particularly in pubescence, inflorescence branching, and corolla size. There is also an increase in the size of the fruits; it is not known whether this is a natural expression of variability or if it is related to the use of the fruits by man. The existence of such a wide range of forms in northwestern South America may indicate that *C. hartwegii* arose there; on the other hand, such variability may not as much reflect age or ancestry as it does dissected topography and reproductively isolated populations with a patchy distribution in intermontane valleys and forest light gaps.

Members of this species are frequently planted on a local scale for their yellow, mild and sweet-tasting fruits. In Colombia, they are most often eaten in preserves, juices, or sweets, or are candied or made into marmelade (Pittier, 1910; Romero-Castañeda, 1961, 1969). Vernacular names for this species in Colombia include "tomate silvestre," "tomate de monte," "tomate de indio," "naranja," "regalgar," "reventadera," "tonga," "Tsutsucuru," and "venenillo."

9b. *Cyphomandra hartwegii* subspecies *ramosa* Bohs, subsp. nov. (fig. 3). TYPE: Colombia, Dept. Huila, Fundación Merenberg, near Santa Leticia, growing in botanical garden area of Merenberg finca, "tree ca. 5 m tall, leaves somewhat coriaceous with faint odor, trunk leaves pinnately lobed, corolla yellow-green, unripe fruits green, pendent," ca. 1300 m, 18 Aug. 1981, *Bohs 1644* (holotype, COL!; isotypes, CAUP!, GH!). Syn. *Cyphomandra kalbreyeri* Bitter, Repert. Spec. Nov. Regni Veg. 17: 347. 1921. TYPE: Colombia, Dept. Antioquia, Amalfi, Quartier Vivera, im Waldeschatten, 1860 m, 10 May 1880, *Kalbreyer 1662* (holotype, B, destroyed; isotype, K!; photos of holotype, F!, G!, GH!, NY!, WIS!).

Ab subspecie typica *Cyphomandrae hartwegii* pubescentia densa foliorum caulium corollarumque, et inflorescentiis ramosissimis differt.

*Small tree* 4-6 m tall. *Branches* succulent, densely pubescent, often also sparsely pilose. *Leaf blades* usually heteromorphic, simple, subcoriaceous, those of the trunk unlobed, ovate or elliptic-ovate, 20-28 cm long, 11-13 cm wide, or pinnately (3-)5-9-lobed, 25-40 cm long, 20-35 cm wide, those of the crown unlobed, ovate or elliptic, 7-23 cm long, 6-20 cm wide, (acute-) acuminate at apex, cordate to truncate at base, sparsely to moderately pubescent-pilose adaxially, densely pubescent-pi-

lose abaxially, especially on veins; veins very prominent abaxially, less so adaxially; petioles densely puberulent, pubescent, or pubescent-pilose.

*Inflorescence* usually highly branched, often 100+-flowered, 8-30 cm long; peduncle 2.5-9 cm long; flowering pedicels 15-20(30) mm long, in fruit 25-35 mm long, unevenly spaced 1-6 mm apart, leaving pedicellar remnants 1 mm long. Inflorescence axes densely pubescent, often also sparsely pilose.

*Flower buds* ovate-lanceolate, acute to acuminate at apex. *Calyx* moderately to densely pubescent, 3-4 mm high, the lobes deltate, obtuse, apiculate, 1-2 mm long, 2-3 mm wide. *Corolla* light green or whitish, subcoriaceous, stellate, ca. 20-25 mm in diameter, the tube 1 mm long, the lobes 10-15 mm long, 2-3 mm wide, acute at apex, moderately to densely puberulent-pubescent abaxially, nearly glabrous adaxially, tomentose at margin. *Anthers* 4-6 mm long, 1(2) mm wide, narrowly triangular, white, the pores directed upward; connective 5-6 mm long, 1 mm wide, gray, blue, or purplish, narrowly triangular, abaxially slightly shorter than thecae at apex, exceeding them by 0.5-1 mm at base, adaxially present.

*Style* filiform, 5-7 mm long, 0.2-0.5 mm in diameter, exerted 1-2 mm beyond stamens, not dilated apically; stigma truncate, 0.2-0.5 mm in diameter.

*Fruit* ellipsoidal or ovoid, obtuse at apex, 5-9 cm long, 3.5-6 cm in diameter, glabrous, yellow; mesocarp with stone cell aggregates; seeds 7-9 mm long, 6-7 mm wide, rugose, scarcely to moderately false-pubescent.

Distribución: Tropical wet forest and cloud forest, 1000-2500 meters in elevation, valleys of the Magdalena and Cauca Rivers, Colombia (fig. 2).

Vernacular names: "Tomate de monte" (*Little 8108*), "tomate macho" (*Fosberg 20136*).

Uses: G. Buch informed the author that the fruits are edible but sour, and that they make a good juice when sweetened with sugar. Kalbreyer (#1662) reports that the fruits are used to kill beetles.

ADDITIONAL SPECIMENS EXAMINED. Colombia. HUILA: Fundación Merenberg, near Santa Leticia, ca. 1300 m, 18 Aug. 1981, *Bohs 1643* (GH), *1645* (CAUP, COL, GH); Mpio. de La Plata, vereda Agua Bonita, Finca Merenberg, 1200-1300 m, 12 July 1975, *Díaz et al. 484* (COL); ridge between Quebrada la Candela and Río Naranjo, 18 km SW of San Agustín, 1°43'N, 76°18'W, ca. 1900 m, 12 Feb. 1943, *Fosberg 20136* (NY, US); hoyá del Magdalena, San Agustín, km 7 carretera a Santa Rosa, "Mesitas", 1860 m, 28 Aug. 1958, *Idrobo et al. 2901* (COL, NY, P); Baraya to Hacienda Pensilvania, 15 km E along trail, 7300 ft, 22 June 1944, *Little 8108* (COL, NY, US); E of Neiva, 1300-1800 m, 1-8 Aug. 1917, *Rusby & Pennell 1003* (NY). TOLIMA: Cajamarca a 15 km

hacia Ibagué, 1700 m, 11 May 1983, *López 83-0621* (COL); Prov. de Mariquita, La Palmilla, 2200 m, 1851-1857, *Triana s. n.* (BM, G, P). VALLE: cerca de la Represa del Calima, 1700 m. 12 Aug. 1966, *Espinal 1959* (MO). WITHOUT LOCALITY: *Mutis 1973, 1985, 3566* (US).

This infraspecific taxon encompasses a number of collections found in the valleys of the Cauca and Magdalena rivers in west central Colombia. They can be distinguished from the typical subspecies of *C. hartwegii* by the abundant pubescence found on

the vegetative parts and usually on the outside of the corolla lobes and by the highly branched inflorescences. Preliminary crossing experiments performed at Harvard University in Cambridge, Massachusetts, U.S.A. (Bohs, unpubl. data) indicate that these plants have developed incomplete reproductive barriers with *C. hartwegii* subsp. *hartwegii* (as represented by *Rury 580* from Pichincha, Ecuador; subsp. *ramosa* represented by *Buch s.n.* from Huila, Colombia). Full sized fruits were set in 4 out of 10 artificial pollinations using subsp. *hartwegii* as the

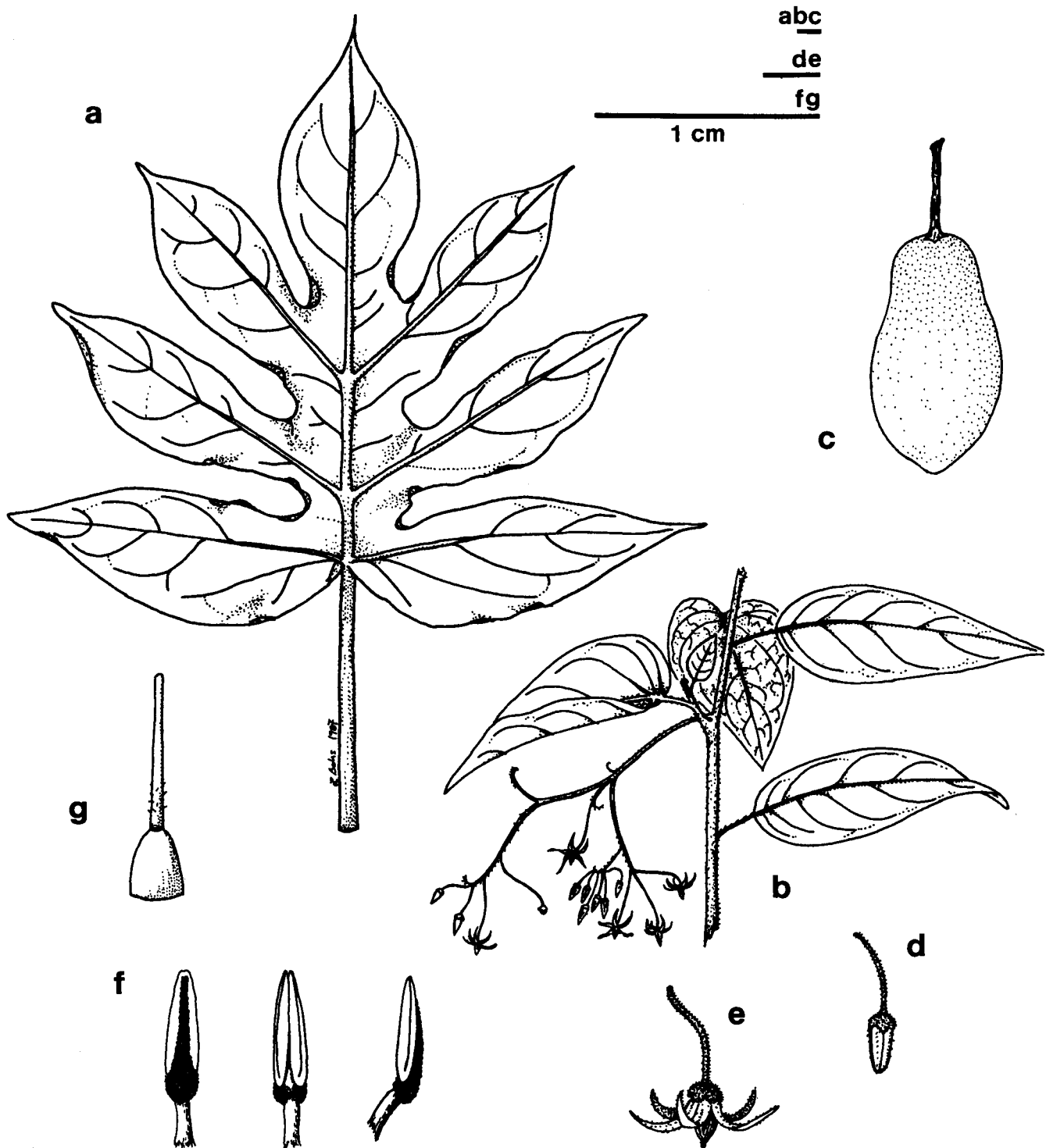


FIGURE 3. *Cyphomandra hartwegii* subspecies *ramosa* Bohs. a. Trunk leaf. b. Crown leaves and inflorescence. c. Fruit. d. Flower bud. e. Opened flower. f. Stamens (left to right: abaxial, adaxial, side view.) g. Gynoecium. (All based on *Bohs 1644*.)

female parent, but all the seeds within remained undeveloped. In the reciprocal cross, the ovary swelled to form a very small fruit after pollination in 4 out of 11 attempts, but did not develop further. The presence of morphological and geographical distinctions as well as evidence for reproductive isolation justify delimiting this infraspecific taxon at the subspecific rather than the varietal level. Its great morphological similarity to typical collections of *C. hartwegii*, however, precludes recognition as a separate species.

The distinctive pinnately lobed trunk leaves of this subspecies and greenish flowers with long narrow anthers and truncate stigmas closely resemble those of *C. hartwegii* subsp. *hartwegii*. In overall size, however, the flowers of subsp. *ramosa* are somewhat smaller. The fruits and seeds of subsp. *ramosa* are some of the largest yet found within *C. hartwegii*. They are reportedly edible and may have some potential as a fruit crop after breeding and improvement to reduce the acidic taste and eliminate the large seeds and stone cell aggregates.

The species *Cyphomandra kalbreyeri*, included here as a synonym, has the very pubescent leaves and axes characteristic of *C. hartwegii* subsp. *ramosa* but differs from it in a few respects. The rachises and pedicels of the former taxon are only sparsely pubescent rather than densely so, but this may be a consequence of the method of preparation and preservation of the specimen. The corolla lobes in *C. kalbreyeri* are nearly glabrous outside except on the margins and at the apices, and the anthers are wider than those of subsp. *ramosa*, with the connec-

tive occupying less of the abaxial surface. Unfortunately, the holotype at Berlin has been lost, but a fairly good isotype remains at Kew. *Cyphomandra kalbreyeri* was collected from the most northerly locality in the range of subsp. *ramosa*, but nevertheless occupies the Cauca and Magdalena drainage as do the other collections of subsp. *ramosa*.

There is some evidence that subsp. *ramosa* may have a higher altitudinal preference than subsp. *hartwegii*, but this suggestion must be corroborated by additional collections and field work.

The infraspecific epithet reflects the distinctive highly branched inflorescences of these plants. A new name, type, and diagnosis have been chosen because Bitter's original description of *C. kalbreyeri*, although voluminous, does not adequately set forth the distinguishing features of this taxon.

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