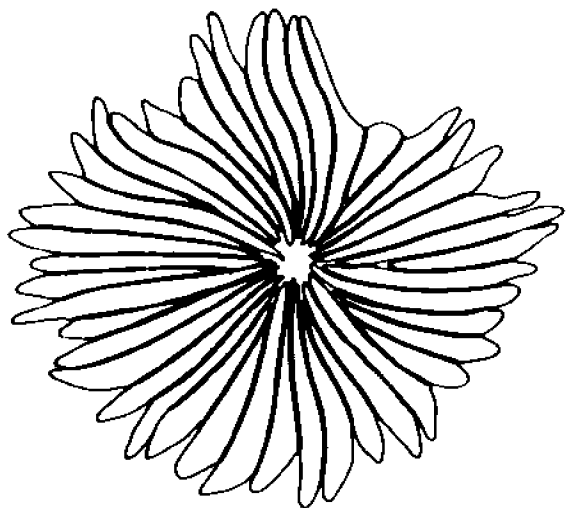


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SECTION CONOMORPHA (MYRSINACEAE).

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A REVISION OF THE GENUS CYBIANTHUS  
SECTION CONOMORPHA (MYRSINACEAE)

by

GETULIO AGOSTINI

A dissertation submitted to the Graduate  
Faculty in Biology in partial fulfillment  
of the requirements for the degree of  
Doctor of Philosophy, The City University  
of New York.

1971

This manuscript has been read and accepted for the Graduate Faculty in Biology in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

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## Abstract

A REVISION OF THE GENUS CYBIANTHUS  
SECTION CONOMORPHA (MYRSINACEAE)

by

Getulio Agostini

Adviser: Professor Bassett Maguire

In this paper morphological evidence is presented to combine the genera Conomorpha, Comomyrsine and Weigeltia into the genus Cybianthus. Grammadenia subgen. Cybianthopsis is found to be phenetically closer to Cybianthus than to the other species of Grammadenia. Cybianthus is divided into eleven sections and a new classification scheme presented. A comparison of the new classification with Mez's classification is made. The genus is characterized, and its relationships and position within the family are discussed. A key is provided to the American genera of the family. The sections are characterized and keyed out. Descriptions are provided for each section with a list of the species assigned to each one. The transferral of names has been avoided pending further studies in the genus. The second part of the paper deals with Cybianthus section Conomorpha. The distri-

bution and ecology of the species are discussed. Guayana has the highest concentration of species (10), followed by the Andes (7), the Amazonian valley (5) and southern Brazil (3). Distribution maps are provided. Morphology and anatomy of the species are studied in detail. Three basic types of flower vascular patterns are described. Three distinct types of endosperm have been found which differ in the shape of the intrusive tissue. Anatomical leaf characters were found to be valuable in the identification of sterile specimens. Probable phylogenetic relationships are hypothesized and a phylogenetic tree is presented. The systematic treatment of Cybianthus section Conomorpha is presented with a key to the species. For each species the bibliographical references, synonymy, description, illustration and distribution are provided. Remarks on each species follow the statement of distribution and specimens. The following species are described as new: Cybianthus biflorus, C. maguirei, C. pittieri, C. spathulifolius, and C. wurdackii. Indexes to the scientific names and to the collections examined are presented.

### Acknowledgments

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## INTRODUCTION

The Myrsinaceae is a large pantropical family of over 1000 species. Its taxonomy has been in a state of confusion. Much of this confusion stems from the intrinsic characteristics of the family which make both classification and identification of specimens very difficult.

Many areas in tropical America await much more intensive collecting and exploration. It is not an exaggeration to state that in Venezuela, for instance, there has been adequate collecting in less than 5 % of the country. The resulting lack of herbarium material is one of the factors which impedes taxonomical work on tropical plants.

Another factor which imposes problems in the study of members of this family is the small size of the flowers. It makes observation and analysis very difficult without a high power microscope. The flowers are also frequently unisexual and the plants dioecious, that is, each plant bears flowers of only one sex. This also poses the difficulty of matching individuals of each sex for each species. The task is further complicated where marked floral dimorphism is present. Furthermore, in some species only specimens of one sex are available for study at any given time, thus

limiting the spectrum of variation characteristic of the species.

Fruiting collections represent another problem. Since the fruits are superficially very similar, they have heretofore escaped close examination. The result has been that no previous attempt has been made to investigate fruit characters for diagnostic differences. In the present paper, an attempt to bridge this gap has been made.

Being rather inconspicuous plants, the members of the Myrsinaceae have seldom received critical attention by taxonomists. Besides being poorly collected, the members of this family have also very little economic importance. When arborescent, they are but small trees not suitable for lumber. The fruits have, in many cases, an edible exocarp so scanty that they are only consumed locally. A few, mostly Asiatic species of the genus *Ardisia*, are cultivated for ornamental purposes. A few species have been locally used for their curative properties or as fish poison.

Despite the relatively little attention given to the family thus far, numerous new taxa have been added to those listed by Mez in his world-wide monograph (Mez, 1902). The number of taxa published to date doubles the number of species recognized by Mez. His monograph has been the groundwork for most of the studies in the family, which usually have been of a local character. As very few workers have been critical in their interpretation of Mez's concepts, it is not surprising to find that many of these taxa do not

actually represent distinct species. Such an uncritical proliferation of names makes any taxonomic revision of the family very difficult.

The present study was started as a revision of a group of South American species. My deep interest in this group was stimulated by the abundance of species growing in Venezuela. As a result of taxonomic studies currently being carried out on the family Myrsinaceae for the Flora of Venezuela, the impracticability of separating groups of species into separate genera became evident. This was particularly obvious when related species of different genera were studied. A detailed study of representative species of the various genera indicates that they all should be considered an integral part of a larger assembly of species and so treated in this study. For the most part, the species included in this assembly were previously placed in the genera Conomorpha, Conomyrsine, Cybianthus, and Weigeltia. The taxonomy of this alliance will be fully discussed in following sections.

The second portion of this paper deals with the species of Cybianthus section Conomorpha, many of which were formerly included in Conomorpha. Stress given to the morphological and anatomical characters of inflorescences, leaves, trichomes, flowers, and fruits yielded numerous previously unstudied diagnostic characters. Anatomical characters of leaves were studied in detail, particularly their potential value in the identification of sterile specimens.

It was found that every species can be distinguished by a particular combination of anatomical characters.

In the group under investigation three types of seeds occur, each basically different in the internal structure of the sectioned endosperm. An "aril" consisting of fibrillar compressed hairs surrounds the seed. In some species this "aril" is scanty and adnate to seed and endocarp, while in other species it is copious and free from seed and endocarp. Such observations will undoubtedly facilitate the identification of fruiting specimens within the group of species studied. As will be discussed later, fruiting characters have also proved to be good indicators of probable phylogenetic relationships and likely pathways of migration.

Although typification is an integral part of modern taxonomic procedure, as documented in the International Code of Botanical Nomenclature, this was not true in Mez's times. Consequently, Mez did not select holotypes for the numerous species he described as new. This imposes a further difficulty in that one must now select types from among the collections originally examined by Mez. These selected types, called lectotypes, are equivalent to the holotypes.

A taxonomic revision of Cybianthus section Conomorpha is presented here and twenty-six species are reviewed. In this treatment dependence on morphological characters has been unavoidable. I realize that experiments in hybridization are desirable to test the application of biological concepts of species in this group.

## THE GENUS CYBIANTHUS SENSU LATO

The *Conomyrsine-Conomorpha-Cybianthus-Weigeltia* complex

Since Mez's monograph of the Myrsinaceae was published in 1902, no inclusive survey of the American species has been carried out. In his work, Mez enumerated 928 species assigned to 32 genera. The generic concepts which he established greatly advanced our knowledge of the taxonomy of the family and were maintained unchanged for almost half a century. All the subsequent work has been based primarily on Mez's concept of genera and species. Even during the forties and fifties all regional floras dealing with the family Myrsinaceae were based upon or adapted from Mez's work.

It has become increasingly evident that some of the generic limits established by Mez will have to be redrawn. E. Y. Hosaka initiated this trend in 1940. In a revision of the Hawaiian species of Myrsine, Hosaka revived the opinion previously supported by Bentham and Hooker (1873) of including the genera Rapanea, Suttonia, and Myrsine under the genus Myrsine. In the sixties, a revisionary study of the Mexican and Central American Myrsinaceae led Lundell to raise Ardisia subgenus Synardisia to generic rank as Synardisia (Lundell,

1963), and Ardisia subgenus Walleniopsis to generic rank as Gentlea (Lundell, 1964). Also in 1964, Lundell erected the genus Yunckeria to include three species previously included in Ardisia.

My concern with the group of species included by Mez in the genus Conomorpha led to undertake a more inclusive analysis. In a preliminary survey of taxonomic limits three groups of species treated as genera by Mez, i.e., Conomorpha, Cybianthus, and Weigeltia came under consideration. The first difficulty arose from the great number of taxa described since Mez's monograph in 1902. Because many of the new taxa were incorrectly assigned to certain genera, the first problem was to assign them to their supposedly proper positions. It was at first thought that Mez's genera could be maintained and that it was only necessary to transfer some species from one genus to another. In practice, this has proved very difficult to do.

In the beginning of this investigation Mez's keys were employed as a matter of convenience. In his key Mez (1902) segregated Conomorpha, Cybianthus, and Weigeltia according to the following character contrasts:

- |   |                     |
|---|---------------------|
| 1. Anthers basifixed.                                   | <u>Cybianthus</u>   |
| 1. Anthers dorsifixed.                                  |                     |
| 2. Anthers elongate, notably longer than wide.          | <u>Conomorpha</u> . |
| 2. Anthers short; shorter or slightly longer than wide. | <u>Weigeltia</u> .  |

The diagnostic stress placed on characters of the anthers by Mez has been responsible for much of the taxonomic confusion within the various genera he maintained. Following Mez's treatment most students of this family used characters of the anthers as the only taxonomic criterion, a practice which has obscured true relationships within the group. In this regard it is worthwhile to mention a comment made by J. F. Macbride (1931:33) when he described Weigeltia nanavensis:

"The species is rather aberrant in Weigeltia, but its regularly lobed calyx and its roundish, dorsally fixed anthers seem to forbid referring it to any other genus, though the superficial resemblance to Cybianthus psychotriifolius is striking. Perhaps only one genus is concerned".

Diagnostic use of anthers is further complicated by their size, which ranges from 0.5 to 1.0 mm, and even smaller in the case of staminodia. Such diminutive size imposes difficulty in the observation and analysis of the anthers, a point which is illustrated by Mez's inclusion of Cybianthus cruegeri, C. poeppigii, and other related taxa in Cybianthus. In fact, all these taxa are phenetically closer to others placed by Mez himself in Weigeltia and all have anthers of the type found in Weigeltia.

Close analysis of the species previously considered to belong to the genera Conomorpha, Cybianthus, and Weigeltia showed that they fall into an assemblage of eleven discrete

groups. It was also found that the Puerto Rican species Grammadenia sintenisii is actually phenetically closer to this assemblage of species than to the other species of Grammadenia. This species is so different from the bulk of Grammadenia that Mez established the subgenus Cybianthopsis (1901:425) to accommodate it within Grammadenia. This species constitutes an addition to our original eleven groups.

Another taxon, Conomyrsine, was first established as a genus by Bentham and Hooker (1873). Mez in his monograph included Conomyrsine as a subgenus of Weigeltia but some years later (Mez, 1905) he restored Conomyrsine to the rank of genus. In his publication of Conomyrsine sodiroana he described the fruits as 3 cm in diameter and with numerous seeds. This type of fruit is found in the genus Clavija, a member of the Theophrastaceae. Since these were the first fruits examined by Mez, he concluded that Conomyrsine should be excluded from Weigeltia. He also concluded that Conomyrsine occupies an intermediate position between the Myrsinaceae and the Theophrastaceae. It should be mentioned that the species included in Conomyrsine and species of the genus Clavija resemble each other but this resemblance seems to end with the vegetative organs. Other fruiting specimens belonging to the same assemblage have smaller fruits containing only one seed. It therefore seems safe to conclude that Conomyrsine should be included in the Myrsinaceae and that its relationships are not with Clavija but with the taxa Conomorpha, Cybianthus and Weigeltia.

One of the twelve groups here treated is distinctly different in that it consists of species with bisexual flowers arranged in a terminal inflorescence, elongate style, capitate stigma, and elongate filaments which are quite or almost free from the corolla. This combination of characters is not found in any other group within the assemblage of species treated in the present review. On morphological grounds the group approaches other species included in the genus Geissanthus except for the obviously imbricate sepals. For that reason the group has been excluded from the assemblage of species here treated and transferred to the genus Geissanthus with which they share a more natural affinity (Agostini, 1970).

The remaining eleven groups form a homogeneous assemblage. Collectively they are separated from the other members of the family by a combination of the following characters: unisexual flowers arranged in axillary inflorescences, stamens adnate to one-third or more of the corolla length and included or at least shorter than the corolla.

## Nomenclatural history

### Cybianthus

Cybianthus was first established as a genus in 1829 by C. Martius to accomodate the two species C. penduliflorus and C. cuneifolius. Martius characterized Cybianthus by tetramerous flowers, rotate corollas, and sessile anthers which dehisce by terminal pores. In 1834, A. De Candolle added two new species, C. principis and C. humboldtii. Later, in 1841, De Candolle himself recognized that these two species did not belong in Cybianthus and transferred them to Icacorea (= Ardisia). At the same time De Candolle (1841a:92) added seven species to Cybianthus, two of which were subsequently transferred to Conomorpha and Weigeltia by Mez (1902). In his monographic work on the family, De Candolle (1844:115-118) gave an account of the genus including twelve species. At this point, the concept of the genus was expanded to include species with elongate staminal filaments. In his treatment of the Myrsinaceae for the Flora Brasiliensis, Miquel (1856:291-301) enumerated twenty species and established three sections within the genus Cybianthus. In Cybianthus section Eucybianthus Miquel included eight taxa, among them C. penduliflorus Martius (1829), and C. cuneifolius Martius (1829). In Cybianthus section

Cybianthoides Miquel included ten species, among them C. guyanensis (A. DC.) Miquel, and C. peruvianus (A. DC.) Miquel. These two last names were originally described in 1844 by De Candolle in the related genus Conomorpha. Finally, in Cybianthus section Weigeltia Miquel included five species. This last group will be fully discussed under Weigeltia. At this point, Miquel had expanded the concept of the genus Cybianthus not only to include the species with rotate corollas and basifixed anthers dehiscent by pores, but also species with cupuliform corollas and dorsifixed anthers dehiscent by clefts.

Peckia was originally described as a genus by Vellozo in 1825. In the original account of Peckia, Vellozo cites the two species P. verticillata and P. cuneifolia. In 1891 O. Kuntze realized that the species included in Cybianthus were congeneric with those included in Peckia by Vellozo. Since Cybianthus did not appear in the literature until 1829, Peckia published by Vellozo in 1825 has priority. On this basis, Kuntze transferred all the binomials known to him from Cybianthus to Peckia. This was reversed by Mez in 1902 when he revived Cybianthus and put Peckia under synonymy. Mez's characterization of Cybianthus is very similar to that proposed by Martius in 1829. He included in Cybianthus only those species with tetramerous flowers, rotate corollas, and anthers dehiscent by terminal pores. Nevertheless, in his account Mez (1902) made an important addition to the

knowledge of this group by recognizing the unisexual nature of the flowers. In 1935, the International Congress conserved the name Cybianthus Martius (1829) against Peckia Vellozo (1825).

### Conomorpha

Conomorpha was first established as a genus by A. De Candolle (1834:102). The original account included the two species, C. oblongifolia A. DC. and C. laxiflora (Martius) A. DC., the latter transferred from Wallenia (Martius, 1829:89). De Candolle characterized the genus by the funnel-shaped calyx and corolla, the tetramerous flowers, and the elongate anthers dehiscent by longitudinal slits. The name Conomorpha alludes to the conic pistillode found in the staminate flowers. In his monographic work on the Myrsinaceae, De Candolle (1844: 113-114) added three new species and keyed the species known to him into two groups. These same two groups were later treated by Miquel (1850:111) as sections. In section Euconomorpha Miquel included C. oblongifolia A. DC. (1834), C. peruviana A. DC. (1844), C. guyanensis A. DC. (1844), and C. macrophylla Martius (1837). In section Conomorphida Miquel included C. laxiflora (Martius) A. DC. (1834) and C. multipunctata (A. DC.) Miquel (1850). In his treatment of the family for the Flora Brasiliensis, Miquel (1856:301) reclassified the genus into three sections. He expanded section Conomorphida to include C. macrophylla Martius (1837).

C. reticulata Miquel (1856), and C. nemoralis (Martius) Martius and Miquel (1856). He also restricted section Euconomorpha to the sole species C. oblongifolia A. DC. (1834). In the new section Aconomorpha Miquel included C. heterantha Bentham ex Miquel (1856) and Myrsine spicata H. B. K. (1818). The last name is cited by Miquel but was not formally transferred to Conomorpha.

In 1902 Mez divided Conomorpha into two subgenera. In Conomorpha subgenus Microconomorpha Mez included six binomials of which C. verticillata Zahlbr. (1882) is the oldest valid name. The subgenus Euconomorpha included all of the three Miquel sections and contained thirty one species. Among them the oldest valid name is Conomorpha spicata (H. B. K.) Mez (1902), a new combination based on Myrsine spicata H. B. K. (1818).

Among the species included by Mez in Conomorpha subgenus Conomorpha is C. sodiroana Mez (1902). This species along with four others later described were transferred to Geissanthus by Agostini (1970).

### Comomyrsine

Comomyrsine was first established as a genus by J. D. Hooker f. in 1876, who enumerated three species. Some years later, Mez (1902:283) reduced Comomyrsine to synonymy under Weigeltia. In 1905 Mez revived Comomyrsine as a genus and described Comomyrsine sodiroana. In the original account of this name, Mez included fruit characters

for the first time. He described the fruit as being 3 cm in diameter, with a coriaceous pericarp, and with eight seeds. This type of fruit is characteristic of Clavija, in the related family Theophrastaceae, and has not been found in any other species. As the fruit was separated in an envelope, there is doubt as to whether it really belongs with the specimen examined by Mez.

### Weigeltia

Weigeltia was first established as a genus by A. De Candolle (1834:102) with the sole species W. myrianthos. De Candolle characterized the genus by the tetramerous flowers, the elongate filaments, and the longitudinal dehiscence of the anthers. In 1844, De Candolle added three new species to Weigeltia. In this later account of the genus, De Candolle maintained the original diagnostic characters and added the branched (paniculate) inflorescence to further distinguish Weigeltia from Cybianthus. He also recognized that his W. myrianthos was conspecific with Salvadora surinamensis, published by Sprengel in 1828. The formal transfer of this name to Weigeltia was made by Mez in 1902, which resulted in the new combination W. surinamensis (Sprengel f.) Mez. It should be mentioned here that the other species of the genus Salvadora, which belong to the family Salvadoraceae, differ from all members of the Myrsinaceae by having opposite leaves and stamens alternating with the petals. In 1856 Miquel

submerged Weigeltia in Cybianthus, reducing its rank to that of section. Later, in his monographic work, Mez (1902) revived the genus Weigeltia and created twenty-one names. Mez segregated Weigeltia into three subgenera. In subgenus Euweigeltia he included sixteen species, of which W. surinamensis (Sprengel f.) Mez is the oldest valid name. In subgenus Comomyrsine Mez included two of the three species published by Hooker (1876) in Comomyrsine. The other species described by Hooker was Comomyrsine schlimii. This species was segregated by Mez to form the monotypic subgenus Triadophora, characterized by its 3-merous flowers. Mez expanded the original concept of the genus to include species with 3- or 5-merous flowers, and recognized the unisexual nature of the flowers.

#### Proposed new classification

As discussed earlier, in the assemblage of species currently assigned to the genera Conomorpha, Cybianthus, and Weigeltia, eleven discrete groups can be recognized. In proposing a suitable classification for the group one is presented with two alternatives: either to merge all the species into one genus and recognize subgeneric categories, or to recognize several small genera.

After careful consideration of the alternatives, the idea of recognizing several small genera was abandoned because the groups within the assemblage are more closely related to each other than to the remaining taxa in the

family. When examined on the basis of more than one diagnostic character, no group can be clearly separated. In addition, when any two groups are compared there is almost always a third group which shares characters of both groups. Recognizing the eleven groups of our assemblage as genera would call for a needless proliferation of names, and the presence of groups with intermediate combination of characters would make distinctions more difficult.

Merging all the species into one genus seems more sensible from the practical standpoint since the creation of new generic names will be unnecessary. The use of one generic name reinforces the close taxonomic relationship between the species groups and allows more distinct generic delimitations for the family as a whole.

If all the taxa considered within this assemblage are included into one genus, the valid name to be applied to this taxon is Cybianthus, which was first established as a genus in 1829 by C. Martius. The distinctness of the eleven groups within the genus requires taxonomic recognition. Thus, by convention, sectional rank has been assigned to the groups. Correspondence of the proposed classification to that of Mez (1902) is shown in Table 1. The formal taxonomic treatment of the genus and a review of the sections will be presented in a following section.

Table 1. Comparison of the proposed new classification  
of Cybianthus sensu lato with Mez's classification.

| Mez's classification                  | New classification here<br>proposed for <u>Cybianthus</u>                              |
|---------------------------------------|--|
| Conomorpha subgen.<br>Euconomorpha    | Sect. 1. Laxiflorus<br>Sect. 2. Stapfianus<br>Sect. 3. Iteoides<br>Sect. 5. Conomorpha |
| Conomorpha subgen.<br>Microconomorpha | Sect. 4. Verticillatus<br>Sect. 6. Intermedius   |
| Weigeltia subgen.<br>Euweigeltia      | Sect. 7. Weigeltia   |
| Weigeltia subgen.<br>Conomyrsine      | Sect. 8. Conomyrsine   |
| Weigeltia subgen.<br>Triadophora      | Sect. 9. Triadophora   |
| Grammadenia subgen.<br>Cybianthopsis  | Sect. 10. Cybianthopsis  |
| Cybianthus                            | Sect. 11. Cybianthus   |

Generic relationships

The genus Cybianthus sensu lato stands as distinct from most other genera by having unisexual flowers. The only other American genera with unisexual flowers are Myrsine (including Rapanea) and Wallenia. Both genera can be easily distinguished from Cybianthus. The contrasting characters that separate Cybianthus from the other American genera are expressed in the key that follows.

Artificial key to the American genera  
of the family Myrsinaceae

1. Inflorescence reduced to a glomerule; flowers unisexual, 4-5-merous; anthers dehiscent by longitudinal slits; stigma sessile and well-developed in the pistillate flowers; ovules few, uniseriate. Highest concentration of species in South America. Myrsine (Rapanea).
1. Inflorescence usually with the axis elongate; if the inflorescence short or glomerulate, then the combination of other characters not as above.
  2. Flowers bisexual.
    3. Corolla densely tomentose at least within, the lobes contorted; anthers dehiscent by pores or longitudinal slits; ovules usually uniseriate and few. Highest concentration of species in

Mexico, Central America, and South American  
Andes. Parathesis.

3. Corolla glabrous or sometimes with glands or papillae.
4. Ovules in more than one series, usually numerous.
5. Filaments connate in a tube; anthers as long as wide. Endemic to Cuba. Solonia.
5. Filaments free.
6. Anthers longer than wide, dehiscent by pores or longitudinal slits; filaments shorter or as long as the corolla. Highest concentration of species in Central America. Ardisia.
6. Anthers as long as wide, dehiscent by wide longitudinal slits; filaments longer than the corolla. Central America and South American Andes. Gentlea.
4. Ovules in one series, usually few.
7. Leaf blades sessile.
8. Anthers dehiscent by pores; inflorescence an elongate raceme. South America. Grammadenia.
8. Anthers dehiscent by longitudinal slits; inflorescence an umbelliform raceme. Endemic to Dominican Republic. Vegaea.

7. Leaf blades petiolate; anthers dehiscent by longitudinal slits; inflorescence usually a panicle.
9. Stigma capitate; style usually short; flower sessile or pedicels very short; calyx usually closed in bud and opening irregularly into 3-6 lobes. South America. Geissanthus.
9. Stigma punctiform or truncate; style usually elongate; calyx open in bud.
10. Anthers less than three times as long as wide.
11. Connective apiculate. Mexico and Central America. Synardisia.
11. Connective not apiculate. Highest concentration of species in South America. Stylogyne.
10. Anthers more than three times longer than wide.
12. Ovules 6-8. Central America. Yunckeria.
12. Ovules 10-14. South America. Gtenardisia.
2. Flowers unisexual.
13. Filaments longer than the corolla, free or almost free from the corolla tube; inflorescence axillary or terminal. West Indies. Wallenia.
13. Filaments shorter than the corolla, adnate to the corolla tube; inflorescence always axillary. South America. Cybianthus s.l.

The bulk of the family has traditionally been divided into three groups representing probable lines of evolutionary development. The first line is characterized by an inferior ovary and is represented by Maesa, an Old World genus of about 250 species. The second and third lines are represented by those genera with superior ovaries. Genera with ovules in more than one series are usually considered a line distinct from the remaining genera with uniseriate ovules.

Maesa is differentiated from the remainder of the family by an inferior ovary with ovules in more than one series and by fruits with more than one seed. The line represented by Maesa probably diverged early in the evolution of the family. Its relationship to Cybianthus seems rather remote. It shows a parallelism to Cybianthus in having small anthers, unisexual flowers, and a gamopetalous corolla.

Ardisia and related genera of the second line are characterized by bisexual flowers, ovules in more than one series, and filaments free to almost free from the corolla. These characters can be considered primitive, while unisexual flowers, uniseriate ovules and filaments connate to the corolla can be regarded as derived. The primitiveness of Ardisia seems to be sustained also by its pantropical distribution, while the distribution of Cybianthus and Wallenia is restricted to America. If this is the case, Ardisia is probably close to the ancestral condition within

the family while Cybianthus and Wallenia with their set of derivative characters are probably among the more advanced.

Cybianthus shows morphological similarities with a few other genera of the third line. The African and Oceanic Embelia with about the same number of species (ca. 150) as Cybianthus is remarkably similar in most floral and vegetative characters. The only constant character that separates Cybianthus from Embelia is the gamopetalous corolla. The development of Cybianthus in America seems to have been parallel to that of Embelia. Both groups probably separated from the main line of the family at about the same time.

The relationships between Cybianthus and Myrsine (including Suttonia and Rapanea) end with the unisexual flowers. In all other floral and vegetative details, Myrsine probably represents an independent line of development which evolved long before Cybianthus separated from the main core of the family. Unisexual flowers seem to have evolved independently in both genera and probably indicate convergence rather than parallelism. The greatest number of species of Myrsine occurs in Asia and Oceania while the species of Cybianthus are restricted to South America.

The only other American genus with unisexual flowers is Wallenia, a genus endemic to the West Indies. Morphological details indicate a close relationship of Cybianthus and Wallenia. It seems very probable that Wallenia and Cybianthus share a recent common origin.

Taxonomic review of the genusCybianthus s. l.

Cybianthus C. F. P. Martius, Nova Gen. Sp. 3:87. 1929.

Nomen Conservandum.

Type species: Cybianthus penduliflorus C. F. P. Martius.

Shrubs or small trees with glabrous, pubescent or lepidote branches. Leaves petiolate, alternate, subopposite or pseudovercillate. Inflorescence an axillary raceme or panicle. Flowers unisexual, dioecious, 3- to 6-merous. Staminate flowers usually with a conic pistillode. Pistillate flowers with developed staminodia. Calyx cupuliform or flattened, the sepals connate from  $1/5$  to  $1/2$  of their length. Corolla campanulate, cupuliform or rotate, petals connate  $1/5$  to  $3/4$  of their length, externally glabrous or lepidote, internally glabrous or glandular-granulose. Stamens adnate to the petals; filaments free or connate into a staminal tube which is adnate to the corolla; anthers rounded or triangular in shape, dehiscent by apical, round or sometimes elongate pores, or by narrow or wide longitudinal slits which usually do not reach the cordate base; pollen grains 15-25 microns long, 3-colporate, smooth; ovary subglobose, glabrous or with glandular scales; style short or elongate, slender or usually stout; stigma truncate or usually capitate; placenta central, free, basal, fleshy, with 2 to 5 ovules imbedded and arranged in

one series. Fruit a drupe, monospermous; endosperm present, hard, semitransparent, not starchy; embryo small, linear, flexuose, straight or curved; cotyledons not expanded.

Key to the sections of Cybianthus

1. Anthers in staminate flowers longer than wide, usually curved, dehiscent by narrow longitudinal slits.
2. Calyx not lepidote externally, the margin glandular-ciliolate.
3. Leaves alternate.
  4. Branchlets pubescent.
    5. Perianth glands not raised; branchlets covered by multicellular branched hairs.
      - Section 1. Laxiflorus Agostini.
    5. Perianth glands raised; branchlets lepidote.
      - Section 6. Intermedius Agostini
  4. Branchlets glabrous or glandular-granulose; perianth glands raised.
    - Section 3. Iteoides Agostini.
3. Leaves pseudoverticillate.
  6. Perianth glands not raised; branchlets covered by multicellular branched hairs; leaf apex truncate to rounded, the margin entire.
    - Section 2. Stappianus Agostini.

6. Perianth glands raised; branchlets glandular-granulose; leaf apex acute or acuminate, the margin usually dentate.

Section 4. Verticillatus Agostini.

2. Calyx lepidote outside, the margin not glandular-ciliolate; leaves alternate; branchlets lepidote; perianth glands not raised.

Section 5. Conomorpha (A. DC.) Agostini.

1. Anthers in staminate flowers as long as or only slightly longer than wide, not curved, dehiscent by pores or by wide longitudinal slits.
7. Flowers 4- or 5-merous; corolla lobes glandular-granulose internally.
8. Corolla lobes glandular-granulose at the center internally; anthers dorsifixed; inflorescence a panicle, rarely a raceme; flowers 4- or 5-merous.

Section 7. Weigeltia (A. DC.) Agostini.

8. Corolla lobes glandular-granulose over the whole surface within.
9. Anthers dorsifixed; inflorescence a panicle; flowers 4- or 5-merous.

Section 8. Conomyrsine (Hooker f.) Agostini.

9. Anthers basifixed; inflorescence usually a simple raceme.
10. Inflorescence a pseudo-umbellate raceme; flowers 5-merous.

Section 10. Cybianthopsis (Mez) Agostini

10. Inflorescence an elongate raceme, occasionally branched at the base; flowers usually 4-merous.

Section 11. Cybianthus.

7. Flowers 3-merous; corolla lobes glabrous; anthers dorsifixed. Section 9. Triadophora (Mez) Agostini.

Cybianthus sect. 1. Laxiflorus Agostini, sect. nov.

Conomorpha A. De Candolle, Trans. Linn. Soc. 17: 102. 1834. Ex Parte.

Conomorpha A. De Candolle sect. Conomorphida Miquel in Martius, Flora Brasiliensis 10: 302. 1856.

Conomorpha subgen. Euconomorpha Mez in Engler, Pflanzenreich 4(236): 254. 1902. Ex parte.

Folia alterna. Ramuli pilis multicellularibus ramosis obtecti. Inflorescentia racemosa, pedunculo 0.1-0.5 cm longo. Flores 4- raro 5-meri. Calycis lobi valvati, marginibus glandulari-ciliolatis; glandulis schizogenis brunneis haud prominentibus. Corolla campanulata, lobis valvatis vel paullo imbricatis extus marginibus atque intus omnino glandulari-granulosis; glandulis schizogenis brunneis haud prominentibus. Filamenta antheris breviora vel antheras aequalia. Antherae elongatae triangulares plerumque curvatae basi cordatae medio vel infra medium dorsifixae rimis angustatis longitudinalibus dehiscentes. Staminodia stamina simulantia, reducta. Ovarium lepidotum. Stylus elongatus tenuis stigmate truncato vel capitato coronatus.

*Pistillodium pistillum simulans reductum fistulosum.*

Leaves alternate. Branchlets covered with multicellular branched hairs. Inflorescence a raceme, the peduncle 0.1-0.5 cm long. Flowers 4- rarely 5-merous. Calyx lobes valvate, the margin glandular-ciliolate; schizogenous glands brown, not prominent. Corolla campanulate; lobes valvate or slightly imbricate, glandular-granulose over the whole surface within and at the margins outside; schizogenous glands brown, not prominent. Filaments shorter or as long as the anthers, connate to form a tube or free. Anthers elongate, triangular, usually curved, cordate at the base, dorsifixed at or below the middle, dehiscent by narrow longitudinal slits. Staminodes similar to stamens and reduced in size. Ovary lepidote. Style elongate, slender, tapered with a truncate or capitate stigma. Pistillode similar to pistil, hollow and reduced in size.

Type. *Conomorpha spicata* (H. B. K.) Mez.

Distribution. Guayana and the Amazon River basin.

Species. The following species and varieties belong to this section. Further studies may require the reduction of some to synonymy:

|  |  |
|--|--|
| <i>Conomorpha candolleana</i> Mez        | <i>C. leprosa</i> Steyermark           |
| <i>C. citrifolia</i> Mez                 | <i>C. lithophyta</i> R. E. Schultes    |
| <i>C. duidae</i> Gleason and<br>Moldenke | <i>C. madeirensis</i> A. C. Smith      |
| <i>C. fulvopulverulenta</i> Mez          | <i>C. magnoliifolia</i> Mez            |
| <i>C. glaucorubens</i> Mez               | <i>C. obovata</i> Mez                  |
| <i>C. gracilis</i> A. C. Smith           | <i>C. ptariensis</i> Steyermark        |
| <i>C. grandiflora</i> Mez                | <i>C. reticulata</i> Bentham ex<br>Mez |
| <i>C. latifolia</i> Mez                  | <i>C. riparia</i> R. E. Schultes       |
| <i>C. laxiflora</i> (Martius)<br>A. DC.  | <i>C. robusta</i> Mez                  |
| var. <i>latifolia</i> Miq.               | <i>C. spicata</i> (H. B. K.) Mez       |

*Cybianthus* sect. 2. *Stapfianus* Agostini, sect. nov.

Folia pseudoverticillata. Ramuli pilis multicellularibus ramosis obtecti. Inflorescentia paniculata, pedunculo 1-3 cm longo. Flores 5-meri. Calycis lobi imbricati, marginibus glandulari-ciliolatis; glandulis schizogenis brunneis haud prominentibus. Corolla cupuliformi, lobis imbricatis extus marginibus atque intus omnino glandulari-granulosis; glandulis schizogenis brunneis haud prominentibus. Filamenta antheris longiora vel antheras aequalia. Antherae elongatae triangulares vel ovatis triangulares haud curvatae basi cordatae infra medium dorsifixae rimis angustatis longitudinalibus dehiscentes. Staminodia stamina simulantia, reducta. Ovarium lepidotum. Stylus elongatus tenui stigmatate capitato coronatus. Pistilodium pistillum simu-

lans reductum.

Leaves pseudoverticillate. Branchlets covered by branched multicellular hairs. Inflorescence a panicle, the peduncle 1-3 cm long. Flowers 5-merous. Calyx lobes imbricate, the margin glandular-ciliolate; schizogenous glands brown, not prominent. Corolla cupuliform; lobes imbricate, glandular-granulose over the whole surface within and at the margins outside; schizogenous glands brown, not prominent. Filaments one to three times longer than the anthers, connate to form a tube or free. Anthers elongate, triangular or ovate-triangular, cordate at the base, dorsifixed near the base, dehiscent by narrow longitudinal slits. Staminodes similar to stamens and reduced in size. Ovary lepidote. Style elongate, slender, tapered with a capitate stigma. Pistillode similar to pistil and reduced in size.

Type. Conomorpha stapfii Mez

Distribution. Andes of Colombia.

Species. One species known:

*Conomorpha stapfii* Mez

*Cybianthus* sect. 3. *Iteoides* Agostini, sect. nov.

Conomorpha A. De Candolle subgen. Euconomorpha Mez  
in Engler, Pflanzenreich 4(236): 254. 1902. Ex  
parte.

Folia alterna. Ramuli glabri vel glandulari-granulosi. Inflorescentia racemosa, pedunculo 0.1-0.5 cm longo. Flores 4- vel 5-meri. Calycis lobi valvati, marginibus glandulari-ciliolatis; glandulis schizogenis brunneis prominentibus vel haud prominentibus. Corolla rotata vel campanulata, lobis valvatis vel paullo imbricatis intus omnino glandulari-granulosis; glandulis schizogenis brunneis haud prominentibus. Filamenta nulla vel antheras aequalia in tubum connata. Antherae elongatae triangulares curvatae basi cordatae medio vel infra medium dorsifixae rimis angustatis longitudinalibus dehiscentes. Staminodia stamina simulantia, reducta. Ovarium lepidotum. Stylus elongatus tenuis vel crassus, stigmate truncato vel capitato coronatus. Pistillodium pistillum similans reductum.

Leaves alternate. Branchlets glabrous or glandular-granulose. Inflorescence a raceme, the peduncle 0.1-0.5 cm long. Flowers 4- or 5-merous. Calyx lobes valvate, the margin glandular-ciliolate; schizogenous glands brown, prominent or not. Corolla rotate or cupuliform; lobes valvate or slightly imbricate, glandular-granulose over the whole surface within, schizogenous glands brown, not prominent. Filaments almost absent or as long as the anthers, connate

to form a tube. Anthers elongate, triangular, usually curved, cordate at the base, dorsifixed at or below the middle, dehiscent by narrow longitudinal slits. Staminodes similar to stamens and reduced in size. Ovary lepidote. Style elongate, slender or stout, tapered with a truncate or capitate stigma. Pistillode similar to pistil and reduced in size.

Type. Conomorpha iteoides (Bentham) Mez.

Distribution. Andes of Colombia and Venezuela.

Species. Only the following four species known:

Conomorpha glabra Mez

C. iteoides (Bentham) Mez

Badula iteoides Bentham

Conomorpha meridensis Mez

Conomorpha santanderensis A. C. Smith

Conomorpha sessilantha Steyermark

C. nevadensis Mez

Conomorpha densipapillata Steyermark

C. tanana Steyermark

Cybianthus sect. 4. Verticillatus Agostini, sect. nov.

Conomorpha A. De Candolle subgen. Microconomorpha

Mez in Engler, Pflanzenreich 4(236): 251. 1902.

Type species: Conomorpha verticillata Zahlbr.

(lectotype).

Folia pseudoverticillata. Ramuli glandulari-granulosei obtecti. Inflorescentia racemosa raro paniculata, pedunculo 1-4 cm longo. Flores 5-meri. Calycis lobi valvati, marginibus glandulari-ciliolatis; glandulis schizogenis brunneis prominentibus. Corolla rotata vel cupuliformi, lobis imbricatis intus omnino glandulari-granulosis; glandulis schizogenis brunneis prominentibus. Filamenta antheris longiora vel anthera aequalia. Antherae elongatae triangulares plerumque curvatae basi cordatae medio vel infra medium dorsifixae rimis angustatis longitudinalibus dehiscentes. Staminodia stamina simulantes, reducta. Ovarium lepidotum. Stylus elongatus tenuis vel crassus stigmate truncato coronatus. Pistillodium pistillum simulans reductum fistulosum.

Leaves pseudoverticillate. Branchlets glandular-granulose. Inflorescence a raceme, rarely a panicle, the peduncle 1-4 cm long. Flowers 5-merous. Calyx lobes valvate, the margin glandular-ciliolate; schizogenous glands dark, prominent. Corolla rotate or cupuliform; lobes imbricate, glandular-granulose over the whole surface within; schizogenous glands dark, prominent. Filaments one to three times longer than anthers, usually connate to form a tube. Anthers elongate, triangular, usually curved, cordate at the base, dorsifixed at or below the middle, dehiscent by narrow longitudinal slits. Staminodes similar to stamens, reduced in size. Ovary lepidote. Style elongate, slender or stout, tapered with a truncate stigma. Pistillode

similar to pistil, hollow and reduced in size.

Type. Conomorpha verticillata Zahlbr.

Distribution. Andes from Colombia to Peru.

Species. Only these two species known:

Conomorpha perseoides Mez

C. verticillata Zahlbr.

Myrsine verticillata Presley

Conomorpha verticillata (Presl.) Mez

Conomorpha jelskii Mez

Conomorpha pastensis Mez

Conomorpha dentata Mez

Conomorpha quercifolia Mez

Conomorpha preslii Macbride

var. jelskii (Mez) Macbride

Cybianthus sect. 5. Conomorpha (A. De Candolle) Agostini,  
stat. nov.

Conomorpha A. De Candolle, Trans. Linn. Soc. 17:  
102. 1834. Ex Parte.

Conomorpha sect. Euconomorpha Miquel, Stirp. Flora  
Surinamensis p. 111. 1850. Type species:

Conomorpha oblongifolia A. DC. (lectotype).

Conomorpha sect. Aconomorpha Miquel in Martius,  
Flora Brasiliensis 10: 304. 1856. Type species:

Conomorpha heterantha Bentham (lectotype).

Conomorpha subgen. Euconomorpha Mez in Engler,

Pflanzenreich 4(236): 254. Ex parte.

Folia alterna. Ramuli lepidoti obtecti. Inflorescentia racemosa vel basi ramosa raro paniculata, pedunculo 0.1-1.5 cm longo. Flores 4- raro 5-meri. Calycis lobi valvati, marginibus haud glandulari-ciliolatis; glandulis schizogenis brunneis haud prominentibus. Corolla campanulata vel cupuliformi, lobis valvatis vel paullo imbricatis intus plerumque omnino glandulari-granulosis; glandulis schizogenis brunneis plerumque haud prominentibus. Filamenta antheris breviora vel antheris longiora plerumque cum tubo connatis. Antherae breves vel elongatae triangulares vel ovatae triangulares plerumque curvatae basi cordatae medio vel infra medium dorsifixae rimis angustatis longitudinalibus dehiscentes. Staminodia stamina simulantes, reducta. Ovarium lepidotum. Stylus elongatus tenuis vel crassus stigmate truncatus vel capitato coronatus. Pistillodium conicum.

Leaves alternate. Branchlets lepidote. Inflorescence a raceme, sometimes branched at the base, rarely a panicle, the peduncle 0.1-1.5 cm long. Flowers 4- or 5-merous. Calyx lobes valvate, the margin entire or rarely crenate, not glandular-ciliolate; schizogenous glands pale or dark brown, not prominent. Corolla campanulate or cupuliform; lobes valvate or slightly imbricate, usually glandular-granulose within; schizogenous glands pale or dark brown, not promi-

ment. Filaments absent to three times longer than anthers, usually connate to form a tube. Anthers short or elongate, triangular or triangular-ovate, usually curved, cordate at the base, dorsifixed at or below the middle, dehiscent by narrow longitudinal slits. Staminodes similar to stamens and reduced in size. Ovary lepidote. Style elongate, slender or stout, tapered with a truncate or capitate stigma. Pistillode conic.

Type. Conomorpha oblongifolia A. De Candolle

Distribution. Twenty-six species with the main center in Guayana, five species in the Andes, two in southern Brazil, two in the Lesser Antilles, and one in Costa Rica.

Species. The following taxa belong to this section:

|                               |                               |
|-------------------------------|-------------------------------|
| Cybianthus amplus (Mez)       | C. dussii (Mez) Agostini      |
| Agostini                      | <u>Conomorpha dussii</u> Mez  |
| <u>Conomorpha ampla</u> Mez   | C. frigidicola (Steyermark)   |
| C. biflorus Agostini          | Agostini                      |
| C. caracasanus (Mez) Agostini | <u>Conomorpha frigidicola</u> |
| Mez                           | Steyermark                    |
| <u>Conomorpha caracasana</u>  | C. guyanensis (A. DC.) Miquel |
| Mez                           | <u>Conomorpha guyanensis</u>  |
| C. crotonoides (Mez) Agostini | A. DC.                        |
| Mez                           | C. laetus (Mez) Agostini      |
| <u>Conomorpha crotonoides</u> | <u>Conomorpha laeta</u> Mez   |
| Mez                           |                               |

- C. laurifolius* (Mez) Agostini  
*Conomorpha laurifolia*  
 Mez  
*Conomorpha hieronymoides* Steyermark
- C. lepidotus* (Gleason) Agostini  
*Conomorpha lepidota*  
 Gleason  
*Conomorpha curvivenia* Gleason  
*Conomorpha lepidota*  
 f. *acutata* Steyermark
- C. multipunctatus* A. De Candolle  
*Conomorpha multipunctata* (A. DC.)  
 Miquel
- C. maguirei* Agostini
- C. oblongifolius* (A. DC.) Agostini  
*Conomorpha oblongifolia* A. De Candolle
- C. occigranatensis* (Cuatrecasas) Agostini  
*Conomorpha occigranatensis* Cuatrecasas
- C. peruvianus* (A. DC) Miquel  
*Conomorpha peruviana* A. De Candolle
- C. pittieri* Agostini
- C. pseudoicacoreus* (Miquel) Agostini  
*Conomorpha pseudoicacorea* (Miquel) Mez
- C. punctatus* (Mez) Agostini  
*Conomorpha punctata* Mez  
*Conomorpha sessilis* A. C. Smith
- C. roraimae* (Steyermark) Agostini  
*Conomorpha roraimae* Steyermark
- C. rostratus* (Hasskarl) Agostini  
*Conomorpha peruviana*  
 A. DC. var. *rostrata* (Hasskarl) Mez
- C. spathulifolius* Agostini
- C. steyermarkianus* (Agostini) Agostini  
*Conomorpha steyermarkiana* Agostini
- C. wurdackii* Agostini

*Cybianthus* sect. 6. *Intermedius* Agostini, sect. nov.

Folia alterna. Ramuli lepidoti. Inflorescentia racemosa, pedunculo 0.1-1.0 cm longo. Flores 4-meri. Calycis lobi valvati, marginibus glandulari-ciliolatis; glandulis schizogenis rubro-brunneis prominentibus. Corolla rotata, lobis valvatis reflexis intus omnino glandulari-granulosis; glandulis schizogenis prominentibus. Filamenta antheris longiora vel antheras aequalia. Antherae elongatae triangulares curvatae basi cordatae infra medium dorsifixae rimis angustatis longitudinalibus dehiscentes. Flores foeminei non visi.

Leaves alternate. Branchlets lepidote. Inflorescence a raceme. Flowers 4-merous. Calyx lobes valvate, the margin glandular-ciliolate; schizogenous glands reddish-brown, prominent. Corolla rotate; lobes reflexed, valvate, glandular-granulose over the whole surface within; schizogenous glands prominent. Filaments one to two times longer than the anthers, not connate. Anthers elongate, triangular, curved, dorsifixed near the base, dehiscent by narrow longitudinal slits. Pistillode absent. Pistillate flowers not seen.

Type. *Cybianthus intermedius* Agostini

Distribution. Guayana.

Species. The only species of this section shares a few diagnostic characters with species of other sections. The

indument is lepidote and the anthers are elongate and curved as in section Conomorpha. It also resembles species of the sections Laxiflorus and Iteoides in having the corolla lobes densely glandular-granulose within. The corolla tube is glandular-granulose as in the species of section Cybianthus.

Cybianthus sect. 7. Weigeltia (A. DC.) Miquel in Martius, Flora Brasiliensis 10: 299. 1856.

Weigeltia A. De Candolle, Trans. Linn. Soc. 17: 102. 1834.

Leaves alternate, rarely subopposite or verticillate. Branchlets covered by scales or by multicellular, branched hairs. Inflorescence a pinnate panicle, rarely a bipinnate panicle or a raceme; peduncle 0.5-2.0 cm long. Flowers 4-merous, rarely 5-merous. Calyx lobes valvate; the margin crenate or rarely entire, glabrous or rarely glandular-ciliolate; schizogenous glands prominent or not. Corolla rotate or cupuliform; lobes imbricate, not granulose within; schizogenous glands prominent or not. Filaments one to three times longer than anthers, not connate. Anthers subglobose or broadly ovate, cordate, dorsifixed at or below the middle, dehiscent by wide longitudinal slits. Staminodes similar to stamens and reduced in size. Ovary lepidote or glabrous. Style short or long and stout, tapered with a truncate or capitate

stigma usually lobed. Pistillode conic, lepidote.

Type. Weigeltia surinamensis (Sprengel f.) Mez

Distribution. Thirty-five species in South America and two in the Lesser Antilles. In South America they are distributed as follows: ten in the Guayana area, ten in Southern Brazil, five in the Amazonian basin, and ten in the Andes.

Species. The following taxa belong to this section:

*Conomorpha dubia* Macbride

*C. jajiensis* Steyermark

*C. larensis* Steyermark

*C. liriensis* Steyermark

*C. nemoralis* (Martius) Mez

*C. sulcata* Steyermark

*Cybianthus cuspidatus* Miquel

*Cybianthus meriden-*  
*sis* Miquel

*C. cruegeri* Mez

*Cybianthus cuspidatus* Griseb

*Weigeltia myrian-*  
*thos* Griseb

*Cybianthus densiflorus* Miquel

*Weigeltia densiflora* (Miquel) Mez

*C. duckei* R. E. Schultes

*C. fendleri* Mez

*C. klotzschii* Mez

*C. longifolius* Miquel

*Weigeltia longifolia* Benth.

*C. microbotrys* A. DC.

*Weigeltia microbotrys*  
(A. DC.) Mez

*C. multicostatus* Miquel

- Cybianthus obovatus (Martius) Martius et Miquel  
Weigeltia obovata Martius
- C. poeppigii Mez
- Weigeltia albiflora A. C. Smith
- W. antillana Mez
- W. blanchetii A. DC.
- W. bogotensis Mez
- W. buchtieni Pax
- W. gardneri A. DC.
- W. glaziovii Mez
- W. glomerulata A. C. Smith
- W. grandifolia Mez
- W. hoehnei Mansfield
- W. lawrencei Moldenke
- W. nanayensis Macbride
- Weigeltia nitida Mez
- W. parviflora Mez
- W. potiaei Mez
- W. quelchii (N. E. Brown) Mez
- Ardisia quelchii N. E. Brown
- Conomorpha depressa Steyermark
- W. schomburgkiana Mez
- W. surinamensis (Sprengel f. ) Mez
- Salvadora surinamensis Sprengel f.
- Weigeltia myrianthos A. De Candolle
- Cybianthus myrianthos (A. DC.) Miquel
- W. sylvatica Gleason

Cybianthus sect. 8. Comomyrsine (Hooker f.) Agostini, sect. nov.

Comomyrsine Hooker f. in Bentham and Hooker, Gen.

Pl. 2: 643. 1876.

Weigeltia A. DC. subgen. Comomyrsine (Hooker f.)

Mez in Engler, Pflanzenreich 4(236): 290. 1902.

Leaves alternate, clustered at the tip of branchlets. Branchlets granulose-glandular. Inflorescence a pinnate or bipinnate panicle; peduncle 1.0-2.5 cm long. Flowers 4-, 5- or rarely 6-merous. Calyx lobes valvate, the margin entire, glabrous or glandular-papillose; schizogenous glands prominent or inconspicuous. Corolla rotate; lobes valvate, glandular-granulose within; schizogenous glands dark and prominent or inconspicuous. Filaments two or three times longer than the anthers, not connate. Anthers rounded, dorsifixed, dehiscent by wide longitudinal slits. Staminodes similar to stamens and reduced in size. Ovary subglobose, lepidote. Style short, stout, tapered with a capitate or 2- to 3-lobulate stigma. Pistillode conic, lepidote.

Type. Comomyrsine sprucei Hooker f.

Distribution. Seven species in Western South America, from Panama to Peru.

Species. The following taxa belong to this section:

Comomyrsine simplex Hooker f.

Weigeltia simplex

(Hooker f.) Mez

C. sodiroana Mez

C. sprucei Hooker f.

Weigeltia sprucei

(Hooker f.) Mez

|                                    |                                      |
|------------------------------------|--------------------------------------|
| <i>Weigeltia chamaephyta</i> Diels | <i>W. purpurea</i> Cuatrecasas       |
| <i>W. goudotiana</i> Mez           | <i>W. silvestris</i> Macbride        |
| <i>W. humilis</i> Mez              | <i>W. verticilloides</i> Cuatrecasas |
| <i>W. panamensis</i> Standley      |                                      |

*Cybianthus* sect. 9. *Triadophora* (Mez) Agostini, stat. nov.

*Weigeltia* subgen. *Triadophora* Mez in Engler,

*Pflanzenreich* 4(236): 291. 1902.

Leaves alternate, clustered at the apexes of branchlets, typically marked by parallel subepidermic fibres. Branchlets covered by malpighian hairs. Inflorescence a pinnate or bipinnate panicle, the peduncle 4-6 cm long. Flowers 3-merous. Calyx lobes imbricate, the margin glandular-ciliolate; schizogenous glands dark, prominent. Corolla sub-rotate; lobes imbricate, reflexed after anthesis, glandular-granulose within; schizogenous glands dark, prominent. Filaments two to three times longer than the anthers, not connate. Anthers deltoid, cordate or deeply sagittate at the base, dorsifixed, dehiscent by wide longitudinal slits. Staminodes similar to stamens and reduced in size. Ovary glabrous. Style short and stout, tapering into a 3-lobulate stigma. Pistillode conic.

Type. *Conocarpus schlimii* Hooker f.

Distribution. Two species distributed in the Andes of Colombia and one in the state of Mato Grosso in Brazil.

Species. Three species known:

*Comomyrsine schlimii* Hooker f.

*Weigeltia schlimii* (Hooker f.) Mez

*Weigeltia multiflora* A. C. Smith

*W. schlimii* var. *intermedia* Moldenke

*W. triandra* Asplund

Cybianthus sect. 10. *Cybianthopsis* (Mez) Agostini, status nov.

*Grammadenia* subgen. *Cybianthopsis* Mez in Urban,

Symb. Antill. 2: 425. 1901.

Leaves pseudovercillate. Branchlets glabrous or granulose-glandular. Inflorescence a pseudo-umbellate raceme, the peduncle 1.0-1.5 cm long. Flowers 5-merous. Calyx lobes valvate, the margin glandular-ciliolate; schizogenous glands not prominent. Corolla rotate; lobes dextrocontorted, glandular-granulose within; schizogenous glands not prominent. Filaments shorter than the anthers, not connate. Anthers quadrate or quadrate-obovate, the apex round or truncate, basifixed, dehiscent by terminal, confluent pores. Staminodes as stamens but anthers elongate, triangular, not dehiscent. Ovary subglobose, glabrous. Style short, stout, tapered with a capitate stigma. Pistillode globose or conic.

Type. Grammadenia sintenisii (Urban) Mez

Distribution. Puerto Rico

Species. The sole species was originally described as a species of Ardisia and later transferred by Mez (1902) to Grammadenia. It is a discordant element in Grammadenia because of the petiolate leaves, the unisexual flowers, the granulose petals, and the absence of a staminal tube. Only one species:

Grammadenia sintenisii (Urban) Mez

Ardisia sintenisii Urban

Cybianthus sect. 11. Cybianthus

Cybianthus sect. Eucybianthus Miquel in Martius,

Flora Brasiliensis 10: 292. 1856.

Cybianthus sect. Cybianthoides Miquel, l. c. 10: 296.  
1856.

Peckia Vellozo, Fl. Flum. p. 51. 1825. Nomen  
rejiciendum.

Leaves alternate or subopposite, rarely pseudover-  
ticillate. Branchlets covered by multicellular, branched  
hairs or rarely by scales. Inflorescence a raceme, rarely  
branched at the base; peduncle 0.1-0.5 cm long. Flowers  
4-merous, rarely 5-merous. Calyx lobes imbricate, rarely  
valvate, the margin glandular-ciliolate; schizogenous glands,

pale or dark brown, prominent or not. Corolla rotate; lobes imbricate, glandular-granulose over the whole surface within; schizogenous glands pale or dark brown, prominent or not. Filaments absent to three times longer than the anther, not connate. Anthers broadly ovate or quadrate, basifixed, usually not cordate at base, dehiscent by terminal pores or elongate pores at the upper 2/3 of the anther. Staminodes similar to stamens but reduced in size. Ovary lepidote or glabrous. Style short or elongate, stout, tapered with a lobed or segmented capitate stigma. Pistillode globose or conic, lepidote.

Type. Cybianthus penduliflorus C. F. P. Martius

Distribution. Forty-five species mostly concentrated in northern Brazil with two species in southern South America, five species in Guayana, and ten species in the Amazon River basin.

Species. The following species and varieties belong to this section:

|                                  |                        |
|----------------------------------|------------------------|
| Conomorpha apiculata Steyermark  | C. boissieri A. DC.    |
|                                  | C. brownii Gleason     |
| Cybianthus alpestris (Warm.) Mez | C. collinus Mez        |
|                                  | C. comatus Mez         |
| <u>Cybianthus angustifolius</u>  | C. coriaceus Martius   |
| var. <u>alpestris</u> Warm.      | C. cuneifolius Martius |
| C. angustifolius A. DC.          | var. gracillima Warm.  |

- C. cuyabensis* Mez  
*C. cyclopetalus* Mez  
*C. densicomus* Martius  
     var. *grandifolius*  
         Hassler  
*C. detergens* Martius  
*C. egensis* Mez  
*C. froelichii* Mez  
*C. fuscus* Martius  
*C. glaber* Martius  
*C. glaziovii* Mez  
*C. goyazensis* Mez  
*C. gracillimus* Mez  
*C. indecorus* Mez  
*C. lagoensis* Mez  
*C. lanceolatus* Pax  
*C. macrophyllus* Miquel  
*C. minutiflorus* Mez  
*C. nemophilus* Pittier  
*C. nitidus* Miquel  
*C. parvifolius* Schlechtendahl  
     *C. parviflorus* Muell.  
*C. penduliflorus* Martius  
     *C. pendiflorus* A. DC.  
     *C. luridus* Benth  
*C. prieurii* A. DC.  
*C. psychotriifolius* Rusby  
*C. regnellii* Mez  
*C. resinosus* Mez  
*C. schwackeanus* Mez  
*C. selloanus* Mez  
*C. subspicatus* Benth  
*C. venezuelanus* Mez  
*C. viridiflorus* A. C. Smith  
*Peckia verticillata* Vellozo  
*P. megaphylla* Vellozo

THE GENUS CYBIANTHUS SECTION CONOMORPHACharacterization

The genus Cybianthus can be distinguished from the remaining genera of the family Myrsinaceae, except Myrsine and Wallenia, by the unisexual flowers. Cybianthus can be distinguished from Myrsine by the elongate inflorescence and by the small stigma atop a short or elongate style in the pistillate flowers. Cybianthus can be distinguished from Wallenia by the calyx and corolla which are usually connate less than half of the length and the stamens which are not exerted in the staminate flowers.

Members of section Conomorpha can be distinguished from the members of all other sections by the combination of alternate leaves, the lepidote pubescence of flowers and branchlets, and dorsifixed anthers dehiscent by narrow slits.

It would appear that in the evolutionary history of the family, the group of species included in Cybianthus section Conomorpha has progressed toward reduction to unisexual flowers in contrast to the bulk of the family which possesses hermaphroditic flowers. Also tetramerous flowers

predominate in contrast with the rest of the family where pentamerous flowers are more common. The size of all floral parts is notably smaller when compared with most other members of the family. If compared with Ardisia and other presumably primitive members of the Myrsinaceae, the species included in Cybianthus section Conomorpha are marked by the reduction in ovule number, and by the reduced development of the style. Despite such reductions, sufficient variation exists within the group to permit speciation.

The twenty six species here considered within Cybianthus section Conomorpha are very closely related as is indicated by the sharing of a number of diagnostic characters.

#### Distribution and ecology

The present distribution of the species of Cybianthus section Conomorpha is predominantly South American (Fig. 1 & Table 2). The northernmost limit of the range is marked by the two West Indian species C. dussii and C. rostratus. One collection from Costa Rica shows affinities with C. occigranatensis and C. peruvianus but does not fit within the normal limits of variation of either of these two species. It may either represent a northern extension of one of these species or be the representative of a new taxon. Further collections will have to be made before any

reasonable conclusion can be reached.

The southern limit of the section is marked by the range of *C. brasiliensis*, known in southern Brazil from Goiás and Minas Gerais to Santa Catarina. All the other species are found in Colombia, Venezuela, the Guianas, Ecuador, Peru, Bolivia, and Brazil. Species of *Cybianthus* section *Conomorpha* have not been found in Paraguay or northern Argentina. Neither have they been found in the easternmost corner of Brazil.

The range of a given species usually falls completely within one of the several phytogeographical divisions of South America. All the Guayanan species (Figs. 4-5) are restricted to the Guayana Highland with the exception of *C. lepidotus* which has also been collected in Bolivia, and *C. multipunctatus* which grows at low altitudes in Guayana. It is worth mentioning that *C. multipunctatus* has its closest relatives in Amazonia rather than in the Guayana Highland.

All the amazonian species (Fig. 3), except *C. amplus*, are restricted to Amazonia, considered in a hydrographic sense. *C. amplus* has been collected in the state of Bahia in southeastern Brazil, and it is also the only species common to the upper Amazonian basin and to the upper Rio Negro-Rio Orinoco drainage basin (Fig. 3). The paucity of common species in these two areas has been previously noted (McVaugh, 1969). Two species, *C. dussii* and *C. rostratus*, are restricted to the Lesser Antilles

(Fig. 2). C. rostratus has a wider range from Guadeloupe to Grenada while C. dussii is endemic to Martinique. Seven species are found in the Andean highland including the Andean branches of western and northern Venezuela (Fig. 6).

Only C. pittieri extends its range to Tobago (Fig. 2) which is phytogeographically closer to Trinidad and the South American mainland than to the Lesser Antilles. The two species, C. peruvianus and C. comperuvianus, may be considered Andean in distribution but their relationship lies more with the Amazonian species than with the Andean species. The range of these two species runs along the borderline of the Andes and Amazonia (Fig. 3). The ranges of C. brasiliensis and C. oblongifolius are restricted to south and southeastern Brazil. C. oblongifolius is isolated and probably endemic to Minas Gerais (Fig. 4).

The altitudes at which the species of Cybianthus section Conomorpha have been found range from sea level to 3000 meters in the Andes, most species having a distinct limit of tolerance. All but a few species are exclusively highland species not found below 1000 meters of elevation. The species C. peruvianus, C. comperuvianus, and C. brasiliensis are predominantly lowland species but can be occasionally found up to 1500 meters elevation. On the other hand, C. pittieri and C. lepidotus are predominantly highland species but can be occasionally found as low as 850 meters elevation (Table 2).

Tabl. 2. Geographical and altitudinal distribution of the species  
of Cybianthus section Conomorpha

| Overall area                                    | Local distribution                     | Altitude  | Species         |
|---|--|-----------|-----------------|
| Lesser Antilles                                 | Martinique                             | unknown   | dussii          |
|   | Guadeloupe to Saint Vincent            | 500-800   | rostratus       |
|   | Venezuela (Aragua)                     | 1500-1700 | caracasanus     |
| Andes (including Northern Venezuela and Tobago) | Colombia and Ecuador                   | 2000-2600 | cuatrecasasii   |
|   | Venezuela (Mérida)                     | 2400-2900 | frigidicola     |
|   | Peru (Amazonas)                        | ca. 2000  | laetus          |
|   | Venezuela and Colombia                 | 1800-2800 | laurifolius     |
|   | Colombia and Ecuador                   | 1000-2000 | occigranatensis |
|   | Venezuela and Tobago                   | 800-1400  | pittieri        |
|   | Guyana                                 | 1300-1600 | biflorus        |
|   | Venezuela (Bolivar)                    | 1800-2500 | crotonoides     |
|   | Venezuela and Bolivia                  | 850-2200  | lepidotus       |
|   | Guyana, Surinam and French Guiana      | 300-1000  | multipunctatus  |
| Guayana   | Brazil and Venezuela                   | 1300-2000 | maguirei        |
|   | Venezuela (Bolivar)                    | 1000-1400 | punctatus       |
|   | Venezuela (Bolivar)                    | 2000-2600 | roraimae        |
|   | Venezuela (Amazonas)                   | 1500-2200 | spathulifolius  |
|   | Venezuela (Bolivar)                    | 2000-2300 | steyermarkianus |
|   | Venezuela (Bolivar)                    | 1700-2300 | wurdackii       |
|   | Brazil, Colombia, and Venezuela        | 50-1100   | amplus          |
| Amazonia  | Brazil, Bolivia and Peru               | 350-1100  | comperuvianus   |
|   | Brazil                                 | 300-400   | guyanensis      |
|   | Bolivia and Peru                       | 200-1500  | peruvianus      |
|   | Brazil and Peru                        | 70-700    | pseudoicacoreus |
| Eastern and Southeastern Brazil                 | Brazil (Minas Gerais to Sta. Catarina) | 5-1500    | brasiliensis    |
|   | Brazil (Minas Gerais)                  | unknown   | oblongifolius   |

## FIGURE LEGENDS (1-4)

Figure 1. Distribution of Cybianthus section Conomorpha.

Figure 2. Distribution of Cybianthus section Conomorpha species. The enclosed areas represent total distribution ranges, circles represent known localities. 1. C. multipunctatus. 2. C. pittieri. 3. C. caracasanus. 4. C. rostratus 5. C. dussii. 6. C. biflorus.

Figure 3. Distribution of Cybianthus section Conomorpha species. Inset shows the distribution of C. amplus (Open circles). 7 (+). C. guyanensis. 8 (▲). C. pseudoicacoreus. 9 (○). C. amplus. 10 (▲). C. comperuvianus. 11 (●). C. peruvianus.

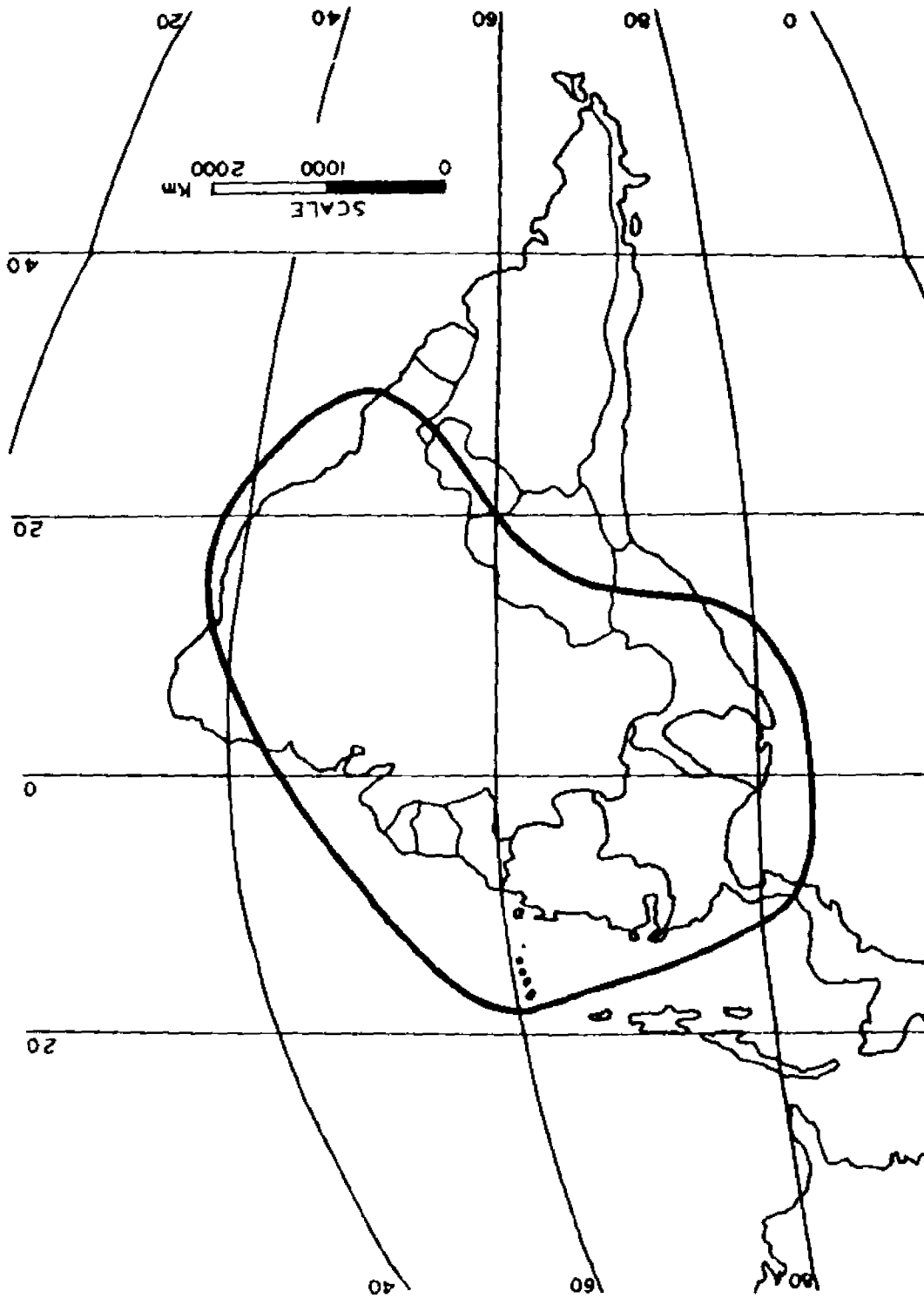
Figure 4. Distribution of Cybianthus section Conomorpha species. The enclosed areas represent total distribution ranges. 12 (●). C. punctatus. 13 (▲). C. oblongifolius. 14 (Δ). C. lepidotus. 26. (○). C. brasiliensis.

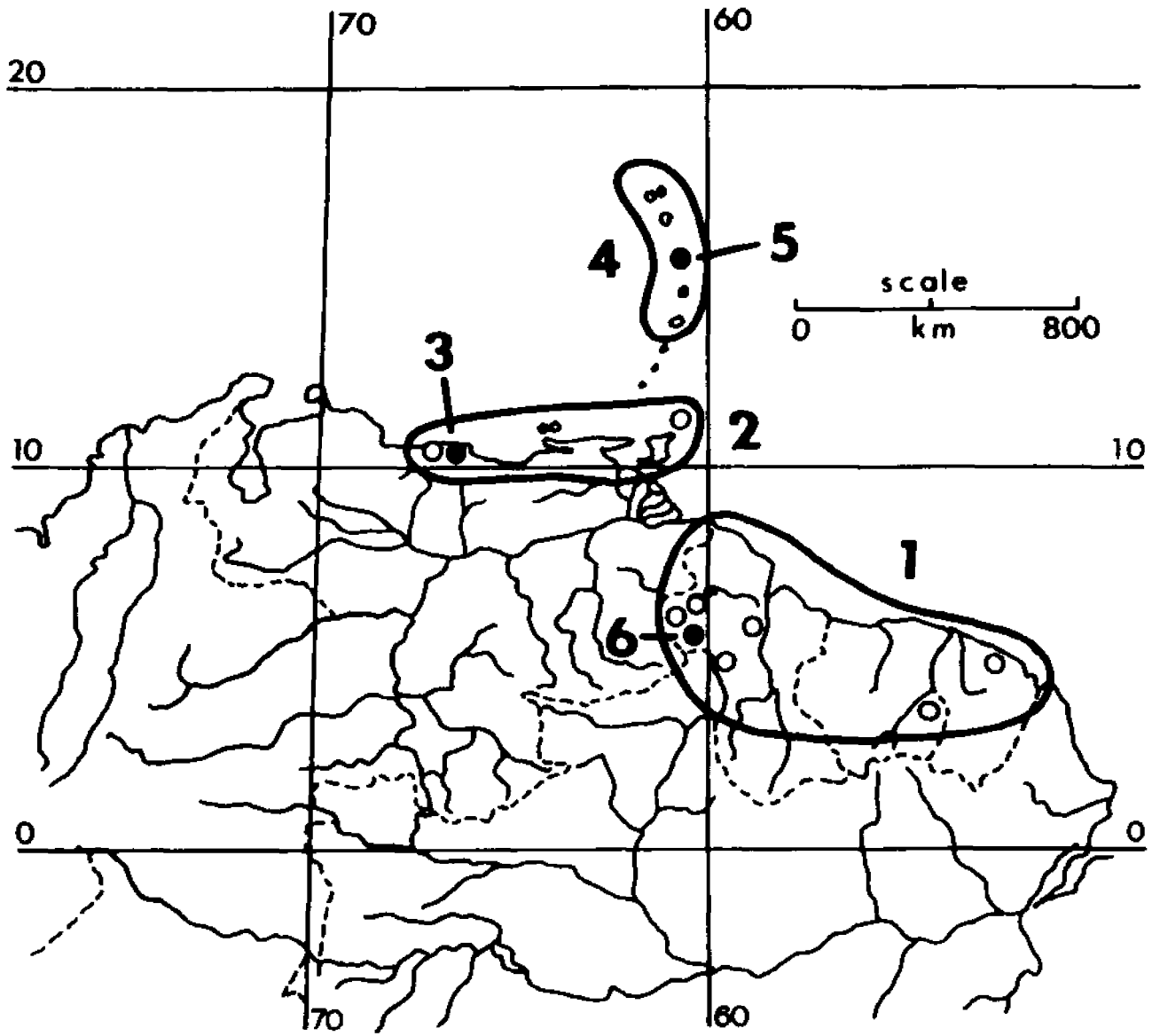
## FIGURE LEGENDS (5-6)

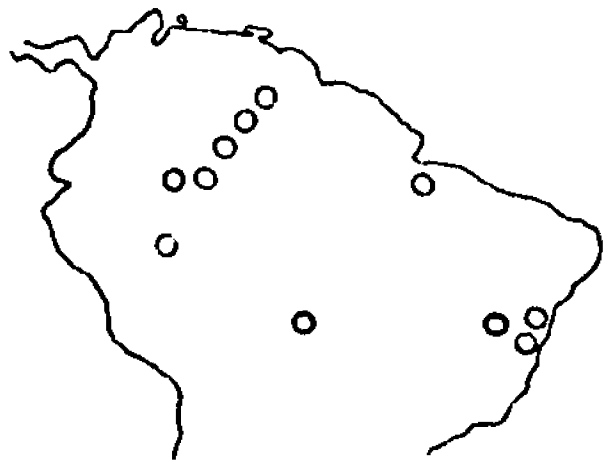
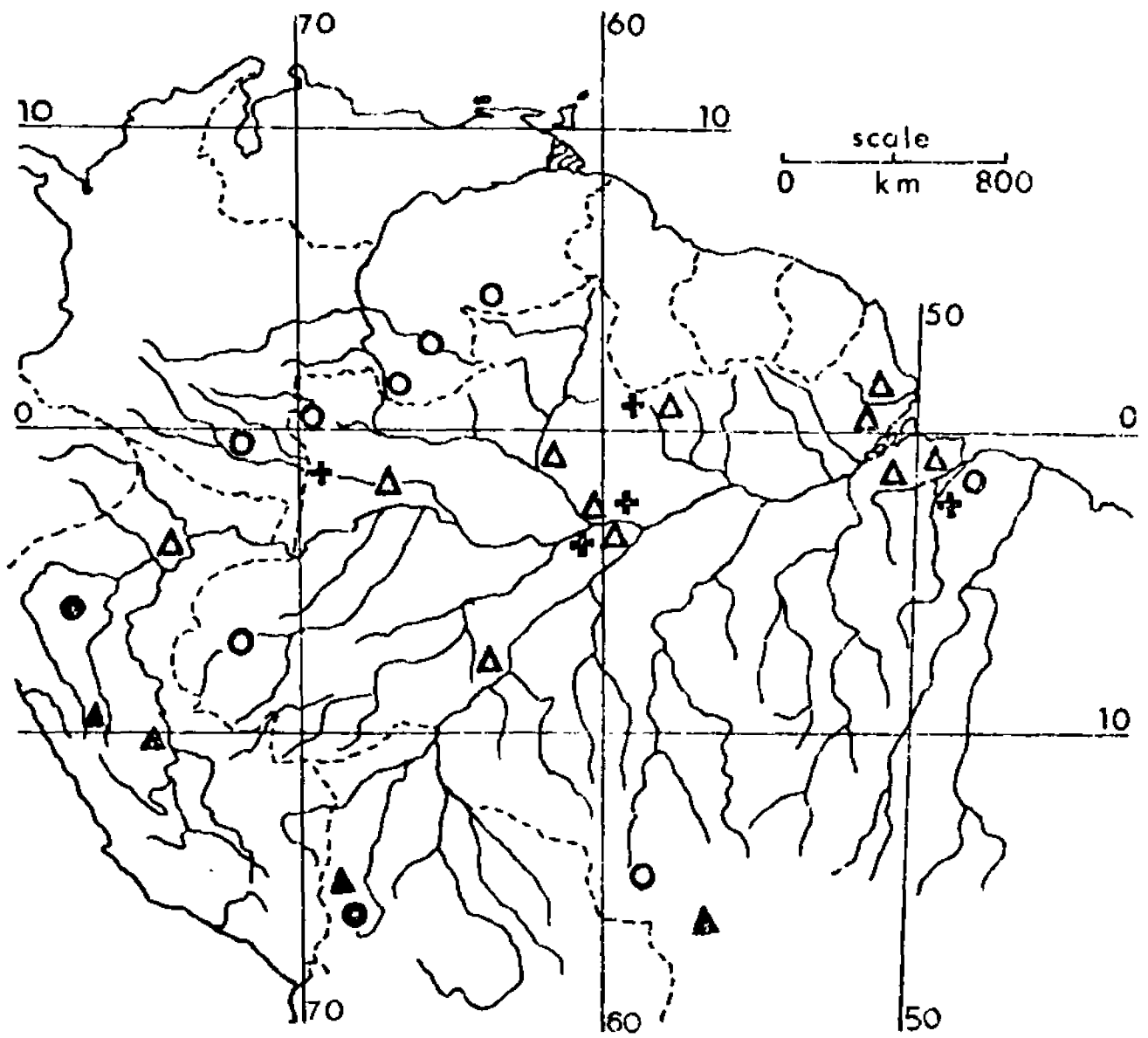
Figure 5. Distribution of Cybianthus section Conomorpha species. Enclosed area represents probable maximum range of these species restricted to the Guayana Highland. 15 (○). C. maguirei. 16 (●). C. crotonoides. 17 (⊕). C. stevermarkianus. 18 (△). C. wurdackii. 19 (▲). C. roraimae. 20 (■). C. spathulifolius.

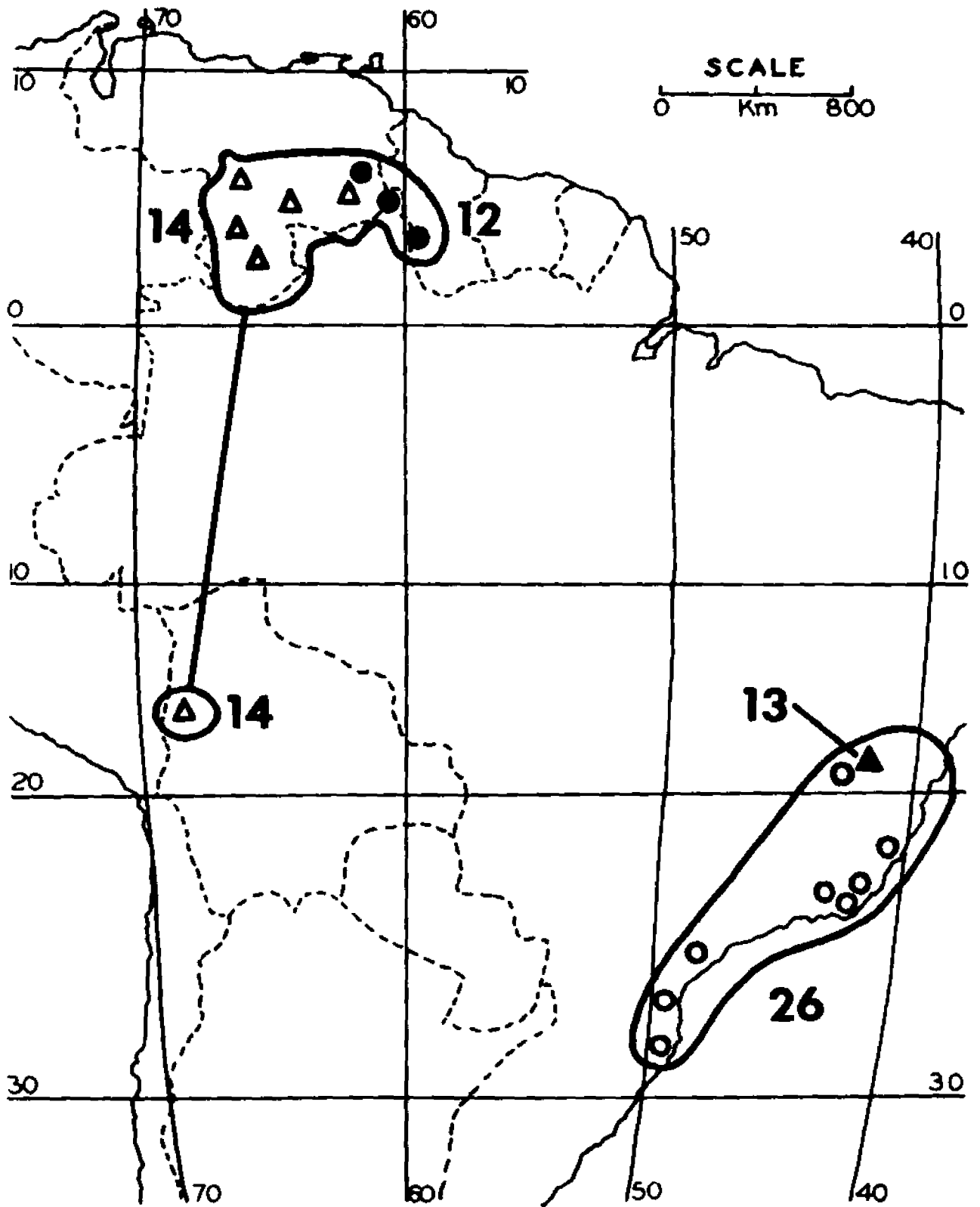
Figure 6. Distribution of Cybianthus section Conomorpha species. The enclosed areas represent total distribution ranges. 21 (○). C. laurifolius. 22 (△). C. frigidicola. 23 (●). C. cuatrecasasii. 24 (▲). C. occigranatis. 25 (■). C. laetus.

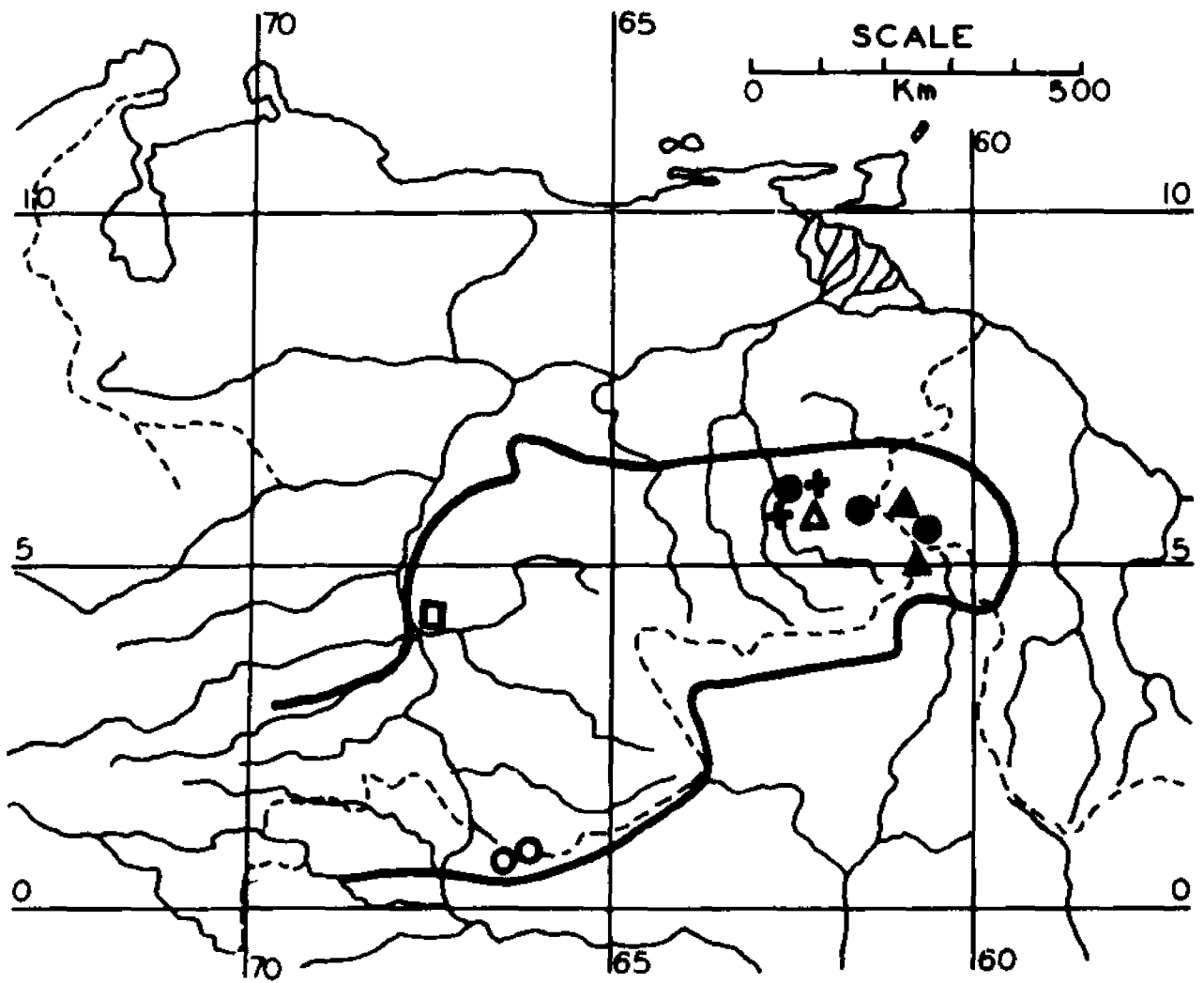
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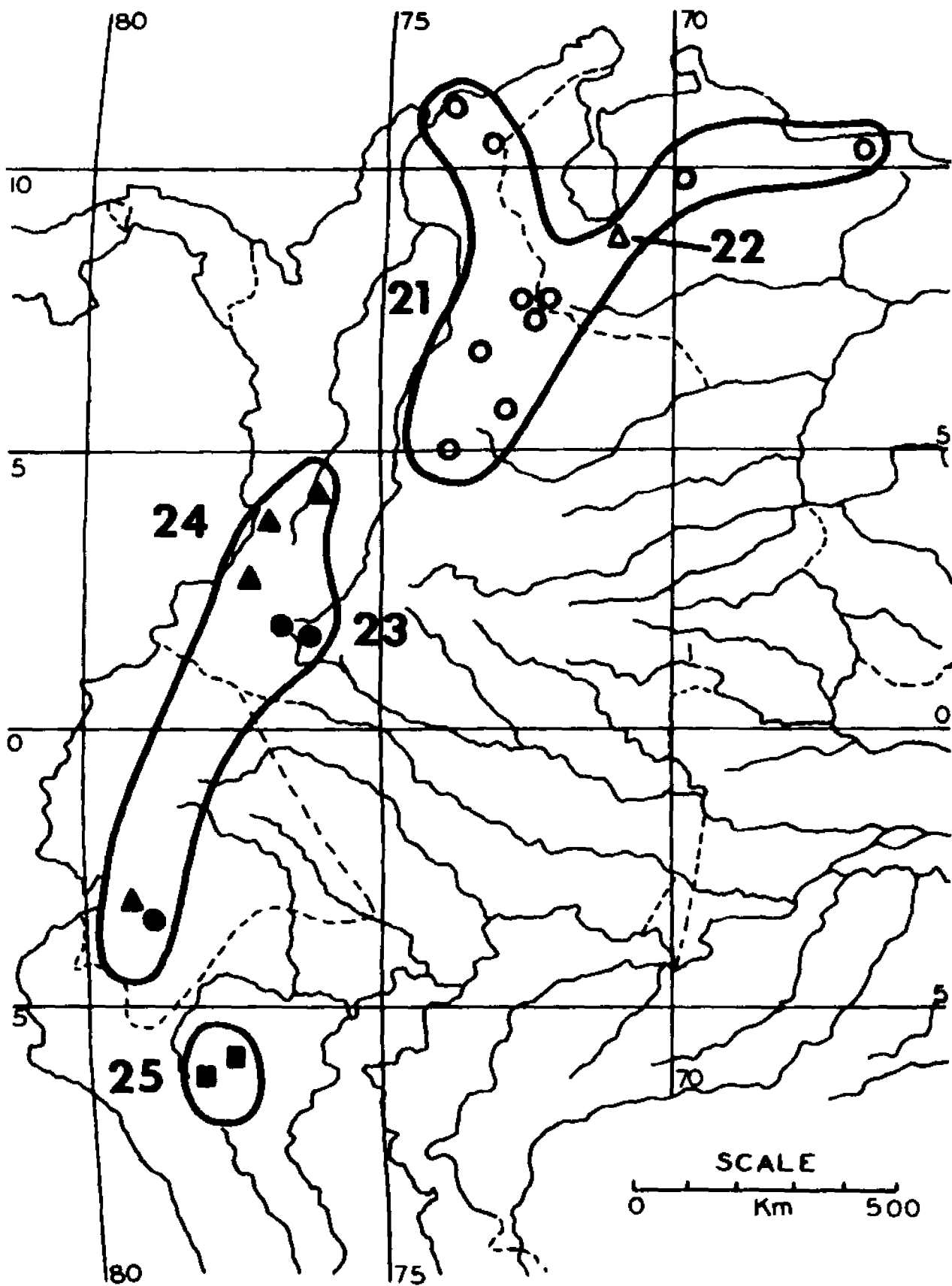












The species of Cybianthus section Conomorpha are predominantly forest inhabitants. In contrast with most species of section Laxiflorus, they are not found along rivers or in lowland savannas. They seem to occur in wet and predominantly evergreen forests, at either high or low elevations. Several species thrive at high altitudes as elements of the dwarfed forests of the Andes or are components of the very peculiar summit flora of the flat-topped Guayana mountains.

#### Morphology and anatomy

#### Materials and methods

This study was based on herbarium material deposited at The New York Botanical Garden, the Herbario Nacional de Venezuela, and nineteen other herbaria in America and Europe whose directors or curators kindly lent material. Observations on gross morphology were made with the aid of a high power binocular microscope. Portions to be studied anatomically were treated with a 1% solution of aerosol and allowed to soften for one to two weeks at room temperature. The samples were then washed with flowing water for a few hours. After this, the washed material was immersed in 70% ethyl alcohol. Slides for the study of scales were obtained by scraping the leaf surfaces with a razor blade. Sections of petioles and leaf blades were made free hand with a razor

blade. All the slides were permanently preserved in diaphane, a mounting medium which is soluble in alcohol. This made the mounting process shorter by elimination of the usual xylol series. Observations were made on (1) unstained sections and (2) sections stained in phloroglucinol and concentrated hydrochloric acid. Microscope slides of pollen were prepared from herbarium specimens following the method described by Erdtman (1966).

### Habit and branching

All species in section Conomorpha are shrubs or small trees rarely growing to a height of 8 m or more. Most species are very variable in height. The habit very probably depends most on the particular, prevalent ecological conditions. The branchlets are usually almost terete in transection but in some species they are prominently ribbed. In C. biflorus, a Guayanan species, the branches are short and divaricate. In other species the branches develop at various angles. Lenticels are uncommon except in C. brasiliensis where they are prominent.

### Trichomes

The trichomes found in the section consist of discoid multicellular plates one cell thick on very short stalks. The cells of a plate are arranged and elongate radially. These trichomes are usually referred to as scales

and are of two types.

The two types of scales can be distinguished readily from a surface view or a transverse section by the differential thicknesses of the walls. The covering scales are almost always brown in color while the glandular scales are usually paler. The diameter of the glandular scale is always smaller than the diameter of the covering scale in a given species. The fact that the stalk cell of the glandular scale is always of a greater diameter than the stalk cell of the covering scale was particularly helpful in locating and differentiating the two types of scales in the bleached cuticular preparations.

The covering scales (Figs. 7 to 10) are the most common type and are found on all vegetative parts and the outer surfaces of the floral perianth. These scales show no secretory activity and are usually sunken in a shallow depression of the epidermal surface. The plate ranges from 100 to 250 microns in diameter. The shape of the plate margin is characteristic of each species, being more deeply lobed in some species than in others. The shape of the margin is nevertheless a difficult character to describe and quantify. The cells constituting the plate range in number from 16, as in *C. punctatus* (Fig. 7-1), to 60, as in *C. lepidotus* (Fig. 10-25, 28). The diameter and the number of cells forming the plate provide a valuable diagnostic character. None of the walls of the cells constituting the plate are thickened to a great extent nor are they cutin-

ized. The walls seem to be entirely of cellulose. The cavities of these cells are totally or partially filled with resin. In most species there are scales in which the peripheral portions of the cells forming the plate appear to have collapsed and a portion of the resin to have been lost. In these scales the margins are translucent while the centers usually remain opaque. Plates composed of either entire or collapsed cells (Fig. 10) can be found in almost all the species studied. Intermediate stages of resin loss are also frequently found.

The stalk is always unicellular. In the stalk cell all the walls are heavily thickened and cutinized except for the basal, internal wall which is always thinner. The cavity of the stalk cell is characteristically constricted at or near the middle. When the scales fall, they leave small cavities where the basal cells were embedded, giving a scrobiculate aspect to the adult leaf surface. In some species the scars and the surrounding tissues are raised above the surface, giving a pusticulate aspect to the upper surface of blades.

The glandular scales (Fig. 11) are sparse on vegetative parts. These are the only scales present on the inner surfaces of petals and on the surface of the ovary. These scales are always paler than the covering scales and show secretory activity. In many species glandular scales may be present on the under surface of leaves, while in others, they seem to be completely lacking. The occurrence of this

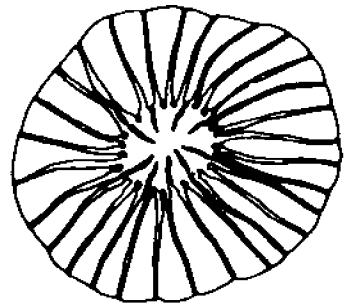
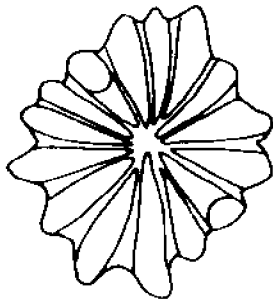
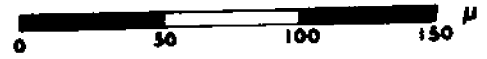
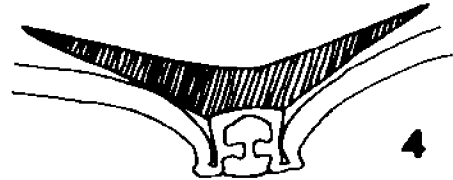
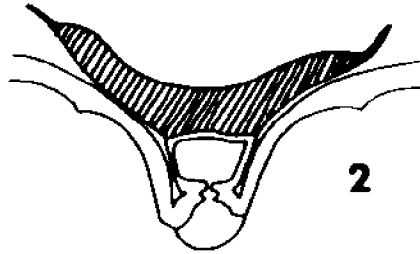
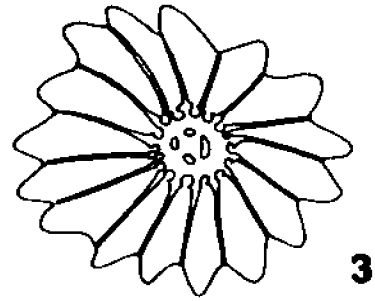
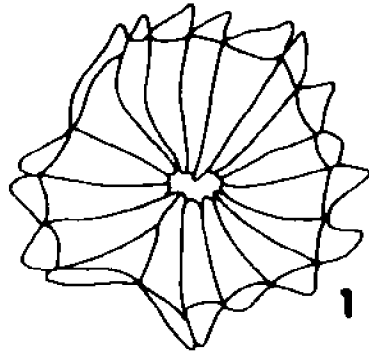
## FIGURE LEGENDS (7-10)

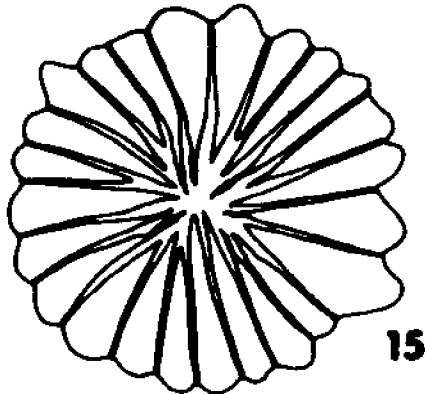
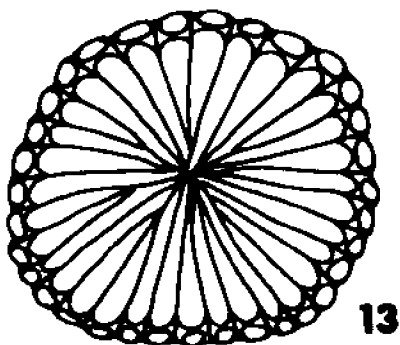
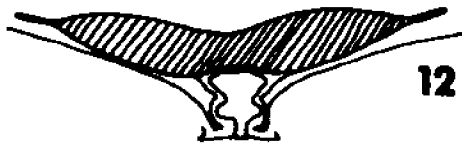
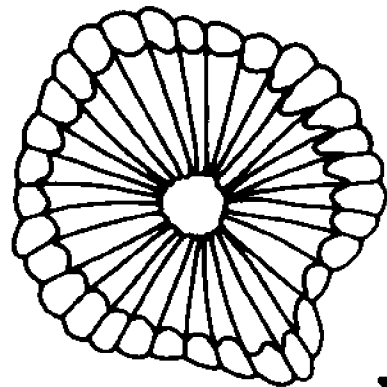
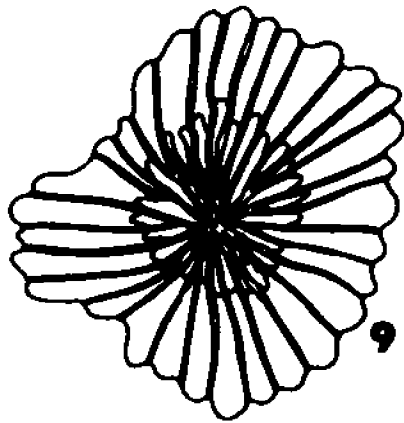
Fig. 7. Representative covering scales found on the undersurface of leaf blades in Cybianthus section Conomorpha. 1, 3, 5, 7. Top view. 2, 4, 6, 8. Longitudinal section. 1-4. C. punctatus (Pinkus 55). 5-6. C. guyanensis (Spruce 1150). 7-8. C. amplus (Sellow 653).

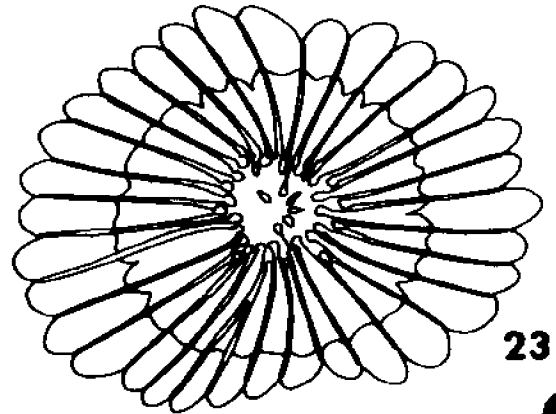
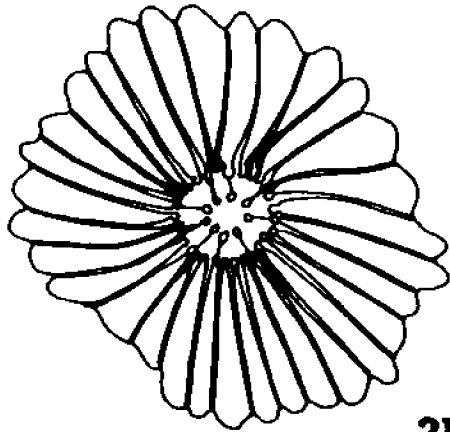
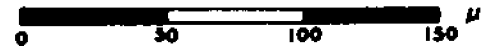
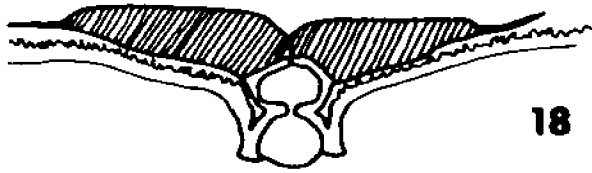
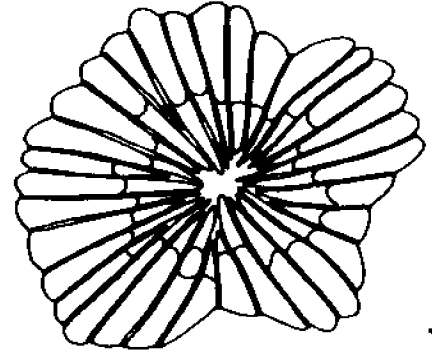
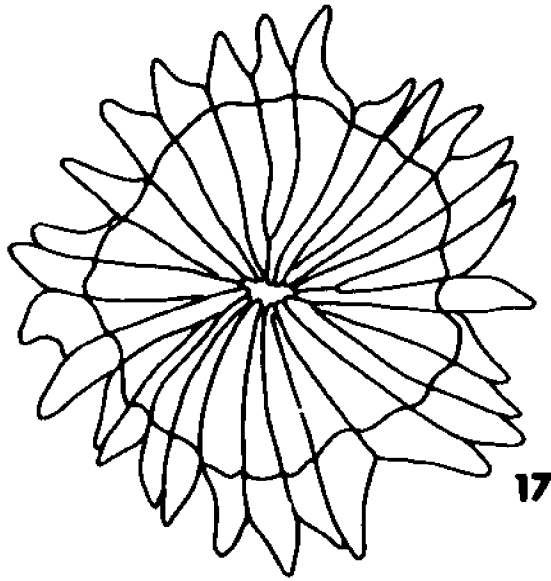
Fig. 8. Representative covering scales found on the undersurface of leaf blades in Cybianthus section Conomorpha. 9, 11, 13, 15. Top view. 2, 4, 6, 8. Longitudinal section. 9-10. C. cuatrecasasi (Little 7481). 11-12. C. brasiliensis (Glaziov 14047). 13-14. C. oblongifolius (Pohl 3515). 15-16. C. multipunctatus (Kappler 1229).

Fig. 9. Representative covering scales found on the undersurface of leaf blades in Cybianthus section Conomorpha. 17, 19, 21, 23. Top view. 18, 20, 22, 24. Longitudinal section. 17-18. C. crotonoides (Cardona 2721). 19-20. C. comperuvianus (Killip 26168). 21-22. C. roraimae (Maguire 33464). 23-24. C. biflorus (Tillett and Tillett 45056).

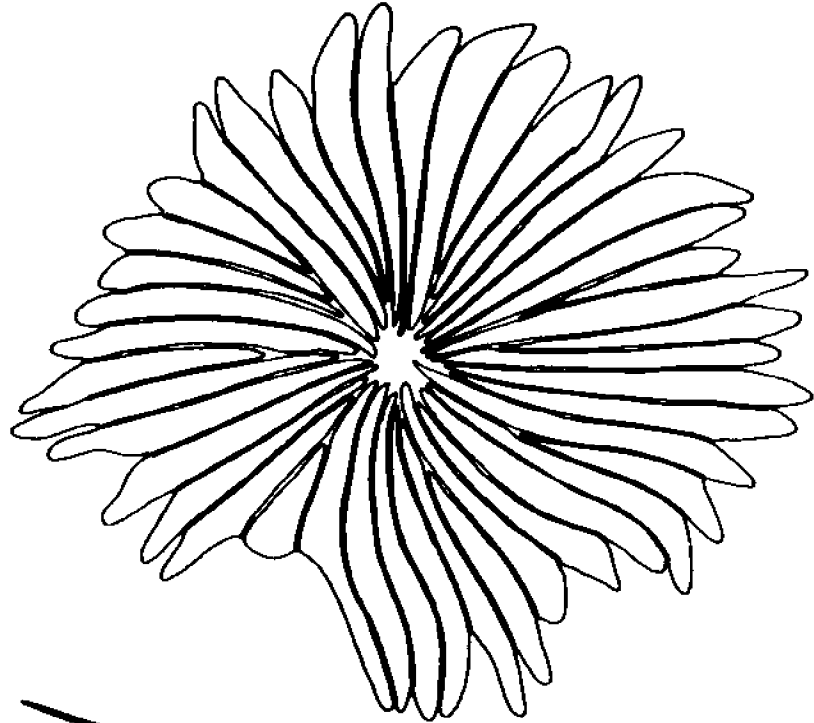
Fig. 10. Representative covering scales found on the undersurface of leaf blades in Cybianthus section Conomorpha. 25, 27. Top view. 26, 28. Longitudinal section. 25-26. C. lepidotus (Krukoff 10987). 27-28. C. lepidotus (Cowan 31221).







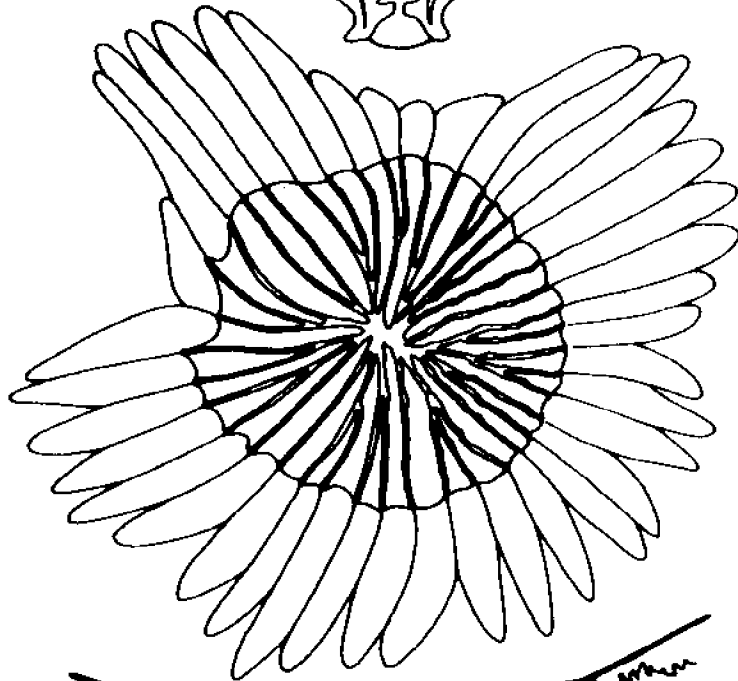
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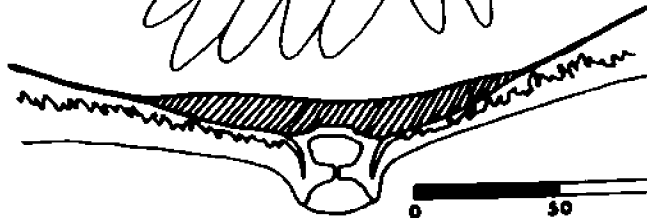


26



27

**10**



28

type of scale on the leaves is inconsistent. For this reason the presence or absence of glandular scales on leaves is unreliable as a diagnostic character.

The plate of the glandular scale ranges from 80 to 100 microns. The margin of the plate is always entire. The cells forming the plate range in number from 20 to 60. All but the anticlinal, radial cell walls constituting the plate are thickened. The cell cavity is usually not resinous and the stalk is always unicellular.

### Leaves

All species of Cybianthus section Conomorpha have alternate and petiolate leaves. The petiole ranges from 0.1 cm long (C. spathulifolius) to 4.5 cm long (C. amplus). The range in length of the petiole is characteristic of each species and can be used as a diagnostic character.

The petiole can be rounded, elliptic or triangular in transection. The vascular traces of the leaves originate in the vascular cylinder of the stem, creating a single leaf gap (Fig. 12-d). At the base of the petiole the sclerenchymatic fibers that accompany the vascular cylinder in the stem taper and disappear. Occasionally a few inconspicuous fibers accompany the vascular bundles through the petiole (Fig. 12-e). The fibers reappear at the apex of the petiole and are abundant along the midrib. The lack of fibers in

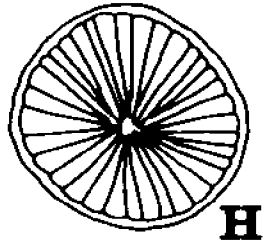
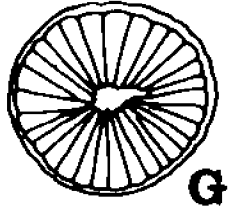
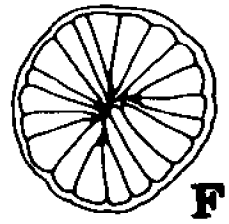
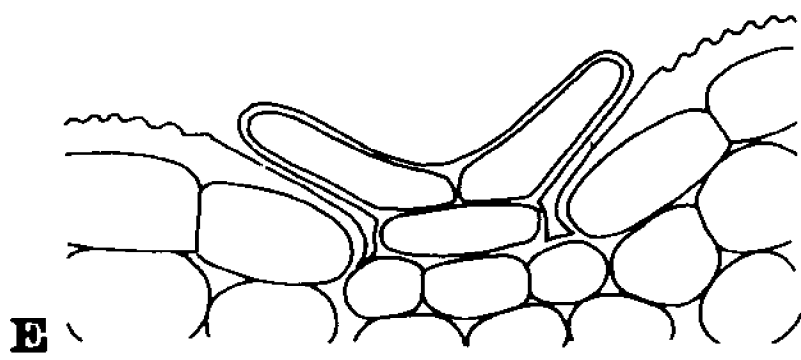
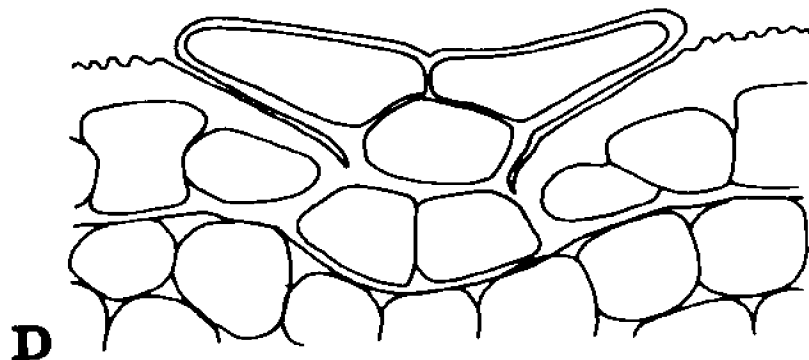
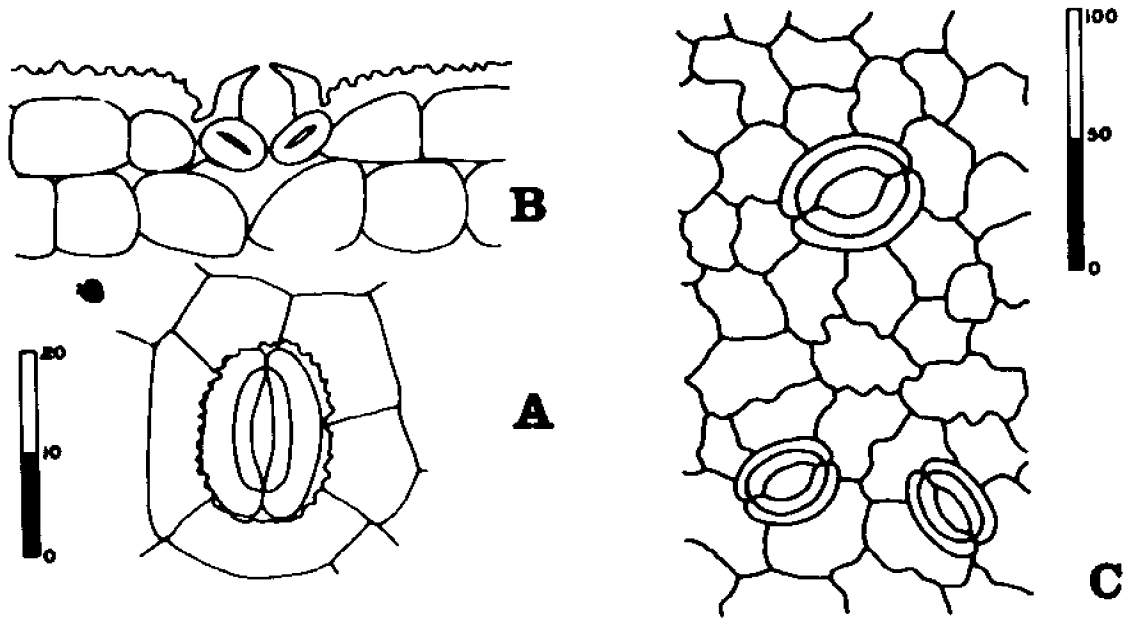
the petiole may have some relationship with flexibility. In the petiole the vascular tissues are associated in small bundles of several elements each. In most species the bundles form a dissected arc or circle in transection (Fig. 12-a, b). In C. *amplus* there is a central vascular strand which is accompanied by two pairs of small, isolated bundles (Fig. 12-e). The central vascular strand is invaginate in C. *maguirei* (Fig. 12-c). In a few species like C. *caracasanus* and C. *comperuvianus* (Fig. 12-b) the central strand is crescentic and almost undivided. The arrangement of tissues in the central vascular strand of the petiole is concentric, with the phloem towards the periphery and the xylem towards the center. The vascular strand almost always encloses a pith. The amount of pith is variable depending upon the species and contains secretory canals and cavities. The cortex of the petiole is usually collenchymatic and has few to numerous secretory cavities and canals. In some species (e. g., C. *amplus*, Fig. 12-e and C. *maguirei*, Fig. 12-c) occasional isodiametric sclereids (stone cells) are found in the cortex. The petiolar epidermis is uniseriate and in most species is densely invested with covering scales. In none of the species examined was cork produced on the petioles.

The size and shape of the leaf blades are of limited diagnostic value. In most species there is a predominant leaf shape. However, some individual leaf blades in the same specimen diverge markedly in shape and size. Some

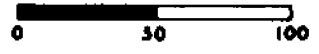
## FIGURE LEGENDS (11-12)

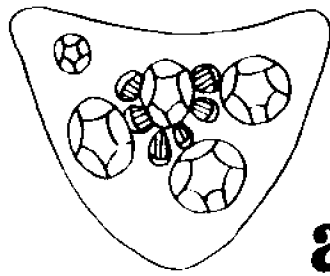
Fig. 11. Glandular scales, stomata and hydathodes in Cybianthus section Conomorpha. Scales shown are in microns. A. Surface view of stomata of C. roraimae (Maguire 33464). B. Transection of stomata of C. roraimae (Maguire 33464). C. Surface view of hydathode of C. laurifolius Fosberg 21970). D. Longitudinal section of leaf glandular scale of C. peruvianus (Skutch 2797). E. Longitudinal section of leaf glandular scale of C. brasiliensis (Klein 1576). F. Surface view of leaf glandular scale of C. biflorus (Tillett and Tillett 45056). G. Surface view of ovary glandular scale of C. comperuvianus (Buchtien 1753). H. Surface view of leaf glandular scale of C. amplus (Belém 3086).

Fig. 12. Petiolar trace patterns in Cybianthus section Conomorpha. Solid black: sclerenchyma; white: phloem; lined: xylem. Figures a, b, c and d represent semi-schematic mid-petiolar cross sections. a. C. biflorus (Tillett and Tillett 45056). b. C. comperuvianus (Killip 26168). c. C. maguirei (Maguire 37042). e. C. amplus (Belém 3086); the arrows show the two pairs of lateral bundles. d. Schematic representation of the one-trace unilacunar petiolar trace pattern found in all species of the section.

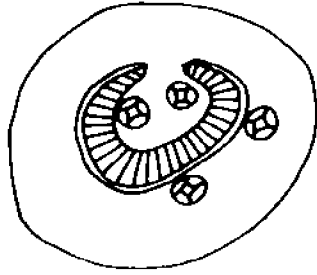


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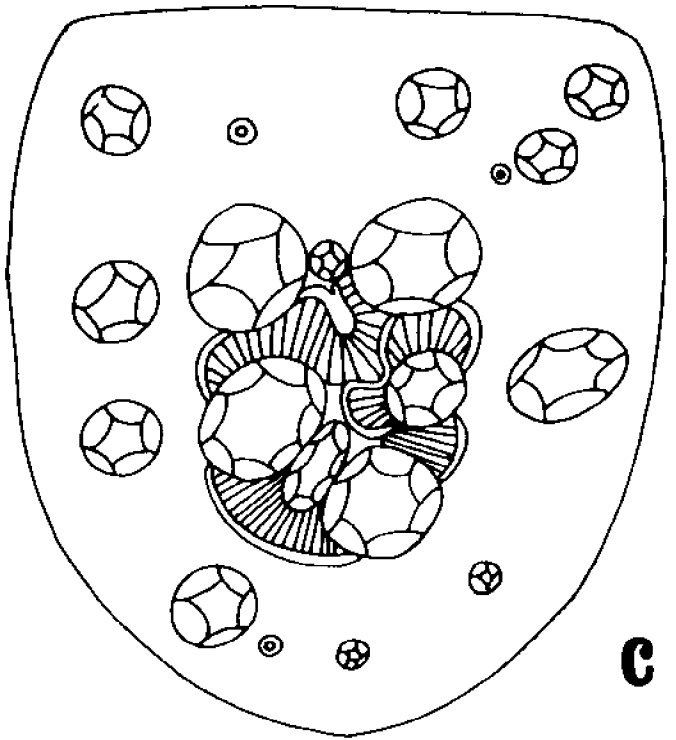
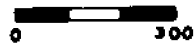




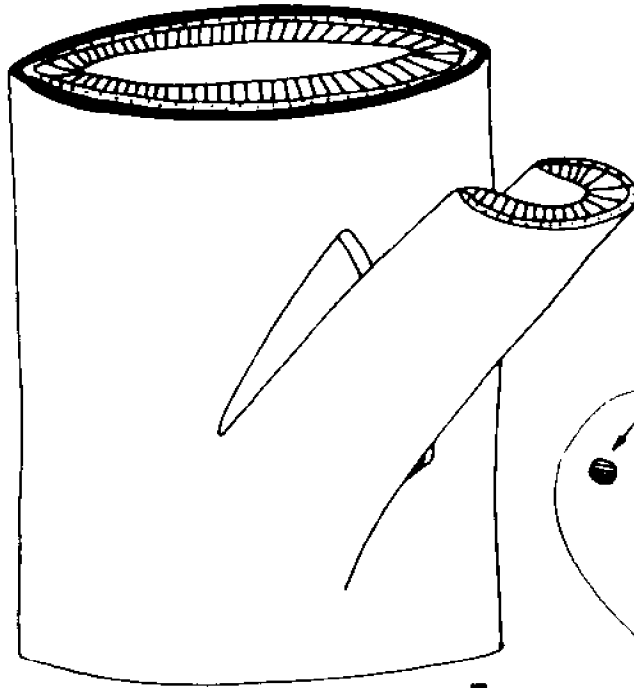
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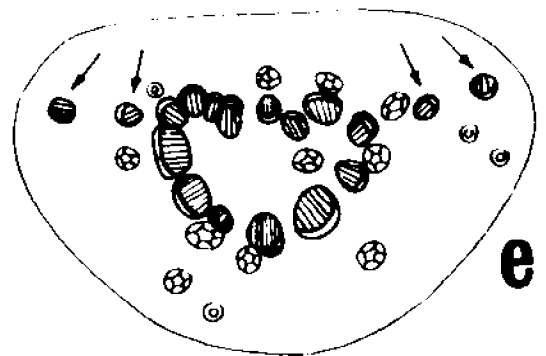
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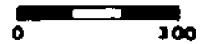
**c**



**d**



**e**



species are more variable than others. In some the leaves are so variable that representative specimens of the extremes of variation have been recognized as distinct species.

The leaf blades in all the species of Cybianthus section Conomorpha are dorsiventral. In most species the cuticle ranges from 2 to 10 microns thick, but in three species (C. crotonoides, C. amplus, and C. steyermarkianus) the cuticle ranges from 15 to 30 microns thick. In most species the cuticle shows striations which seem to be variable in some species. The sizes and characteristics of the cuticle are recorded in Table 3.

The epidermis consists of one layer of isodiametric cells. Along the midrib the cells are elongated. In some species (e. g., C. maguirei, Fig. 20-G) the anticlinal walls may be straight or slightly undulate while in others like C. dussii (Fig. 15-D) these walls are conspicuously but not very strongly undulate. A few species (e. g., C. caracasanus, Fig. 13-B) have very strongly undulate walls. These and other cuticular epidermal characters have been used by several authors to distinguish and identify species. The systematic value of the cuticular characters has been reviewed by Stace (1965a, 1965b) who found them to be of significance at the specific level in the Combretaceae. A survey made on the epidermis of the twenty-six species of the section showed that the shape of the anticlinal walls was constant within each species. The results of this sur-

## FIGURE LEGENDS (13-16)

Fig. 13. Surface view of lower epidermis of leaf of Cybianthus section Conomorpha species. All drawings are shown at the same scale (x 300). A. C. comperuvianus (Killip 26168). B. C. caracasanus (Pittier 15525). C. C. multipunctatus (Maguire 40805). D. C. occigranatensis (Pennell 5147).

Fig. 14. Surface view of lower epidermis of leaf of Cybianthus section Conomorpha species. All drawings are shown at the same scale (x 300). E. C. oblongifolius (Pohl 3515). F. C. pittieri (Broadway 4051). G. C. guyanensis (Spruce s.n.). H. C. rostratus (Beard 1355).

Fig. 15. Surface view of lower epidermis of leaf of Cybianthus section Conomorpha species. All drawings are shown at the same scale (x 300). A. C. laurifolius (Fosberg 21970). B. C. laurifolius (Smith 1727). C. C. amplus (Sellow 653). D. C. dussii (Duss 147b).

Fig. 16. Surface view of lower epidermis of leaf of Cybianthus section Conomorpha species. All drawings are shown at the same scale (x 300). E. C. brasiliensis (Glaziou 14047). F. C. pseudoicacoreus (Killip 29871). G. C. biflorus (Tillett and Tillett 45056). H. C. brasiliensis (Reitz and Klein 1107).

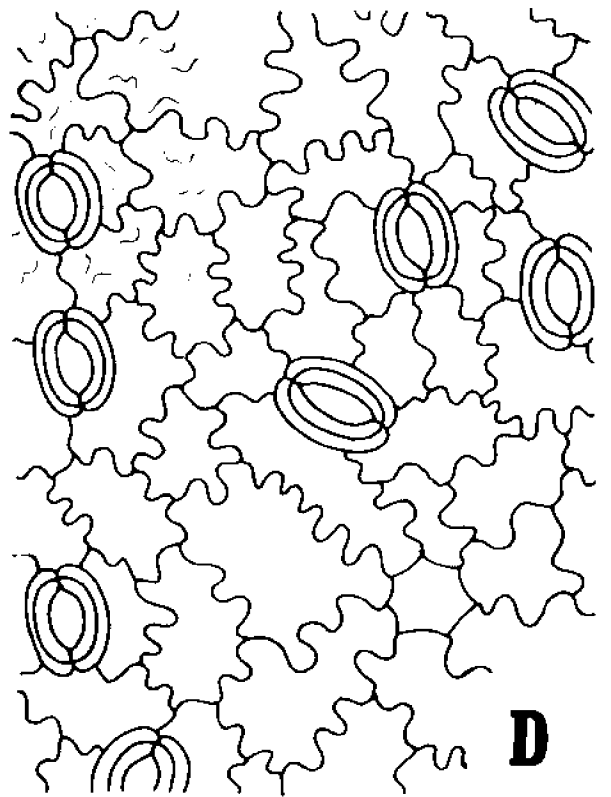
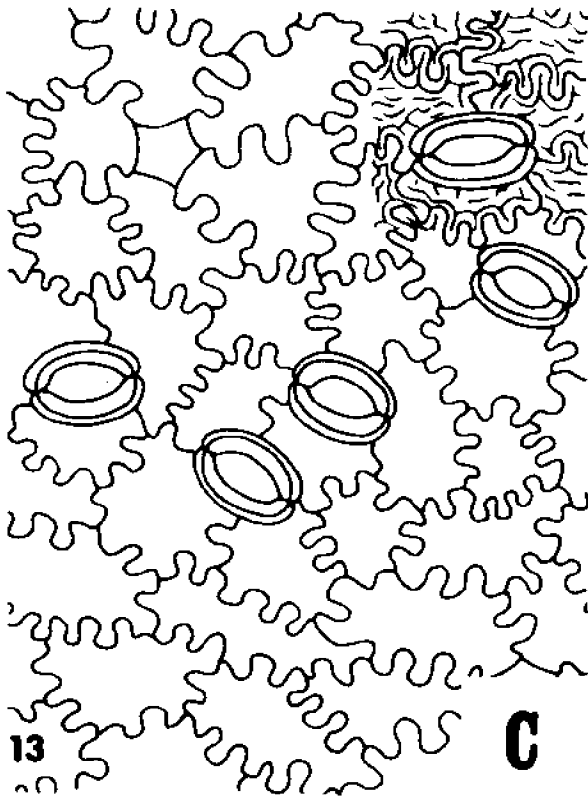
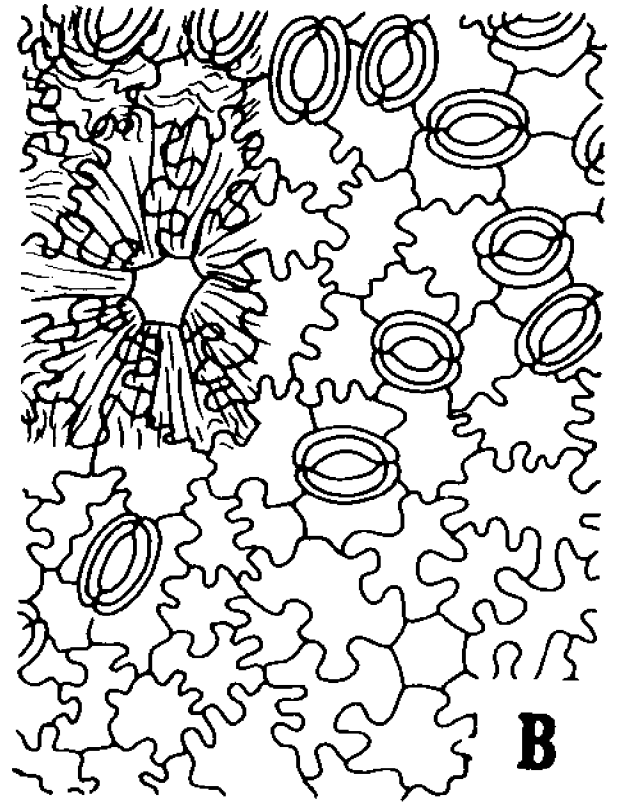
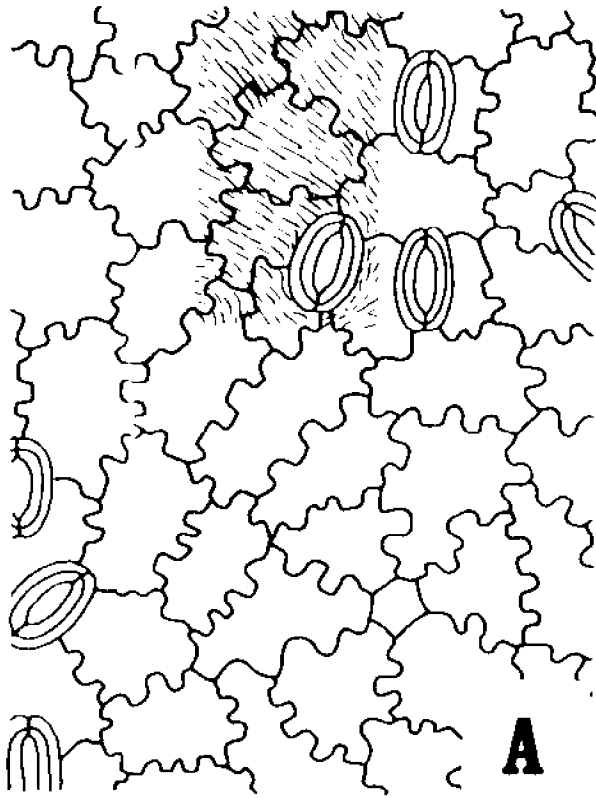
## FIGURE LEGENDS (17-20)

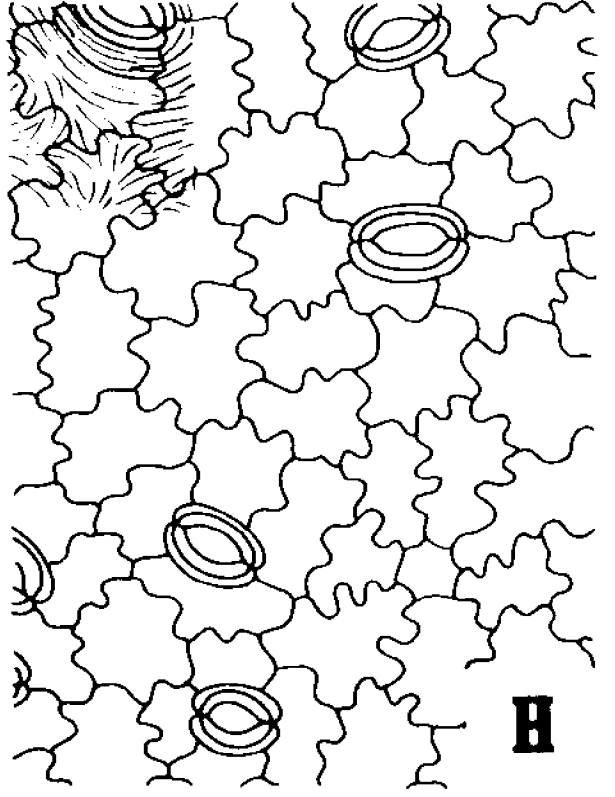
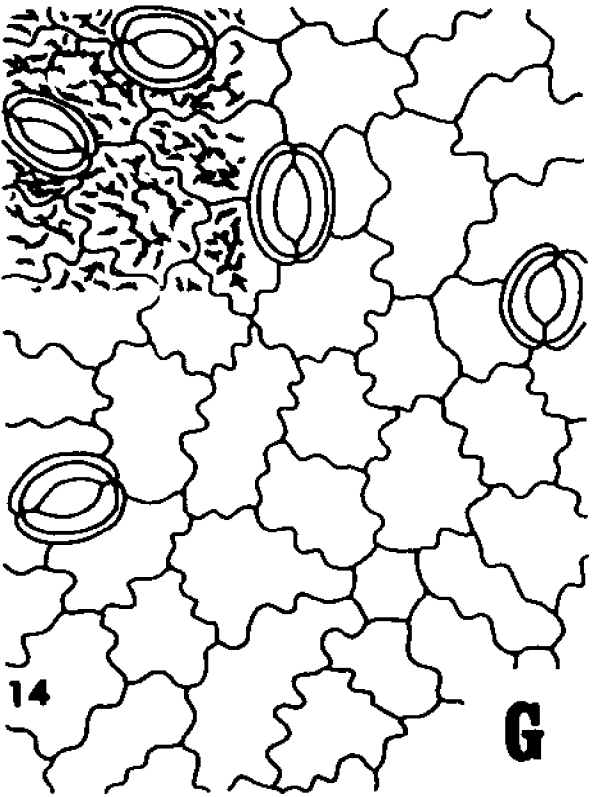
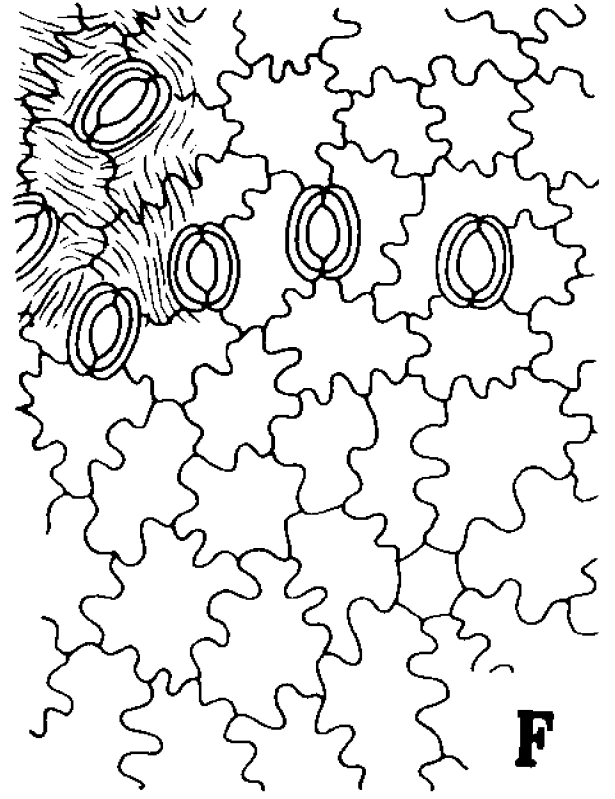
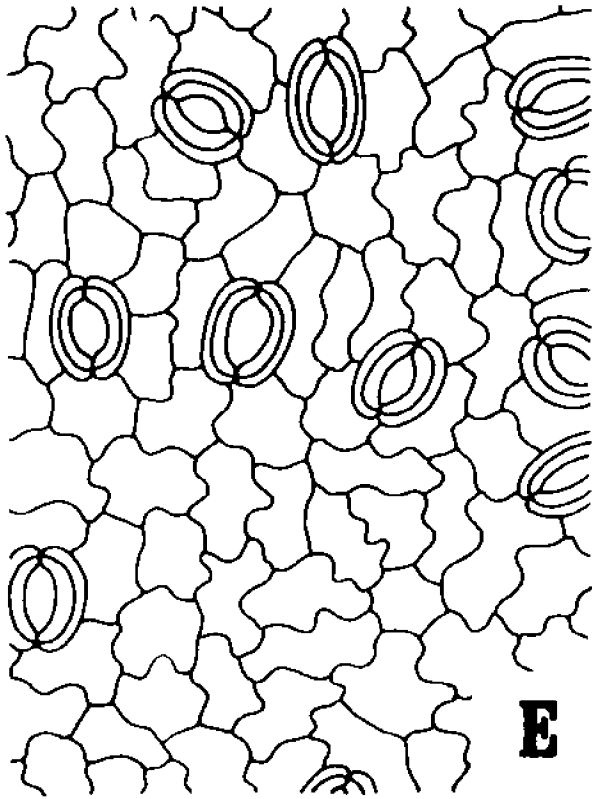
Fig. 17. Surface view of lower epidermis of leaf of Cybianthus section Conomorpha species. All drawings are shown at the same scale (x 300). A. C. cuatrecasasi (Little 2481). B. C. guyanensis (Prance 5085). C. C. spathulifolius (Maguire 28658). D. C. frigidicola (Steyermark 56516).

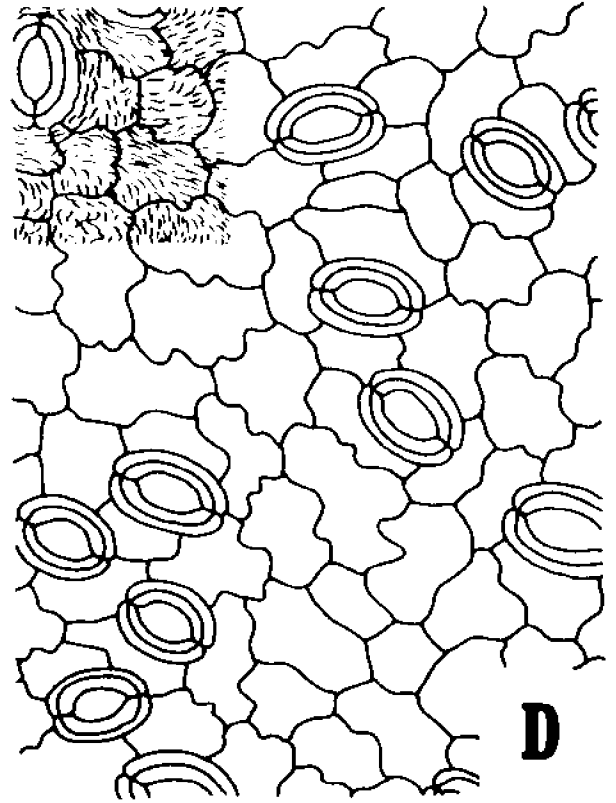
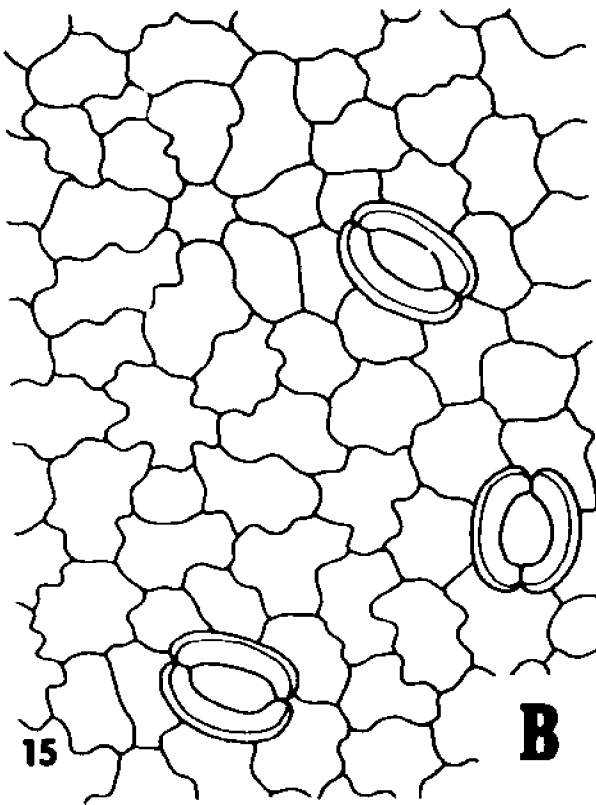
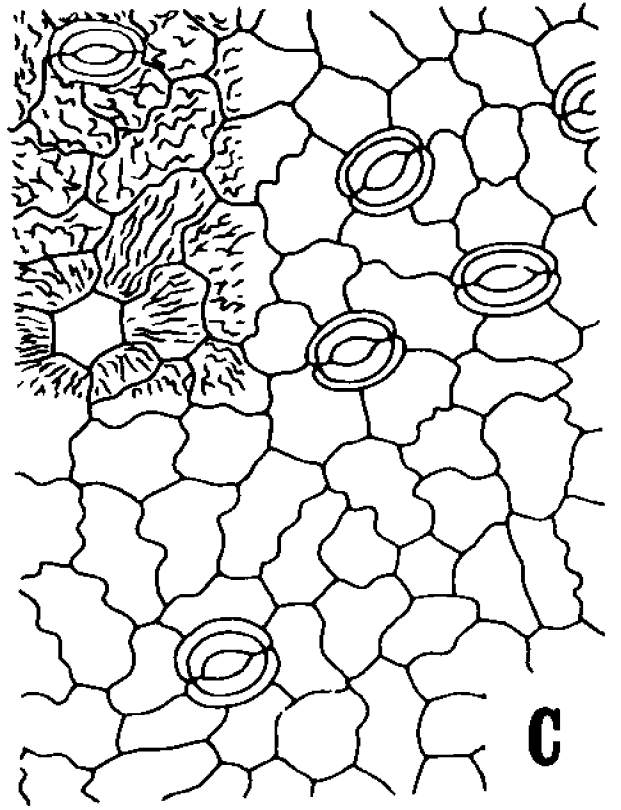
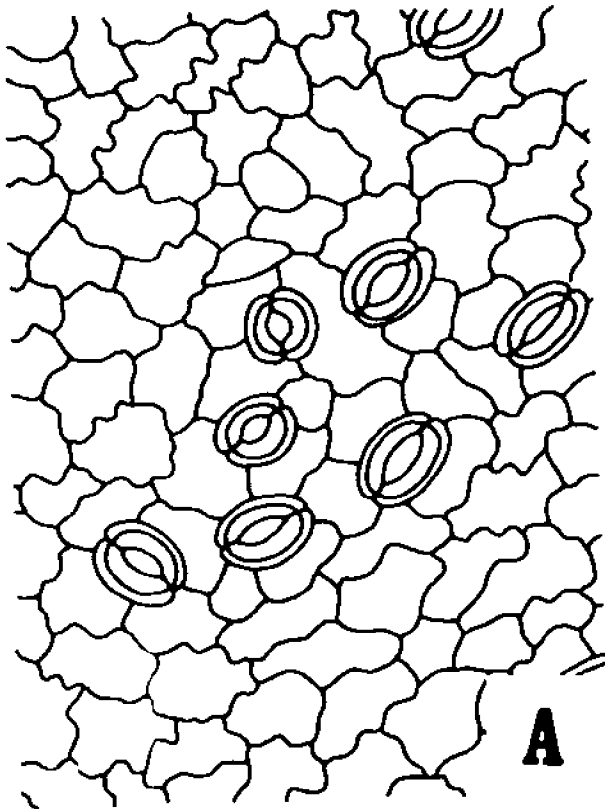
Fig. 18. Surface view of lower epidermis of leaf of Cybianthus section Conomorpha species. All drawings are shown at the same scale (x 300). E. C. laetus (Weberbauer 4354). F. C. amplus (Hoehne 2111). G. C. punctatus (Pinkus 55). H. C. amplus (Belém 3086).

Fig. 19. Surface view of lower epidermis of leaf of Cybianthus section Conomorpha species. All drawings are shown at the same scale (x 300). A. C. lepidotus (Steyermark and Wurdack 501). B. C. crotonoides (Steyermark 93936). C. C. cuatrecasasi (Cuatrecasas 23583). D. C. stevermarkianus (Steyermark and Wurdack 660).

Fig. 20. Surface view of lower epidermis of leaf of Cybianthus section Conomorpha species. All drawings are shown at the same scale.(x 300). E. C. roraimae (Maguire 33464). F. C. wurdackii (Wurdack 34240). G. C. maguirei (Maguire 37042). H. C. peruvianus (Klug 3508).







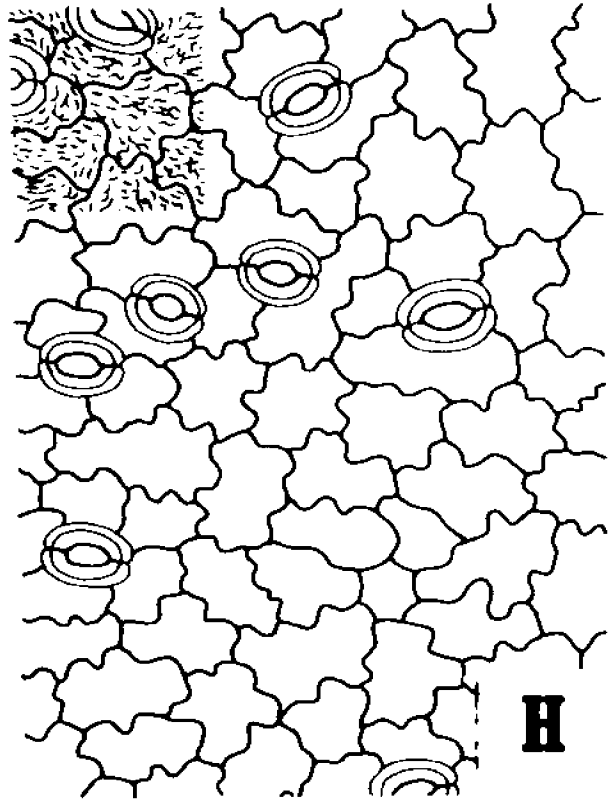
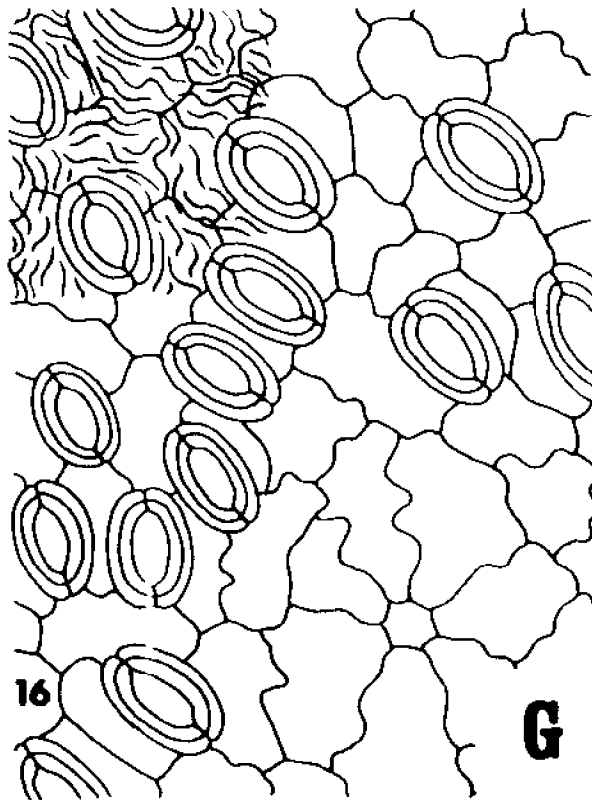
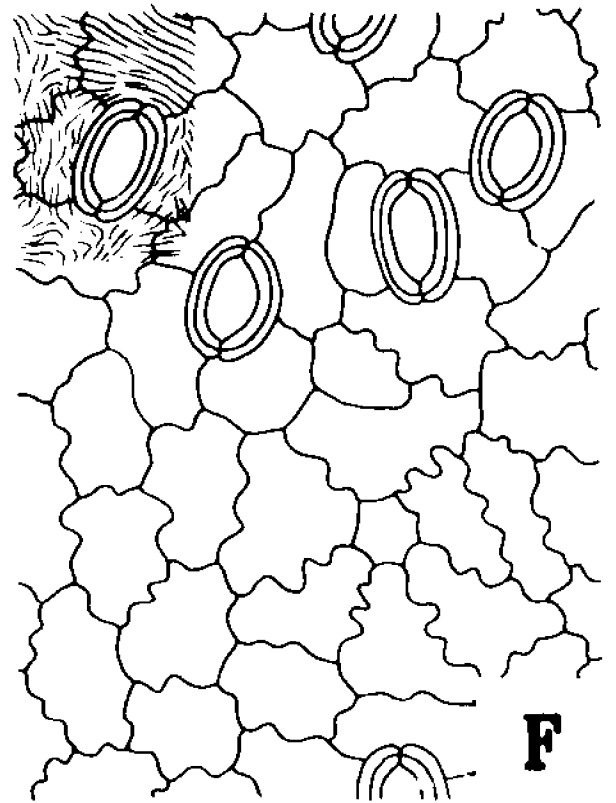
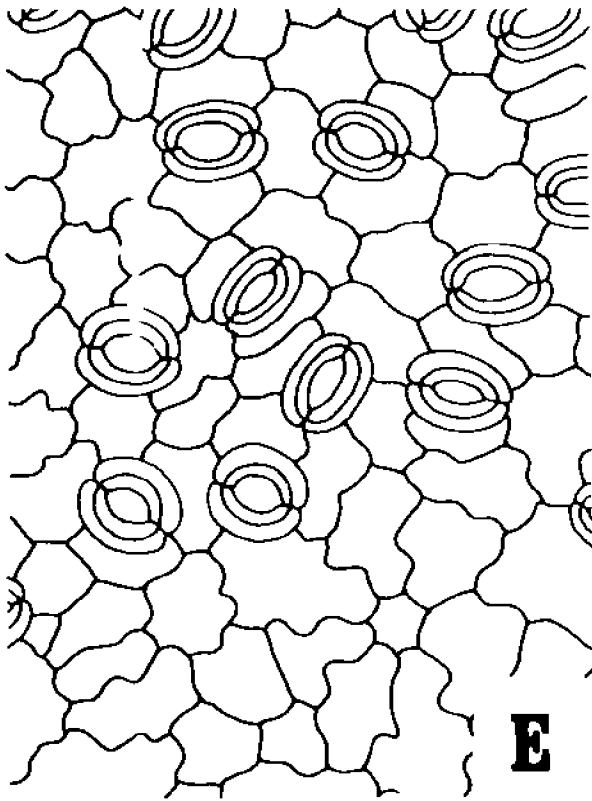
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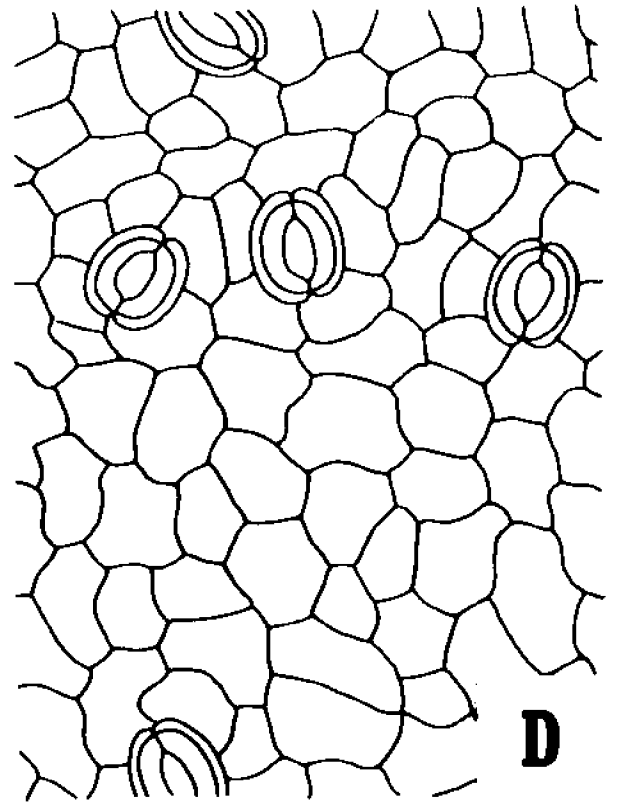
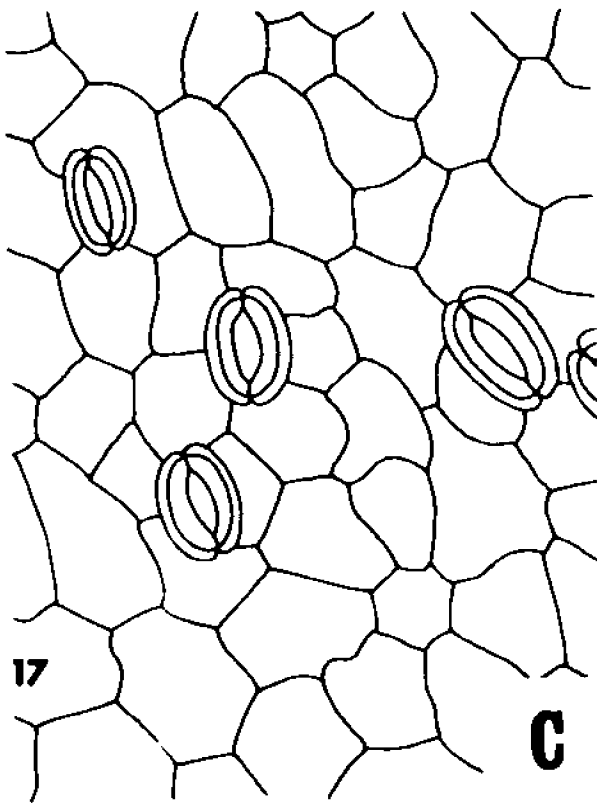
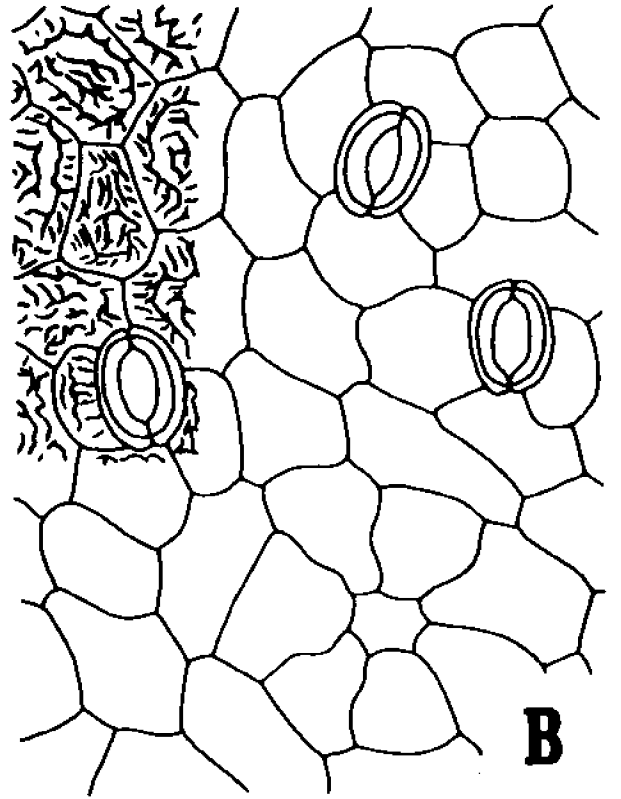
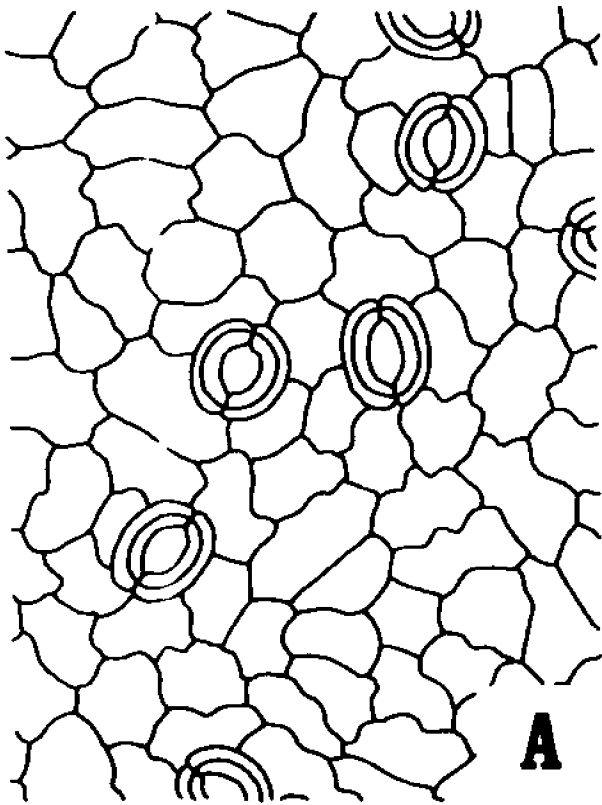
**A**

**C**

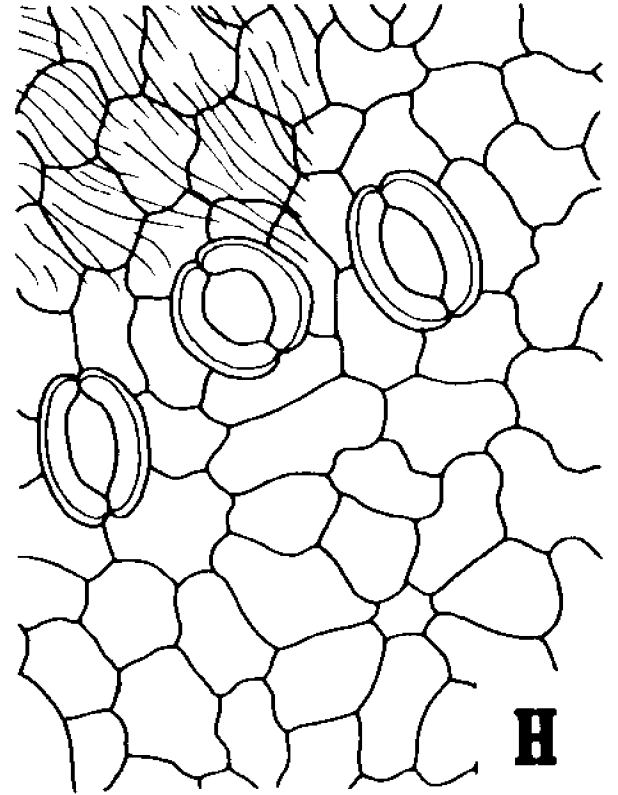
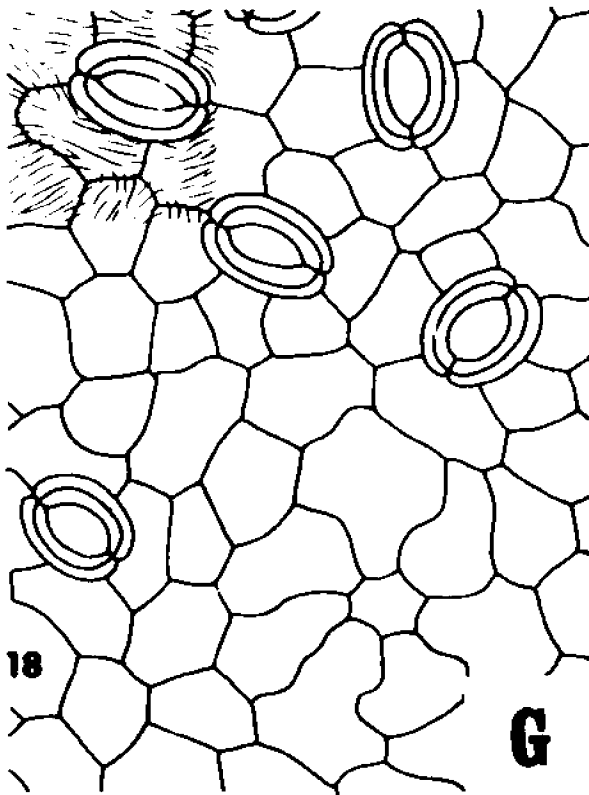
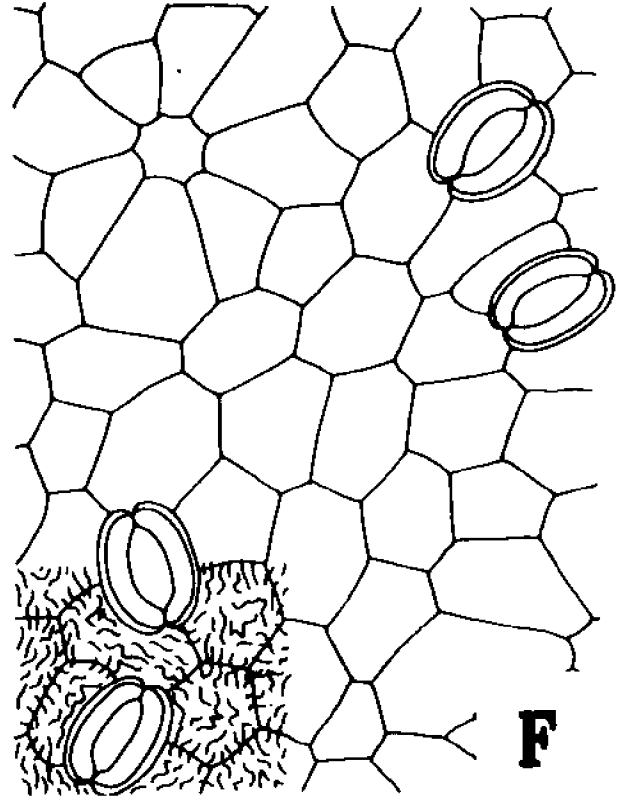
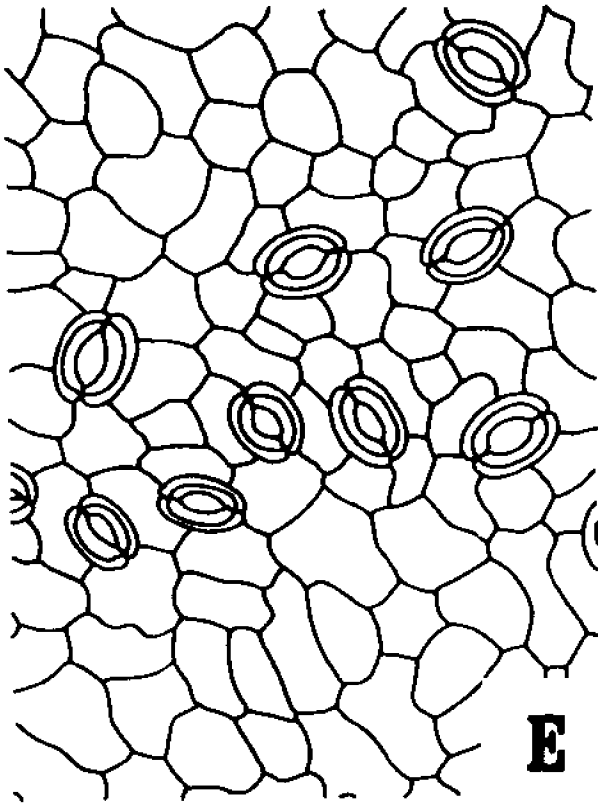
**B**

**D**





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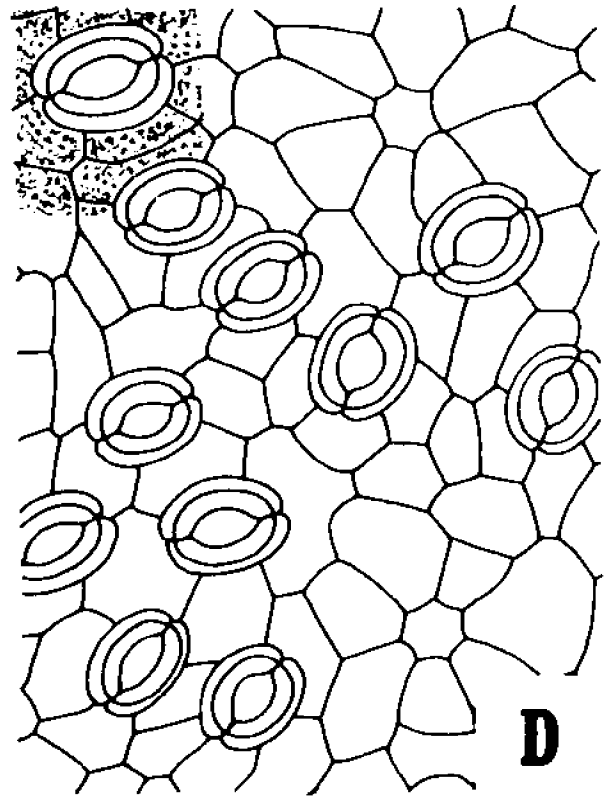
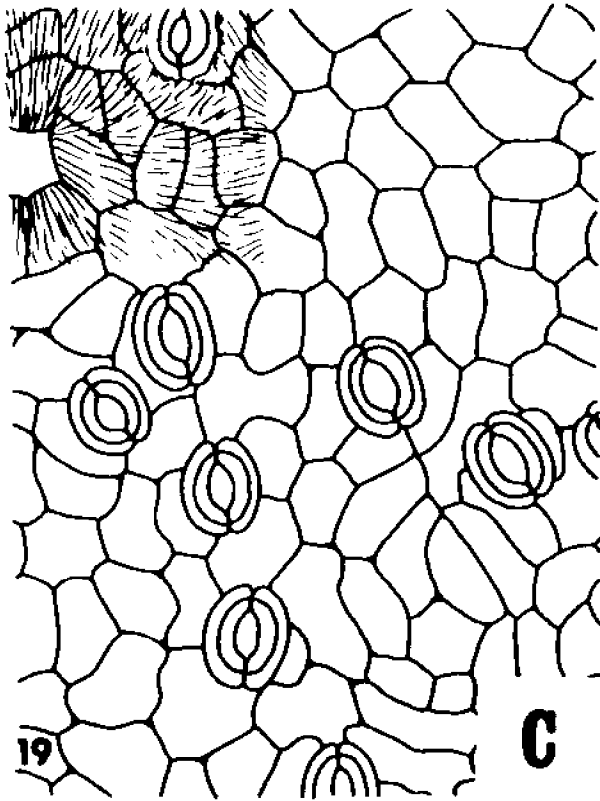
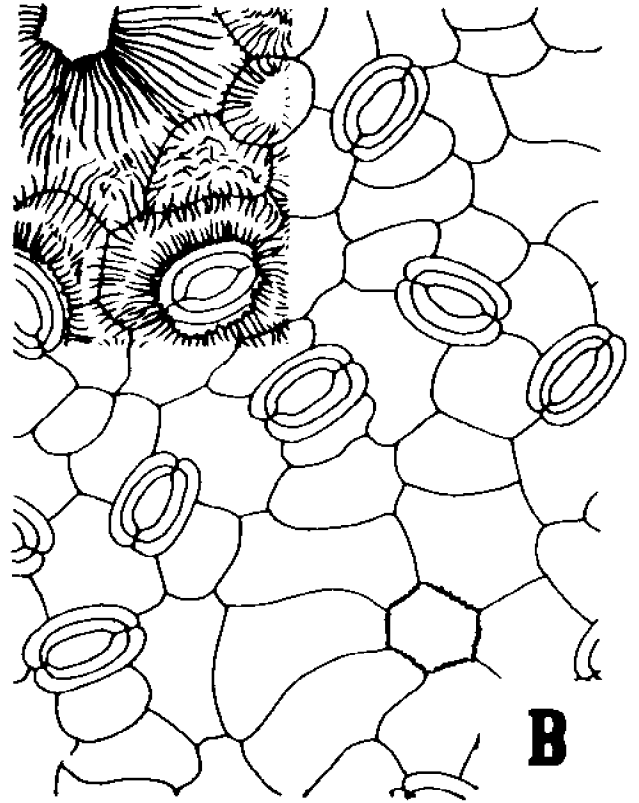
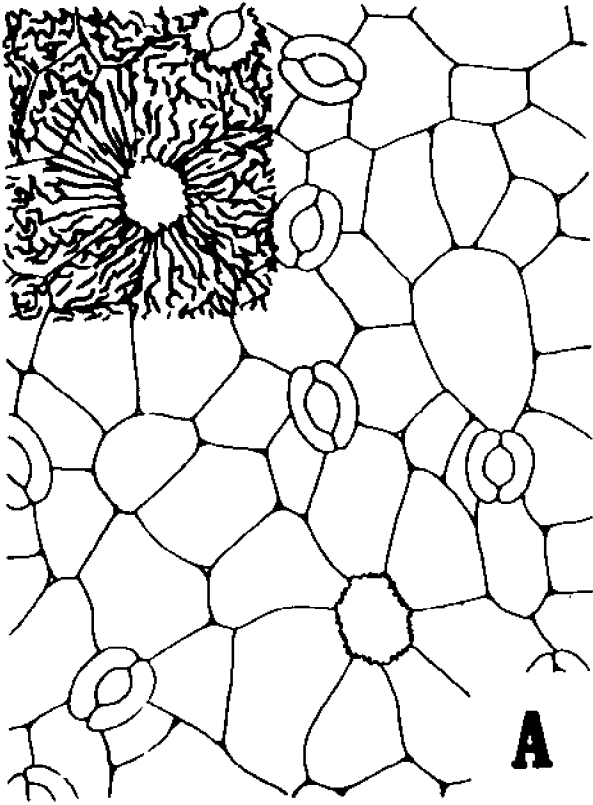
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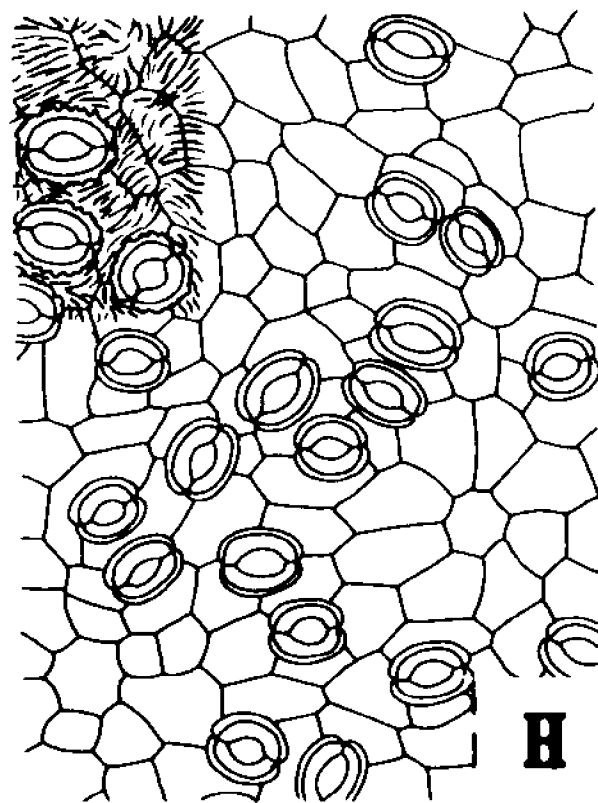
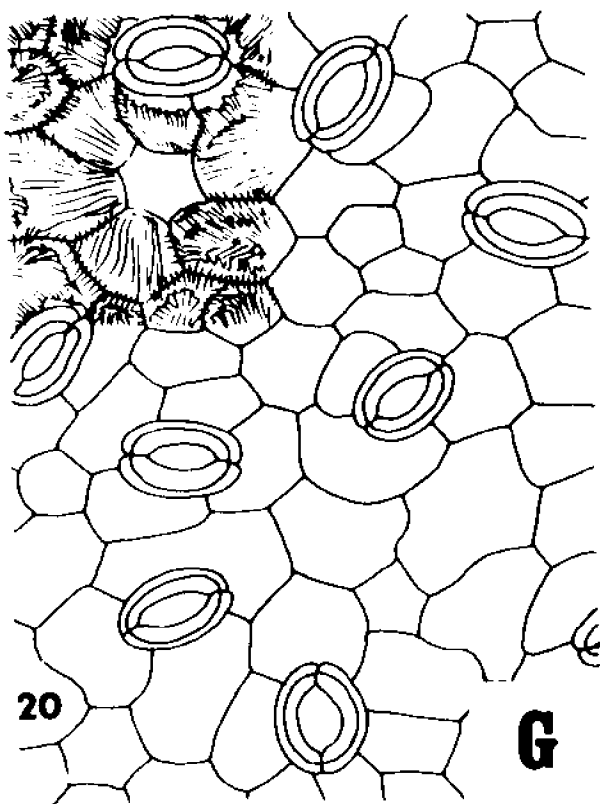
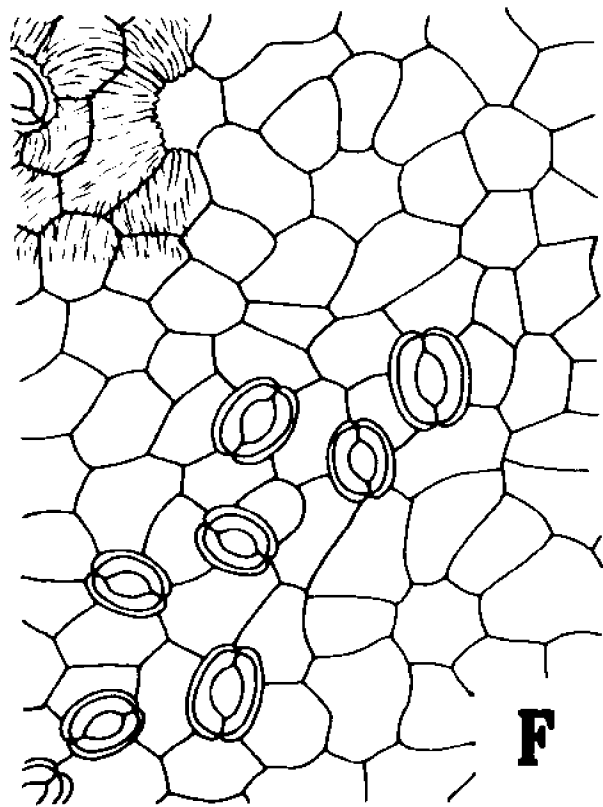
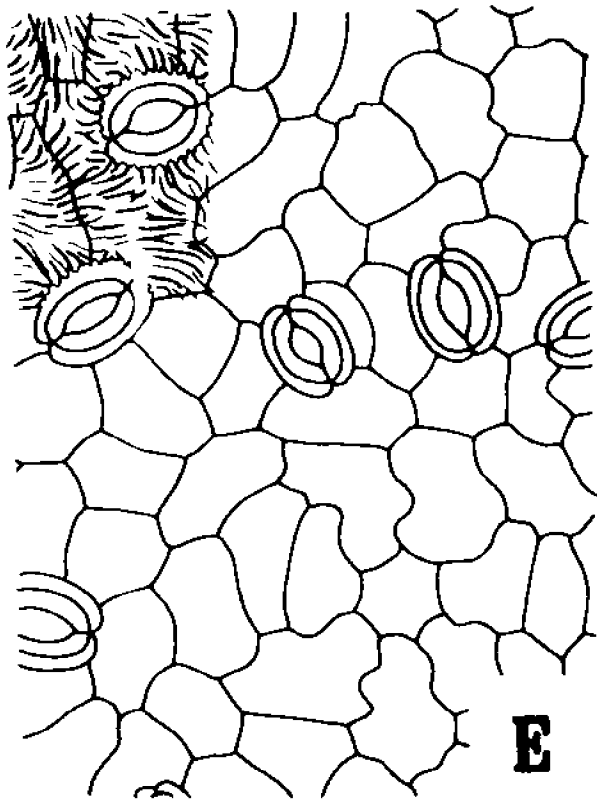
**E**

**F**

**G**

**H**





vey are shown in Table 3. There is no hypodermis in any of the species studied.

The mesophyll consists of one layer of palisade parenchyma on the adaxial side and few to several layers of spongy parenchyma. The characteristics of the spongy parenchyma were difficult to assess, since the material for this study was dried herbarium specimens. The spongy parenchyma does not withstand pressing without being crushed, since it lacks supporting tissues.

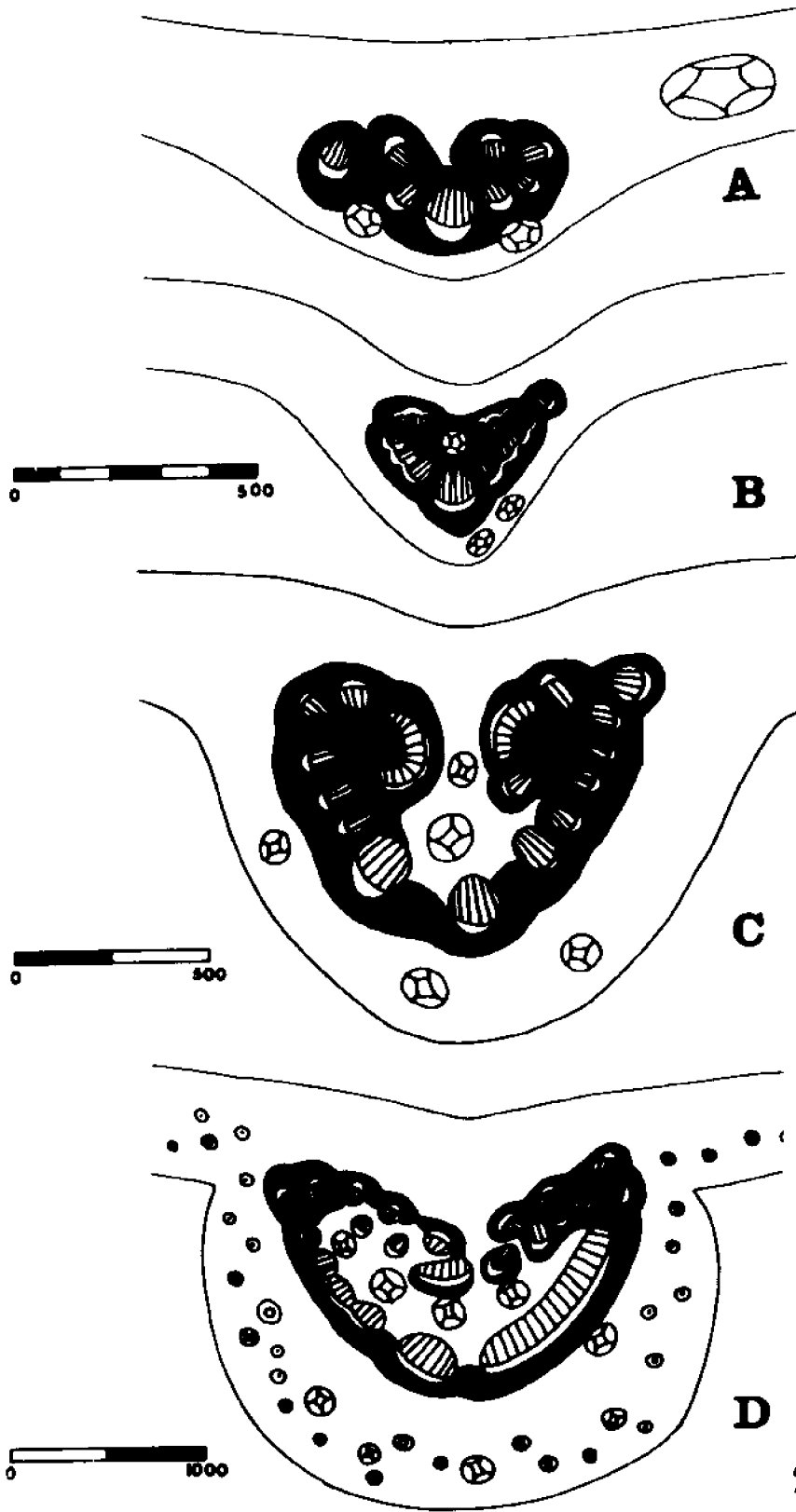
The midrib is always prominent on the abaxial surface and depressed or flat on the adaxial one. The midrib has a vascular structure similar to that of the petiole (Figs. 21 and 22). The main difference is in the presence of abundant sclerenchymatic fibres surrounding the central strand. This central strand is always more or less dissected into several to many separate bundles. In species with a simple crescentic or partially closed cylindric strand (Fig. 21-A and B), the lateral bundles seem to originate from the adaxial side of the central strand, and through inversion the xylem becomes adaxial. In other species (Fig. 22-E and F), the central strand has an extra adaxial series or layer of bundles, which exhibit the same orientation as the abaxial bundles. This central strand resembles the inverted Greek letter omega. This type of vascular strand appears to be discontinuous along the midrib but a section at any level shows at least one side in which the three layers of vascular bundles are present. A more complicated

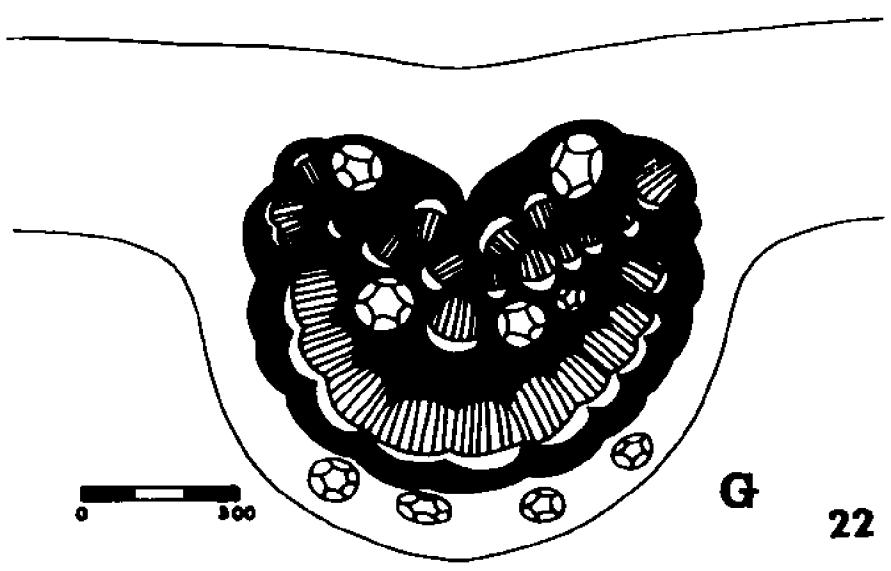
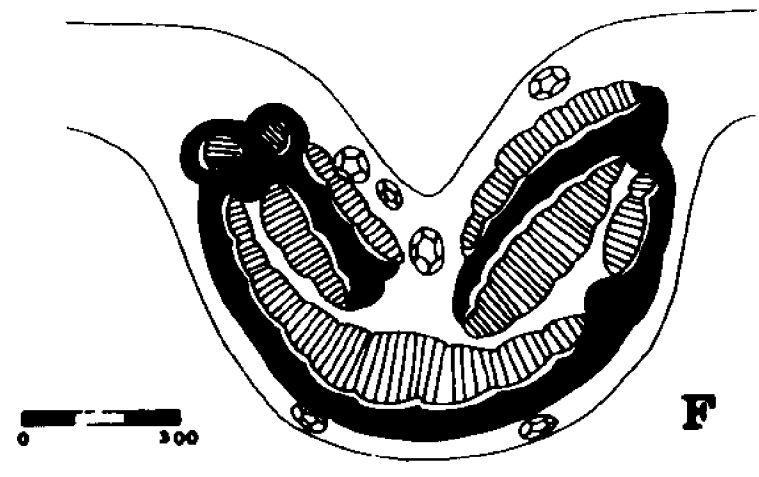
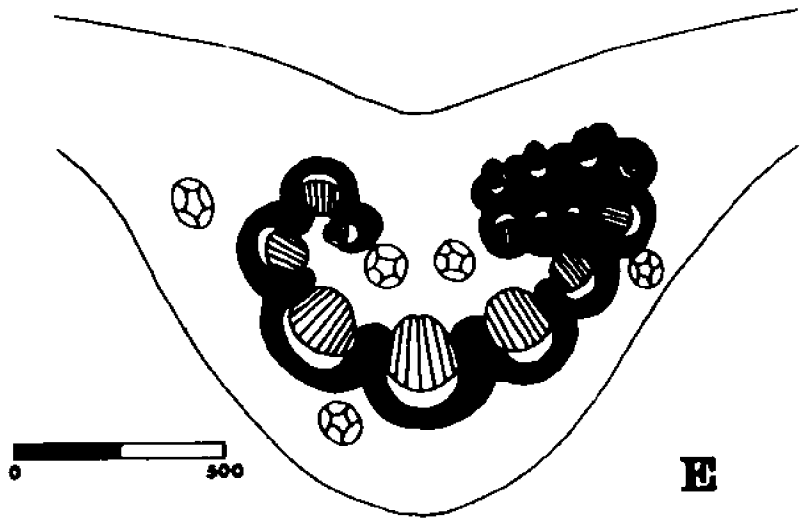
## FIGURE LEGENDS (21-22)

Fig. 21. Midrib vascularization in Cybianthus section Conomorpha species. Solid black: sclerenchyma; white: phloem; lined: xylem; circles with star centers: secretory cavities; concentric circles: stone cells.

A. C. biflorus (Tillett and Tillett 45056); B. C. brasiliensis (Klein 1576). C. C. punctatus (Pinkus 55). D. C. spathulifolius (Maguire 28668).

Fig. 22. Midrib vascularization on Cybianthus section Conomorpha species. For symbols see Figure 21. Scales shown are in microns. E. C. amplus (Belém 3086). F. C. guyanensis (Spruce s.n.). G. C. leptodotus (Cowan 31221).





structure is shown by the species in which the central strand seems to invaginate (Figs. 21-D and 22-G). As a consequence, three layers of bundles are present with the intermediate layer showing the same orientation as the adaxial one.

The stomata are restricted to the abaxial side of leaf blades. They are always of the ranunculaceous (anomocytic) type in which the cells surrounding the guard cells are not differentiated in size or form from those of the remainder of the epidermis (Figs. 13 to 20). The guard cells are located at the same level as the other epidermal cells, but being smaller they are somewhat sunken in relation to the outer surface (Fig. 11-B). In surface view the guard cells look double, as if there were subsidiary cells on either side of the stoma. This is a visual artifact produced by the outer stomatal ledges of the guard cells which form a thick rim above the stomatal aperture (Fig. 11-A and B). This rim was called the poral rim by Bandulska (1923). The stomata range from 30 to 64 microns in length and 22 to 54 microns in width. The margins of the depression in which the guard cells are located in most species appear to be smooth from the surface view while in some species the margin has a dentate appearance which is species specific (Table 3).

In several of the species studied, abnormally large stomata were found (Fig. 11-C) which are interpreted to be water stomata or hydathodes. These infrequent structures are of little value in identification. Stace (1956b:231) reached a similar conclusion in the genera Conocarpus and Macrop-

teranthes of the Combretaceae.

### Inflorescence

The inflorescence is always of the indefinite (Roeper, 1826) or polythelic (Troll, 1964) type. In the section there are three variations of the indefinite type. One is a typical pyramidal panicle. In this type of inflorescence the lateral branches are borne at various levels along the axis and become smaller towards the apex. Only C. punctatus and C. oblongifolius have this type of inflorescence.

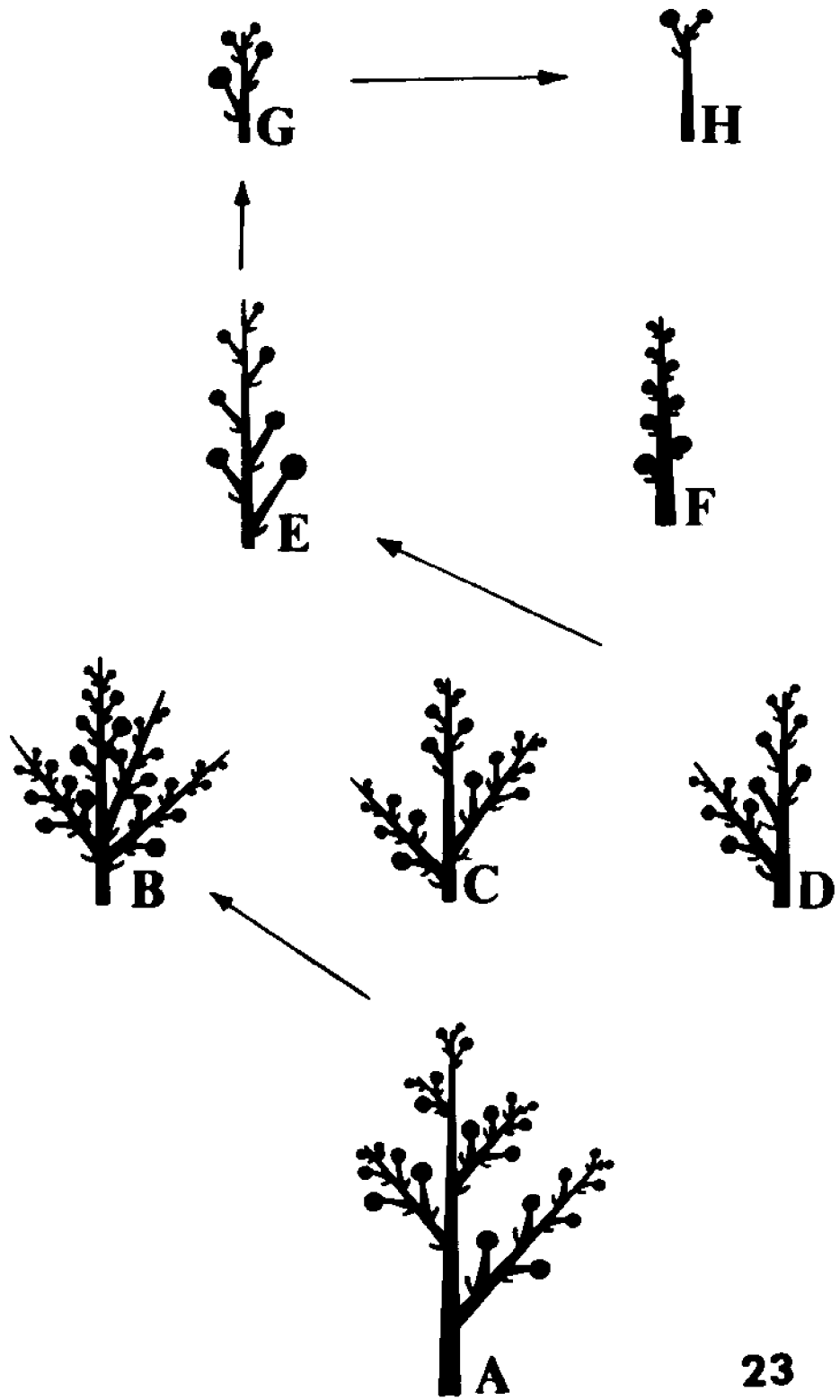
A second variation is a clustered panicle in which the branches cluster at the base of the axis and are more or less equal in length. Most species in the section have this type of inflorescence.

A third variation is the simple raceme. Some species like C. lepidotus and C. roraimae, develop only racemose inflorescences. On occasion some species which normally produce clustered panicles may produce racemose inflorescences. This occurs when the branching of the inflorescence does not take place.

There are no clear clues of any phylogenetic trends among the three types of inflorescences but the complete series found within the section indicates a gradient from the multiflowered pyramidal panicle to the few-flowered raceme. It seems probable that the panicle is the most primitive type of inflorescence within the section, the raceme being a derivative type. Several of the highland species

## FIGURE LEGEND (23)

Fig. 23. Inflorescence types found in Cybianthus section Conomorpha. The arrows indicate probable lines of development within the section. A. Pyramidal panicle; B-D. Clustered panicles; E. Raceme; F. Spike-like raceme (C. lepidotus); G. Raceme with few flowers; H. Umbel-like raceme (C. biflorus).



have undergone a reduction in the number of flowers. Among them C. biflorus is the extreme instance in which the inflorescence is a raceme of usually only two flowers. The probable trend of development of the inflorescence types is shown in Figure 23.

In Cybianthus the inflorescence is always axillary. Species with terminal inflorescences formerly included in Conomorpha have been transferred to Geissanthus (Agostini, 1970).

### Flowers

All the species of Cybianthus are dioecious. The first author to call attention to the unisexuality of the flowers was Mez (1902). In most sections the flowers are so distinct that staminate individuals have erroneously been placed in different species. In section Conomorpha unisexuality is of little consequence in classification because with the exception of the sexual apparatus the staminate and pistillate flowers look alike. Staminate flowers can be distinguished by the reduced pistillode which lacks a stigma and which is either compact or hollow, always lacking ovules. If superficially examined however, pistillate flowers look bisexual. Only by a very detailed examination does it become evident that the sterile thecae do not produce pollen, even though the narrow longitudinal slits of dehiscence may be present, as in the fertile anthers (Figs. 24 and 25).

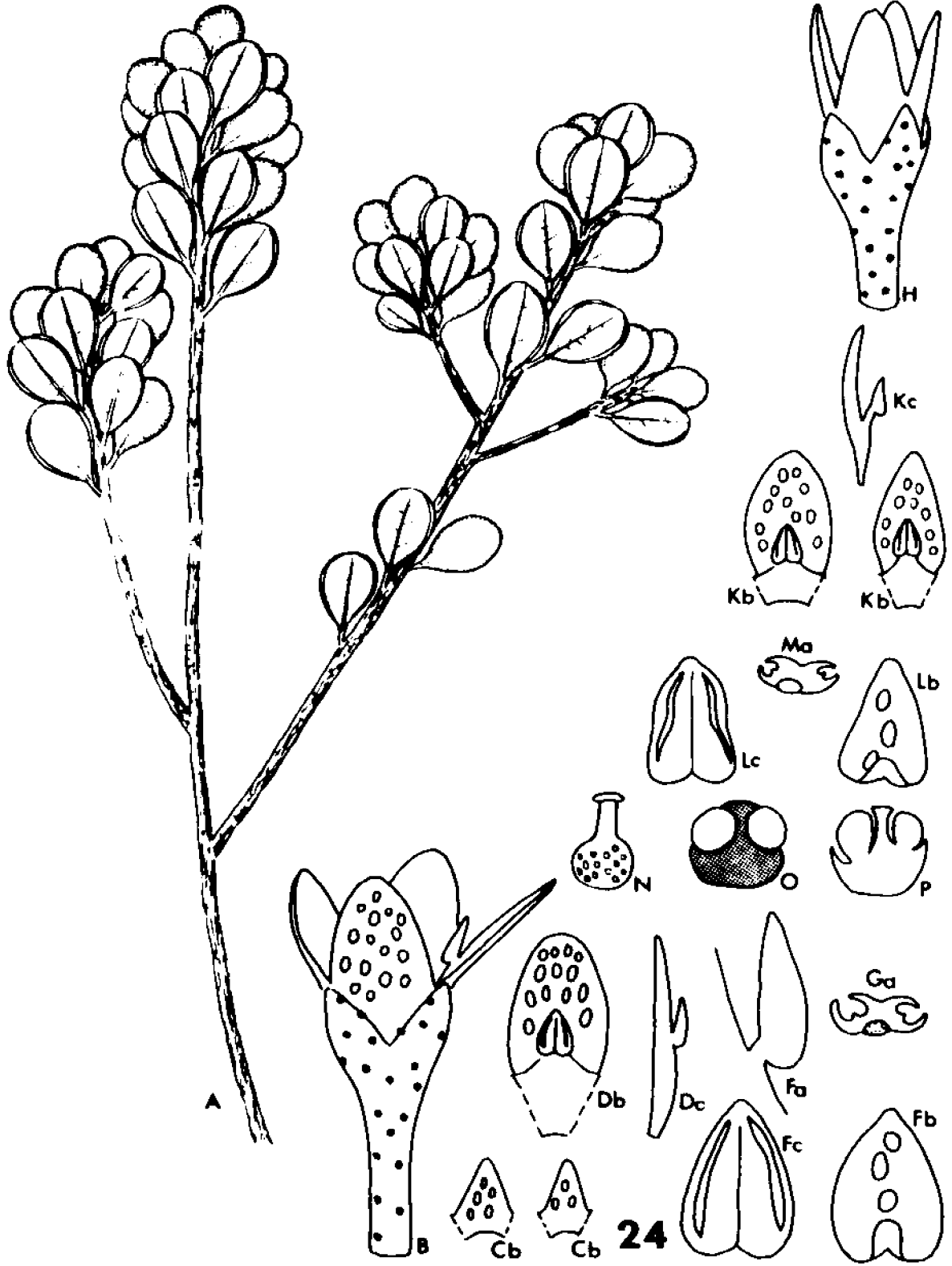
## FIGURE LEGENDS (24-25)

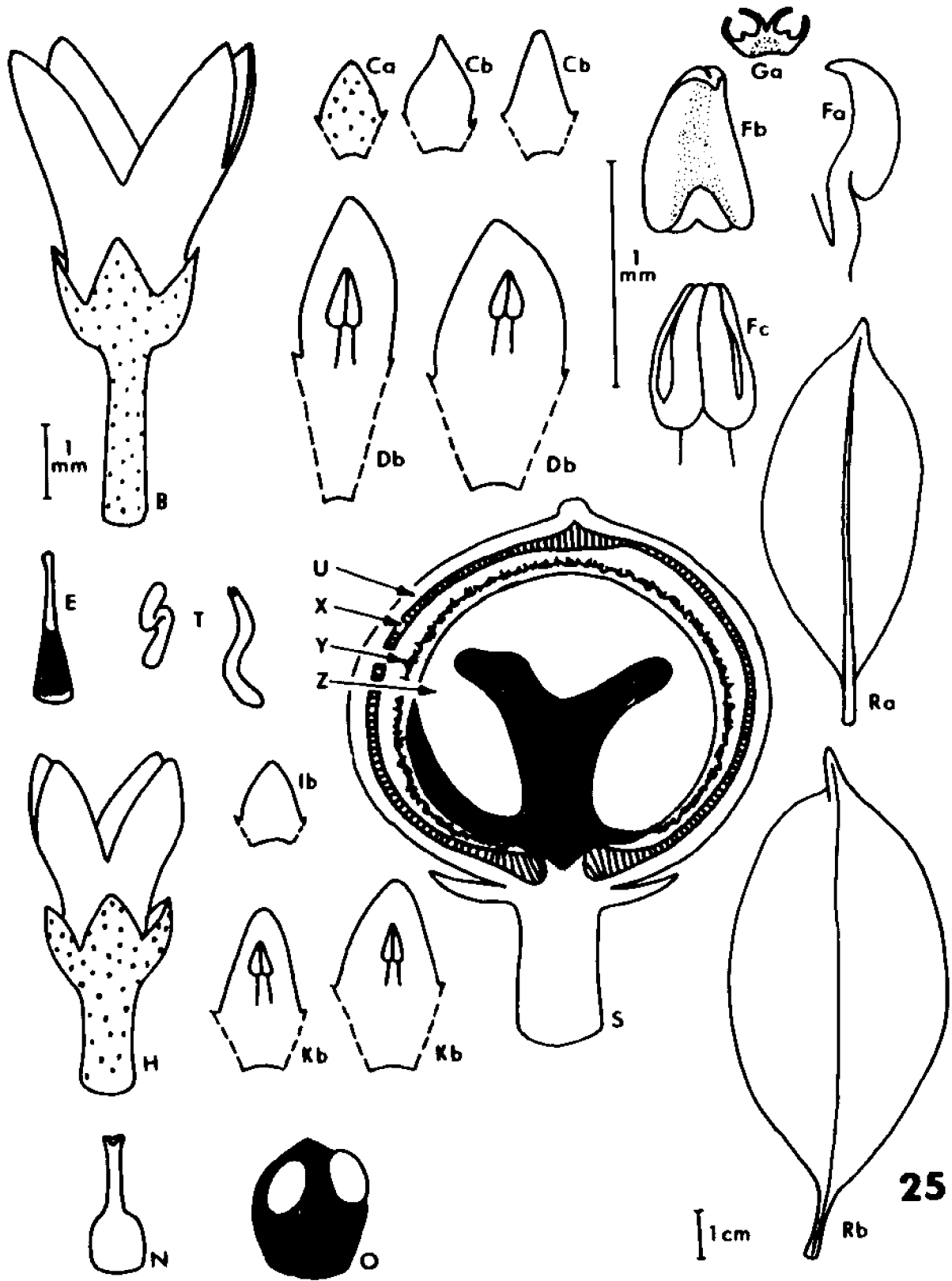
Fig. 24. C. stevermarkianus. Magnifications: B-E, H-K, N, S, T (x 10). F, G, L, M, O, P (x 30). A, R, (x 2/3). All drawings from Figure 30 to Figure 55 are at the same scale. A. Habit. B. Staminate flower. C. Calyx of staminate flower. Ca. Calyx lobe, external view. Cb. Calyx lobe, internal view. Cc. Calyx and pedicel. D. Corolla of staminate flower. Da. Corolla lobe, external view. Db. Corolla lobe, internal view. Dc. Corolla lobe and stamen, longitudinal section. E. Pistillode. F. Anther of staminate flower. Fa. Anther and filament, longitudinal section. Fb. Anther, side towards petal. Fc. Anther, side towards pistillode. G. Anther, transection. Ga. Anther, transection at a middle level. Gb. Anther, transection at the apex. Gc. Anther, transection at the base. H. Pistillate flower. I. Calyx of pistillate flower. Ia. Calyx lobe, external view. Ib. Calyx lobe, internal view. Ic. Calyx and pedicel. K. Corolla of pistillate flower. Ka. Corolla lobe, external view. Kb. Corolla lobe, internal view. Kc. Corolla lobe and stamen, longitudinal section. L. Staminode. La. Sterile theca and filament, longitudinal section. Lb. Sterile theca, side towards petal. Lc. Sterile theca, side towards pistil. M. Sterile theca, transection. N. Pistil. O. Placenta. P. Placenta, longitudinal section. R. Leaf. S. Fruit, longitudinal section.

Figure legends (24-25) cont.

T. Embryo. U. Pericarp. X. Endocarp. Y. "Aril".  
Z. Endosperm. A. Cardona 2723. B-G. Steevermark and  
Wurdack 660. H-P. Steevermark 74934.

Fig. 25. Q. caracasanus. For legend and scales  
see Figure 24. B-F. Fendler 751. H, S, T. Pittier 15525.  
R. Moritz 1666.





25

Usually the pedicels are elongate, but in some species they are very short and thick. In C. lepidotus the raceme resembles a spike.

Each flower is accompanied by a single, early caducous bract. It is usually triangular or ovate and glabrous on the ventral surface but lepidote on the dorsal one.

Floral structure is characteristic of the genus (Figs. 24-25). The calyx lobes are frequently connate at the base, but may be connate to the middle in some species. The calyx is glabrous internally and lepidote externally. In some species the scales on the outer surface of the calyx are very sparse. The margin of the calyx lobes of all species of the section is characteristically scaly but never glandular-ciliolate, as in other sections of the genus.

The venation of the calyx lobes is of the same type found in the corolla. The number of veins in the calyx lobes is the same as the number of veins in the corolla lobes.

The corolla is gamopetalous with the lobes usually connate a quarter to half its length. Only in C. caracasanus are the corolla lobes connate more than half of its length. The corolla tube is completely glabrous internally but the lobes frequently appear granulose internally because of the glandular scales. The outer surface of the corolla is usually invested with covering scales, but in some species they may be lacking. The corolla lobes are valvate, or sometimes slightly imbricate towards the apex.

The floral vascular pattern was studied in several

species of section Conomorpha. The corolla showed a simple type of venation. In all the species a median vein extends from the base to above the middle of the petal. In C. rostratus (Fig. 27-A) and other species the median vein is the only vein found while in C. biflorus (Fig. 27-B), and other species there is a lateral vein at each side of the median vein. The median vein does not extend to the tip of the petal but terminate freely, as do the laterals. In C. maguirei the lateral veins usually branch in the corolla lobe. The stamen trace joins the median vein at the point of attachment of the filament to the corolla or below this point.

The stamens and the corolla lobes are equal in number and opposite. The anthers are triangular or ovate, always dehiscent by narrow longitudinal slits. The sterile thecae of the staminodia are sometimes very similar in shape to the fertile anthers but are usually smaller. It is often difficult to distinguish sterile thecae from the fertile anthers but a detailed examination shows that no pollen is produced in the sterile thecae although narrow longitudinal slits are usually present (Fig. 24, F, K).

Filaments are adnate to the corolla. In some species the filaments are distinct but in other species they form a conspicuous tube which is thick and adnate to the corolla. This tube may develop in the staminate flowers but may be absent in the pistillate flowers, may be present in both, or may be absent in the staminate flowers. In some

species the staminal tube is developed but is not as prominent as in others. Frequently, the staminal tube bears lobes alternating with the petals. These lobes resemble the episepalous staminodia found in members of the Theophrasta-ceae. The staminal tube is always glabrous internally.

The pollen grains seem to be very homogeneous in structure through the section. Following the terminology of Erdtman (1966), the pollen grains (Fig. 26) are 3-colporate, with 3 more or less circular apertures (pori) at the equator included within three elongate apertures crossing the equator at right angles. In equatorial view they are prolate. In polar view they are triangular to almost round. The pollen grains range from 20 to 25 microns in length and 14 to 19 microns in width. Under the scanning electron microscope the surface of the pollen grains lacks ornamentation and is nearly smooth.

In each flower there is a single pistil. The ovary is globose and has a short style with either a truncate or capitate stigma. Secretory cavities are often found in the walls of ovary and style. The secretory cavities are prominent in some cases on the outer surface of the ovary and style. The ovary is covered by glandular scales (Fig. 11) and consists of only one cavity. The placenta is massive, basal, usually globose and has the ovules embedded in it. The number of ovules varies from 2 to 4.

The number of flower parts varies within the section. In some species the flowers are constantly 4-merous while in

## FIGURE LEGENDS (26-27)

Fig. 26. Pollen grains in Cybianthus section Conomorpha species. A-B. Light microscope photographs. C-D. scanning electron microscope photographs. A. C. pittieri, x 3000 (Pittier 9246). B. C. maguirei, polar view, x 3500 (Maguire 37042). C. C. amplus, polar and equatorial views, x2000 (Wurdack 34681). D. C. maguirei, polar view, x7000 (Silva 60919).

Fig. 27. Corolla vascular patterns in Cybianthus section Conomorpha. A. C. rostratus (Beard 1355). B. C. biflorus (Tillett and Tillett 45056). C. C. maguirei (Silva 60919).



**A**

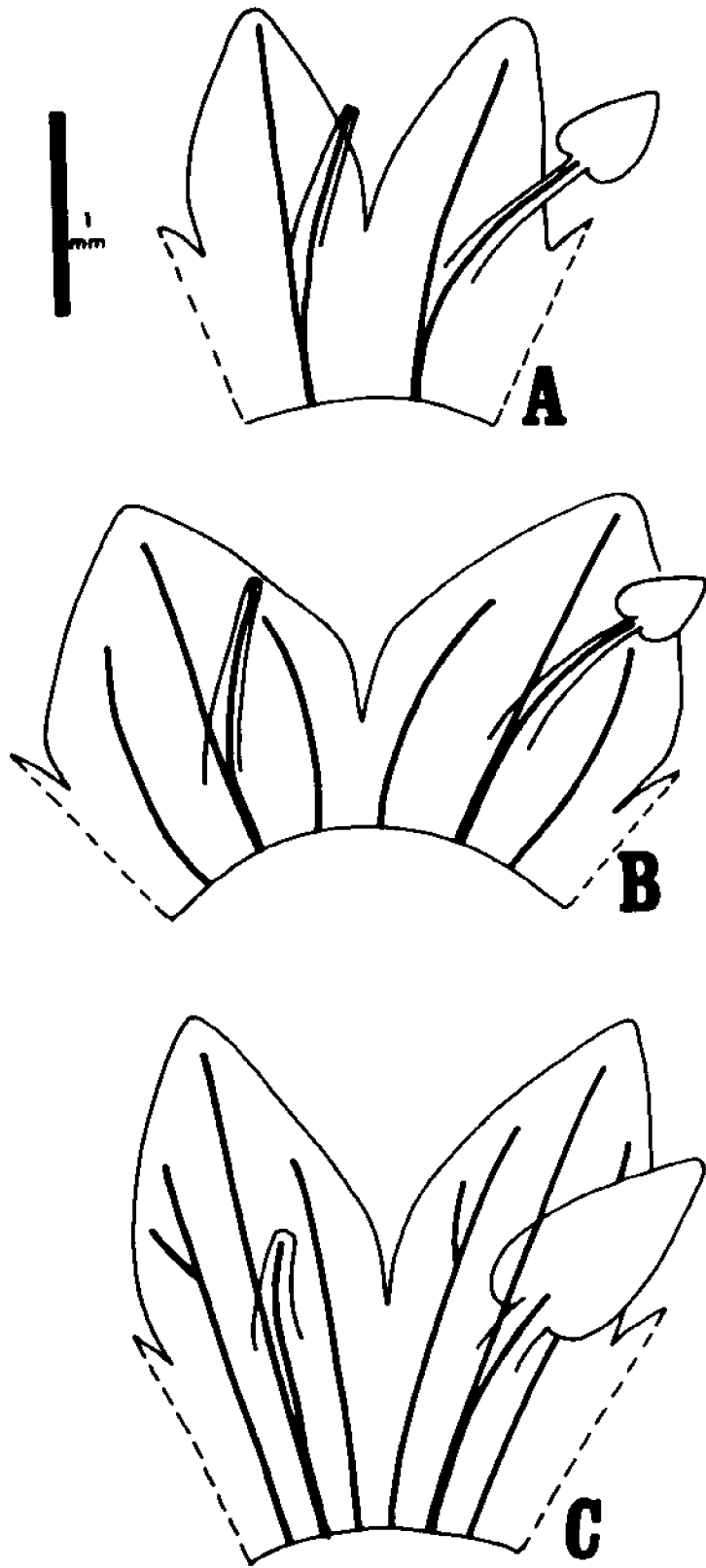


**B**



**C**

**D**



others species of the section the flowers vary from 3- to 6-merous. The distribution of different types of flowers in the inflorescence was studied in detail in the species C. amplus, C. lepidotus, C. multipunctatus, C. peruvianus, and C. roxinae. No distribution pattern was evident in the inflorescence, except that in most cases there was only one predominant flower type in a given inflorescence. In most species the atypical flower types seem to appear more or less at random in the inflorescence. The number of parts can be used as a diagnostic character to separate some of the sections of Cybianthus, but within section Conomorpha this character is of limited diagnostic value. In C. lepidotus and C. punctatus, both Guayanan species, the flowers are predominantly 5-merous but may occasionally be 4-merous. In C. brasiliensis 3-merous flowers have been found among the predominantly 4-merous ones. The two species C. punctatus and C. guyanensis have been found to normally produce 5-merous flowers but they occasionally develop 6-merous ones.

Chromosomes have not been examined in this group of species and the author is unaware of any such studies. To date no chromosome counts are available. The lack of living or suitable preserved material has prevented the author from studying the chromosomes.

Fruits in the genus have been described as either berries or drupes. In all the species examined, the fruit is consistently a drupe. The exocarp is fleshy and usually dark colored at maturity. In all the species

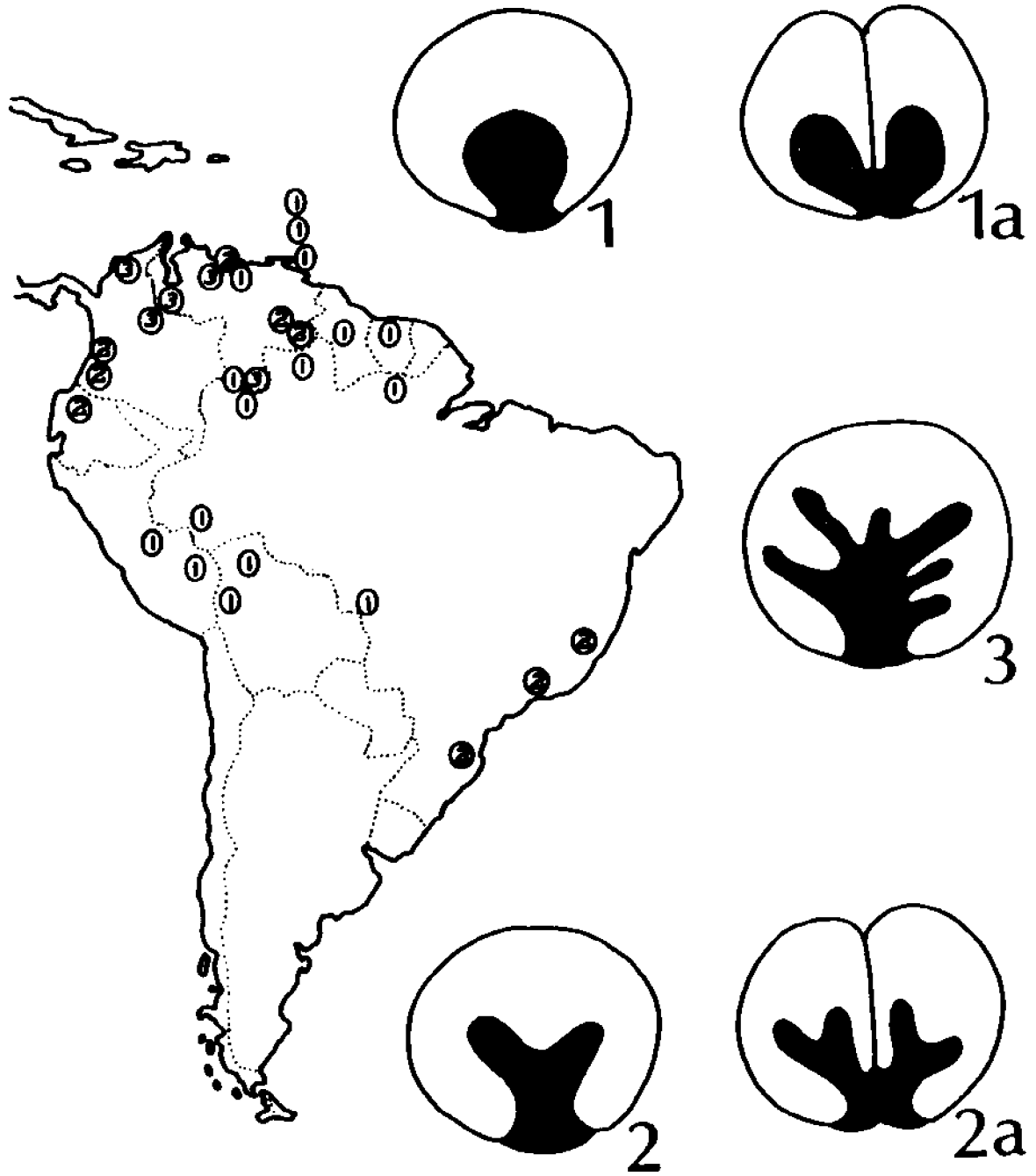
of section Conomorpha the endocarp is consistently only one cell thick. The endocarp consists of closely distributed stony cells. The pericarp surrounds a cavity containing one seed. The fruit is always subglobose, sometimes slightly depressed. It ranges from 4 to 8 mm long and from 4 to 10 mm diameter.

A fibrous tissue is found surrounding the seed. In some species, it is particularly copious and not adnate to the seed or to the endocarp. In other species this tissue is scanty and usually adnate to the seed, to the endocarp, or to both. It has been avoided here to call this tissue either aril or arilloid pending ontogenetical studies to establish its true nature. I prefer to call it "aril" in the absence of a better term. It may prove to be either a true aril originating from the short funicle of the ovule, or it may prove to be a false aril or arilloid originating from the ovular integuments or from the placental flaps that previously surrounded the ovules.

Consistently throughout the genus only one ovule develops. This is the case in all the American genera of the family. In C. brasiliensis and C. lepidotus occasional two-seeded fruits are found. The significance of these two-seeded fruits is obscure at present. The seed is globose and depressed on the side where it is attached to the pericarp. The testa is one cell thick and pale or dark in color.

## FIGURE LEGEND (28)

Fig. 28. Seed endosperm types in Cybianthus section Conomorpha species and their geographical distribution. The circled numbers in the map represent localities where the different endosperm types have been found. Endosperm intrusion stippled. 1. Type I. 1a. Twin seeds of type I. 2. Type II. 2a. Twin seeds of type II. 3. Type III.



SCALE  
0 1000 2000 Km

The endosperm is massive and occupies most of the seed volume. In all the species of Cybianthus examined, the endosperm was hard, semitransparent, and not starchy. The endosperm is intruded with a dark, amorphous tissue which spreads from the base of attachment of the seed towards the center in a characteristic fashion (Fig. 28). In some species this tissue forms a more or less globose intrusion in the endosperm (Fig. 28-1). I have designated this type I endosperm. In most species the tissue forms a more or less crateriform (goblet-shaped) intrusion which in longitudinal section looks like a forked stem with two terminal lobes (Fig. 28-2), which is here called type II endosperm. Finally, in two species, a further type has been found. In these species, the tissue branches more or less radially forming multiple finger-like intrusions in the endosperm (Fig. 28-3). I refer to this as type III endosperm. The origin of this tissue is not clear, but it may prove to have originated not from the main core of the placenta but from the short funiculus of the ovule. In the cases in which two ovules develop, each seed shows the endosperm type characteristic of the species (Fig. 28-1a and 2a).

The embryo in section Conomorpha is always elongate, small, linear, transversal, and either flexuose, straight or curved. The cotyledons are small and not expanded. The embryo is always completely included within the endosperm.

Use of anatomical characters  
in identification

One of the aims of this work was to find characters other than floral ones to aid in the identification of sterile specimens which look so much alike.

Anatomical characters have been used at the family and generic level to support or contradict probable phyletic relationships. Very little has been done at the specific level and the general impression among botanists has been that anatomical characters are unreliable as diagnostic characters because of their great variability within widespread species.

Anatomical characters of leaf blades have been studied in all the twenty-six species of Cybianthus section Conomorpha. The data shown in table 3, can be used as an anatomical key to the species.

When the whole range of variation was recorded for each character it was found that no single character is sufficient to separate one species from all the others but every one of the species studied can be distinguished on the basis of a particular combination of characters. Most species can be distinguished from otherwise phenetically similar species by a limited number of characters, despite the fact that in several species the range of expression of the characters overlaps widely. For example, the number of

cells forming the plate of the covering scales shows a wide range of variation in most species as is shown in Table 3. However, despite variation, this character can be used to distinguish couplets of sympatric and phenetically similar species such as C. stevermarkianus and C. wurdackii.

Other attempts to use anatomical characters to distinguish and identify species have been successful. Cuticular characteristics have been used to distinguish and identify species by several authors, notably Marlier-Spirlet (1923) in Cinnamomum, Ahmad (1945) in Solanum and more recently, a review has been presented by Stace (1965a, b).

Table 3. Anatomical characters which distinguish the species of Cybianthus section Gonomorpha.

1. Thickness of cuticle on upper epidermis of leaf blade:
  - A. Cuticle thin (2 to 10 microns thick)
  - B. Cuticle thick (15 to 30 microns thick)
2. Thickness of cuticle on lower epidermis of leaf blade:
 

Same two categories as in 1.
3. Upper cuticle surface:
  - A. Cuticle smooth or inconspicuously striate.
  - B. Cuticle conspicuously striated but the striae not obscuring the anticlinal cell walls of the epidermis.
  - C. Cuticle prominently striated, the striae obscuring the anticlinal cell walls of the epidermis.
4. Lower cuticle surface:
 

Same three categories as in 3.
5. Margin of the stomatal and scale depressions:
  - A. Margin smooth or undulate.
  - B. Margin prominently dentate.
6. Diameter of plate of covering scales on the lower leaf surface:
  - A. Small (100 to 150 microns)
  - B. Intermediate (150 to 200 microns)
  - C. Large (200 to 250 microns)
7. Number of cells forming the plate of the covering scales on the lower leaf surface:
 

Ranges are shown by the actual numbers.

8. Undulation of upper epidermal anticlinal cell walls:
  - A. Walls very strongly undulate.
  - B. Walls conspicuously though not very strongly undulate.
  - C. Walls straight or curved.
9. Undulation of lower epidermal anticlinal cell walls:  
Same three categories as in 8.
10. Shape of vascular bundles in transection of midrib:
  - A. Vascular bundles discrete and more or less round in transection.
  - B. Vascular bundles elongate in transection.
11. Shape and arrangement of median strand in midrib:
  - A. Median strand round or crescentic in transection.
  - B. Median strand shaped like a Greek letter omega, with three layers of bundles. The adaxial bundles with the same orientation of the abaxial ones.
  - C. Median strand more or less round, enclosing a layer of bundles which have the same orientation of the abaxial ones.

Table 3. Anatomical characters which distinguish the species of *Cybianthus* section *Conomorpha*.

| SPECIES                | 1 | 2  | 3  | 4  | 5 | 6 | 7     | 8  | 9  | 10 | 11 |
|------------------------|---|----|----|----|---|---|-------|----|----|----|----|
| <i>amplus</i>          | B | AB | AB | B  | A | A | 22-38 | C  | BC | AB | B  |
| <i>biflorus</i>        | A | A  | A  | C  | A | B | 28-36 | B  | B  | A  | A  |
| <i>brasiliensis</i>    | A | A  | B  | B  | A | A | 20-32 | B  | B  | B  | A  |
| <i>caracasanus</i>     | A | A  | A  | C  | A | A | 20-28 | A  | A  | B  | B  |
| <i>comperuvianus</i>   | A | A  | B  | B  | A | A | 32-42 | A  | A  | B  | B  |
| <i>crotonoides</i>     | B | B  | A  | C  | B | C | 38-42 | C  | C  | A  | B  |
| <i>cuatrecasasii</i>   | A | A  | AB | AB | A | A | 28-38 | C  | BC | B  | B  |
| <i>dussii</i>          | A | A  | A  | B  | A | A | 26-36 | C  | B  | A  | A  |
| <i>frigidicola</i>     | A | A  | A  | A  | A | A | 26-32 | C  | C  | B  | A  |
| <i>guyanensis</i>      | A | A  | B  | B  | A | A | 16-32 | C  | BC | B  | B  |
| <i>laetus</i>          | A | A  | A  | B  | A | A | 24-34 | C  | C  | B  | A  |
| <i>laurifolius</i>     | A | A  | AB | AB | A | A | 24-30 | C  | B  | B  | A  |
| <i>lepidotus</i>       | A | A  | A  | C  | B | C | 42-60 | C  | C  | AB | C  |
| <i>maguirei</i>        | A | A  | A  | C  | B | B | 32-42 | C  | C  | B  | C  |
| <i>multipunctatus</i>  | A | A  | A  | BC | A | A | 32-34 | AB | A  | B  | A  |
| <i>oblongifolius</i>   | A | A  | A  | A  | A | A | 26-34 | B  | B  | B  | A  |
| <i>occigranatensis</i> | A | A  | A  | AB | A | A | 26-36 | A  | A  | B  | B  |
| <i>peruvianus</i>      | A | A  | B  | C  | B | A | 24-32 | C  | C  | B  | B  |
| <i>pittieri</i>        | A | A  | B  | B  | A | A | 24-34 | A  | A  | B  | A  |
| <i>pseudoicacoreus</i> | A | A  | B  | BC | A | A | 30-34 | AB | AB | B  | B  |
| <i>punctatus</i>       | A | A  | B  | B  | A | A | 16-20 | C  | C  | A  | A  |
| <i>roraimae</i>        | A | A  | A  | C  | B | B | 34-38 | C  | C  | A  | C  |
| <i>rostratus</i>       | A | A  | A  | C  | A | A | 34-36 | B  | B  | B  | A  |
| <i>spathulifolius</i>  | A | A  | A  | A  | A | B | 35-36 | C  | C  | AB | A  |
| <i>steyermarkianus</i> | B | B  | A  | A  | A | A | 20-24 | C  | C  | A  | A  |
| <i>wurdackii</i>       | B | A  | A  | B  | B | A | 32-38 | C  | C  | A  | A  |

### Specific relationships

One of the few characters which aids understanding of the present distribution and phylogenetic history of this group of species is the endosperm. As was previously described, three kinds of endosperm are found within Cybianthus section Conomorpha (Fig. 28). Type I endosperm is the most frequent within the section. This type of endosperm was the only one found in several species of other genera selected at random. It is presumably an ancestral or near ancestral type because of its widespread distribution. Because endosperm of type II and III has only been found in section Conomorpha, it is reasonable to expect these types to represent more advanced or derived conditions than type I. The mapping of the distribution of taxa with the three types of endosperm within the section, shows several peculiarities (Fig. 28). First of all, no species of the Amazonian Valley have endosperm of type II. This gives a disjunct distribution to endosperm II, which is found in populations of Colombia, Venezuela, and Ecuador, and again, in south and southeastern Brazil. This strongly indicates that type II was originally distributed in a larger area before its range was disrupted, and that

the species with the presumably primitive type I endosperm are newcomers to the Amazonian Valley. There may have been a second wave of distribution for the primitive type from a refugium in the Guayana lowland. Such an assumption is confirmed by the current evidence that the Guayanan and southern Brazilian shields may not always have been separated by the Amazonian basin lowlands.

Endosperm of types II and III are found in both highlands of Guayana and the Andes. Type III endosperm has been found in C. spathulifolius from Guayana, and C. laurifolius from the Andes of Venezuela and Colombia. As type III endosperm is an elaborate type, it seems highly improbable that it had had an independent origin in both Guayana and the Andes. It is more probable that type III was, at one time or another, distributed over the entire Guayana Highlands and the Andes, its range being subsequently disrupted.

Type I endosperm is almost always found in association with lowland habitats. The significance of this correlation is obscure at this moment. C. lepidotus is the only highland species with type I endosperm. This species has a disjunct distribution, being found only in southern Venezuela and in Bolivia. The populations of C. lepidotus in Bolivia may be the only remnants of what must have been the southern extreme of a previously wider range.

When compared with Ardisia and other presumably

primitive genera of the Myrsinaceae, it can be noticed that the stamens in the species of Cybianthus section Conomorpha have experienced fusion and adnation during the course of evolution. The filaments are usually fused in a structure here called a staminal tube, which in turn is fused with the corolla at a variable height. In some of the species the stamens are not connate. These species may have retained the original free stamens but this should be viewed with caution. The anther is never completely sessile on the staminal tube when it is present. The filaments show a free portion that can be short or long. In many species the adnation of the filaments and staminal tube to the corolla is so weak that they can be easily separated, if not manipulated carefully, giving the false impression of being free. The presence of an elongate free portion of the filament could be considered as primitive within the section.

The probable center of distribution is the Guayana area, where the highest concentration of species (10) is found, followed by the Andes (7), the Amazonian Valley (5) and south and southern Brazil (3).

Most species of Cybianthus section Conomorpha show 4 or 5 floral parts. Some species are predominantly 4-merous, and only two species, C. lepidotus and C. punctatus, show a marked predominance of 5-merous flowers. Since pentamerous flowers are dominant within the family and the

presumably primitive genera are all pentamerous, pentamery is very probably a primitive condition within the section. It seems significant that the only two species predominantly pentamerous are presently distributed in Guayana. Nevertheless, it should be considered that the variation found in most species could, at any point, diverge and be conspicuously directed toward either pentamery or tetramery, in all probability with very little genetic change. There are no grounds for expecting the Guayanan species to be primitive, but C. multipunctatus, the only lowland species in Guayana, must be very close to the primitive species of the group. This species possesses a combination of free stamens, elongate filaments, and type I endosperm. All of these characters are considered to be probably primitive.

The specific relationships are very difficult to picture when there are few characters to analyze. Nevertheless, when all the available information is taken into consideration, the species fall into a few species-groups. Comparison of common and differential characters usually gives a reliable estimate of affinity. The more characters the species share, the less divergent they are in relation to the hypothetical ancestral type. The species of the Amazonian Valley are closely related to C. multipunctatus of the Guayana lowland. They all have type I endosperm. The two species of the Lesser Antilles, C. dussii and C. rostratus also have type I endosperm as do C. caracasa-

nus and C. pittieri of the Coastal Ranges of Venezuela and Tobago. These two last species and C. multipunctatus have free and elongate filaments in common. It seems probable that the ancestors of the Lesser Antilles species came from genotypes originating in the Guayana area through northern Venezuela. As we know very little of the rates of evolution of the species and their differentiating characters, it becomes very difficult to select any one species as primitive. The Guayanan species are probably related to C. multipunctatus through C. biflorus. This species, despite having a very reduced inflorescence, usually with two flowers, shows other presumably primitive characters including free elongate filaments. All the Guayanan species have restricted distributions except C. lepidotus, which is also found in Bolivia. It is also the only highland species with type I endosperm. Most Guayanan species show a marked reduction in leaf size which can very probably be correlated with the very extreme conditions found at the summits of the flat-topped mountains where they grow. It is frequently found that the same species develop types adapted to the montane forests that cover the sides of the mountain. These probable ecotypes have not only larger but also thinner and less coriaceous leaves.

C. laurifolius is found in the northern extension of the Andes. This species can be easily recognized by the type III endosperm. Only one other species, C. spatulifolius from Guayana, has been found to have this type of endosperm. Both species have rather large coriaceous

leaves, but the staminate flowers of C. laurifolius do not develop a staminal tube.

C. cuatrecasasii and C. occigranatis are found in the Andes of western Colombia, Ecuador, and northern Peru. These two species have type II endosperm, in common with C. brasiliensis in southern Brazil and with the highland species of Guayana. The other Andean species, C. lactus, has not been collected in fruit, but its relationships seem to lie with the small-leaved Guayanan species C. crotonoides and C. stevermarkianus.

C. brasiliensis is the only species with type II endosperm found in southern Brazil. It is also the species with the southernmost range within the section. The Guayana Highland species and the Andean species also have type II endosperm. This may be indicative of a relationship among C. brasiliensis, the Guayana Highland species and the Andean species, especially if we consider type II as derived from type I, an event not likely to have occurred twice. It is more probable that the ancestors of C. brasiliensis came from the north, probably through the Andes. The other Brazilian species, C. oblongifolius, has not been collected in fruit. Its relationships lie, very probably, with C. punctatus, a species of the Guayana Highland. C. oblongifolius and C. punctatus are the only known species within the section that develop pyramidal panicles with elongate peduncles. All the other species

have racemes or a panicle branched only from the base, leaving very short peduncles.

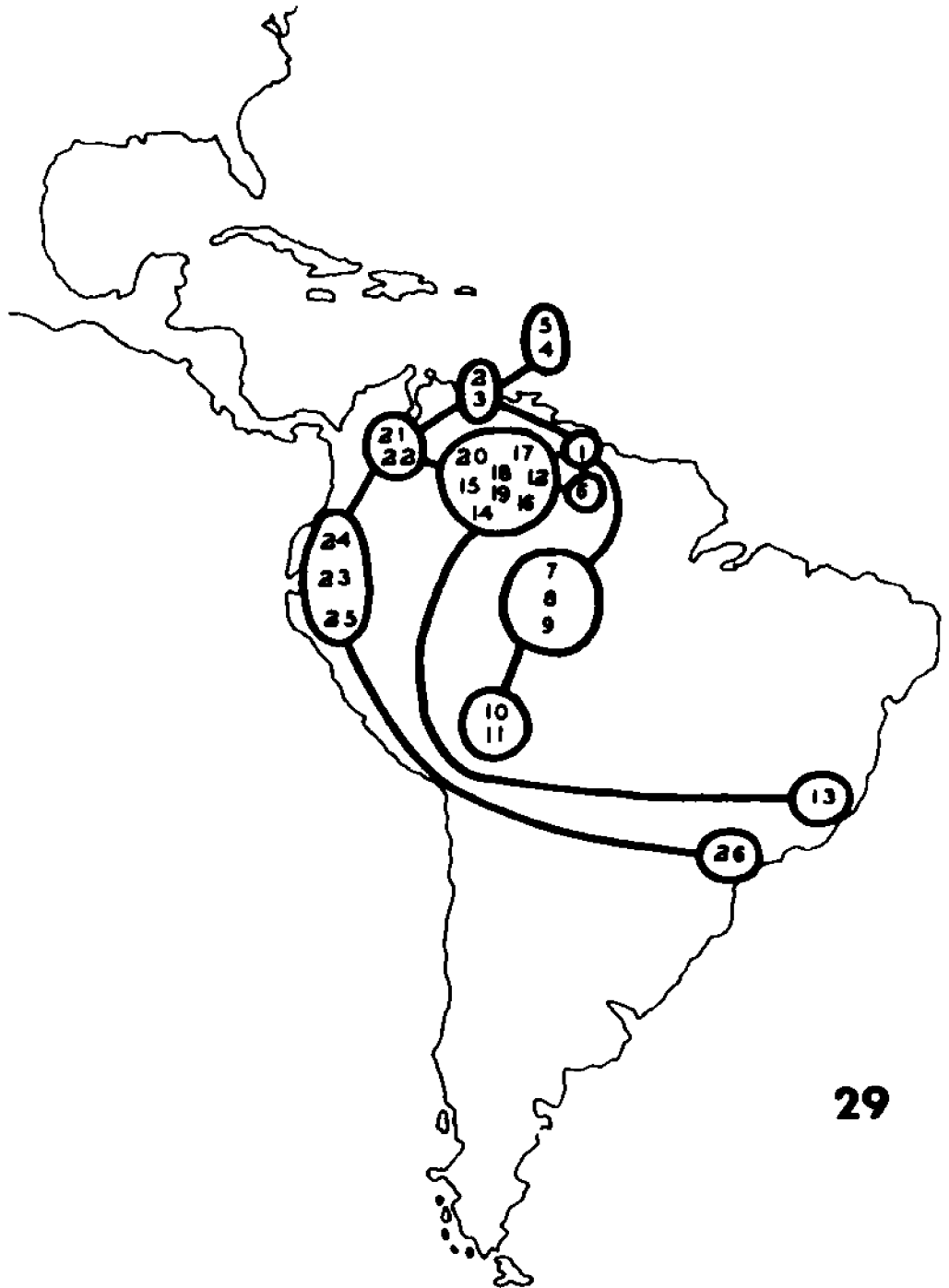
Observations on leaf anatomy have not been considered in the analysis of probable phyletic relationships among the species of Cybianthus section Conomorpha even though the species groupings indicated by morphological characters are valid when anatomical characters alone are considered. For example, the largest covering scales are found in species of the Guayana Highland. Likewise all Amazonian species have the midrib median strand shaped like a Greek letter omega. Because anatomical characters are more or less constant for each species it has no bearing on the classification proposed here. When all the species are considered, there is a lack of correlation between anatomical and morphological characters which emphasizes the plasticity that characterizes vegetative organs. Anatomical leaf characters are probably more subject to environmental influence than other characters in the plant as leaves have a direct bearing on day to day survival. For example cuticles may have developed in physiologically dry habitats. Other anatomical leaf characters, like the shape and arrangement of vascular bundles in the median strand of the midrib, have no apparent adaptive significance to the plant and also lack correlation with morphological characters

The probable relationships of the species included in Cybianthus section Conomorpha are pictured in Figure 29.

## FIGURE LEGEND (29)

Fig. 29. Probable relationships among the species of Cybianthus section Conomorpha. Numbers on the map are those assigned to each species:

- |  |  |
|--|--|
| 1. <i>C. multipunctatus</i> A. DC.             | 15. <i>C. maguirei</i> Agost.                            |
| 2. <i>C. pittieri</i> Agost.                   | 16. <i>C. crotonoides</i> (Scom-<br>burgk ex Mez) Agost. |
| 3. <i>C. caracasanus</i> (Mez)<br>Agost.       | 17. <i>C. steyermarkianus</i><br>(Agost.) Agost.         |
| 4. <i>C. rostratus</i> (Hassk.)<br>Agost.      | 18. <i>C. wurdackii</i> Agost.                           |
| 5. <i>C. dussii</i> (Mez) Agost.               | 19. <i>C. roraimae</i> (Stey.)<br>Agost.                 |
| 6. <i>C. biflorus</i> Agost.                   | 20. <i>C. spathulifolius</i><br>Agost.                   |
| 7. <i>C. guyanensis</i> (A. DC)<br>Miq.        | 21. <i>C. laurifolius</i> (Mez)<br>Agost.                |
| 8. <i>C. pseudoicacoreus</i> (Miq.)<br>Agost.  | 22. <i>C. frigidicola</i> (Stey.)<br>Agost.              |
| 9. <i>C. amplus</i> (Mez)<br>Agost.            | 23. <i>C. cuatrecasasii</i><br>Agost.                    |
| 10. <i>C. comperuvianus</i> Agost.             | 24. <i>C. occigranatensis</i><br>(Cuatr.) Agost.         |
| 11. <i>C. peruvianus</i> (A. DC.)<br>Miq.      | 25. <i>C. laetus</i> (Mez) Agost.                        |
| 12. <i>C. punctatus</i> (Mez) Agost.           | 26. <i>C. brasiliensis</i> (Mez)<br>Agost.               |
| 13. <i>C. oblongifolius</i> (A. DC.)<br>Agost. |  |
| 14. <i>C. lepidotus</i> (Gl.) Agost.           |  |



Systematic treatment of Cybianthussection ConomorphaKey to the species<sup>1</sup>


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<sup>1</sup>Based only on flowering specimens and staminate flowers. Pistillate flowers as a rule are smaller than staminate ones. All measurements used in this key have been taken from preserved material or softened flowers from herbarium specimens. Care should be taken not to detach the filament from the corolla.

---

1. Leaf blades 3 cm long or less, 1.0-2.0-(2.5) cm broad.
2. Free portion of the filaments as long or longer than the anthers, 0.4-0.8 mm long.
3. Flower pedicels 1.5-2.5 mm long; inflorescence a raceme with more than 2 flowers. Endemic to Martinique. 5. C. dussii.
3. Flower pedicels slender, 4-5 mm long; inflorescence reduced to 2 flowers at the apex of a long peduncle. Guyana (Mount Ayangana) at altitudes of 1300-1600 m. 6. C. biflorus.
2. Free portion of the filaments shorter than the anthers, 0.1-0.4 mm long.

4. Inflorescence spiciform; flower pedicels less than 1 mm long; flowers mostly 5-merous. Guayana Highland of Venezuela, and Bolivia, at altitudes of 850-2300 m.

14. C. lepidotus.

4. Inflorescence not spiciform; flower pedicels more than 1 mm long; flowers mostly 4-merous.

5. Corolla 3.2-3.5 mm long in anthesis; calyx 1.2-1.8 mm long. Andes of Peru (Amazonas) at altitudes of ca. 2000 m.

25. C. laetus.

5. Corolla 2.0-2.9 mm long in anthesis; calyx 0.7-1.2 mm long. Guayana and southern Brazil.

6. Blades elliptic, elliptic-ovate, or elliptic-obovate; the apex acute or acuminate, rarely obtuse.

7. Free portion of filaments 0.1-0.2 mm long; staminal tube inconspicuous. Guyana Highland of southern Venezuela, at altitudes of 1800-2500 m.

16. C. crotonoides.

7. Free portion of filaments 0.3-0.4 mm long; staminal tube prominent. Southern and southeastern Brazil, from Minas Gerais to Santa Catarina, at altitudes of 5-1500 m.

26. C. brasiliensis.

6. Blades obovate to broadly elliptic, the apex rounded or retuse, rarely obtuse.

8. Corolla 2.5-2.7 mm long; stamens 1.6-1.7 mm long, adnate to ca.  $\frac{1}{2}$  of the corolla length; staminal tube inconspicuous. Guayana Highland of southern Venezuela at altitudes of 2000-2300 m.

17. C. stevensmarkianus.

8. Corolla 2.0-2.2 mm long; stamens 1.4-1.5 mm long, adnate to  $\frac{1}{3}$ - $\frac{1}{4}$  of the corolla length; staminal tube prominent. Guayana Highland of southern Venezuela, at altitudes of 1700-2300 m.

18. C. wurdackii.

1. Leaf blades 4 cm long or more, (1.0)-2.5-24.0 cm broad
9. Free portion of filaments as long or longer than the anthers, usually 0.6-1.0 mm long.
10. Upper surface of leaf blades prominently reticulate. Coastal ranges of northern Venezuela (Edo. Aragua), at altitudes of 1500-1700 m.

3. C. caracasanus.

10. Upper surface of leaf blades not reticulate
11. Petals glabrous within; staminal tube inconspicuous.
12. Anthers 0.5-0.7 mm long; filaments 0.6-0.9 mm long; flower pedicels 0.3-1.0 mm long; corolla 2.0-2.5 mm long; leaf blades 7-15 cm long. Guayana, Surinam, and French Guiana, at altitudes of 300-1000 m.

1. C. multipunctatus.

12. Anthers 0.9-1.0 mm long; filaments 0.9-1.0 mm long; flower pedicels 1-2 mm long; corolla 2.4-3.0 mm long; leaf blades 5-8 cm long. Coastal ranges of northern Venezuela and Tobago, at altitudes of 800-1400 m.
2. *C. pittieri*.
11. Petals prominently glandular-granulose internally; staminal tube well developed.
13. Corolla 2.0-2.5 mm long.
14. Leaf blades 4-7 cm long, the apex abruptly acuminate; petioles 0.5-1.2 cm long; flower pedicels 1-2 mm long. Lesser Antilles from Guadeloupe to St. Vincent, at altitudes of 500-800 m.
4. *C. rostratus*.
14. Leaf blades 12-20 cm long, the apex acute or acuminate; petioles 1-2 cm long; flower pedicels 0.5-1.0 mm long. Northern Amazonia (Brazil).
7. *C. guyanensis*.
13. Corolla 2.8-3.2 mm long. Northern Amazonia (Peru and Brazil), at altitudes of 70-700 m.
8. *C. pseudoicacoreus*.
9. Free portion of the filaments shorter than the anthers, 0.1-0.5 mm long.
15. Corolla 2.8-3.5 mm long in anthesis.
16. Leaf blades 1.0-1.6 cm broad, 3-5 cm long.

Andes of Peru (Amazonas), at altitudes of ca. 2000 m.

25. C. laetus.

16. Leaf blades 2.5-7.0 cm broad, 5-20 cm long.
17. Leaf blade margins flat; petioles usually less than 1 cm long.
18. Corolla 2.8-3.2 mm long in anthesis; staminal tube inconspicuous; free portion of the filaments 0.4-0.7 mm long; petioles 0.5-1.2 mm long. Northern Amazonia (Peru and Brazil), at altitudes of 70-700 m.

8. C. pseudoicacoreus.

18. Corolla 3.5-3.7 mm long; staminal tube prominent; free portion of filaments 0.1-0.3 mm long; petioles 0.1-0.5 cm long. Guayana highland of southern Venezuela, at altitudes of 1500-2000 m.

20. C. spathulifolius.

17. Leaf blade margins revolute; petioles usually more than 1 cm long.
19. Leaf blades elliptic or broadly elliptic, usually more than 2 times longer than broad, the apex acuminate or acute.
20. Flower pedicels 0.4-0.6 mm long; corolla 2.7-3.0 mm long in anthesis.
21. Leaf blades thin and chartaceous, 12-19 cm long; petioles 1.5-3.0 cm long; calyx lobes 1.2-1.4 mm long.
- Endemic to the State of Minas Gerais

- in southeastern Brazil. 13. *C. oblongifolius*.
21. Leaf blades thick and coriaceous, 6-10 cm long; petioles 1.0-1.5 cm long; calyx lobes 0.8-0.9 mm long. Guayana Highland of southern Venezuela, at altitudes of 1300-2000 m. 15. *C. maguirei*.
20. Flower pedicels 1.0-1.5 mm long; corolla 3.0-3.5 mm long in anthesis; leaf blades thin and chartaceous, 8-16 cm long. Andean mountain ranges of southern Colombia and Ecuador, at altitudes of 2000-2600 m. 23. *C. cuatrecasasii*.
19. Leaf blades obovate, usually less than 2 times longer than wide, the apex rounded or truncate. Andean mountain ranges of Venezuela (Edo. Mérida), at altitudes of 2400-2800 m. 22. *C. frigidicola*.
15. Corolla less than 2.7 mm long in anthesis.
22. Leaf blade apex rounded, rarely obtuse; anthers 1.3-1.4 mm long. Andean ranges of Venezuela
22. *C. frigidicola*.
22. Leaf blade apex acuminate, rarely acute; anthers 0.5-1.0 mm long.
23. Corolla lobes glabrous internally; corolla purple. Guayana Highland of southern Venezuela, at altitudes of 2000-2600 m.
19. *C. roraimae*.

23. Corolla lobes glandular-granulose internally; corolla not purple.
24. Inflorescence spiciform, unbranched, solitary, usually as long or longer than the subtending leaf, 4-16 cm long; pedicels 1.0-0.8 mm long, 0.7-1.5 mm thick; flowers usually 5-merous. Guayana Highland of southern Venezuela and Bolivia, at altitudes of 850-2300 m. 14. C. lepidotus.
24. Inflorescence a raceme or a panicle, shorter than the subtending leaf, 1-8 cm long; pedicels 1.0-3.5 mm long, 0.4-0.7 mm thick, (if pedicels shorter than 1 mm then inflorescence branched or not solitary); flowers 4- or 5-merous.
25. Calyx 1.4-1.7 mm long, lobes 1.2-1.5 mm long; inflorescence a panicle; peduncle 5-15 mm long. Endemic to the State of Minas Gerais in southeastern Brazil. 13. C. oblongifolius.
25. Calyx 0.7-1.2 mm long, lobes 0.5-1.0 mm long; inflorescence a raceme or a panicle; peduncle 1-15 mm long.
26. Scales on branchlets not completely appressed, the margins raised and conspicuously fimbriate, the indument appearing puberulent; inflorescence a panicle; peduncle 5-15 mm long; flowers 5-merous. Guayana Highland of southern Venezuela, at altitudes of 1000-1400 m. 12. C. punctatus.

26. Scales on branches completely appressed, the indument appearing characteristically scaly; inflorescence a raceme or a panicle branched at the base; peduncle 1-5 mm long; flowers usually 4-merous.
27. Scales densely imbricate on the lower surface of leaf blade; staminal tube inconspicuous. Guayana Highland of southern Venezuela, at altitudes of 1800-2500 m. 16. *C. crotonoides*.
27. Scales not imbricate on the lower surface of leaf blade; staminal tube usually conspicuous.
28. Staminal tube inconspicuous; pedicels (1.0)-1.5-6.0 mm long.
29. Free portion of the filaments 0.4-0.5 mm long; leaf blades usually thick and coriaceous, (5)-9-(12) cm long. Andean mountain ranges of northern and eastern Colombia, and Venezuela, at altitudes of 1800-2800 m. 21. *C. laurifolius*.
29. Free portion of the filaments 0.2-0.3 mm long; leaf blades usually thin and chartaceous, (11)-13-(14) cm long. Andean mountain ranges of western Colombia, and Ecuador, at altitudes of 1000-2000 m. 24. *C. occigranatisensis*.
28. Staminal tube well developed (sometimes not prominent in *C. amplius*); pedicels 0.1-1.0-(2.5) mm long.

30. Flower pedicels 1.0-2.5 mm long; petioles 0.5-1.0 cm long.
31. Corolla lobes glabrous externally; pedicels 1.0-1.5 mm long; leaf blades 9-13(-17) cm long, the margin flat; branchlets usually without prominent lenticels; scales on leaves and flowers pale brown or reddish. Peru, Bolivia, and Brazil (Mato Grosso), at altitudes of 400-1100 m.
10. C. comperuvianus.
31. Corolla lobes lepidote externally; pedicels 1.5-2.5 mm long; leaf blades (4)-7-(10) cm long, the margin revolute at least at the base; branchlets with prominent lenticels; scales on leaves and flowers usually dark brown, almost black. South and southeastern Brazil, from Minas Gerais to Santa Catarina, at altitudes of 5-1500 m.
26. C. brasiliensis.
30. Flower pedicels 0.1-0.8-(1.0) mm long; petioles (1.0)-1.5-3.5 cm long.
32. Branchlets usually thick, 3-8 mm thick at ca. 10 cm from branch apex; leaf blades (4)-6-12 cm broad, the margin revolute; pedicels 0.1-0.5-(1.0) mm long. Amazonia of Colombia, Venezuela, and Brazil (including the State of Bahia), at altitudes of 100-1100 m.
9. C. amplus.
32. Branchlets usually thin, 2-3 mm thick at ca. 10 cm from the branch apex; leaf blades 3-4-(6) cm

broad, the margin flat or revolute; pedicels 0.5-1.0 mm long.

33. Leaf blades oblong-elliptic, (90)-12-19 cm long, the margin flat or subrevolute, the apex acute or acuminate. Northern Brazil.

7. *C. guyanensis*.

33. Leaf blades obovate-elliptic, broadly elliptic, or elliptic, 8-10-(12) cm long, the margin revolute, the apex abruptly acuminate. Peru and Bolivia, at altitudes of 200-1500 m.

11. *C. peruvianus*.

1. Cybianthus multipunctatus A. De Candolle, Ann. Sci. Nat.  
Paris, Serie 2, 16: 94. 1841. (Fig. 30)

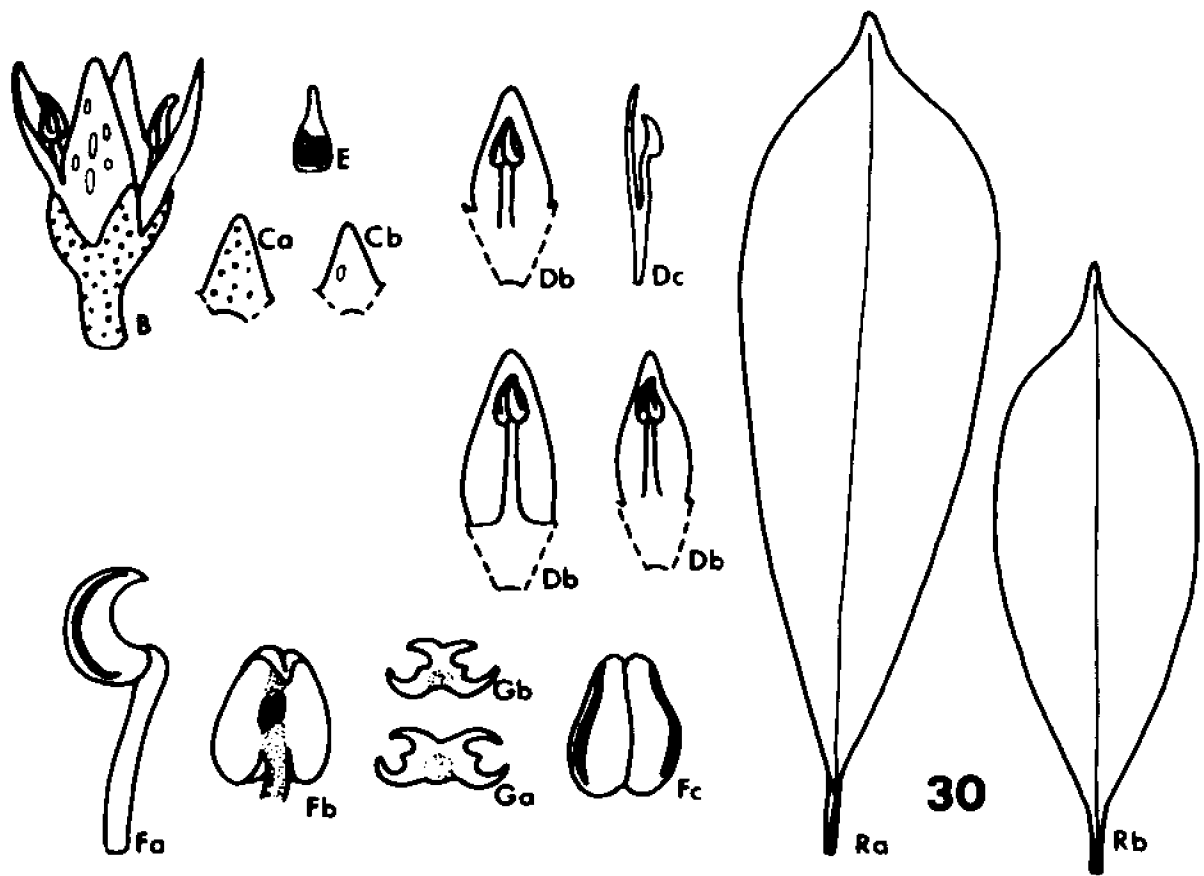
Conomorpha multipunctata (A. De Candolle) Miquel,  
Stirp. Fl. Surinamensis p. 111, t. 34. 1850.

Type: French Guiana, Cayenne, Herb. De Candolle  
(holotype, P, not seen).

Shrub or small tree to 8 m. Branchlets densely lepidote. Petioles 0.5-1.0 cm long, densely lepidote; leaf blades narrowly obovate to narrowly elliptic, membranaceous to chartaceous, 8-12(-15) cm long, 2.0-3.5 cm broad, ratio 2.5-3.5; margin flat; base acute, decurrent; apex acuminate to abruptly acuminate, the acumen 0.5-1.0 cm long; midrib raised on lower surface, depressed on the upper; nerves 15-30 pairs, inconspicuous on both surfaces, or slightly raised beneath; upper surface smooth or slightly wrinkled when dry, densely lepidote when young, becoming glabrous with age; lower surface sparsely lepidote. Inflorescence a raceme or a panicle with 2-3 branches from the base, 2.5-5.0 cm long; peduncle, branches, and axis densely lepidote; peduncle 0.1-0.2 cm long; pedicels at anthesis 0.3-1.0 mm long; bracts and bracteoles triangular-ovate to deltate-ovate, 0.6-1.2 mm long, ca. 0.3 mm broad, densely lepidote dorsally. Flowers 4-merous. Staminate flowers: calyx sub-cupuliform, 0.9-1.0 mm long, sparsely lepidote externally, glabrous internally; tube 0.2-0.3 mm long; lobes triangular to triangular-ovate, chartaceous, 0.7-0.8

## FIGURE LEGEND (30)

Fig. 30. C. multipunctatus. For legend and scales  
see Figure 24. B-F. Pinkus 252. R. Sagot 1031.



mm long, 0.5-0.7 mm broad, the apex attenuate to a round tip, the margin lepidote, the schizogenous glands few, dark brown, not prominent. Corolla 2.0-2.5 mm long; tube 0.6-0.7 mm long, glabrous on both surfaces; lobes triangular-ovate to narrowly triangular-ovate, membranaceous, 1.2-1.6 mm long, 0.6-0.8 mm broad, glabrous externally, glabrous internally, the schizogenous glands few, dark brown, not prominent. Stamens 1.1-1.4 mm long, adnate 0.6-0.8 mm to the corolla tube; filaments 0.6-0.9 mm long, slender, not glandular, not connate in a tube; anthers dorsifixed, ovate, curved, 0.5-0.7 mm long, 0.3-0.4 mm broad, cordate at the base, attenuate to an acute tip at apex, the connective darkened and inconspicuously glandular, pistillode flask-shaped, 0.9-1.0 mm long, the base glandular-lepidote. Pistillate flowers: calyx as in staminate flowers but 0.8-0.9 mm long. Corolla as in staminate flowers but 1.8-1.9 mm long. Staminodes 0.9-1.0 mm long, filaments 0.7-0.8 mm long, sterile thecae similar to anthers but 0.5 mm long. Pistil ca. 1.4 mm long, ovary ca. 0.8 mm long, tapering to a short and stout style; stigma capitate, bilobate; ovules 2. Fruit: 0.5-0.6 mm long, 0.4-0.5 mm diameter; endocarp smooth or rugose externally; "aril" scanty, adnate to seed and endocarp; endosperm type I; embryo slightly curved, 3.0-4.5 mm long.

Distribution. Guyana, Suriname, and French Guiana; at altitudes of 300-1000 m (Fig. 2).

GUYANA. Upper Mazaruni River, long. about  $60^{\circ} 10' W$ ,  
 22 IX 1922, De La Cruz 2045 (NY), 22 IX 1922, De La Cruz  
2168 (NY); Upper Rupununi River, near Dadanawa, lat.  $2^{\circ}$   
 $45' N$ , De La Cruz 1706 (NY); Upper Mazaruni River,  
 Kamakusa, 15 XII 1922, Lang & Persaud 374 (F, NY);  
 Coomaka, X 1924, Persaud 199 (F, K, NY); Moraballi Creek,  
 Essequibo River, 30 XI 1938, Davis 2764 (Forest Dept.  
D601-2764) (BM, K, NY, P, S, U), 12 X 1939, Forest Dept.  
British Guiana F271-3007 (K, NY, U); Makreba Falls,  
 Kurupung River, Upper Mazaruni Region, 25 II 1939, Pinkus  
252 (BR, G, NY, M, RB, S, VEN); Upper Mazaruni River Basin,  
 Mt. Ayangana, alt. 762 m, 3 VIII 1960, Tillett, Tillett &  
Boyan 45012 (NY, P, S, U, VEN); Eagle Mountain, alt. 2000  
 feet, 27 I 1943, Forest Dept. British Guiana F1158-3894 (K);  
 Kaieteur Plateau, 1 V 1944, Maguire & Fanshawe 23122 (F, G,  
 GH, IAN, NY, S, US, VEN); 65 miles Bartica-Potaro Road,  
 28 XI 1947, Forest Dept. British Guiana F2790-5589 (NY, U);  
 10 miles Bartica-Potaro Road, 14 III 1948, Forest Dept.  
British Guiana F2803-5602 (NY, RB, U, VEN); without  
 locality, Appun 836 (K), XII 1890, Jenman 6270 (K).

SURINAME. Hendriktop, alt. 1080 m, 14 III 1922, B. W. 5662  
 (U), 13 III 1922, 5631 (U); ad fl. Carouany, II 1844,  
Kappler 1729 (P, S, U, W); in montibus, qui dicuntur Nassau,  
 2 III 1949, Lenjouw & Lindeman 2661 (NY, U); Nassaubeberge,  
 lijn 13, alt. 550 m, 5 I 1955, Lindeman & Cowan 7000 (U);  
 Nassau Mountains, Marowijne River, alt. 400-550 m, 14 III 1955,  
Maguire, Cowan & Lindeman 40805 (NY, US, VEN); FRENCH GUIANA.

Karouany, 1857, Sagot 1031 (BM, P, S, W); Montagne de Kaw, alt. 275 m, 11 XII 1954, Cowan 38722 (NY, U, US, VEN).

Local name: Teterumaballi (Fanshawe 5602, Guyana).

This species is characterized by the elongate, free filaments and the glabrous corolla lobes. It is the only Guayanan species growing at elevations of 300 to 1000 meters. Its relationships seem to lie with C. lepidotus and with the Amazonian species C. amplus, C. guyanensis, C. pseudo-icacoreus. All these have type I endosperm.

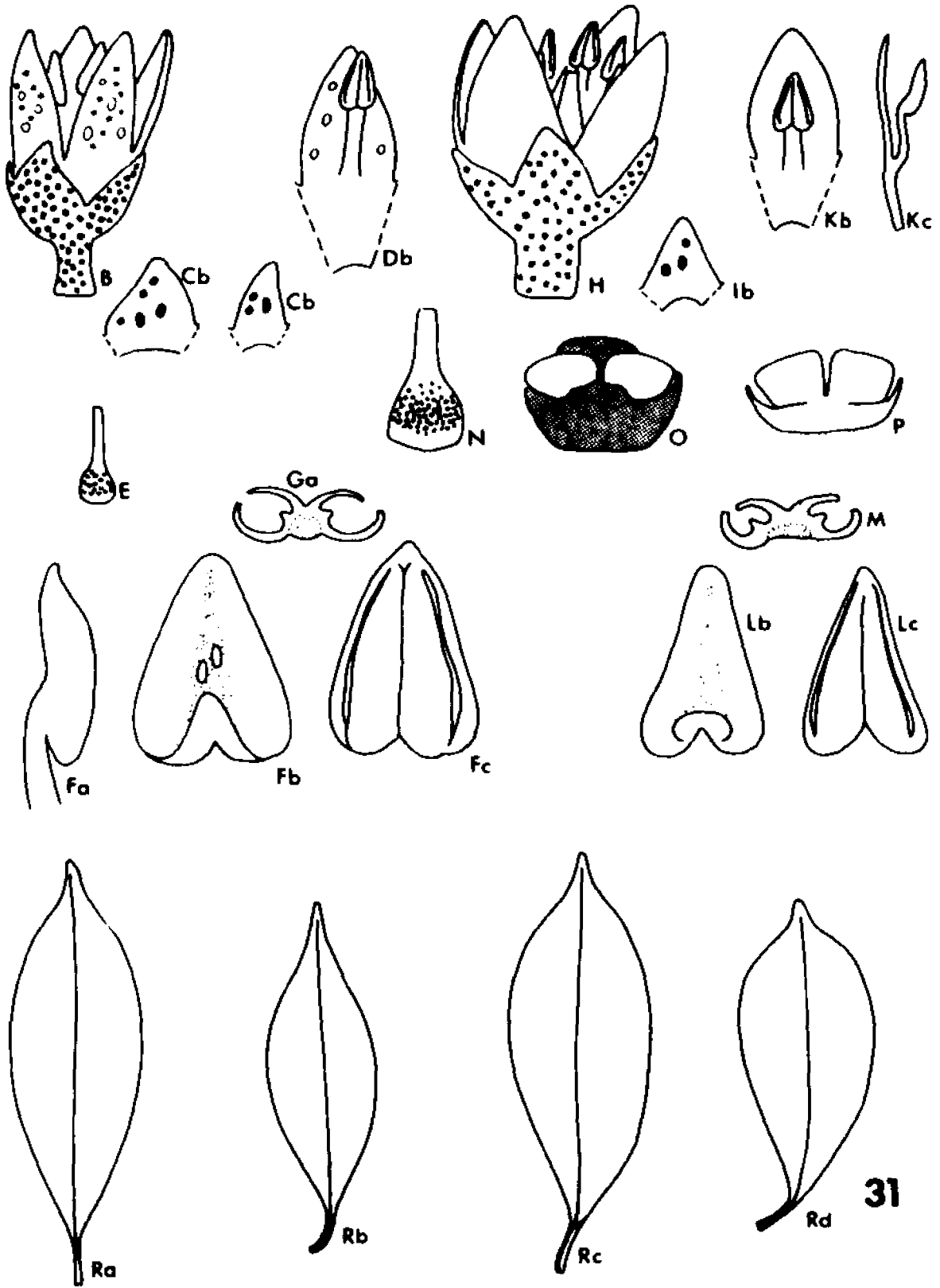
C. multipunctatus is frequently confused with C. guyanensis from which it differs by the elongate free filaments, the glabrous corolla lobes, and the shorter petioles, 0.5-1.0 cm long.

2. *Cybianthus pittieri* Agostini, sp. nov. (Fig. 31).  
*~~~~~*

Arbor ad 6-metralis. Ramuli dense lepidoti.  
 Petioli 0.4-1.0 cm longi dense lepidoti, laminis anguste ellipticis elliptico-obovatis vel obovatis membranaceis vel chartaceis 5.0-7.5 x 2.2-2.5 cm, basi acutis vel obtusis decurrentibus, apice breviter acuminatis abrupte breviter vel longiacuminatis acumine 0.5-1.0 cm longo, supra laevibus juveniliter dense lepidotis maturitates glabrescentibus haud prominenter scrobiculatis subtus parce lepidotis, costa media subtus elevata supra sulcata, nervis lateralibus utrinque, latere 18-24 haud conspicuis vel subtus paullo elevatis. Inflorescentia racemosa vel paniculata basi 1-2-ramosa 1.5-3.5 cm longa, pedunculo axi ramulis pedicellisque dense lepidotis, pedunculo 0.1-0.3 cm longo, pedicellis sub anthesi 0.9-2.0 mm longis, bracteis bracteolisque ovatis vel deltoideo-ovatis pedicellis brevioribus 1.2-1.5 x 0.4-0.6 mm dorso dense lepidotis. Flores 4-meri. Flores masculi: calyce cupuliformi 1.0-1.3 mm longo extus parce lepidoto intus glabro, tubo 0.2-0.3 mm longo, lobis triangulari-ovatis crassiusculis 0.9-1.0 x 0.7-0.9 mm ad apicem rotundatum attenuatis, marginibus lepidotis, glandulis schizogenis paucis haud prominentibus inconspicuis parvis atrobrunneis. Corolla 2.5-3.0 mm longa, tubo 0.8-1.3 mm longo ubique glabro, lobis ovatis vel lati ovatis chartaceis 1.7-2.0 x 1.2-1.4 mm extus parce lepidotis intus glabris ad apicem rotundatum vel acutum attenuatis, marginibus glabris, glandulis schizogenis inconspicuis parvis paucis pallido-brunneis

## FIGURE LEGEND (31)

Fig. 31. C. pittieri. For legend and scales see  
Figure 24. B-F, Ra and Rb. Pittier 9246. H-O, Rc and Rd.  
Pittier 15616.



haud prominentibus. Stamina 2.2-2.9 mm longa cum tubo corollae 0.7-1.4 mm adnata, filamentis ca. 1.0 mm longis haud glandulosis in tubum haud connatis, antheris dorsifixis triangulari-ovatis paullo curvatis 0.9-0.6 mm longis basi cordatis apice rotundato vel apiculato attenuatis, connectivo atrofusco inconspicue glandulosi, glandulis schizogenis pallido brunneis. Pistillodium elongatum conicum ca. 1.4 mm longum basi glandulari-lepidotum. Flores foeminei: Calyce subcupuliformi 1.0-1.3 mm longo, lobis 0.7-0.9 mm longis. Corolla 2.0-2.5 mm longa, tubo 0.8-1.0 mm longo, lobis 1.2-1.4 mm longis. Staminodia 1.9-2.2 mm longa cum tubo corollae 0.8-0.9 mm adnata, filamentis 0.7-0.8 mm longis in tubum haud connatis, thecis sterilibus dorsifixis triangular-ovatis paullo curvatis 0.7-0.8 x 0.5-0.6 mm, basi cordatis apice apiculato attenuatis, connectivo atrofusco, inconspicue glanduloso, glandulis schizogenis pallido-brunneis. Pistillum 1.8-1.9 mm longum, ovario ca. 1 mm longo 0.8-0.9 mm diametro dense glandulari-lepidoto inconspicue glandulari, stylo 0.7-0.8 mm longo, stigmate truncato, ovulis 2-3. Fructus 5-6 mm longus 6-7 mm diametro, endocarpio extus verruculoso, pseudo-arillo exiguo ad semen endocarpiumque adnato, endospermio typo I, embryone curvato ca. 3 mm longo.

Small tree to 6 m. Branchlets densely lepidote. Petioles 0.4-1.0 cm long, densely lepidote; leaf blades narrowly elliptic, elliptic-obovate or obovate, membranaceous to chartaceous, 5.0-7.5 cm long, 2.2-2.5 cm broad, ratio 2.5;

base acute or obtuse, decurrent; apex short acuminate, abruptly short- or long-acuminate, the acumen 0.5-1.0 cm long; upper surface smooth, densely lepidote when young, becoming glabrous with age, not prominently scrobiculate; lower surface sparsely lepidote; midrib raised on lower surface, depressed on the upper; nerves 18-24 pairs, inconspicuous on both surfaces or slightly raised on the lower. Inflorescence a raceme or a panicle with 1 to 2 branches from the base, 1.5-3.5 cm long; peduncle, axis, branches, and pedicels densely lepidote; peduncle 0.1-0.3 cm long; pedicels at anthesis 0.9-2.0 mm long; bracts and bracteoles ovate or deltoid-ovate, shorter than the pedicels, 1.2-1.5 mm long, 0.4-0.6 mm broad, densely lepidote dorsally. Flowers 4-merous. Staminate flowers: calyx cupuliform, 1.0-1.3 mm long, sparsely lepidote externally, glabrous internally; tube 0.2-0.3 mm long; lobes triangular-ovate, fleshy, 0.9-1.0 mm long, 0.7-0.9 mm broad, the apex attenuate to a round tip, the margin lepidote, the schizogenous glands few, not prominent, inconspicuous, small, and dark brown. Corolla 2.5-3.0 mm long; tube 0.8-1.3 mm long, glabrous on both surfaces; lobes ovate or broadly ovate, chartaceous, 1.7-2.0 mm long, 1.2-1.4 mm broad, sparsely lepidote externally, glabrous internally, the apex attenuate to a round or acute tip, the margin glabrous, the schizogenous glands inconspicuous, small, few, pale brown, not prominent. Stamens 2.2-2.9 mm long, adnate 0.7-1.4 mm to the corolla tube; filaments ca. 1 mm

long, not glandular, not connate in a tube; anthers dorsifixed, triangular-ovate, slightly curved, ca. 0.9 mm long, ca. 0.6 mm broad, cordate at the base, attenuate to a round tip or apiculate tip at apex, the connective darkened, inconspicuously glandular, the schizogenous glands pale brown. Pistillode elongate conic, ca. 1.4 mm long, the base glandular-lepidote. Pistillate flowers: calyx subcupuliform, as in staminate flowers but lobes 0.7-0.9 mm long. Corolla 2.0-2.5 mm long; tube 0.8-1.0 mm long, as in staminate flowers but lobes 1.2-1.4 mm long. Staminodes 1.9-2.2 mm long, adnate 0.8-0.9 mm to the corolla tube; filaments 0.7-0.8 mm long, not connate in a tube, sterile thecae dorsifixed, triangular-ovate, slightly curved, 0.7-0.8 mm long, 0.5-0.6 mm broad, cordate at the base, attenuate to an apiculate tip at apex, the connective darkened, inconspicuously glandular, the schizogenous glands pale brown. Pistil 1.8-1.9 mm long; ovary ca. 1 mm long, 0.8-0.9 mm diameter, densely glandular-lepidote, inconspicuously glandular; style 0.7-0.8 mm long; stigma truncate; ovules 2-3. Fruits: 5-6 mm long, 6-7 mm diameter; endocarp verruculose externally; "aril" scanty, adnate to seed and endocarp; endosperm type I; embryo curved, ca. 3 mm long.

Type. Tobago, Forest Reserve, 16 III 1911, W. E. Broadway 4051 (holotype, L; isotypes, F, NY, S, U, US).

Distribution. Venezuela and Tobago. In Venezuela it is restricted to the Coastal Range at altitudes of 800-1400 m. It is also probably found in Trinidad (Fig. 2).

VENEZUELA. State of Carabobo: selva arriba de Rio San Gian, sur de Borburata, entre La Toma y La cumbre de La Fila, alt. 750-1000 m, 28 III 1966, Steyermark & Steyermark 95218 (P, S, NY, VEN). State of Aragua: Quebrada de Guamitas, Parque Nacional, alt. 1000 m, 1 X 1947, Pittier & Nakichenovich 15616 (VEN); selva arriba de Guamitas, alt. 1000 m, III 1948, Pittier 15771 (VEN); Dto. Federal: entre El Aguacatal y Alto del Cogollal, alt. 1400 m, 1921, Pittier 9246 (G. NY, VEN). TOBAGO. Forest Reserve, 16 III 1911, Broadway 3993 (F, L, M, S, U), 4051 (type; F, L, NY, S, U, US).

This species can be distinguished from the other species in the section by the combination of acuminate leaf blades, 5-8 cm long, elongate filaments not connate in a tube, and the petals glabrous within.

Cybianthus pittieri is frequently confused with C. rostratus from which it differs by the glabrous inner surface of the petals, a longer corolla, and absence of a conspicuous staminal tube. C. rostratus is found in the Lesser Antilles from Guadeloupe to St. Vincent but has never been collected in Tobago.

3. *Cybianthus caracasanus* (Mez) Agostini, comb. nov. (Fig. 25)

*Conomorpha caracasana* Mez in Engler, Pflanzenreich  
4(236): 260. 1902.

Type: Venezuela, Aragua, Prope Colonia Tovar, 1854-1855,  
A. Fendler 751 (lectotype, G; isotypes, BR, G, GH,  
K, NY, P, S).

Tree to 6 m. Branchlets densely lepidote. Petioles 1-2 cm long, densely lepidote; leaf blades elliptic to elliptic-obovate, thin, chartaceous to coriaceous, 8-12 cm long, 3.5-5.0 cm broad, ratio 2.2-2.4; margin flat to subrevolute, base obtuse or acute, decurrent; apex abruptly acuminate, the acumen 1.0-2.5 cm long; midrib raised on lower surface, depressed on the upper; nerves 14-20 pairs, raised on both surfaces; upper surface reticulate, densely lepidote when young, becoming glabrous with age, shallowly scrobiculate; lower surface sparsely lepidote, not reticulate. Inflorescence a raceme, or a panicle with 1 to 3 branches from the base, 2.5-3.0 cm long; peduncle, axis, branches and pedicels densely lepidote; peduncle 0.1-0.2 cm long; pedicels at anthesis 1.0-2.5 mm long; bracts and bracteoles narrowly triangular, 1.0-1.5 mm long, 0.3-0.4 mm broad, densely lepidote dorsally. Flowers 4-merous. Staminate flowers: calyx cupuliform, 1.2-1.5 mm long, sparsely lepidote externally, glabrous internally; tube 0.3-0.4 mm long; the lobes ovate to triangular-ovate, fleshy, 1.0-1.2 mm long, 0.7-0.8 mm broad, the apex acute and attenuate to a round tip, the margin lepidote,

the schizogenous glands absent or inconspicuous. Corolla 3.2-4.0 mm long; tube 1.5-2.0 mm long, densely glandular-granulose outside, glabrous inside; lobes ovate, membranaceous, 1.7-2.0 mm long, 1.3-1.4 mm broad, densely glandular-granulose on both surfaces, the apex attenuate to a round tip, the margin glandular-granulose, the schizogenous glands absent or inconspicuous. Stamens 2.5-3.0 mm long, adnate 1.8-2.1 mm to the corolla tube; filaments flattened, 0.6-0.8 mm long, not glandular, not connate in a tube; anthers dorsifixed, triangular-ovate, curved, 0.6-0.8 mm long, 0.4-0.5 mm broad, cordate at base, attenuate to an apiculate tip at apex, the connective dark and inconspicuously glandular. Pistillode conic, 2.0-2.1 mm long, the base glandular-lepidote.

Pistillate flowers: calyx cupuliform, 1.0-1.1 mm long, sparingly lepidote externally, glabrous internally; tube 0.1-0.2 mm long; the lobes broadly ovate to deltate-ovate, fleshy, ca. 0.8 mm long, ca. 0.8 mm broad, the apex obtuse, attenuate to a round tip, the margin lepidote, the schizogenous glands absent or inconspicuous. Corolla 2.2-2.5 mm long; tube 0.8-1.1 mm long, densely glandular-granulose externally, glabrous internally; lobes ovate, membranaceous, 1.5-1.7 mm long, 0.8-1.1 mm broad, densely glandular-granulose on both surfaces, the apex attenuate to a round tip, the schizogenous glands one, dark or inconspicuous. Staminodes 1.6-1.8 mm long, adnate 1.0-1.2 mm to the corolla tube; filaments flattened, 0.4-0.6 mm long, glabrous, not glandular, not connate in a tube, sterile thecae dorsifixed, triangular-

ovate, ca. 0.5 mm long, ca. 0.3 mm wide, the base cordate, the apex attenuate to an apiculate tip, the connective darkened and inconspicuously glandular. Pistil 1.8-1.9 mm long; ovary 0.7-0.8 mm long, 0.7-0.8 mm diameter, lepidote externally; style slender, 0.7-0.8 mm long, with a few dark schizogenous glands; stigma capitate, lobed; ovules 2-3. Fruit: ca. 5 mm long, ca. 5.5 mm diameter; endocarp smooth; "aril" scanty, adnate to seed and endocarp; endosperm type II; embryo flexuose, 1.4-1.6 mm long.

Distribution. Known only from the Coastal ranges of the State of Aragua in Venezuela, at elevations of 1500-1700 m (Fig. 2).

VENEZUELA. Edo. Aragua: Prope Colonia Tovar, 1854-1855, Fendler 751 (type: BR, G, GH, K, NY, P, S); Colonia Tovar, Moritz 1666 (paratypes, P, GH, B, W), Karsten s. n. (92?) (W); Subida de Guanitas a La Mesa, Parque Nacional "H. Pittier", alt. 1600 m, VII 1947, Pittier & Nakichenovich 15489 (VEN); Subida de las vueltas, lat. 1500 m, 2 VIII 1947, Pittier 15525 (VEN); knife-edge above Rancho Grande Biological Station, towards Pico Guacamayo, Parque Nacional "H. Pittier", alt. 1500-1700 m, 20 X 1961, Steyermark 89796 (VEN).

This species is characterized by prominent reticulate veins on the upper surface of leaf blades. Some populations of C. laurifolius also show a reticulation on the upper surface of blades but it is not as prominent.

C. caracasanus can be further distinguished from C. laurifolius by the elongate filaments and seeds with type II endosperm. From the sympatric C. pittieri, C. caracasanus can be distinguished by the glandular-granulose inner surface of the petals and the endosperm of type II. Because Mez did not select a type, a lectotype had to be selected from among the four collections (Karsten 62, Fendler 751, Moritz 292 and Moritz 1666) cited by him in the original diagnosis.

4. Cybianthus rostratus (Hassk.) Agostini, comb. nov. (Fig. 32)

Ardisia rostrata Hasskarl, Flora 51: 26. 1868.

Conomorpha peruviana A. DC. var. rostrata (Hasskarl)

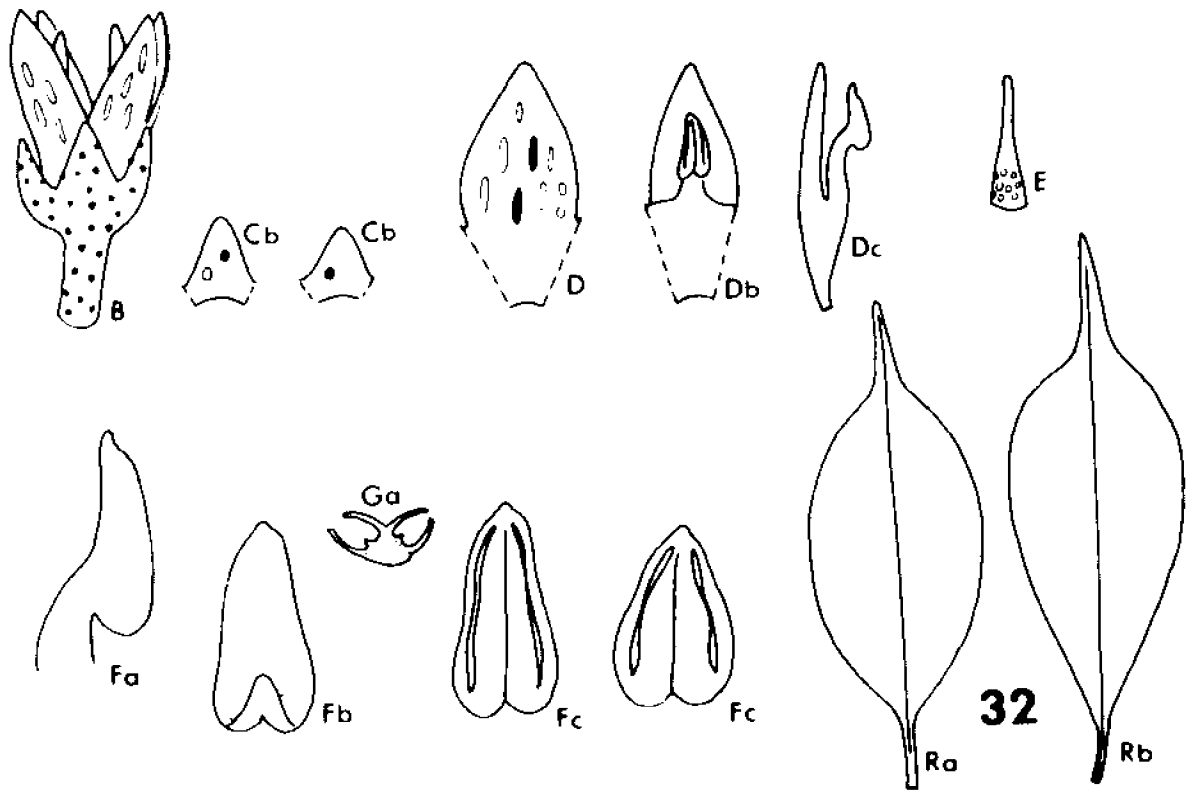
Mez in Urban, Symb. Antill. 2: 422. 1901.

Type: West Indies, sine loco speciali, J. K. Hasskarl 9  
(lectotype, L).

Shrub or small tree to 5 m. Branchlets densely lepidote. Petioles 0.6-0.8 mm long, densely lepidote; leaf blades obovate or elliptic-obovate, membranaceous, 4-7 cm long, 2.5-3.0 cm broad, ratio 1.6-2.5; margin flat; base obtuse or acute, decurrent; apex abruptly long-acuminate to caudate, the acumen 0.6-1.2 cm long, rounded or acute at the tip; midrib raised on lower surface; depressed on the upper; nerves 28-32 pairs, inconspicuous above, slightly raised below; upper surface smooth, densely lepidote when young, becoming glabrous with age; lower surface sparsely lepidote. Inflorescence a raceme or a panicle with 1 or 2 branches from the base, 3-6 cm long; peduncle, axis, branches, and pedicels sparsely lepidote; peduncle 0.2-0.6 cm long; pedicels at anthesis 1.2-2.5 mm long; bracts and bracteoles narrowly triangular to deltate-ovate, shorter than the pedicels 0.8-1.2 mm long, 0.4-0.6 mm broad, sparingly lepidote dorsally. Flowers 4-merous. Staminate flowers: calyx cupuliform, 1.0-1.2 mm long, sparsely lepidote externally, glabrous internally; tube 0.2-0.3 mm long; lobes triangular to deltate-ovate, fleshy, 0.7-0.8 mm long, 0.6-0.8 mm broad, the apex attenuate to a round or acute tip,

## FIGURE LEGEND (32)

Fig. 32. C. rostratus. For legend and scales see  
Figure 24. B-F, Rb. Beard 1355. Ra. Eggers 620.



the margin lepidote, the schizogenous glands not prominent, few, dark or pale brown. Corolla 2.1-2.5 mm long; tube 1.0-1.1 mm long, glabrous on both surfaces; lobes ovate, fleshy, 1.3-1.6 mm long, 0.9-1.3 mm broad, sparsely lepidote or glabrous externally, densely glandular-granulose internally, the apex attenuate to an acute or round tip, the margin glandular-granulose, the schizogenous glands not prominent, elongate and pale or dark brown. Stamens 2.0-2.3 mm long, adnate 0.9-1.0 mm to the corolla tube; filaments 0.7-0.8 mm long, not glandular, connate in a tube 1.0-1.1 mm high, the staminal tube with or without lobes alternating with the petals; anthers dorsifixed, triangular-ovate, curved or straight, 0.5-0.7 mm long, 0.3-0.4 mm broad, cordate at the base, attenuate to an apiculate tip at apex, the connective darkened, inconspicuously glandular. Pistillode elongate conic, 1.2-1.4 mm long, the base glandular-lepidote. Pistillate flowers: not seen. Fruits: 0.6-0.7 mm long, 0.7-0.8 mm diameter; endocarp verruculose externally; "aril" scanty, adnate to seed and endocarp; endosperm type I; embryo straight ca. 4 mm long.

Distribution. Restricted to the Lesser Antilles from Guadeloupe to St. Vincent, at altitudes of 500-800 m (Fig. 2).

GADELOUPE. Bois du morne Desboulais a Pigeon, Duss 3734 (NY). DOMINICA. Layou River road, 11.5 miles from Roseau, 18 IV 1959, Cowan 1627 (NY); Rivesdale, 6 III 1946, Beard 1455 (NY, S); Rosehill, alt. 800 m, I 1882, Eggers 620 (BR, G, L, M, P, W, Z); sine loco speciali, 1839, Inray s. n. (NY).

Imray s. n. (K), Ramage, VII 1888 (K, NY). MARTINIQUE. Without locality, herb. Mart. Suppl. No. 74, Sieber s. n. (GH, M). STA. LUCIA. Piton Flore, alt. 600 m, 25 V 1945, Beard 480 (NY, V); vicinity of Mt. Gimie, alt. 1500 feet, 2 VIII 1959, Webster, Ellis & Miller 9422 (S); without locality, Ramage, X 1888 (K). ST. VINCENT. Mount George, alt. 2400 feet, I 1890, Eggers 6873 (P); Buccament Valley, 21 XI 1945, Beard 1355 (NY, S); without locality, alt. 2000-3000 feet, Smith & Smith 1286 (BM, NY), Hooker, anno 1828 (G). WEST INDIES. Sine locus: Foreyth s. n. (G); Herb. Dr. Hasskarl 9 (lectotype, L); Mourne St. Andrews, II 1823, Collector ignotus 6 (BM, W).

This taxon was considered by Mez to be a variety of C. peruvianus. After closely examining specimens from several islands of the Lesser Antilles, I have concluded that C. rostratus merits recognition at the specific level. It can be distinguished from C. peruvianus (as here considered) mainly by the elongate filaments, the longer pedicels, and the shorter, flat-margined leaf blades.

Cybianthus rostratus can be distinguished from the other species in the section by the elongate filaments, the glandular-granulose inner surface of petals, the staminal tube well developed in staminate flowers, and the corolla only 2.0-2.5 mm long. From the sympatric C. dussii it can be distinguished by the longer (4-7 cm) leaf blades which are usually long acuminate. C. rostratus also resembles

C. pittieri, a species from Tobago and northern Venezuela. It can be differentiated from C. pittieri by the presence of a staminal tube and the smaller corolla.

In his original diagnosis of Ardisia rostrata, J. K. Hasskarl did not cite specimens. Hasskarl's herbarium is presently deposited at the Rijksherbarium in Leiden, Netherlands. The sheet that bears Hasskarl's stamp has two branches on it. The lower branch has flowers while the upper one bears young fruits. Judging from the description, Hasskarl examined both specimens. Nevertheless, he apparently did not annotate the specimens. Except for the number 2 and the word Patria ?, all other annotations were obviously made at a later time. There is no doubt that these two specimens are conspecific with the others collected in the Lesser Antilles. There is also little doubt that these two branches were the original specimens examined by Hasskarl. Consequently, the lower branch in the sheet which bears flowers has been selected as the lectotype.

5. Cybianthus dussii (Mez) Agostini, comb. nov. (Fig. 33)  
Conomorpha dussii Mez in Urban Symb. Antill. 2: 421.  
 1901.

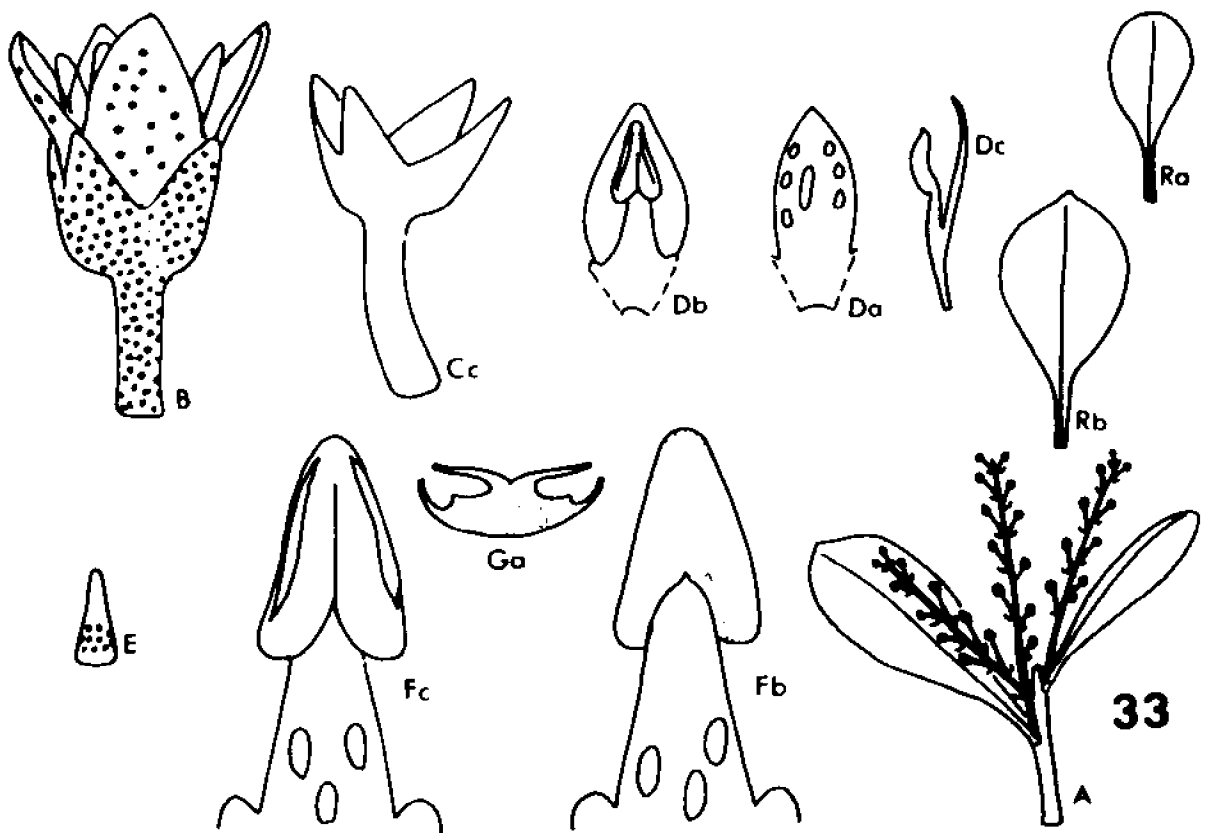
Type: Martinique, sommets des montagnes, a la pointe du mont dit Morne d'Amour, entre Deux-Choux et les Pitons du Carbet, 1880, Pere Duss 147-b (lectotype, NY; isoelectotype, NY).

Shrub to 4 m. Branchlets densely lepidote. Petiole 0.5-0.7 cm long, densely lepidote. Leaf blade obovate to broadly obovate, subcoriaceous, 1.9-2.6 cm long, 1.3-1.8 cm broad; margin revolute; base attenuate to obtuse, decurrent; apex rounded, retuse or shortly acuminate; midrib raised on lower surface and slightly depressed on the upper; nerves 8-10 pairs, raised beneath, inconspicuous above; upper surface smooth or slightly wrinkled in dry specimens, densely lepidote when young, glabrescent with age; lower surface densely to sparingly lepidote. Inflorescence an axillary raceme, or a panicle with 1 or 2 branches from the base, 2.5-3.5 cm long; axis, branches, and pedicels densely lepidote; peduncle ca. 0.5 cm long; pedicels at anthesis 1.5-2.5 mm long; bracts and bracteoles narrowly ovate, 1.0-1.3 mm long, 0.4-0.5 mm broad, densely lepidote dorsally.

Flowers 4-merous. Staminate flowers: calyx cupuliform, 1.4-1.5 mm long, densely lepidote outside, glabrous inside; tube 0.4-0.7 mm long; the lobes triangular, fleshy, 0.7-0.9 mm long, 0.5-0.7 mm broad, acute at apex, attenuate to a round tip, lepidote on margin, with

## FIGURE LEGEND (33)

Fig. 33. C. dussii. For legend and scales see  
Figure 24. A-R. Duss 147b.



no visible schizogenous glands. Corolla 2.0-2.2 mm long; tube 0.4-0.5 mm long; lobes ovate to ovate-elliptic, fleshy, 1.6-1.8 mm long, 1.1-1.2 mm broad, the apex attenuate to a rounded or sometimes cucullate tip, sparingly glandular-lepidote outside, glabrous and papillate inside, with a few inconspicuous schizogenous glands. Stamens 1.2-1.3 mm long, adnate 0.4-0.5 to the corolla; filaments somewhat flattened, 0.6-0.7 mm long, glabrous, with 2 or 3 inconspicuous schizogenous glands; staminal tube bearing lobes 0.1 mm high alternating with the petals; anthers dorsifixed, ovate, 0.6-0.7 mm long, 0.5-0.6 mm broad, cordate at base, attenuate to a round tip at apex, the connective darkened and inconspicuously glandular. Pistillode elongate conic, hollow, 1.4-1.5 mm long, glandular lepidote towards the base, the schizogenous glands not prominent. Pistillate flowers: not seen. Fruits: not seen.

Distribution. Endemic to the island of Martinique (Fig. 2).

MARTINIQUE: Morne d'Amour, 1880, Duss 147-b (type, NY), 1881, Duss 610 (K).

This species is characterized by the small and broadly obovate leaf blades and the revolute margin at least near the base of the blade. It can be distinguished from the sympatric C. rostratus by the smaller leaf blades which are rounded at the apex and never abruptly

acuminate. C. dussii can be distinguished from the other species with small leaves by the elongate filaments. From its close relative C. biflorus it can be distinguished by the shorter flower pedicels and the inflorescence with more than two flowers.

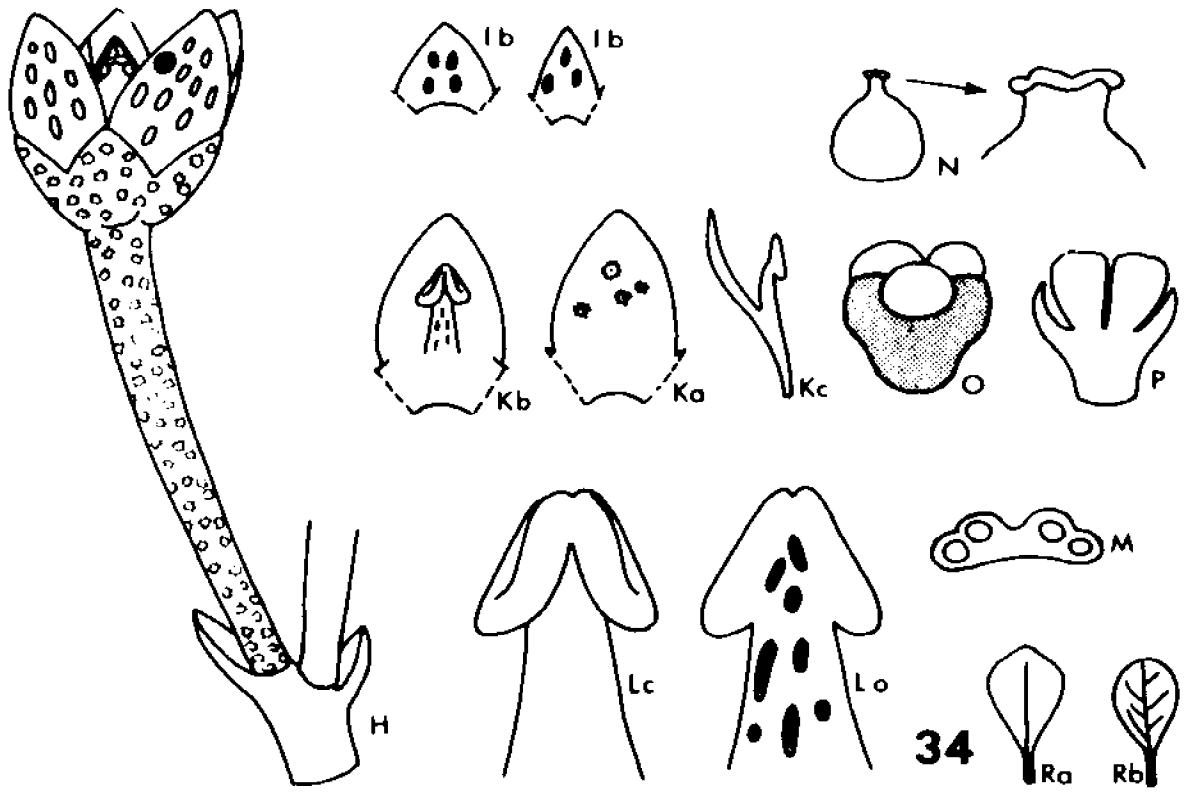
The lectotype of this species had to be selected from two collections cited by Mez. One of the syntypes at NY bears a label which contains data pertaining to the three collections. The label shows that the specimens were collected at the same locality.

6. Cybianthus biflorus Agostini, sp. nov. (Fig. 34)

Frutisque ad 2.5-metralis. Ramuli dense lepidoti. Petioli 0.2-0.4 cm longi dense lepidoti, laminis obovatis vel late obovatis chartaceis 1.3-2.0 x 0.9-1.2 cm basi cuneatis, apice obtusis vel rotundatis, supra pustulatis juveniliter dense lepidotis maturitates glabrescentibus subtus parce lepidotis, costa media subtus elevata supra paullo sulcata, nervis lateralibus utrinque latere 5-7 haud conspicuis vel utrinque paullo elevatis. Inflorescentia racemosa vel subumbellata plerumque 2-flora 1.5-2.0 cm longa, pedunculo axi pedicellisque parce lepidotis, pedunculo 1.0-1.5 cm longo, pedicellis sub anthesi 4.0-5.5 mm longis, bracteis ovatis 0.7-1.0 x 0.4-0.5 mm dorso parce lepidoto. Flores 4- vel raro 5-meri. Flores masculi non visi. Flores foeminei: Calyce cupuliformi 0.7-0.8 mm longo extus parce lepidoto intus glabro, tubo 0.2-0.3 mm longo, lobis triangular-ovatis vel deltoideo-ovatis crassiusculis 0.6-0.8 x 0.6-1.0 mm, ad apicem obtusatum, marginibus parce lepidotis, glandulis schizogenis paucis haud prominentibus atrobrunneis. Corolla 1.9-2.0 mm longa, tubo 0.5-0.6 mm longo ubique glabro, lobis late ovatis crassiusculis 1.5-1.6 x 1.3-1.5 mm extus parce lepidotis intus glabris vel parce glandulari-granulosis, glandulis schizogenis parvis paucis atrobrunneis aliquando 1 vel 2 magis atrobrunneis prominentibus. Staminodia 1.5-1.8 mm longa cum tubo corollae 0.7-0.8 mm adnata, filamentis 0.4-0.5 mm longis in tubum haud connatis, thecis sterilibus dorsifixis deltoideo-ovatis 0.4-0.5 x 0.4-0.5 mm, basi

## FIGURE LEGEND (34)

Fig. 34. C. biflorus. For legend and scales see  
Figure 24. H-R. Tillett and Tillett 45056.



cordatis apice apiculato vel truncato attenuatis, glandulis schizogenis paucis atrobrunneis. Pistillum 1.0-1.2 mm longum, ovario 0.9-1.0 mm longo 0.9-1.0 mm diametro basi glandulari-lepidotum, stylo 0.1-0.2 mm longo, stigmatе capitato lobulato, ovulis 2-3. Fructus non visus.

Shrub to 2.5 m. Branchlets densely to sparingly lepidote. Petiole 0.2-0.4 cm long, densely lepidote. Leaf blades broadly obovate to obovate, chartaceous, 1.3-2.0 cm long, 0.9-1.2 cm broad, ratio 1.3-1.4; base cuneate, decurrent; apex obtuse or rounded; midrib raised on lower surface and slightly depressed on the upper; nerves 5-7 pairs, inconspicuous or only slightly conspicuous in both surfaces; upper surface with pusticulate, dark schizogenous glands, densely lepidote when young, sparingly lepidote when mature; lower surface sparingly lepidote. Inflorescence a sub-umbellate raceme, usually with two flowers, 1.5-2.0 cm long; axis sparingly lepidote; peduncle 1.0-1.5 cm long; pedicels at anthesis 4.0-5.5 mm long; bracts ovate, 0.7-1.0 mm long, 0.4-0.5 mm broad, sparingly lepidote ventrally. Flowers 4- or rarely 5-merous. Staminate flowers: not seen. Pistillate flowers: calyx cupuliform, 0.7-0.9 mm long, sparingly lepidote outside, glabrous inside; tube 0.2-0.3 mm long; the lobes ovate-triangular or deltate-ovate, fleshy, 0.6-0.8 mm long, 0.6-1.0 mm broad, obtuse at apex, margin entire or crenulate, schizogenous glands few and dark. Corolla 1.9-2.0 mm long; tube 0.5-0.6 mm long, glabrous on both surfaces; lobes broadly ovate, fleshy, 1.5-1.6 mm long,

1.3-1.5 mm broad, the apex obtuse, sparingly lepidote outside, smooth and glabrous or sparingly glandular-lepidote inside, schizogenous glands few and dark, one or two occasionally darker and prominent. Staminodes 1.5-1.8 mm long, adnate 0.7-0.9 mm to the corolla tube; filaments flattened, 0.4-0.5 mm long, glabrous, with a few dark schizogenous glands; staminal tube not developed; sterile thecae dorsifixed, deltate-ovate, 0.4-0.5 mm long, 0.4-0.5 mm broad, cordate at base, attenuate to a truncate or emarginulate tip at the apex, connective with 2-3 dark schizogenous glands. Ovary subglobose, 0.9-1.0 mm long, 0.9-1.2 mm diameter, glandular-lepidote; style short and stout, 0.1-0.2 mm long, glabrous; stigma capitate and lobulate; ovules 2-3. Fruits: not seen.

Type. Guyana, Upper Mazaruni River Basin, Mount Ayangana, on shoulder of E. flank, above Thompson Camp, "small shrub to 2.5 m with wand-like horizontal branches; leaves stiff, coriaceous, dark green above, lighter beneath; calyx reddish, corolla creamy; fruit reddish; frequent", alt. 1370-1525 m, 8 VIII 1960, Stephen S. Tillett, Carolyn L. Tillett, & Rufas Boyan 45056 (holotype, NY; isotypes, VEN, US).

Distribution. Guyana, known only from Mount Ayangana (Fig. 2).

This species can be readily distinguished from the other species in the section by the combination of divaricate lateral branches, small leaves, reduced umbellate raceme with usually two flowers, and elongate filaments. The closest relative seems to be C. dussii, an allopatric species

endemic to Martinique. Both have small leaf blades and elongate filaments. It can be distinguished from C. dussii by the slender flower pedicels and the reduced inflorescence.

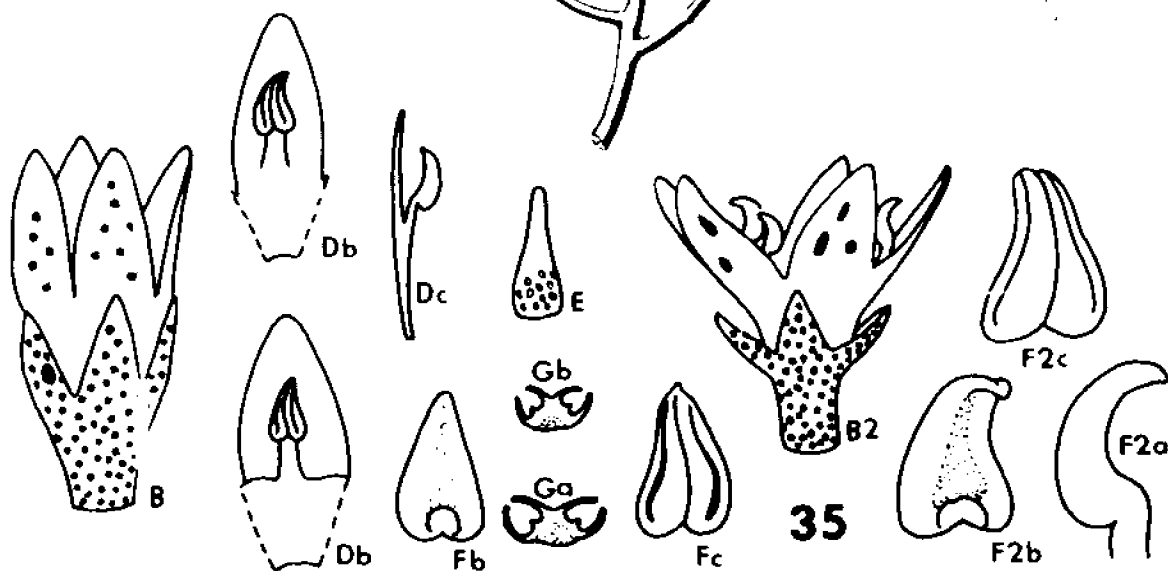
The fruits examined on the type specimen were actually galls with thick walls and no seeds. In place of the seed, 2-4 unidentified insect larvae were found.

7. Cybianthus guyanensis (A. De Candolle) Miquel in Martius,  
 Flora Brasiliensis 10: 298. 1856. (Fig. 35).  
Conomorpha guyanensis A. De Candolle, Ann. Sci. Natur.  
 ser 2, 16: 92. 1841  
Peckia guyanensis (A. De Candolle) O. Ktze. Rev. Gen.  
 2: 402. 1891.  
Conomorpha heterantha Bentham ex Miquel in Martius,  
 Flora Brasiliensis 10: 304. 1856. Type: Brasil,  
 Barra, Prov. Rio Negro, XII 1850-III 1851.  
R. Spruce 1041 (lectotype, M)  
 Type: British Guiana, sine loco speciali, 1898.  
R. Schomburgk 975 (holotype, G, photo seen;  
 isotypes, BM, G, GH, K, L, P, US, W).

Shrub or small tree to 5 m. Branchlets densely lepidote. Petioles 1.0-1.5-(2.0) cm long, densely lepidote; leaf blades narrowly elliptic, membranaceous or chartaceous, 9-14 cm long, 3-4 cm broad, ratio 3-4; margin not or only slightly revolute; base acute, decurrent; apex acuminate; midrib raised on lower surface, depressed on the upper; nerves 20-40 pairs, slightly raised on both surfaces or inconspicuous in the upper one; upper surface smooth or inconspicuously reticulate, densely lepidote when young, becoming glabrous with age; lower surface densely lepidote. Inflorescence a panicle with 1-3 branches from the base, 2-8 cm long; peduncle, axis, and branches densely lepidote; peduncle 0.2-0.5 cm long; pedicels at anthesis 0.5-1.0 mm long; bracts and bracteoles ovate, ca. 0.8 mm long, ca. 0.4

## FIGURE LEGEND (35)

Fig. 35. C. guyanensis. For legend and scales see Fig. 24. A-G. Schomburgk 975. A. Modified from Martius, Flora Brasiliensis, vol. 10, Pl. 49. B2-F2. Spruce 1150.



mm broad, densely lepidote dorsally. Flowers 4- or 5-merous. Staminate flowers: calyx subcupuliform, 0.8-1.2 mm long, densely lepidote externally, glabrous internally; tube 0.3-0.4 mm long; lobes triangular, chartaceous, 0.6-0.8 mm long, 0.5-0.6 mm broad, the apex attenuate to an acute tip, the margin lepidote, the schizogenous glands pale or dark brown, not prominent. Corolla 2.3-2.6 mm long; tube 0.8-1.0 mm long, glabrous on both surfaces; lobes elliptic, elliptic-ovate or ovate, chartaceous, 1.6-1.7 mm long, 0.9-1.0 mm broad, sparsely lepidote externally, densely glandular-granulose internally, the apex round or attenuate to a round tip, the margin glandular-granulose, the schizogenous glands dark or pale brown, not prominent. Stamens 1.5-1.8 mm long, adnate 0.9-1.1 mm to the corolla tube; filaments 0.2-0.4 mm long, not glandular, connate or not in a tube, the staminal tube not bearing lobes alternating with the petals; anthers dorsifixed, narrowly triangular or triangular-ovate, curved, 0.5-0.8 mm long, 0.3-0.4 mm broad, cordate at base, attenuate to an apiculate tip at apex, the connective dark and inconspicuously glandular. Pistillode conic, 1.2-1.4 mm long, the base glandular-lepidote. Pistillate flowers: calyx, corolla, and staminodes as in staminate flowers. Pistil 1.4-1.6 mm long; ovary ca. 0.7 mm long, ca. 1.0 mm diameter, glandular-lepidote externally; style stout, 0.7-0.8 mm long, tapering towards the top; stigma capitate, lobed; ovules 2. Fruit: not seen.

Distribution. Guyana and Brazil (Amazonas and Pará)(Fig. 3).

BRAZIL. Amazonas: Prope Barra, Prov. Rio Negro, Spruce 1041 (type of Conomorpha heterantha Miquel; lectotype, M; isotypes, BM, C, F, G, K, M, NY, W), IV 1851, 1150 (BR, C, G, K, NY, P, W); Prope Panure, ad Rio Uaupés, VIII 1852, Spruce 2436 (BM, BR, G, K, NY, P, W); Rio Negro, Icana, Cachoeira Tunuhy, 5 V 1947, Froese 22277 (U); Banks of Rio Urubu, between Cachoeira Iracema and Manaus-Itacoatira Road, 8 VI 1968, Prance, Philcox, Rodriguez, Ramos, & Farias 5083 (NY). Pará: Mosqueiro, estrada de Carananduba, 18 II 1923, Ducke 18663 (RB). Sine loco speciali: 1898, Schomburgk 975 (type of Conomorpha guyanensis A. De Candolle (holotype, G, not seen; isotypes, BM, G, GH, K, L, P, US, W)).

This species can be distinguished by the combination of oblong-elliptic leaf blades, the usually short filaments, the corolla 2.3-2.6 mm long, corolla lobes internally glandular-granulose, the staminal tube present but not prominent, and the flower pedicels 0.5-1.0 mm long. The closest relatives seem to be C. peruvianus and C. amplus. C. guyanensis can be distinguished from C. peruvianus by the oblong leaves, usually 12-19 cm long, having a flat or subrevolute margin. C. guyanensis is apparently confined to the low lands of Amazonia. On the other hand, C. peruviana can scarcely be considered Amazonian, since it has been found only at the periphery of Amazonia, on the eastern side of the Andes at altitudes up to 1500 m.

Cybianthus guyanensis can be distinguished from C. amplus by the thinner branches, only 2-3 mm in diameter at a point ca. 10 cm from the apex, and the leaf margin being flat or only subrevolute.

The binomial Conomorpha heterantha of Miquel was based on a specimen collected by Spruce (No. 1041) near Manaus (Barra) in Brazil. C. De Candolle based his binomial Conomorpha guyanensis on a specimen collected by R. Schomburgk (No. 975) presumably in Guyana (British Guiana). Close examination of these two type collections revealed no diagnostic differences. Occasionally the flowers of C. heterantha are heteromerous, the character upon which the name is based. In the Spruce specimen the calyx is consistently 4-merous but the corolla may be 5- or 6-merous. It was also observed in other presumably conspecific specimens (Spruce 1150, and Ducke 18663) that the calyx, like the corolla may be 5- or 6-merous.

The Schomburgk specimens (No. 975) are the only ones labeled as collected in Guyana. All other specimens here considered conspecific were collected in the northwestern section of Amazonia. It is reasonable to suspect that the Schomburgk collection came from the Rio Negro area, or if actually collected in Guyana, the locality must have been somewhere in the southernmost part of the country.

8. Cybianthus pseudoicacoreus (Miquel) Agostini, comb.  
 nov. (Fig. 36).

Ardisia pseudoicacorea Miquel in Martius, Flora  
 Brasiliensis 10: 284. 1856.

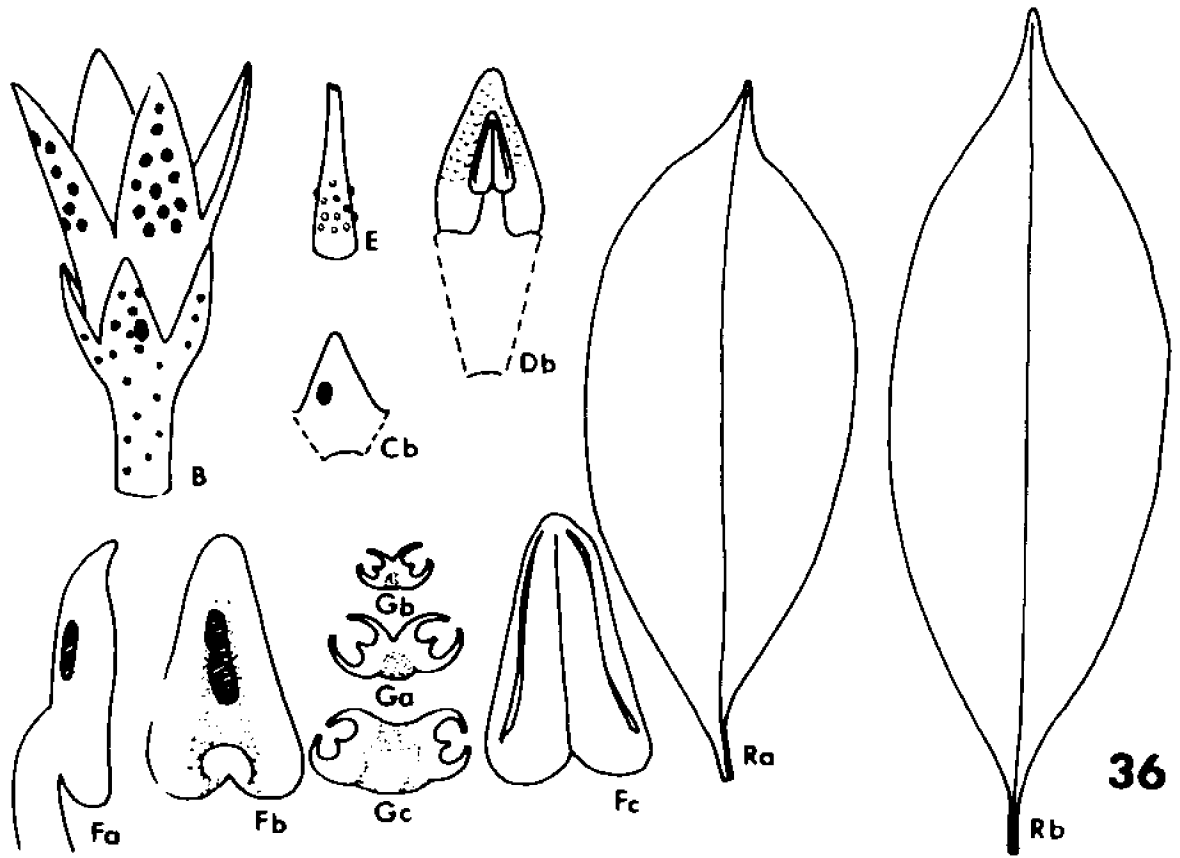
Conomorpha pseudoicacorea (Miquel) Mez in Engler,  
 Pflansenreich 4 (236): 261. 1902.

Type: Brazil, Amazonas, in silvis secus fl. Japura,  
 I 1920, Martius s. n. (lectotype, M).

Shrub or small tree to 7 m. Branchlets densely lepidote. Petioles 0.5-0.8-(1.2) cm long, densely lepidote; leaf blades obovate, narrowly obovate or narrowly obovate-elliptic, membranaceous to chartaceous, (8)-9-12-(15) cm long, 4.0-4.5-(5.5) cm broad, ratio 2.0-2.7; margin flat; base acute, decurrent; apex abruptly acuminate; midrib raised on lower surface, flat or only slightly depressed on the upper; nerves 12-25 pairs, inconspicuous on both surfaces or slightly raised on the lower one; upper surface smooth, densely lepidote when young, becoming pusticulate and glabrous or sparsely lepidote with age; lower surface sparsely lepidote. Inflorescence a raceme or a panicle with 1-2 branches from the base, 1-3 cm long; peduncle, axis, and branches densely lepidote; peduncle 0.1-0.2 cm long; pedicels at anthesis 1.0-1.2 mm long; bracts and bracteoles narrowly ovate, longer than the pedicels, 1.3-1.5 mm long, ca. 0.3 mm broad, densely lepidote dorsally. Flowers 4-merous. Staminate flowers: calyx cupuliform, 1.0-1.2 mm long, sparsely lepidote externally, glabrous internally;

## FIGURE LEGEND (36)

Fig. 36. C. pseudoicacoreus. For legend and scales see Figure 24. B-F. Ule 6160. Ra. Smith 2961. Rb. Klug 2565.



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tube 0.3-0.4 mm long; lobes triangular, fleshy to chartaceous, 0.8-1.0-(1.2) mm long, 0.5-0.7 mm broad, the apex attenuate to a rounded tip, the margin lepidote, the schizogenous glands pale brown and not prominent or reddish-brown and prominent. Corolla 2.8-3.2 mm long; tube 1.2-1.8 mm long, glabrous on both surfaces; lobes ovate, fleshy, 1.3-1.8 mm long, 0.8-1.0 mm broad, sparsely lepidote or glabrous externally, densely glandular-granulose on the upper half internally, the apex attenuate to a round tip, the margin glandular-granulose, the schizogenous glands pale brown and not prominent or reddish-brown and prominent. Stamens 2.2-2.6 mm long, adnate 1.2-1.6 mm to the corolla tube; filaments 0.4-0.7 mm long, not glandular, connate in a tube, 1.2-1.6 mm high, the staminal tube bearing lobes alternating with the petals; anthers dorsifixed, triangular, straight or slightly curved, 0.7-0.9 mm long, 0.4-0.5 mm broad, cordate at base, attenuate to an apiculate tip at apex, the connective dark and inconspicuously glandular. Pistillode elongate, conic, 1.2-1.8 mm long, the base glandular-lepidote. Pistillate flowers: not seen. Fruit: 4-6 mm long, 5-7 mm diameter; endocarp smooth or rugose externally; "aril" scanty, adnate to the seed and endocarp; endosperm type I; embryo curved, 4.0-4.5 mm long.

Distribution. Peru (Loreto) and Brazil (Amazonas and Pará), at altitudes of 70-700 m (Fig. 3).

PERU. Loreto: Iquitos, Tessmann 3650 (NY), 3 VIII 1929, Killip & Smith 27005 (NY); Mishuyacu, near Iquitos, alt. 100 m, 1930, Klug 1412 (F), II 1932, Klug 2565 (F, NY, S, U), 24 IX 1929, Killip & Smith 29871 (NY); Dtto Alto Nanay, 5 III 1968, Simpson & Schunke V. 784 (F).

BRASIL. Amazonas: Flumen Japurá, XII 1819, Martius (M), XII 1920 (M); Manaus-Itacoatiara Highway, km 64, 13 XII 1966, Prance, Pena, Ramos & Monteiro 3618 (COL, G, IAN, IPIAN, K, NY, US, VEN), 27 III 1967, 4208 (COL, G, IAN, IPIAN, K, NY, US, VEN); Manaus-Itacoatiara Highway, km 7, Colônia San Antônio, 16 III 1967, Prance, Pena, Forero, Ramos & Monteiro 4658 (GH, IAN, NY, P, S, US, VEN); Road Humaitá to Porto Velho, km 27, 30 XI 1966, Prance, Pena & Ramos 3480 (K, IAN, NY, US, VEN); Manaus, v 1902, Ule 6160 (G, K, L); kms. 70-60 da Rodovia Manaus-Itacoatiara, 17 X 1963, Oliveira 2698 (UB); basin of Rio Negro, Tonentis, Froë 12157-67 (NY). Amapá: Trail to Serra do Viado, Rio Amaparí, alt. 70-300 m, 17 XI 1954, Cowan 38389 (NY); Trail to Rio Araguay, Serra do Navio, Rio Amaparí, alt. 70-300 m, 19 XI 1954, Cowan 38424 (NY); Serra do Navio, Rio Amapari, 31 VII 1961, Pires, Rodrigues & Irvine 50286 (NY), 2 VIII 1961, 50321 (NY, VEN). Pará: Vicinity of Cachoeira, Road BR 22, Capanema to Maranhão, km 96, 27 X 1965, Prance & Pennington 1725 (NY, S, U); Southern slopes of Akari Mountains, in drainage of Rio Mapuera, alt. 500-700 m, 18 I 1938, Smith 2961 (F, G, NY, P, S, U); Ilhas de Breves, 17 XI 1922, Ducke 18669 (RB), 8 VIII 1926, 21929 (NY).

The closest relatives of C. pseudoicacoreus seem to be the sympatric species C. guyanensis and C. macrophyllus. All have seeds with type I endosperm. C. pseudoicacoreus can be distinguished from these and the other species in the section by the combination of obovate leaf blades, flat leaf margins, the petioles 0.5-1.2 cm long, the flower pedicels ca. 1 mm long, the corolla 2.8-3.0 mm long, the corolla lobes internally glandular-granulose, and the free portion of the filaments 0.4-0.7 mm long.

A lectotype was selected from the three Martius specimens which apparently belong to the same collection. They are all deposited at Munich (M), Germany.

9. Cybianthus amplus (Mez) Agostini, comb. nov.

(Figs. 37-38).

Conomorpha ampla Mez in Engler, Pflanzenreich 4  
(236): 257. 1902.

Conomorpha macrophylla Martius in Herbarium Florae  
Brasiliensis p. 260. 1837. Type: Colombia,  
Vaupés, Serra do Araracoara, dit. Japurensis.  
Martius s. n. (lectotype, M).

Conomorpha utiarityvi Hoehne, Comm. Linh. Telegr.  
Matto Grosso, Ann. 5, Bot. 6: 64. 1915. Type:  
Brazil, Rondonia, salto de Utiarity, Rio  
Papagaio, Junho 1909, F. C. Hoehne 2111 (holo-  
type, R).

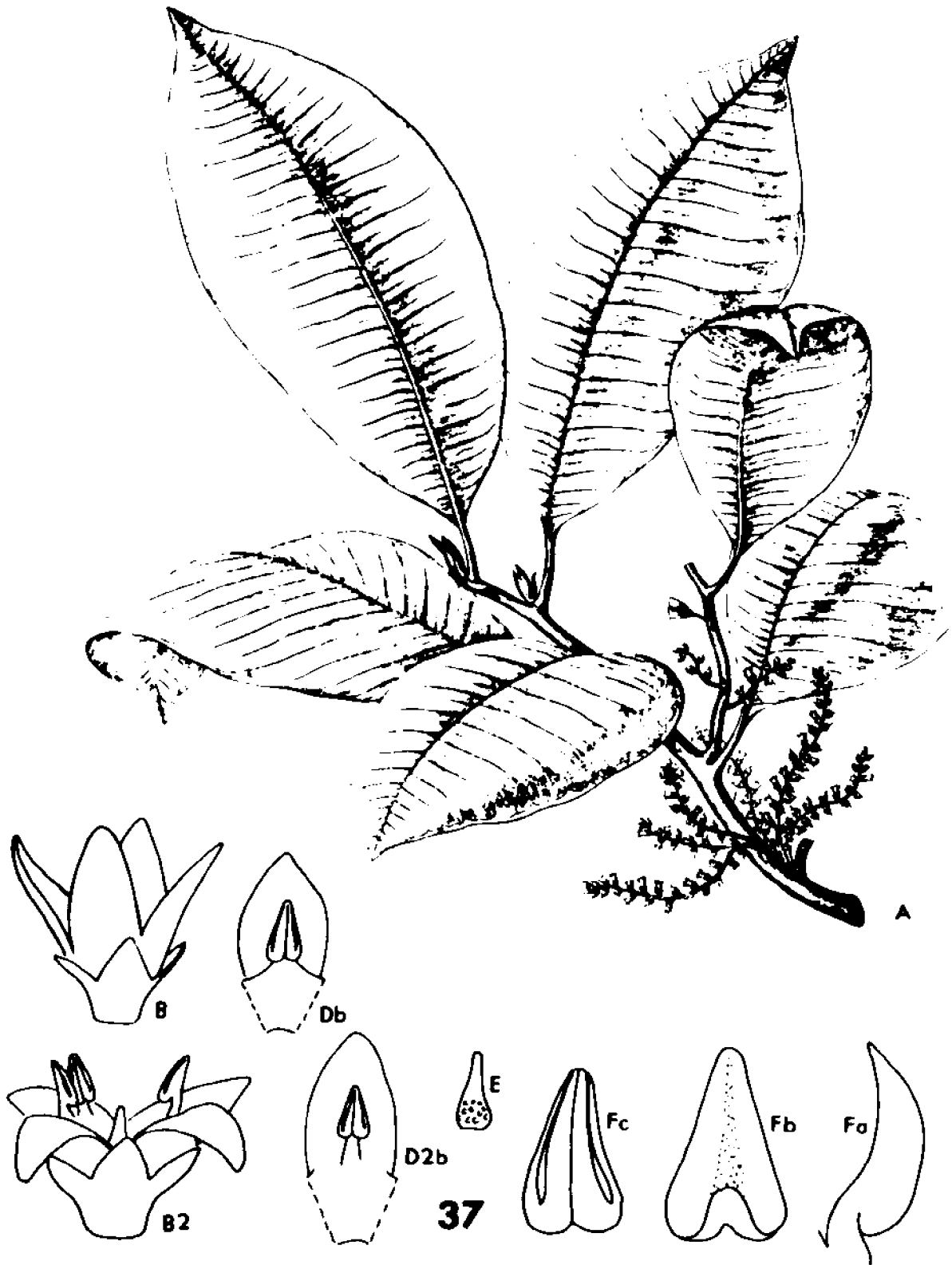
Type: Brazil, Bahia, sine loco speciali, Sello 653  
(lectotype, B).

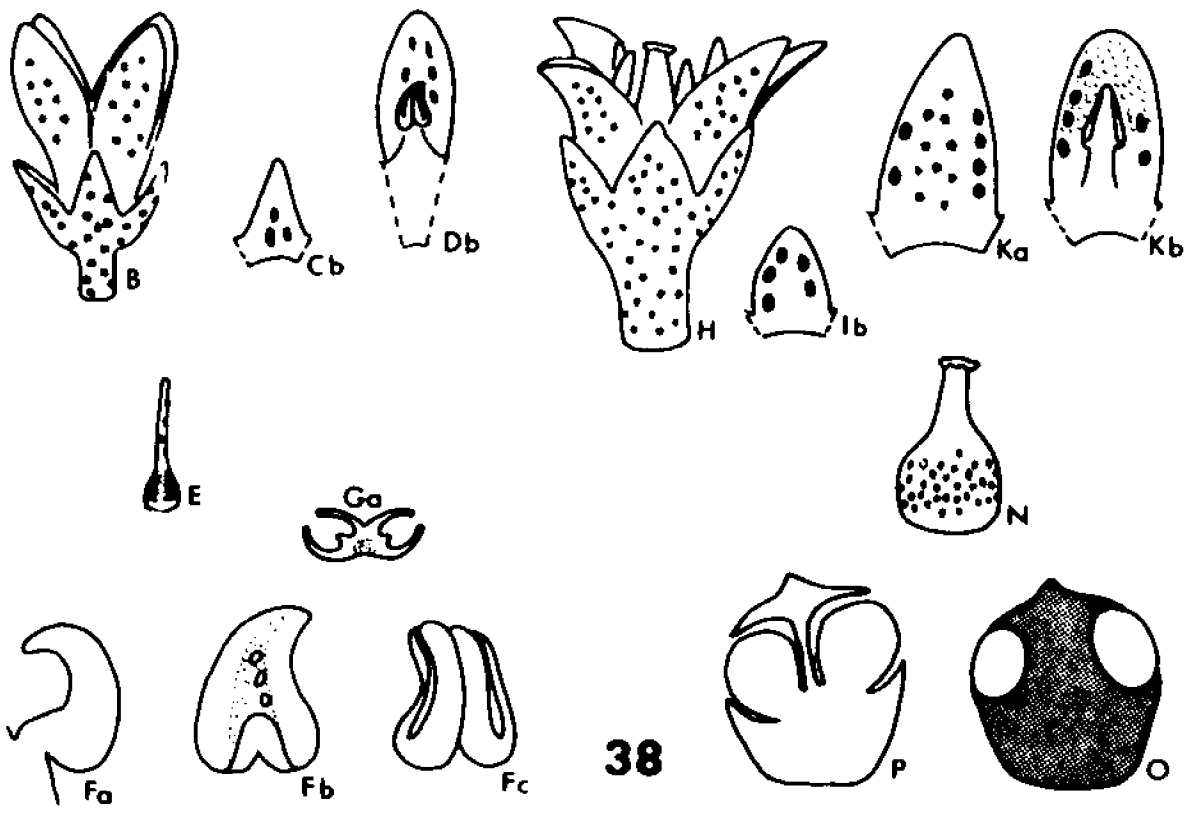
Shrub or small tree to 7 m. Branchlets densely lepidote. Petioles 1.0-3.5 cm long, densely lepidote; leaf blades elliptic, obovate, elliptic-obovate; membranaceous to chartaceous, 8-23 cm long, 4-12 cm broad, ratio 1.4-2.5; margin revolute; base obtuse or acute, decurrent; apex abruptly acuminate; midrib raised on lower surface, depressed on the upper; nerves 24-40 pairs, slightly raised on both surfaces or inconspicuous on the upper one; upper surface smooth or slightly wrinkled when dry, densely lepidote when young, becoming glabrous with age; lower surface densely lepidote. Inflorescence a panicle with 1-6 branches from the

## FIGURE LEGENDS (37-38)

Fig. 37. C. amplus. For legend and scales see Figure 24. A. Modified from Martius, Flora Brasiliensis, vol. 10, Pl. 47. B-F. Hoehne 2111. B2-D2. Maguire 34681.

Fig. 38. C. amplus. For legend and scales see Figure 24. B-F. Belém 3086. H-O. Irwin 14772.





base, 2.5-8.0 cm long; peduncle, axis, and branches densely lepidote; peduncle 0.1-0.5 cm long; pedicels at anthesis 0.5-1.0 mm long; bracts and bracteoles ovate, triangular or triangular-ovate, 0.6-1.0 mm long, 0.4-0.6 mm broad, densely lepidote dorsally. Flowers 4-, rarely 5-merous. Staminate flowers: calyx subcupuliform or cupuliform, 0.7-1.1 mm long, sparsely lepidote externally, glabrous internally; tube 0.2-0.4 mm long; lobes triangular, deltate, or deltate-ovate, fleshy, 0.5-0.8 mm long, 0.5-0.9 mm broad, the apex rounded or attenuated to a round tip, the margin lepidote, the schizogenous glands few, dark brown, not or only slightly prominent. Corolla 2.3-2.7 mm long; tube 0.8-1.1 mm long, glabrous on both surfaces; lobes elliptic, elliptic-ovate or ovate, fleshy, 1.5-2.0 mm long, 0.8-1.2 mm broad, sparsely lepidote externally, glandular-granulose internally, the apex rounded, obtuse, or attenuate to a round tip, the margin glandular-granulose, the schizogenous glands few, dark brown, not or only slightly prominent. Stamens 1.7-2.2 mm long, adnate, 0.8-1.3 mm to the corolla; filaments 0.1-0.3 mm long, connate or not in a tube; anthers dorsifixed, triangular or triangular-ovate, curved, 0.5-0.8 mm long, 0.3-0.4 mm broad, cordate at base, attenuate to an apiculate or acute tip at apex, the connective dark and inconspicuously glandular. Pistillode elongate, conic, 1.0-1.4 mm long, the base glandular-lepidote. Pistillate flowers: corolla, calyx, and staminodes as in staminate flowers. Pistil 1.3-2.0 mm long; ovary 0.7-1.2 mm long,

0.7-1.1 mm diameter, glandular-lepidote externally; style stout, 0.5-0.7 mm long; stigma capitate; ovules 3. Fruit: 5-11 mm long, 6-12 mm diameter; endocarp smooth or rugose; "aril" scanty, adnate to seed and endocarp; endosperm type I; embryo curved, ca. 4 mm long.

Distribution. Colombia, Venezuela, and Brazil at altitudes below 1100 m (Fig. 3)

COLOMBIA. Vaupés: Serra do Araracoara, dit. Japurensis, II 1820, Martius s. n. (type of Conomorpha macrophylla Martius; lectotype, M); riveras del Rio Inírida (69° 45' W long), sitio "Raudal Alto" or Mariapipe, margen derecha, Cerro del Varador, alt. 250 m, 3 II 1953, Fernandez 2056 (COL).

VENEZUELA. Territorio Federal Amazonas: Rio Cunucunuma, Caño Culebra, alt. 1000-1100 m, 18 XI 1950, Maguire, Cowan, & Wurdack 29508 (NY); Cerro Duida, SE slopes along Caño Negro, alt. 350-1095 m, 25-26 VIII 1944, Steyermark 57948 (F, NY); Sabana Grande, between Esmeralda and Base of Cerro Duida, alt. 175 m, 24 III 1953, Maguire & Wurdack 34681 (COL, F, K, NY, S, U, US, VEN); Capihuara, alto Casiquiare, alt. 120 m, 27 V 1942, Williams 15574 (F, G, RB, VEN); Cerro Cariche, Tama-Tama, Maguire 43662 (NY). Bolivar: Sierra Ichún, Salto Ichún, lat. 4° 46', long 63° 18', 27 XII 1961, Steyermark 90249 (VEN). BRAZIL. Amazonas: Prope Panurê ad Rio Uaupés, X 1952 - I 1853, Spruce 2521 (BM, BR, C, G, GH, K, NY, P, W); Rio Negro, acima da boca do Curicuriaty, 24 II 1929, Ducke 21930 (RB); Manaus, Rio Tarumã, 30 IV 1948, Guedes 51 (UB);

Yutica, orilla izquierda del Rio Uaupés, 15 XI 1952, Romero-Castañeda 3536 (COL); Paranagua, Munic. Teffe, basin of Rio Jurua, 22 V 1933, Krukoff 4555 (BM, G, K, NY, M, S, SP, U). Pará: Belem, 9 III 1949, Silva 189 (UB); Mosqueiro, estrada da Carananduba, 18 II 1923, Ducke 18662 (R, RB); Gurupa, igapô do alto Jacopy, 16 III 1923, Ducke 18661 (RB); Belem, IPEAN, 27 V 1964, Silva 57884 (NY, UB). Rondonia: Salto de Utiarity, Rio Papagaio, VI 1909, Hoehne 2111 (type of Conomorpha utiarityi Hoehne; holotype, R), 2078 (paratype, R). Matto Grosso: Vilhena, Campos de Commemoracão, V 1918, Kulhmann 2225 (RB).

Conomorpha ampla was originally described from the State of Bahia in Brazil. Another name, Conomorpha macrophylla, was applied by Martius to specimens collected in the Araracoara Mountains of Colombia. Close examination of the type specimens of these two names yielded a series of differences, but upon examination of other specimens, these differences were very much obscured. There is an insufficient number of available diagnostic characters to maintain C. ampla and C. macrophylla as distinct taxa. Another name, C. utiarityi, was introduced by Hoehne. This name was based on specimens collected near the Utiarity Falls along the Papagaio River in the Territory of Rondonia, Brazil. Presently there are too few collections available to establish any geographic patterns or to permit recognition of subspecific categories.

Maintaining these three taxa as conspecific results in a very peculiar distribution, the bulk of the species has a range completely within Amazonia, a broad but plausible range. The typical representatives of C. ampla, on the other hand, form a pocket in the State of Bahia.

Transfer of Conomorpha macrophylla Martius to Cybianthus would result in the establishment of a homonym since the binomial Cybianthus macrophyllus has been used by Miquel (1856) for a different species. According to the International Code of Botanical Nomenclature, the next valid name, Conomorpha ampla, has to be used. This resulting in a new combination, Cybianthus amplus (Miquel) Agostini.

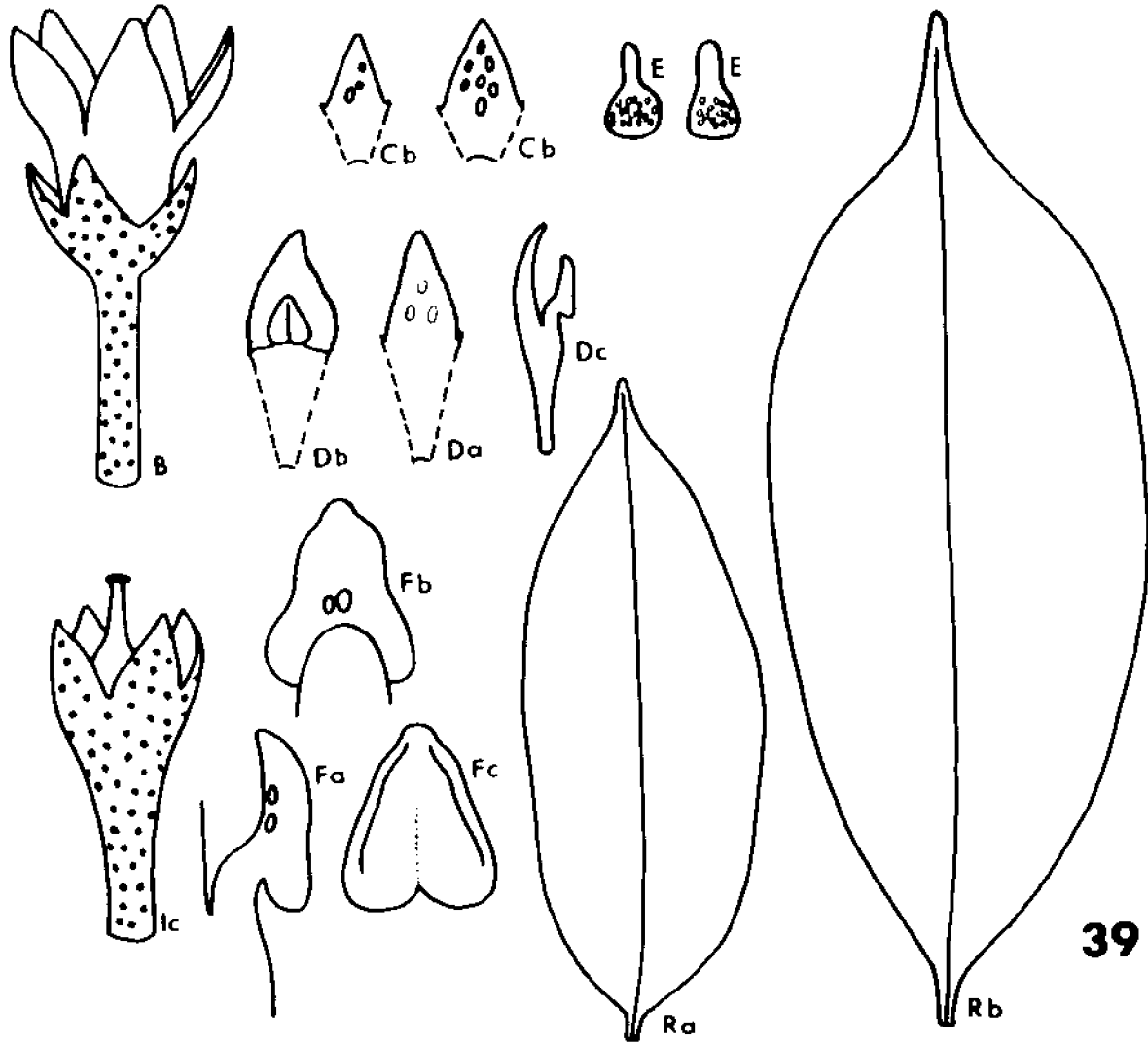
The closest relatives of this species seem to be the other lowland Amazonian species of the section, specifically C. guyanensis and C. peruvianus. From these and the other species of the section, C. amplus can be distinguished by the thick branchlets, the large leaf blades with revolute margins, and the very short pedicels.

10. *Cybianthus comperuvianus* Agostini, sp. nov. (Fig. 39).  
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Arbor vel frutex ad 6-metralis. Ramuli dense lepidoti. Petioli 0.5-1.0 cm longi dense lepidoti, laminis anguste ellipticis elliptico-obovatis vel ellipticis membranaceis 9-17 x 3-6 cm, basi acutis decurrentibus, apice acuminatis, supra laevibus juveniliter dense lepidotis maturitates glabrescentibus subtus parce lepidotis, costa media subtus elevata supra paullo sulcata, nervis lateralibus utrinque latere 20-30 supra haud conspicuis subtus paullo elevatis. Inflorescentia racemosa vel raro paniculata basi 1-2 ramosa 1-3 cm longa, pedunculo axi ramulis pedicellisque dense lepidotis, pedunculo 0.1-0.5 cm longo, pedicellis anthesi 1.5-2.5 mm longis, bracteis bracteolisque ovatis 1.3-1.5 x ca. 0.6 mm dorso dense lepidotis. Flores 4- vel raro 5-meri. Flores masculi: Calyce cupuliformi 1.0-1.2 mm longo extus parce lepidoto intus glabro, tubo 0.3-0.6 mm longo, lobis triangularis vel deltoideis crassiusculis vel membranaceis 0.6-1.0 x 0.5-0.7 mm, ad apicem rotundatum attenuatis, marginibus lepidotis, glandulis schizogenis haud prominentibus parvis pallido brunneis. Corolla 2.2-2.6 mm longa, tubo 1.0-1.2 mm longo ubique glabro, lobis ovatis vel triangulariovatis membranaceis 1.2-1.6 x 0.8-1.0 mm extus glabris intus glandulari-granulosis ad apicem rotundatum vel rotundatum attenuatis, marginibus glandulari-granulosis, glandulis schizogenis pallido brunneis haud prominentibus. Stamina 1.8-2.2 mm longa cum tubo corollae 1.2-1.5 mm adnata, filamentis 0.2-0.3 mm longis haud glandulosis in tubum

## FIGURE LEGEND (39)

Fig. 39. C. comperuvianus. For legend and scales see Figure 24. B-F. Killip and Smith 26168. Ic. Killip and Smith 26286. Ra. Killip and Smith 26073. Rb. Killip and Smith 26563.



connatum, antheris dorsifixis triangulari-ovatis vel deltoideo-ovatis 0.7-0.8 x 0.5-0.6 mm basi subcordatis apice apiculato attenuatis, connectivo atrofusco inconspicue glandulosi. Pistillodium ampulliforme ca. 1 mm longum basi glandulari-lepidotum. Flores foeminei non visi. Fructus 5-7 mm longus 6-8 mm diametro, endocarpio extus laevis, pseudo-arillo vix ad semen endocarpiumque adnato, endospermio type I, embryo paullo curvato ca. 4 mm longo.

Shrub or small tree to 6 m. Branchlets densely lepidote. Petioles 0.5-1.0 cm long, densely lepidote, not canaliculate above; leaf blades elliptic, elliptic-obovate, narrowly elliptic or narrowly elliptic-obovate, membranaceous, 9-13-(17) cm long, 3-5-(6) cm broad, ratio 2.4-3.3; margin flat, base acute, decurrent; apex acuminate; midrib raised on lower surface, slightly depressed on the upper; nerves 20-30 pairs, inconspicuous on the upper surface, slightly raised on the lower one; upper surface smooth, densely lepidote when young, becoming pusticulate and glabrous or sparsely lepidote with age; lower surface sparsely lepidote. Inflorescence a raceme, rarely a panicle with 1-2 branches from the base, 1-3 cm long; peduncle 0.1-0.5 cm long; pedicels at anthesis 1.5-2.5 mm long; bracts and bracteoles ovate, usually as long as the pedicels, 1.3-1.5 mm long, ca. 0.6 mm broad, densely lepidote dorsally. Flowers 4-merous, rarely 5-merous. Staminate flowers: calyx 1.0-1.2 mm long, sparsely lepidote externally, glabrous internally; tube 0.3-0.6 mm long, lobes triangular to deltate, fleshy or

membranaceous, 0.6-1.0 mm long, 0.5-0.7 mm broad, the apex attenuate to a round tip, the margin lepidote, the schizogenous glands pale brown, not prominent. Corolla 2.2-2.6 mm long; tube 1.0-1.2 mm long, glabrous on both surfaces; lobes ovate or triangular-ovate, membranaceous, 1.2-1.6 mm long, 0.8-1.0 mm broad, glabrous externally, densely glandular-granulose internally, the apex rounded or attenuate to a round tip, the margin glandular-granulose, the schizogenous glands pale brown, not prominent. Stamens 1.8-2.2 mm long, adnate 1.2-1.5 mm to the corolla tube; filaments very short, 0.2-0.3 mm long, not glandular, connate in a tube, the staminal tube not bearing lobes alternating to the petals; anthers dorsifixed, deltate or triangular, straight or slightly curved, 0.7-0.8 mm long, 0.5-0.6 mm broad, slightly cordate at the base, attenuate to an apiculate tip at apex, the connective dark and inconspicuously glandular. Pistillode flask-shaped, ca. 1 mm long, glandular-lepidote at base. Pistillate flowers: not seen. Fruit: 5-7 mm long, 6-8 mm diameter; endocarp smooth externally; "aril" scanty and adnate to seed and the endocarp; endosperm type I; embryo slightly curved, ca. 4 mm long.

Type. Brazil, Matto Grosso, Sta. Anna da Chapada, 1903, O. A. Malme 3483 (holotype, S; isotypes, G, GH, R, S).

Distribution. Peru, Bolivia, and Brazil (Mato Grosso), at altitudes of 400-1100 m (Fig. 3).

PERU. Huánuco: Vicinity of Rondos, 24 IV 1962, Schunke-Vigo

5881 (F); Agua Blanca, camino a Monzón, 9 II 1966, Schunke-Vigo 1049 (NY, S, VEN). Junín: E. of Quimiri Bridge, near La Merced, alt. 800-1300 m, 1 IV 1929, Killip & Smith 24011 (F, NY); Pichis Trail, San Nicolás, alt. 1100 m, 4 VII 1929, Killip & Smith 26073 (F, NY); Pichis Trail, Santa Rosa, alt. 625-900 m, 6 VII 1929, Killip & Smith 26168 (BM, F, NY); Puerto Yessup, alt. 400 m, 10 VII 1929, Killip & Smith 26286 (NY); Puerto Bermudez, alt. 375 m, 14 VII 1929, Killip & Smith 26464 (NY), 26548 (NY), 26563 (NY). BOLIVIA. La Paz: Mapiri Region, 1926, Buchtien 1753 (F, GH, NY, US); Tuirí, near Mapiri, alt. 490-750 m, IX 1939, Krukoff 10930 (G, NY, S, U). BRAZIL. Mato Grosso: Santa Anna da Chapada, 1827, Riedel 959 (NY, US), 1902, Malme 2048 (S, UPS), Robert 322 (BM), 1903, Malme 3483 (S, G, GH, R, S); Burity, NE of Cuyabá, alt. 750 m, VI 1927, Collenette 113 (NY).

The closest relatives to this species seem to be the Amazonian species C. pseudoicacoreus, C. guyanensis, and C. macrophyllus. All are lowland species and possess seeds with type I endosperm. From these and other species of the section, C. comperuvianus can be distinguished by the combination of short petioles, flat leaf margins, the flower pedicels 1.0-2.5 mm long, the corolla lobes externally glabrous, short filaments, and the presence of a staminal tube in the pistillate flowers.

Cybianthus comperuvianus can be distinguished from the allopatric C. brasiliensis by the type I endosperm and the pale brown or reddish scales on the lower surface of the

blades. C. comperuvianus has been collected at the borders of Amazonia in Peru, Bolivia, and Central Brazil (Mato Grosso). C. brasiliensis is restricted to the Coastal forests of Southeastern and South Brazil.

The epithet comperuvianus refers to the fact that the species grows sympatrically with and has been confused with C. peruvianus. C. comperuvianus can be distinguished from C. peruvianus by the shorter (0.5-1.0 cm), not prominently canaliculate petioles, the flat leaf margins, the longer (1.0-2.5 mm) flower pedicels, the glabrous outer surface of petals, and the glabrous or almost glabrous inner surface of petals.

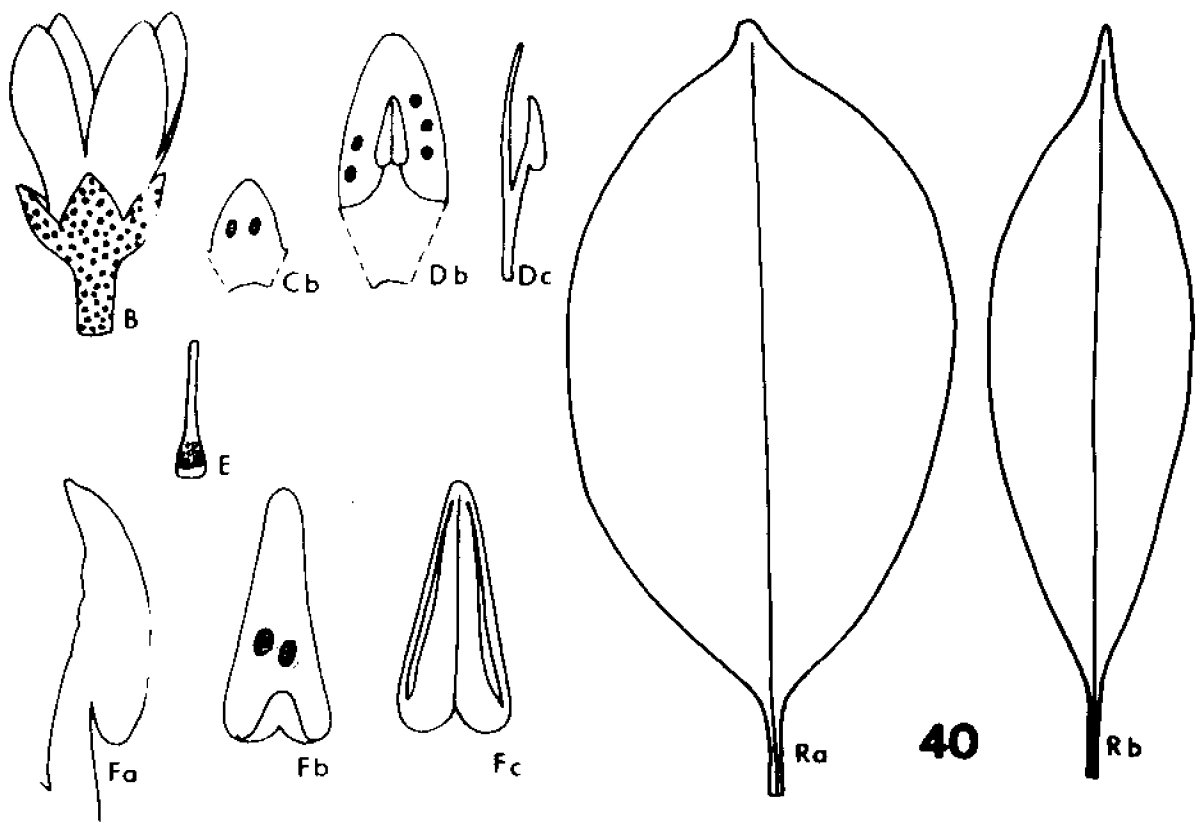
11. Cybianthus peruvianus (A. De Candolle) Miquel in  
 Martius, Flora Brasiliensis 10: 298. 1856. (Fig. 40).  
Conomorpha peruviana A. De Candolle, Ann. Sci. Nat.  
 ser. 2, 16: 92. 1841.  
Peckia peruviana O. Kuntze, Rev. Gen. Pl.  
 p. 402. 1891.

Type: Peru, Provincia Moyobamba, 1838, Matthews s. n.  
 (holotype, G, not seen; isotypes, G, GH, K).

Shrub or small tree to 6 m. Branchlets densely lepidote. Petioles 1.0-1.5 cm long, canaliculate above, densely lepidote; leaf blades elliptic or elliptic-obovate, coriaceous or chartaceous, 7-10-(12) cm long, (2.5)-3.5-5.0 cm wide, ratio 1.8-2.5; margin revolute; base acute or obtuse, decurrent; apex acuminate; midrib raised on lower surface, depressed on the upper; nerves 10-25 pairs, raised on the lower surface, inconspicuous on the upper one; upper surface smooth or slightly wrinkled when dry, densely lepidote when young, becoming pusticulate and glabrous with age; lower surface sparsely lepidote. Inflorescence a panicle with 1-4 branches from the base, (2)-3-8 cm long; peduncle, axis, and branches densely lepidote; peduncle 0.1-0.2 cm long; pedicels at anthesis 0.5-1.0-(1.2) mm long; bracts and bracteoles ovate, usually shorter than the pedicels, 0.7-1.0 mm long, ca. 0.6 mm broad, densely lepidote dorsally. Flowers 4- or 5-merous. Staminate flowers: calyx cupuliform or subcupuliform, 0.8-1.2 mm long,

## FIGURE LEGEND (40)

Fig. 40. C. peruvianus. For legend and scales see  
Figure 24. B-Ra. Klug 4106. Rb. Pearce, Feb. 1844.



lepidote externally, glabrous internally; tube 0.3-0.4 mm long; lobes triangular, triangular-ovate or deltate-ovate, chartaceous, 0.7-0.8 mm long, 0.5-0.8 mm wide, the apex attenuate to a round tip, the margin lepidote, the schizogenous glands dark brown, not prominent. Corolla 2.0-2.6 mm long; tube 0.6-1.2 mm long, glabrous or lepidote externally, glabrous internally; lobes ovate to narrowly ovate, membranous or fleshy, 1.2-1.8 mm long, 0.5-1.1 mm wide, lepidote externally, glabrous or sparsely glandular-granulose internally, the apex rounded or attenuate to a round tip, the margin glandular-granulose, the schizogenous glands few, dark brown, not prominent. Stamens 1.4-2.0 mm long, adnate 0.8-1.2 mm to the corolla tube; filaments 0.2-0.4 mm long, not glandular, connate in a tube, the staminal tube not bearing lobes alternating with the petals; anthers dorsifixed near the base, triangular or narrowly triangular, curved, 0.7-0.9 mm long, 0.4-0.6 mm wide, cordate at the base, attenuate to a round or acute tip at apex, the connective dark and conspicuously glandular. Pistillode conic or elongate conic, 1.0-1.5 mm long, the base glandular-lepidote. Pistillate flowers: not seen. Fruit: 0.3-0.8 mm long, 0.4-0.9 mm diameter, the endocarp smooth externally, the aril scanty and adnate to the seed and endocarp; endosperm type I; embryo curved, 4-6 mm long.

Distribution. Peru and Bolivia, at altitudes of 200-1500 m (Fig. 3).

PERU. San Martin: Moyobamba, 1838, Matthews s. n. (type; G, GH, K); Zepelacio, near Moyobamba, alt. 1100-1600 m, I 1934, Klug 3508 (F, G, GH, NY, S); Chazuta, Rio Huallaga, alt. 260 m, IV 1935, Klug 4106 (BM, F, GH, NY, S).

BOLIVIA. La Paz: Mapiri, alt. 5000 feet, IV 1886, Rusby 2346 (BM, F, NY, US), XII 1907, Buchtien 1745 (US); Mapiri region, San Carlos, alt. 850 m, 1926, Buchtien 1752 (US), 1926, 1753 (GH), 1926, 1755 (US), 1926, 1756 (US); above Coroico, alt. 7000-8000 feet, II 1866, Pearce s. n. (K); Prov. de Larecaja, V 1847, Weddell 4217 (P); Copacabana, 10 km S of Mapiri, alt. 850-950 m, 8 X 1939, Krukoff 10988 (NY).

The closest relatives of C. peruvianus seem to be the Amazonian species C. pseudoicacoreus, C. guyanensis, and C. amplus. From these and the other species in section Conomorpha, C. peruvianus can be distinguished by the combination of petioles 1.0-1.5 cm long, revolute leaf margins, the flower pedicels 0.5-1.2 mm long, the corolla lobes internally glandular-granulose, short filaments, the corolla 2.0-2.6 mm long, and the presence of a staminal tube in the staminate flowers.

C. peruvianus has been confused with the sympatric C. comperuvianus. It can be distinguished from C. comperuvianus by the longer (1.0-1.5 cm) and canaliculate petioles, the revolute leaf margins, the usually shorter (0.5-2.0 mm) flower pedicels, the lepidote outer surface of the petals, and the densely glandular-granulose inner surface of the petals.

12. Cybianthus punctatus (Mez) Agostini, comb. nov. (Fig. 41).

Conomorpha punctata Mez in Engler, Pflanzenreich  
4(236): 260. 1902.

Conomorpha sessilis A. C. Smith, Bull. Torrey

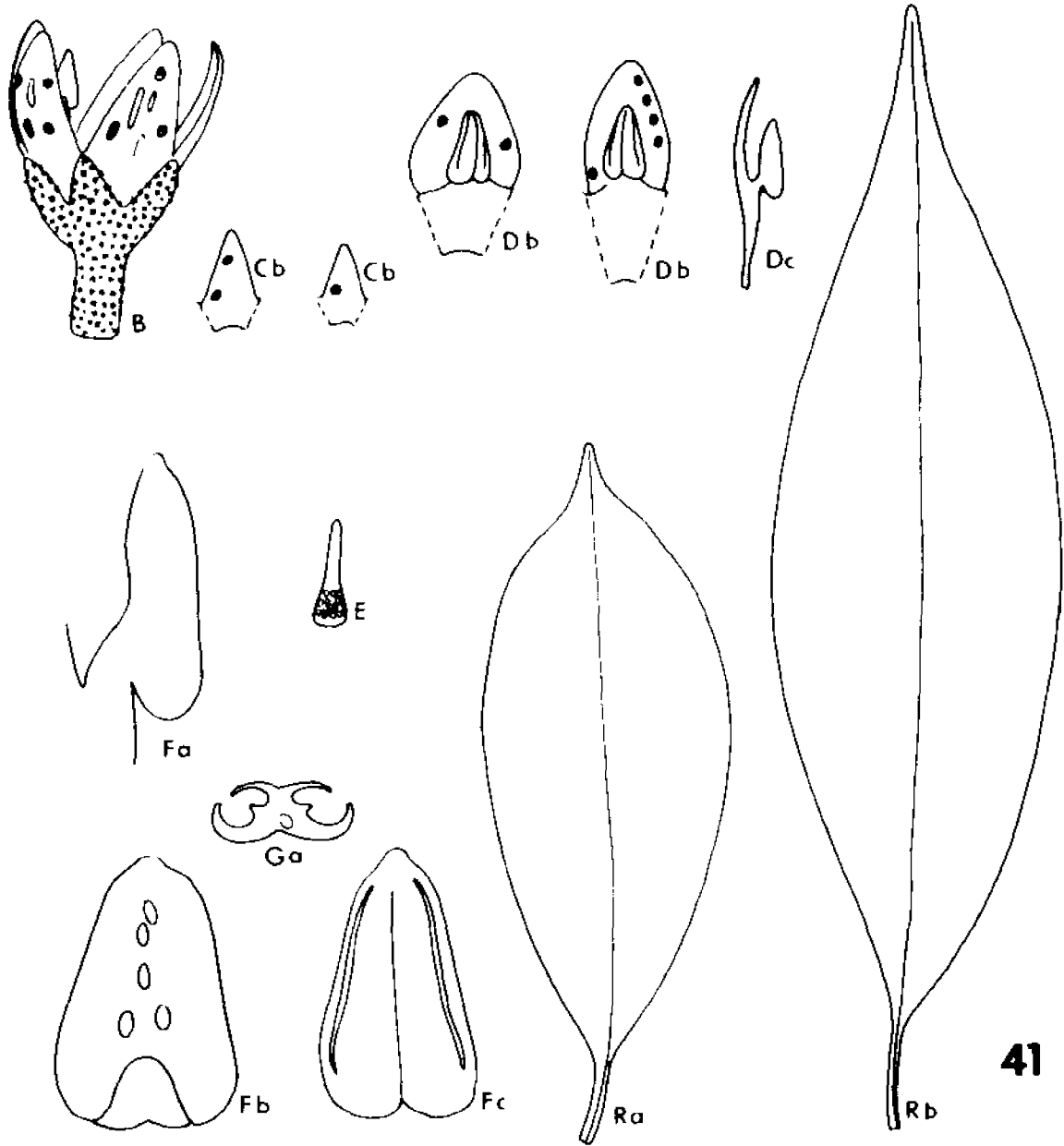
Club 67(4): 294. 1940. Type: Venezuela, Bolivar, Roraima, vicinity of Arabupu, Arabupu River, XII 1938, A. S. Pinkus 55 (holotype, NY).

Type: Venezuela, Bolivar, Roraima, 1842-1843, R. Schomburgk 554 (lectotype, G; isotypes, BM, K, P, W).

Shrub or small tree to 3 m. Branchlets densely lepidote. Petioles 1.0-1.5 cm long, densely lepidote; leaf blades elliptic, narrowly elliptic, elliptic-obovate or narrowly elliptic-obovate, membranaceous to chartaceous, 7.5-10.0-(15) cm long, 2.5-4.5 cm broad, ratio 2.2-3.0; the margin revolute; base acute, decurrent; apex acuminate, the acumen 0.5-1.0 cm long; midrib raised on lower surface, depressed on the upper; nerves 12-18 pairs, slightly raised on both surfaces; upper surface whitish, smooth or slightly wrinkled when dry, densely lepidote when young, becoming glabrous with age, shallowly scrobiculate; lower surface sparsely lepidote. Inflorescence a panicle with 3-7 lateral branches, 3.5-5.5 cm long, 2.5-3.5 cm broad; peduncle, axis, branches and pedicels densely lepidote; peduncle 0.3-1.5 cm long; pedicels at anthesis 1.0-1.5 mm long; bracts and bracteoles triangular to triangular-ovate, shorter than the pedicels, 0.5-0.7 mm long, ca. 0.4 mm broad, densely lepidote

## FIGURE LEGEND (41)

Fig. 41. C. punctatus. For legend and scales see  
Figure 24. B-Ra. Pinkus 55. Rb. Forest Dept. Brit. Guiana  
WB331-5757.



dorsally. Flowers 5-merous, rarely 4- or 6-merous.

Staminate flowers: Calyx cupuliform, 0.9-1.0 mm long, densely lepidote externally, glabrous internally; tube 0.2-0.3 mm long; lobes triangular, fleshy, 0.7-0.9 mm long, 0.5-0.6 mm broad, the apex attenuate to a round tip, the margin lepidote, the schizogenous glands few, dark brown, placed towards the margin. Corolla 2.0-2.5 mm long; tube 0.7-0.9 mm long, glabrous on both surfaces; lobes ovate or broadly ovate, fleshy, 13-16 mm long, 0.9-1.1 mm broad, sparsely glandular-granulose externally, densely glandular-granulose towards the apex internally, the apex rounded or attenuate to a round tip, the margin glandular-granulose, the schizogenous glands globular and dark brown towards the margins, elongate and pale brown in the center, not or only slightly prominent. Stamens 1.7-2.0 mm long, adnate ca. 0.8 mm to the corolla tube; filaments 0.1-0.2 mm long, not glandular, connate in a tube 0.8-1.0 mm high, the staminal tube without lobes alternating with the petals; anthers dorsifixed, triangular-ovate, straight, 0.9-1.0 mm long, 0.5-0.6 mm broad, slightly cordate at base, attenuate to an apiculate tip at apex, the connective glandular, the schizogenous glands pale brown. Pistillode elongate conic, 1.2-1.5 mm long, the base glandular-lepidote. Pistillate flowers: not seen. Fruit: not seen

Distribution. Venezuela (Bolivar) and Guyana, at altitudes of 1000-1400 m (Fig. 4).

VENEZUELA. Bolivar: Roraima, 1842-3, Schomburgk 554 (type of Conomorpha punctata Mez; lectotype, G; isotypes BM, K, P, W); Mount Roraima District, vicinity of Arabupu, Arabupu River, alt. 1400 m, XII 1938, Pinkus 55 (type of Conomorpha sessilis A. C. Smith; holotype, NY; isotypes, F, G, S); Gran Sabana, quebrada tributary to Río Kukenám, south of Mount Roraima, alt. 1005-1065 m, 2 X 1944, Steyermark 59122 (NY, VEN); Kavanayén, selva de Oparuma, 28 V 1946, Lesser 1836 (K, VEN); Arabupu, Mount Roraima, alt. 1400 m, 13 XII 1938, Forest Depart. of British Guiana P49-2821 (K). GUYANA. Wabuwak Kanuku Mts., X 1948, Forest Depart. of British Guiana WB331-5757 (NY).

Cybianthus punctatus can be distinguished from the other species in the section by the indument, which appears puberulent, an effect caused by the raised and distinctly fimbriate margins of the scales.

The closest relative to this species is probably the allopatric species C. oblongifolius. They are the only two known species in the section which have paniculate inflorescences with an elongate peduncle, usually 0.5-1.5 cm long. C. punctatus can be further differentiated from C. oblongifolius and the other species in the section by the combination of

elongate (1.0-1.5 cm) petioles, revolute leaf margins, the paniculate inflorescence with peduncle 0.5-1.5 cm long, the flower pedicels 1.0-1.5 mm long, the calyx 0.7-1.2 mm long, the corolla 2.0-2.5 mm long, the short filaments, and the presence of a staminal tube in the staminate flowers.

In his original diagnosis of C. sessilis, A. C. Smith related this taxon to C. punctatus. He cites the "narrower and thicker leaves, shorter pedicels, smaller and usually 4-(rather than 5- or 6) merous flowers and its even less conspicuous filaments" to differentiate C. sessilis from C. punctatus. Close examination of the type specimens of C. sessilis (Pinkus 55) revealed that the flowers are predominantly 5-merous. The statement made by Smith was apparently based on a comparison with the original diagnosis of C. punctatus. As none of the diagnostic characters cited by Smith hold to distinguish C. sessilis as a distinct taxon, it is considered here as a synonym.

Most collections of this species are from Mount Roraima, located at the tricorners of Venezuela, Guyana, and Brazil. Many of these are labeled as collected in Guyana but to date the only accessible and explored part of Mount Roraima is located on the Venezuelan side, from the Gran Sabana area in the state of Bolivar. Consequently, most specimens, including the type of C. punctatus, were actually collected in Venezuela.

13. Cybianthus oblongifolius (A. de Candolle) Agostini,  
comb. nov. (Fig. 42)

Conomorpha oblongifolia A. De Candolle, Trans. Linn.  
Soc. 17: 103. 1834.

Type: Brazil, Minas Gerais, ad Itambé montum, J. B. Pohl  
3515 (dupl. No. 866), (lectotype, G, not seen;  
isolectotypes, F, GH, K, W).

Tree (?). Branchlets densely lepidote. Petiole  
1.5-3.0 cm long, sparingly lepidote. Leaf blade narrowly  
elliptic to narrowly obovate, membranaceous, 12-19 cm long,  
4-6 cm wide, ratio 3.0-3.1; margin revolute; base acute,  
decurrent; apex acute; midrib raised on lower surface and  
depressed on the upper. nerves 12-24 pairs, slightly  
visible on both surfaces; upper surface slightly wrinkled  
in dry specimens, densely lepidote when young, glabrescent  
with age, shallowly scrobiculate; lower surface sparingly  
lepidote. Inflorescence a pinnate or  
bipinnate panicle, 4-8 cm long; peduncle 0.5-1.0 cm long,  
densely lepidote; axis, branches, and pedicels sparingly  
lepidote; pedicels at anthesis 0.4-0.5 mm long; bracts and  
bracteoles caducous, not seen. Flowers 4-merous.  
Staminate flowers: calyx cupuliform, 1.4-1.7 mm long,  
sparingly lepidote outside, glabrous inside; tube 0.4-0.5  
mm long; the lobes deltate or deltate-ovate, fleshy, 1.2-1.4  
mm long, 1.1-1.2 mm wide, acute at apex, attenuate to a  
round tip, sparsely lepidote on margin, schizogenous glands

## FIGURE LEGEND (42)

Fig. 42. C. oblongifolius. For legend and scales see Figure 24. A-F. Pohl 1315.



42

absent or inconspicuous. Corolla 2.4-2.7 mm long; tube 0.9-1.1 mm long, glabrous in both surfaces; lobes ovate, fleshy, 1.5-1.9 mm long, 1.1-1.2 mm broad, the apex attenuate to a round tip, glabrous or sparingly lepidote outside, smooth and sparingly glandular-granulose inside, schizogenous glands absent or inconspicuous. Stamens 1.9-2.0 mm long, adnate 0.9-1.1 mm to the corolla tube; filaments curvate, 0.2-0.3 mm long, glabrous, not glandular; staminal tube 1.1-1.3 mm high, bearing lobes 0.1 mm high, alternating with the petals; anthers dorsifixed, triangular, curved, 0.8-0.9 mm long, 0.4-0.5 mm broad, cordate at base, attenuate to an apiculate tip at apex, the connective not glandular. Pistillode conic, 1.6-1.8 mm long, glandular-lepidote. Pistillate flowers: not seen. Fruit: not seen.

Distribution. Brazil, Minas Gerais. Known only from the type locality (Fig. 4), a region of high endemism.

This species can be distinguished by the combination of long petioles (1.5-3.0 cm long), large leaf blades with revolute margins, the sparsely lepidote outer surface of the calyx, the calyx 1.4-1.7 mm long, the corolla 2.4-2.7 mm long, the short filaments, and the presence of a prominent staminal tube in the staminate flowers.

C. oblongifolius can be distinguished from the sympatric C. brasiliensis by the longer leaf blades and the pale brown or reddish scales on the lower surface of the blades. It can be distinguished from C. amplus, a species of the State of Bahia, by the paniculate inflorescence, the peduncle

0.5-1.5 cm long, the narrower leaf blades acute at the apex, and the calyx 1.4-1.7 mm long.

The closest relative of this species is probably the allopatric C. punctatus, a species of the Guayana Highlands. Both species have paniculate inflorescences with elongate peduncles. It can be distinguished from C. punctatus by the larger flowers, the calyx only sparsely lepidote externally, and the scales of branchlets completely appressed.

14. Cybianthus lepidotus (Gleason) Agostini, comb. nov.

(Fig. 43).

Conomorpha lepidota Gleason, Bull. Torrey Club

58: 446. 1931

Conomorpha curvivenia Gleason, Bull. Torrey Club

58: 444. 1931. Type: Venezuela, Terr. Fed.

Amazonas, Mount Duida, alt. 1260 m, 19 VIII

1928-IV 1929, G. H. H. Tate 927 (holotype, NY).

Conomorpha lepidota Gl. f. acutata Steyermark,

Fieldiana Bot. 28 (3): 465. 1953. Type:

Venezuela, Terr. Fed. Amazonas, Cerro Duida,

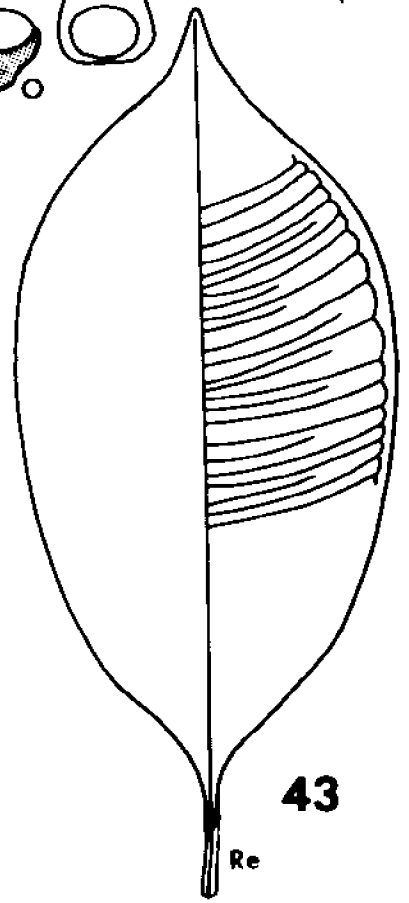
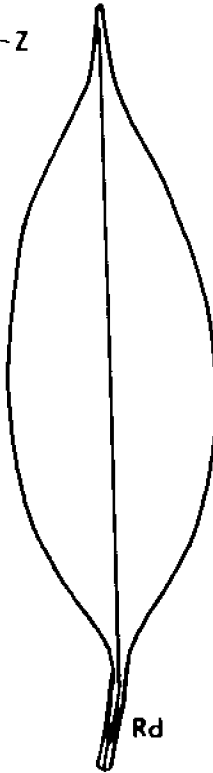
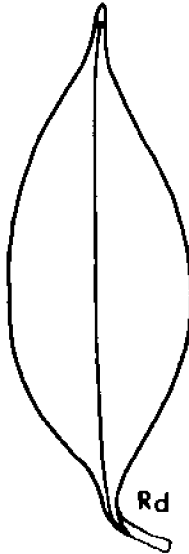
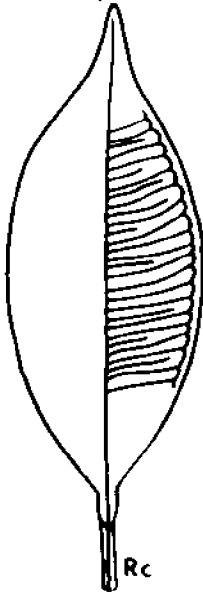
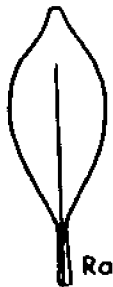
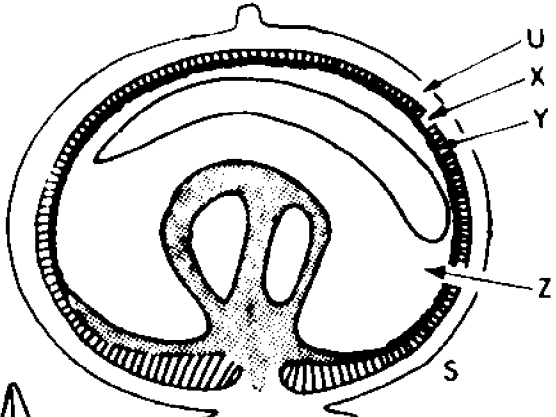
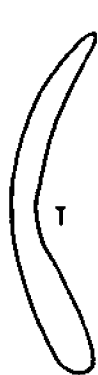
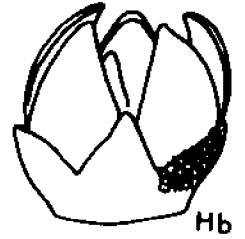
2 XII 1944, J. A. Steyermark 58265 (F).

Type: Venezuela, Territorio Federal Amazonas, Summit  
of Mount Duida, alt. 4400 ft., VIII 1928 to  
IV 1929, G. H. H. Tate 741 (holotype, NY).

Shrub or small tree to 6 m. Branches densely  
lepidote. Petiole 0.6-0.5 cm long, densely lepidote.  
Leaf blades elliptic, narrowly elliptic to narrowly  
elliptic-obovate, membranaceous to coriaceous, 3.0-13.5  
cm long, 1.6-6.0 cm broad, ratio 2.2-3.2; margin revolute  
to subrevolute; base acute to obtuse, decurrent; apex  
acuminate, acumen 0.3-2.0 cm long; midrib raised on the  
lower surface and depressed on the upper; nerves 24-28  
pairs conspicuous at an angle of about 75-85°, or  
inconspicuous on both sides; upper surface smooth,  
densely lepidote when young, glabrescent with age; lower

## FIGURE LEGEND (43)

Fig. 43. C. lepidotus. For legend and scales see Figure 24. B-G, Rb. Steevermark 74900. Ha. Steevermark 98074. Hb-O, Re. Tate 927. S-T. Krukoff 10987. Ra. Tate 741. Rc. Wurdack 31221. Rd. Steevermark and Wurdack 501.



surface densely lepidote. Inflorescence a raceme or a spike, unbranched, 2-16 cm long, axis and pedicels densely lepidote, peduncle 0.5-0.6 cm long; pedicels at anthesis very short, 0.2-0.8 mm long; bracts ovate to depressed-ovate, 0.5-0.6 mm long, densely lepidote ventrally. Flowers 5- rarely 4-merous. Staminate flowers: calyx cupuliform, 0.9-1.2 mm long, densely lepidote outside, glabrous inside; tube 0.2-0.4 mm long; the lobes triangular to ovate-triangular, fleshy, 0.6-0.8 mm long, 0.6-0.8 mm broad, obtuse, acute or acuminate at apex, attenuate to a round tip, lepidote on margin, with a few dark schizogenous glands. Corolla 1.5-2.5 mm long; tube 0.5-1.0 mm long, glabrous in both surfaces; lobes ovate to broadly ovate, fleshy, 1.2-1.7 mm long, 0.7-0.9 mm broad, the apex attenuate to a round cucullate tip, glabrous or sparsely lepidote outside, glabrous and papillose inside, schizogenous glands few, concentrated towards the margins. Stamens 1.5-1.6 mm long, adnate 0.5-1.0 mm to the corolla tube; filament short, 0.3-0.4 mm long, staminal tube bearing lobes 0.1-0.2 mm high alternating with the petals; anthers dorsifixed, triangular-ovate, 0.6-0.7 mm long, 0.4-0.5 mm broad, cordate at base, attenuate to a round tip at apex, the connective not glandular. Pistillode conic, 1.1-1.2 mm long, hollow, lepidote towards the base, inconspicuously glandular. Pistillate flowers: calyx and corolla as in staminate flowers. Staminodes adnate 0.5-1.0 mm to the corolla tube, 1.2-1.3 mm long; filaments flattened,

very short, 0.1-0.2 mm long; staminal tube 0.5-0.6 mm high, bearing lobes 0.1-0.2 mm long, alternating with the petals, sterile thecae dorsifixed, triangular-ovate, 0.7-0.8 mm long, 0.7-0.8 mm broad, cordate at the base, attenuate to a round or an emarginulate tip, the connective not glandular. Pistil 1.4-1.5 mm long, conic; ovary 1 mm broad, lepidote; style not differentiated, somewhat concave at the tip, glabrous; stigma not conspicuous. Ovules 2-3. Fruit globose or depress-globose, red (fide Steyermark), 0.5-1.0 mm long, 0.6-1.0 mm diameter; endocarp smooth, "aril" scanty, adnate to seed and endocarp; endosperm type I; embryo curved 3.5-4.0 mm long.

Distribution. Guayana Highland of southern Venezuela and Bolivia. In the Guayana Highland the species seem to be restricted to mountains at elevations of 1000-2300 m. In Bolivia it grows at elevations of 850-950 m (Fig. 4).

VENEZUELA. Terr. Fed. Amazonas: summit of Mount Duida, alt. 1460 m, VIII 1928-IV 1929, Tate 741 (type of Conomorpha lepidota Gl.; holotype, NY; isotypes, NY, K); slopes of Mount Duida, alt. 1260 m, VIII 1928-IV 1929, Tate 927 (type of Conomorpha curvivenia Gl.; holotype, NY); summit of Cerro Duida, savanna hills, alt. 1025-1200 m, 2 XII 1944, Steyermark 58265 (type of Conomorpha lepidota f. acutata Steyermark; holotype, F, not seen; isotype, NY); Cerro Yavi, alt. 2200 m, 1 III 1947, Phelps & Hitchcock 32 (VEN, NY); Cerro Yavi, alt. 1800 m, 1947, Phelps & Hitchcock 174 (VEN); Cerro Paru, cumbre, alt. 2000 m, 4 II 1951, Cowan & Wurdack

31221 (NY), 7 II 1951, 31342 (NY). Bolivar: Chimanta Massif, above Middle Falls of Rio Tirica, alt. 1925 m, 5 II 1955, Steyermark & Wurdack 501 (NY, VEN); on slope leading to summit of Apacara-tepui, alt. 2000-2150 m, 20 VI 1953, Steyermark 75815 (NY, VEN); summit of Apacara-tepui, alt. 2125-2300 m, 23 IV 1953, Steyermark 74900 (NY, VEN); Meseta de Jaua, Cerro Jaua, alt. 1922-2100 m, 22 III 1967, Steyermark 98074 (VEN).

This species can be recognized by the spike-like, unbranched, and solitary raceme. The flowering pedicels are usually 0.2-0.4 mm long and about 1 mm diameter. In specimens from the Meseta Jaua (Steyermark 98074), the flowering pedicels are longer, up to 0.8 mm long.

Gleason applied the name Conomorpha curvivenia to specimens having large broad leaves (Tate 927). These specimens seem to represent an ecological variant of the species, restricted to dense forest slopes. The small-leaved specimens seem to be restricted to higher altitudes and mountain summits.

Specimens from the type locality which have acutely acuminate apices were recognized as form acutata by Steyermark. It has been found that the specimens examined by Steyermark do not differ from the bulk of the species, and that acute- or round-tipped acuminate apices can be found together on the same specimen.

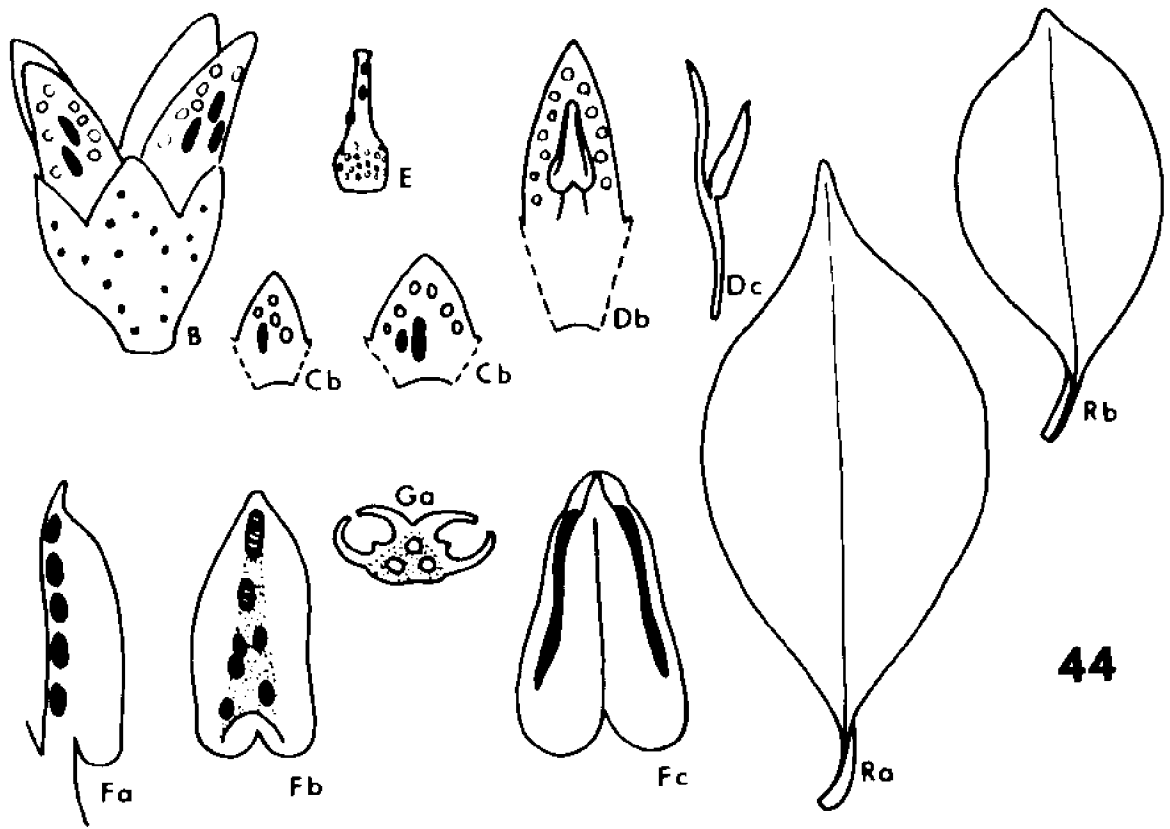
The distribution of this species seems to be discontinuous. Several collections are known from the highland of southern Venezuela and from Bolivia, but the species seems to be absent or has never been collected between these areas. These widely disjunct population groups may represent distinct subspecies, however, there are not enough collections currently available to permit recognition of subspecific categories.

15. *Cybianthus maguirei* Agostini, sp. nov. (Fig. 44).

Frutex vel arbor ad 1.5-metralis. Ramuli dense lepidoti. Petioli 1.0-1.2 cm longi dense lepidoti, laminis ellipticis vel elliptico-obovatis coriaceis 6.5-9.5 x 3-4 cm, basi obtusis decurrentibus, apice breviter acuminatis acumine 0.4-0.6 mm longo, supra laevibus vel paullo corrugatis juveniliter dense lepidotis maturitates glabrescentibus subtus dense lepidotis, costa media subtus elevata supra paullo sulcata, nervis lateralibus utrinque latere 24-30 haud conspicuis vel subtus paullo elevatis. Inflorescentia racemosa vel paniculata basi 2-3-ramosa 1.5-2.0 cm longa, pedunculo axi ramulis pedicellisque dense lepidotis, pedunculo 0.2-0.3 cm longo, pedicellis sub anthesi 0.4-0.6 mm longis, bracteis bracteolisque deltoideo-ovatis 0.5-1.0 x 0.8-1.0 mm dorso dense lepidotis. Flores 4-meri. Flores masculi: Calyce cupuliformi 1.0-1.5 mm longo extus parce lepidoto intus glabro, tubo 0.4-0.5 mm longo, lobis triangulari-ovatis crassiusculis 0.8-0.9 x 0.4-0.9 mm, ad apicem rotundatum attenuatis, marginibus lepidotis, glandulis schizogenis prominentibus atrobrunneis. Corolla 2.7-3.0 mm longa, tubo 0.9-1.2 mm longo ubique glabro, lobis ovatis crassiusculis 1.6-1.9 x 0.9-1.2 mm extus parce lepidotus intus dense glandulari-granulosi ad apicem obtusum attenuatis, marginibus glandulari-granulosi, glandulis schizogenis prominentibus atrobrunneis. Stamina 2.1-2.4 mm longa cum tubo corollae 1.1-1.3 mm adnata, filamentis 0.1-0.3 mm longis haud glandulosi vel glandulis paucis pallido brunneis

## FIGURE LEGEND (44)

Fig. 44. C. maguirei. For legend and scales see  
Figure 24. B-F. Maguire 37042. Ra. Maguire 37197.  
Rb. Silva 60919.



44

in tubum haud connatis, antheris dorsifixis ovatis paullo curvatis 0.9-1.0 x 0.4-0.5 mm basi cordatis apice apiculato attenuatis, connectivo atrofusco glandulosis, glandulis schizogenis atro-brunneis. Pistillodium ampulliforme 1.4-1.5 mm longum basi glandulari-lepidotum. Flores feminei non visi. Fructus non visus.

Shrub or small tree to 1.5 m. Branchlets densely lepidote. Petioles 1.0-1.2 cm long, densely lepidote; leaf blades elliptic or elliptic-obovate, coriaceous, 6.5-9.5 cm long, 3-4 cm broad, ratio 2.0-2.4; base obtuse, decurrent; apex short-acuminate, the acumen 0.4-0.6 cm long, attenuate to a round or acute tip; margin revolute; midrib raised on lower surface, slightly depressed on the upper; nerves 24-30 pairs, inconspicuous on both surfaces or slightly raised on the lower one; upper surface smooth or slightly wrinkled when dry, densely lepidote when young, becoming glabrous with age, pusticulate or shallowly scrobiculate; lower surface densely lepidote. Inflorescence a raceme or a panicle with 2-3 branches from the base, 1.5-2.0 cm long; peduncle, axis, and branches densely lepidote; peduncle 0.2-0.3 cm long; pedicels at anthesis 0.4-0.6 mm long; bracts and bracteoles deltate-ovate, usually longer than the pedicels, 0.5-1.0 mm long, 0.8-1.0 mm broad, densely lepidote dorsally. Flowers 4-merous. Staminate flowers: calyx cupuliform, 1.0-1.5 mm long, sparsely lepidote externally, glabrous internally;

tube 0.4-0.5 mm long, lobes triangular or deltate-ovate, fleshy, 0.8-0.9 mm long, 0.4-0.9 mm broad, the apex attenuate to a round tip, the margin lepidote, the schizogenous glands prominent, reddish brown above, black below. Corolla campanulate, 2.7-3.0 mm long; tube 0.9-1.2 mm long, glabrous on both surfaces; lobes ovate, fleshy, 1.6-1.9 mm long, 0.9-1.2 mm broad, sparsely lepidote externally, densely glandular-granulose internally, the apex attenuate to an obtuse tip, the margin glandular-granulose, the schizogenous glands prominent, reddish-brown on the margins, black at center. Stamens 2.1-2.4 mm long, adnate 1.1-1.3 mm to the corolla tube; filaments somewhat flattened, 0.1-0.3 mm long, not glandular or with a few reddish-brown schizogenous glands, not connate or slightly connate in a tube; anthers dorsifixed near the base, ovate, slightly curved, 0.9-1.0 mm long, 0.4-0.5 mm broad, cordate at the base, attenuate to an apiculate tip at apex, the connective dark and prominently glandular, the schizogenous glands dark-brown. Pistillode flask-shaped, 1.4-1.5 mm long, the base glandular-lepidote. Pistillate flowers: not seen. Fruit: not seen.

Type. Brazil, Amazonas, Serra Pirapucú, alt. 1300-1700 m; tree, calyx brown, corolla white, in low humid catinga Forest, 27 I 1966, Nilo T. Silva & Umbelino Brazão 60919 (holotype, NY; isotype, VEN).

Distribution. Venezuela and Brazil. This species is known only from the southernmost frontier of Venezuela and Brazil, in the area of Cerro Neblina, at altitudes of 1300-2000 m (Fig. 5)

VENEZUELA. Territorio Federal Amazonas: Cerro de la Neblina, summit 1700-2000 m, 4 I 1954, Maguire, Wurdack & Bunting 37042 (NY), 10 I 1954, 37197 (NY). BRAZIL. Amazonas: Serra Pirapucú, alt. 1300-1700 m, 27 I 1966, Silva & Brazão 60919 (type; NY, VEN).

The closest relatives of this species seem to be the other species of the Guayana Highland, particularly C. crotonoides, C. stevermarkianus, and C. wurdackii. From these and other species in the section, C. maguirei can be distinguished by the combination of petioles 1.0-1.2 cm long, the thick coriaceous leaf blades, 6-10 cm long, the revolute margin of the leaf blades, the pedicels 0.4-0.6 mm long, the prominent schizogenous glands, the corolla 2.7-3.0 mm long and the short filaments.

This species is named in honor of Dr. Bassett Maguire, of The New York Botanical Garden, a distinguished botanical explorer who has been responsible for an ambitious project to study the Flora of the Guayana Highland.

6. Cybianthus crotonoides (Schomburgk ex Mez) Agostini,  
comb. nov. (Fig. 45).

Cybianthus crotonoides R. Schomburgk, Nomen nudum.

Versuch einer Fauna und Flora von British-Guiana  
p. 1086. 1849.

Conomorpha crotonoides Schomburgk ex Mez in Engler,  
Pflanzenreich 4(236): 262. 1902.

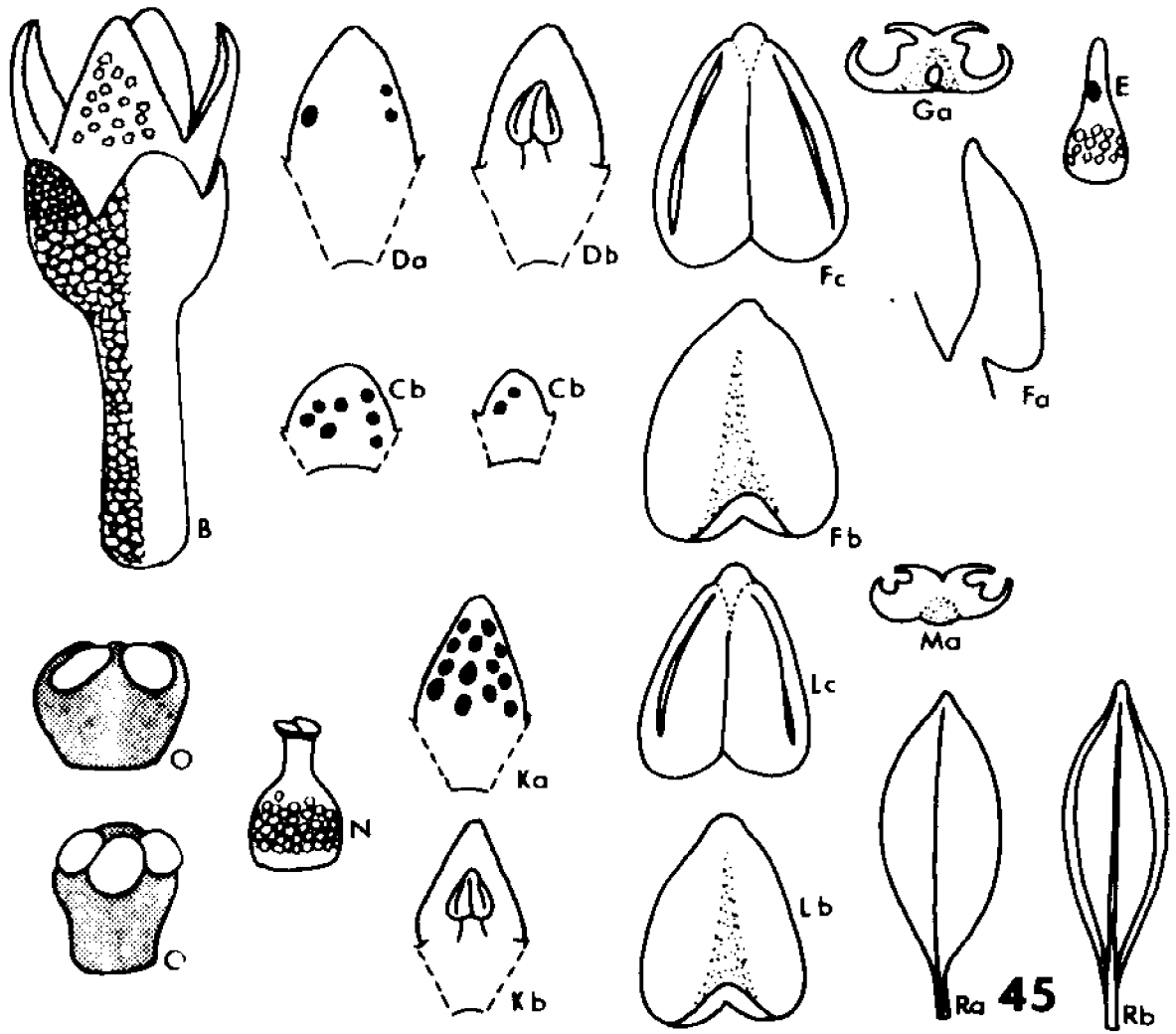
Type: Venezuela: Bolivar, Roraima, 1842-1843,

R. Schomburgk 681 (1027) (holotype, G; isotypes,  
K, P, W).

Shrub to 4 m. Branchlets densely lepidote. Petiole 0.9-1.3 cm long, densely lepidote. Leaf blades elliptic to elliptic-obovate, coriaceous, 2-6 cm long, 1.0-2.5 cm broad, ratio 1.8-3.0; margin revolute; base acute, decurrent; apex obtuse, acute or shortly acuminate; midrib raised on lower surface and slightly depressed on the upper; nerves 22-26 pairs, inconspicuous or only slightly so in both surfaces; upper surface scrobiculate, smooth or slightly wrinkled in dry specimens, densely lepidote when young, becoming glabrous with age; lower surface densely lepidote. Inflorescence a raceme, 2.0-3.5 cm long; axis and pedicels densely lepidote; peduncle 0.6-1.2 cm long; pedicels at anthesis 1-3 mm long; bracts ovate, 0.3-0.6 mm long, 1.5-3.5 mm broad, densely lepidote ventrally. Flowers 4-merous. Staminate flowers: calyx cupuliform, 1.1-1.2 mm long, densely lepidote outside, glabrous inside; tube 0.4-0.5 mm long; the lobes ovate or

## FIGURE LEGEND (45)

Fig. 45. C. crotonoides. For legend and scales see Figure 24. B-F. Cardona 2721. K-O, Ra. Steiermark 93936. Rb. Steiermark 59902.



broadly ovate, fleshy, 0.5-0.8 mm long, 0.7-1.0 mm broad, rounded at apex, lepidote on margin, with small, dark schizogenous glands. Corolla 2.5-2.7 mm long; tube 1.0-1.1 mm long, glabrous on both surfaces; lobes ovate to ovate-elliptic, fleshy, 1.5-1.6 mm long, 1.1-1.2 mm broad, the apex attenuate to a round and cucullate tip, densely to sparingly lepidote outside, papillate inside and at the margins. Stamens 1.9-2.1 mm long, adnate 1.2-1.3 mm to the corolla tube; filaments 0.1-0.2 mm long; staminal tube not developed; anther dorsifixed, ovate, 0.8-0.9 mm long, 0.6-0.7 mm broad, cordate at base, attenuate to an apiculate tip at apex, the connective darkened and inconspicuously glandular. Pistillode similar to pistille but reduced in size. Pistillate flowers: calyx as in pistillate flowers but the lobes triangular-ovate, without dark schizogenous glands. Corolla as in staminate flowers but 1.9-2.0 mm long. Staminodes similar to stamens but sterile thecae 0.6-0.7 mm long. Ovary subglobose, 0.9-1.1 mm diameter, densely lepidote; style short and stout, 0.5-0.6 mm long, glabrous; stigma capitate and lobulate; ovules 3-4. Fruit: depressed-globose, 3.5-4.0 mm long, 4.5-5.0 mm diameter; endocarp smooth externally; "aril" copious, free from seed and endocarp; endosperm type II; embryo not seen.

Distribution. Venezuela, State of Bolivar, at altitudes of 1800-2500 m (Fig. 5).

VENEZUELA. Bolivar: Mount Roraima, 1843, Schomburgk 681 (1027) (type: G, K, P, W); Auyantepui, alt. 1850 m, XII 1937.

Fate 1171 (VEN, NY), Pannier & Schwabe W/n (VEN); parte superior del Auyan-tepui, alt. 2300 m, IV 1956,  
Vareschi & Foldats 4844 (VEN); Auyan-tepui, alt. 2100 m, I 1949, Cardona 2721 (VEN, NY); cumbre de la parte Sur del Auyan-tepui, alt. 2050-2300 m, 15 V 1964,  
Steyermark 93936 (VEN, NY); summit of Carrao-tepui, alt. 2470-2500 m, 7 XII 1944, Steyermark 60890 (VEN, NY); Ptari-tepui, along base of South-facing high sandstone bluffs, alt. 2410 m, 6 XI 1944, Steyermark 59902 (NY).

The closest relatives of this species seem to be the other Guayanan species, particularly C. steyermarkianus, C. neblinensis, and C. wurdackii. These are all highland species and have type II seed endosperm. From these and the other species in the section, C. crotonoides can be distinguished by the combination of coriaceous leaf blades, 2-6 cm long, with acute or acuminate apices and revolute margins, the corolla 2.5-2.7 mm long, the corolla lobes externally lepidote, the short filaments, and the staminal tube inconspicuous in the staminate flowers.

C. crotonoides may be confused with C. laetus, an allopatric species from Peru. It can be distinguished from C. laetus by the petiole 0.9-1.3 cm long, the usually elliptic leaf blades, the corolla tube shorter or as long as the calyx, the sepals connate over 1/3 of the calyx length, and the densely dark-lepidote ovary in the pistillate flowers.

The transfer of Conomorpha crotonoides Schomburgk ex Mez to Cybianthus creates the new combination Cybianthus crotonoides (Schomburgk ex Mez) Agostini, a binomial at first glance preoccupied by Cybianthus crotonoides Schomburgk, cited under synonymy by Mez. But the original publication of Schomburgk's name was not accompanied by a diagnosis or a specimen citation, and consequently Cybianthus crotonoides Schomburgk is an invalid nomen nudum without any status under the International Code of Botanical Nomenclature.

17. Cybianthus steyermarkianus (Agostini) Agostini,  
comb. nov. (Fig. 24).

Conomorpha steyermarkiana Agostini, Act. Bot.

Venezuelica 2: 283. 1967.

Type: Venezuela, Bolivar, Cerro Auyan-tepui, cumbre,  
arbusto 3 m, alt. 2100 m, F. Cardona 2723  
(holotype, VEN; isotype, NY).

Shrub to 4 m. Branchlets densely lepidote, branches glabrescent. Petiole 0.5-1.0 cm long, densely or sparingly lepidote. Leaf blades rounded, obovate, obovate-elliptic or elliptic, coriaceous, (1.2)-1.5-2.5 cm long, 1.0-1.7 cm broad, ratio 1.5-1.7; margin revolute, base acute or obtuse, decurrent; apex rounded to obtuse; midrib raised on lower surface, depressed on the upper, nerves 6-12 pairs, conspicuous on the lower surface or inconspicuous on both sides; upper surface smooth or wrinkled in dry specimens, densely lepidote when young, glabrescent with age, scrobiculate; lower surface densely to sparingly lepidote. Inflorescence an axillary raceme with 5-9 flowers, 0.7-3.0 cm long; axis and pedicels densely lepidote; peduncle 0.3-1.5 cm long; pedicels at anthesis 1.5-3.5 mm long; bracts narrowly elliptic, 1.0-1.5 mm long, 0.4-0.6 mm broad, densely lepidote ventrally. Flowers 4-merous. Staminate flowers: calyx cupuliform, 0.9-1.2 mm long, sparingly lepidote outside, glabrous inside; tube 0.2-0.3 mm long, sparingly lepidote outside, glabrous inside; the lobes

triangular, fleshy, 0.7-0.8 mm long, 0.6-0.7 mm broad, tapering to a round tip, lepidote on margin, schizogenous glands clear or pale orange, almost inconspicuous. Corolla 2.7-2.9 mm long; tube 0.8-0.9 mm long, glabrous on both sides; lobes elliptic, broadly elliptic or ovate-elliptic, fleshy, 2.0-2.2 mm long, 1.2-1.4 mm broad, the apex rounded, glabrous or sparingly lepidote outside, glabrous inside, schizogenous glands clear or pale orange. Stamens 1.6-1.7 mm long, adnate 1.2-1.4 mm to the corolla tube; filaments very short, less than 0.1 mm long; staminal tube 0.8-1.4 mm high, not bearing lobes alternating with the petals; anther dorsifixed near the base, ovate, ca. 0.5 mm long, 0.4-0.5 mm broad, cordate at base, attenuate to an apiculate tip at apex, the connective glandular with clear or pale orange schizogenous glands. Pistillode 1.2-1.4 mm long, the basal portion hollow, lepidote, narrowing to a stylar glabrous elongation. Pistillate flowers: calyx as in staminate flowers. Corolla 1.9-2.2 mm long; tube 0.4-0.5 mm long, glabrous on both sides; lobes elliptic, broadly elliptic or ovate-elliptic, fleshy, 1.6-1.7 mm long, 0.9-1.1 mm broad, the apex obtuse, rounded or attenuate to a rounded tip, glabrous or sparingly lepidote outside, glabrous inside, schizogenous glands clear or pale orange. Staminodes 1.0-1.3 mm long, adnate 0.6-0.8 mm to the corolla tube; filaments short 0.1-0.2 mm long; staminal tube 0.4-0.7 mm long, not bearing lobes alternating with the petals; sterile thecae dorsifixed near the base, ovate, 0.5-0.6 mm long, ca. 0.4

mm broad, cordate at base, attenuate to an apiculate tip at apex, the connective glandular with clear or pale orange schizogenous glands. Pistille 1.2-1.4 mm long; ovary subglobose, 0.6-0.7 mm long, 0.6-0.7 mm diameter, lepidote; style elongated, 0.5-0.6 mm long, ca. 0.2 mm diameter, glabrous; stigma capituliform, lobulate; ovules 3. Fruit : not seen.

Distribution. Venezuela, State of Bolivar, restricted to mountains in Guayana at altitudes of 2000-2300 m (Fig. 5).

VENEZUELA. Bolivar: Auyan-tepuí, cumbre, alt. 2100 m, I 1949, Cardona 2723 (type, NY, VEN); Churi-tepuí (Muru-tepuí), NW cumbre, alt. 2300-2350 m, 3 II 1953, Wurdack 34299 (NY); Chimantá Massif: Abacapa-tepuí, NW summit, alt. 2125-2300 m, 13 IV 1953, Steyermark 74934 (NY, VEN); Apácara-tepuí, eastern-central summit, alt. 2450-2500 m, 26 VI 1953, Steyermark 75899 (NY, VEN); Torono-tepuí, summit, alt. 2165-2180 m, 9 II 1955, Steyermark & Wurdack 660 (NY, VEN); Torono-tepuí, summit, north facing slopes above Caño Mejado, alt. 2030-2150 m, 21 II 1955, Steyermark & Wurdack 1035 (NY, VEN).

The closest relative of C. steyermarkianus seems to be the sympatric species C. wurdackii, with which it can be confused. C. steyermarkianus can be distinguished

from *Q. wurdackii* by the corolla 2.5-2.7 mm long and the inconspicuous staminal tube. Other species of the Guayana highlands seem to be related to *Q. stevermarkianus*, particularly *Q. neblinensis* and *Q. roraimae*. From these and the other species in the section, *Q. stevermarkianus* can be distinguished by the combination of small, obovate leaf blades with an obtuse or rounded apex, the corolla 2.5-2.7 mm long, the corolla lobes internally glandular-granulose, the short filaments adnate to about half of the corolla length, and the inconspicuous staminal tube.

All the fruits examined were parasitized and hypertrophic. These galls were almost completely composed of solid parenchymatic tissue, with only a small, irregular cavity in the center inhabited by several minute unidentified insect larvae.

18. Cybianthus wurdackii Agostini, sp. nov. (Fig. 47).

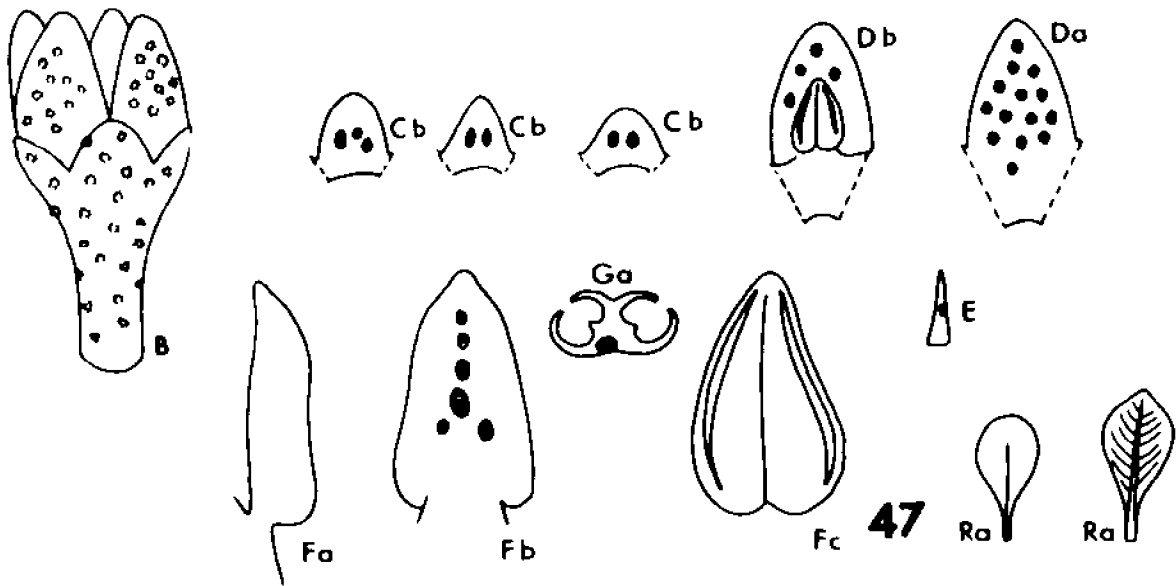
Frutex ad 3-metralis. Ramuli dense lepidoti. Petioli 0.3-0.7 mm longo dense lepidoti, laminis obovatis, coriaceis 1.5-2.0 x 0.8-1.0 cm, basi cuneatis decurrentibus, apice obtusis vel rotundatis vel raro breviter acuminatis, supra parce rugosis juveniliter dense lepidotis maturitates glabrescentibus subtus parce lepidotis, marginibus revolutis, costa media subtus elevata supra sulcata, nervis lateralibus utrinque latere 6-8 haud conspicuis vel subtus paullo elevatis. Inflorescentia racemosa 4-7 flora 1.0-1.5 cm longa, pedunculo pedicellisque dense lepidotis, pedunculo 0.6-0.7 cm longo, pedicellis sub anthesi 1.5-1.8 mm longis, bracteis triangulari-ovatis 0.5-1.0 x 0.2-0.4 mm dorso dense lepidotis. Flores 4-meri. Flores masculi: Calyce cupuliformi 0.7-0.9 mm longo extus parce lepidoto intus glabro, tubo 0.1-0.2 mm longo, lobis ovatis vel late ovatis crassiusculis 0.5-0.7 x 0.6-0.7 mm, apice obtusatis vel rotundatis, marginibus lepidotis, glandulis schizogenis paucis haud prominentibus atrobrunneis. Corolla 2.0-2.2 mm longa, tubo 0.6-0.7 mm longo ubique glabro, lobis ovatis crassiusculis 1.3-1.4 x 1.0-1.2 mm extus parce lepidotis intus glandulari-granulosis apice rotundatis, glandulis schizogenis inconspicuis parvis numerosis atrobrunneis prominentibus. Stamina 1.4-1.5 mm longa cum tubo corollae 0.6-0.7 mm adnata, filamentis ad 0.1 mm longis in tubum connatis, antheris dorsifixis ovatis paullo curvatis 0.7-0.8 x 0.4-0.5 mm basi cordatis apice apiculatis attenuatis connectivo inconspicue glandulosis. Pistillodium conicum

0.8-0.9 mm longum. Flores foeminei non visi. Fructus non visus.

Shrub to 3 m. Branchlets densely lepidote. Petioles 0.3-0.7 cm long, densely lepidote. Leaf blades obovate, coriaceous, 1.5-2.0 cm long, 0.8-1.0 cm broad, ratio 1.5-1.8; base cuneate, decurrent; apex obtuse rounded, rarely obtuse or shortly acuminate; margin revolute; midrib raised on lower surface and depressed on the upper; nerves 6-8 pairs, inconspicuous on both surfaces or slightly raised on the lower one; upper surface wrinkled in dry specimens, densely lepidote when young, scrobiculate and sparingly lepidote when adult; lower surface densely lepidote; margin revolute. Inflorescence a raceme with 4-7 flowers, 1.0-1.5 cm long, axis, peduncle, and pedicels densely lepidote; peduncle 0.6-0.7 cm long; pedicels at anthesis 1.5-1.8 mm long; bracts triangular-ovate, 0.5-1.0 mm long, 0.2-0.4 mm broad, densely lepidote ventrally. Flowers 4-merous. Staminate flowers: calyx cupuliform, 0.7-0.9 mm long, sparingly lepidote outside, glabrous inside; tube 0.1-0.2 mm long; the lobes ovate to broadly ovate, fleshy, 0.5-0.7 mm broad, obtuse or rounded at apex, lepidote on margin, with 2-4 dark schizogenous glands. Corolla 2.0-2.2 mm long; tube 0.6-0.7 mm long; lobes ovate, fleshy, 1.3-1.4 mm long, 1.0-1.2 mm broad, the apex rounded, sparingly glandular-lepidote outside, glabrous and pistillate inside, with 10-15 dark, rounded, prominent schizogenous glands.

## FIGURE LEGEND (47)

Fig. 47. C. wurdackii. For legend and scales see  
Figure 24. B-R. Wurdack 34240.



Stamens 1.4-1.5 mm long, adnate 0.6-0.7 mm to the corolla tube; filaments very short, less than 0.1 mm long; staminal tube 0.7-0.8 mm high; anthers dorsifixed near the base, ovate, 0.7-0.8 mm long, 0.4-0.5 mm broad, cordate at base, attenuate to an apiculate tip at apex, the connective conspicuously glandular. Pistillode conic, 0.8-0.9 mm long. Pistillate flowers: not seen. Fruit: not seen.

Type: Venezuela, Bolivar, Churi-tepuí (Muru-tepuí), northwest cumbre, upper cumbre and deep caños of upper cumbre, shrub 1-3 m, buds cream, alt. 2250-2300 m, 26 I 1953, John J. Wurdack 34240 (holotype, NY; isotypes, COL, F, S, US, VEN).

Distribution. Only known from two Guayana sandstone mountains of southern Venezuela in the state of Bolívar, at altitudes of 1700-2300 m (Fig. 5).

VENEZUELA. Estado Bolivar: slopes and talus forest, Sarvén-tepuí, alt. 1750-1850 m, 19 I 1953, Wurdack 34189 (NY); northwest cumbres of Churi-tepuí (Muru-tepuí), alt. 2250-2300 m, 26 I 1953, Wurdack 34240 (type; COL, F, NY, S, US, VEN).

The closest relative of C. wurdackii seems to be the sympatric C. stevermarkii. They could be confused because they both have similar obovate leaf blades. The other Guayanan highland species seem to be

also related to C. wurdackii, particularly C. crotonoides, C. biflorus, and C. neblinensis. C. wurdackii can be distinguished from these and the other species in the section by the combination of petioles 0.3-0.7 cm long, small obovate leaf blades with a revolute margin, the racemose inflorescence with 4-7 flowers, the corolla 2.0-2.2 mm long, the very short filaments, and the staminal tube well-developed in the staminate flowers.

This species is named after Dr. John J. Wurdack, of the Smithsonian Institution, who has been an active collector and student of the Guayana flora.

19. Cybianthus roraimae (Steyermark) Agostini, comb. nov.  
 (Fig. 48).

Conomorpha roraimae Steyermark, Fieldiana Bot.

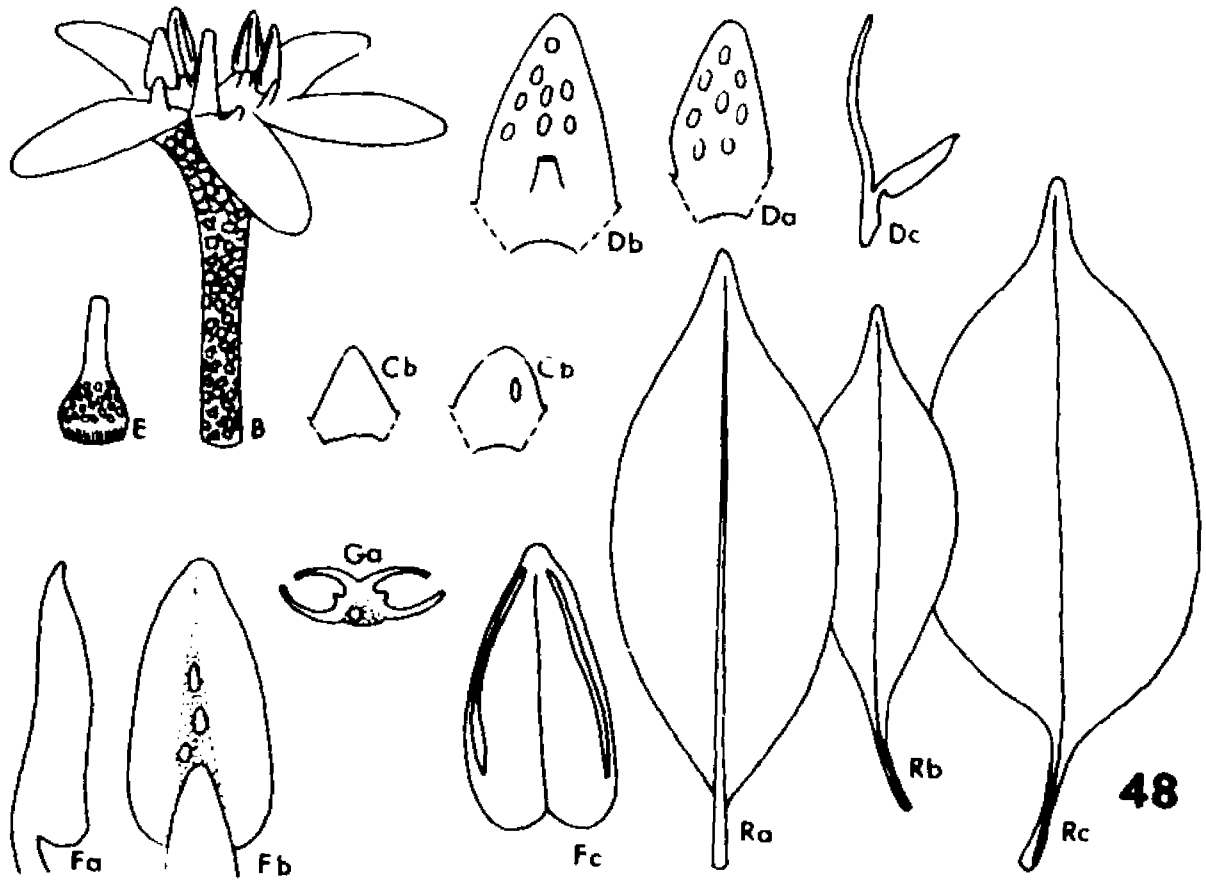
28(3): 468. 1953.

Type: Venezuela, Bolivar, Mount Roraima, ascent of ledge along southwest-facing side, from beginning of sandstone bluffs to summit, alt. 2255-2620 m, 27 IX 1944, J. A. Steyermark 58759 (holotype, F, not seen; isotype, NY).

Shrub or small tree to 5 m. Branchlets densely lepidote. Petioles 1-2 cm long, densely lepidote; leaf blades elliptic, elliptic-ovate or ovate, membranaceous to chartaceous, 7-11 cm long, 2.5-4.5 cm broad, ratio 1.7-2.2; margin revolute at least at the base; base acute to obtuse, decurrent; apex acuminate, the acumen 1.0-1.5 cm long; midrib raised on lower surface, depressed on the upper; nerves 26-30 pairs, slightly raised on both surfaces; upper surface smooth or slightly wrinkled when dry, densely lepidote when young, becoming glabrous with age, pusticulate; lower surface densely lepidote. Inflorescence a raceme or a panicle with 1-3 branches from the base, 5-8 cm long; peduncle, axis, branches, and pedicels densely lepidote; peduncle 0.5-2.5 cm long; pedicels at anthesis, 2.0-3.5 mm long; bracts and bracteoles ovate to broadly ovate, 0.5-1.0 mm long, 0.5-0.8 mm broad, densely lepidote dorsally. Flowers 4- or usually 5-merous. Staminate flowers: calyx

## FIGURE LEGEND (48)

Fig. 48. C. roraimae. For legend and scales see  
Figure 24. B-D, Rb. Maguire 33464. F, G, Rc. Wurdack  
34270. Ra. Steiermark 58765.



subcupuliform, 0.7-1.1 mm long, densely lepidote externally, glabrous internally; tube 0.3-0.4 mm long; lobes triangular-ovate or deltate-ovate, fleshy, 0.5-0.7 mm long, 0.5-0.8 mm broad, the apex rounded or attenuate to a round tip, the margin lepidote, the schizogenous glands absent or inconspicuous. Corolla 2.0-2.3 mm long; tube ca. 0.4 mm long, glabrous in both surfaces; lobes ovate, membranaceous, 1.8-2.0 mm long, 0.9-1.1 mm broad, glabrous on both surfaces; the apex attenuate to a round tip, the margin entire and glabrous, the schizogenous glands pale brown or yellowish, inconspicuous, not prominent. Stamens 1.7-1.8 mm long, adnate ca. 0.8 mm to the corolla; filaments somewhat flattened, 0.3-0.4 mm long, not glandular, not connate in a tube; anthers dorsifixed near the base, ovate-triangular, slightly curved, 0.8-1.0 mm long, ca. 0.5 mm broad, cordate at the base, attenuate to an apiculate tip at apex, the connective dark and inconspicuously glandular, the schizogenous glands pale brown or yellowish. Pistillode flask-shaped or elongate conic, 1.2-1.5 mm long, the base glandular lepidote with dark scales. Pistillate flowers: not seen. Fruit: not seen.

Distribution. Known only from three Guayana sandstone mountains in southern Venezuela, in eastern State of Bolivar, at altitudes of 2000-2600 m (Fig. 5).

VENEZUELA. Bolivar: Mount Roraima, ascent of ledge along southwest-facing side, alt. 2250-2620 m, 27 IX 1944,

Steyermark 58759 (F, NY), 58765 (paratype, NY); Mount Roraima, alt. 2000 m, XII 1909, Ule 8724 (L, K); Ilu-tepui, west-facing slopes, alt. 2100-2400 m, 17 III 1952.

Maguire 33464 (GH, NY, VEN), 21 III 1952, 33504 (NY); northwest slopes of Churi-tepui (Muru-tepui), alt. 2050 m, 29 I 1953,

Wurdack 34259 (K, NY, US, VEN), 30 I 1953, 34270 (NY).

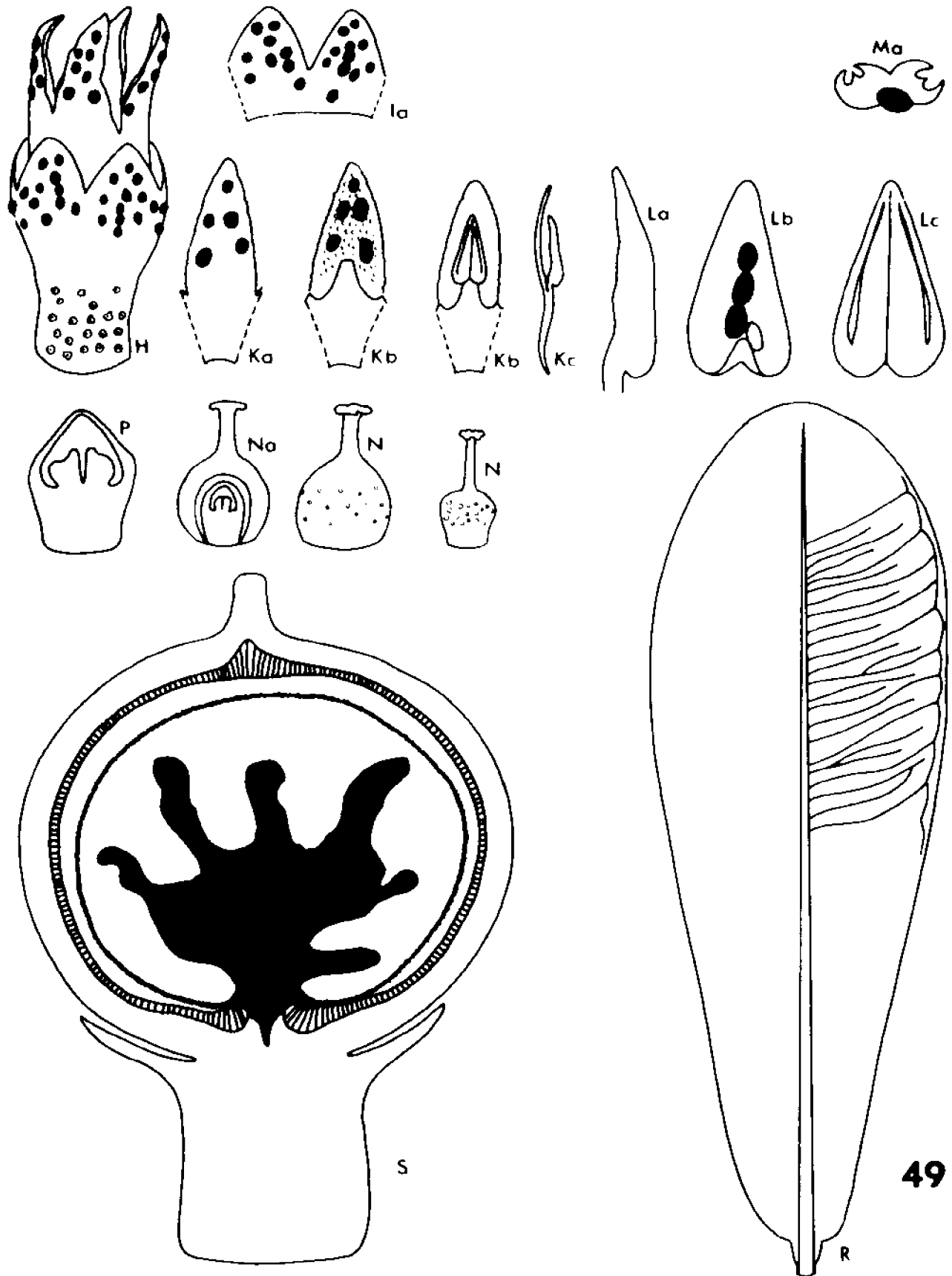
The closest relative to C. roraimae seems to be the other Guayana highland species particularly the small-leaved C. steyermarkianus and C. wurdackii. From these and all other species in the section, C. roraimae can be distinguished by the combination of large leaf blades which are acuminate at the apex, the purple corolla, 2.0-2.3 mm long, the corolla lobes internally glabrous, and the elongate racemes with flower pedicels 2.0-3.5 mm long. The purple corolla is unique among species of this section.

20. Cybianthus spathulifolius Agostini, sp. nov. (Fig. 49).

Arbor vel frutex. Ramuli dense lepidoti. Petioli 0.1-0.2 cm longi dense lepidoti, laminis anguste obovatis coriaceis 8-19 x 3-7 cm, basi truncatis to cuneatis decurrentibus, apice breviter acuminatis, supra laevibus vel paullo corrugatis juveniliter dense lepidotis maturitates glabrescentibus subtus dense lepidotis, costa media subtus elevata supra sulcata, nervis leteralibus utrinque latere 30-60 conspicuis vel supra haud conspicuis. Inflorescentia racemosa vel paniculata basi 1-2-ramosa 2-4 cm longa, pedunculo axi ramulis pedicellisque dense lepidotis, pedunculo ad 0.1 cm longo, pedicellis anthesis 1.0-1.5 mm longis, bracteis bracteolisque depresso-ovatis 0.6-0.8 mm longis, dorso dense lepidotis. Flores 4- vel raro 5-meri. Flores masculi: Calyce cupuliformi 1.0-1.2 mm longo ubique glabro vel extus parce lepidoto, tubo 0.3-0.4 mm longo, lobis deltoideis vel triangulari-ovatis crassiusculis 0.8-1.0 x 0.8-0.9 mm apice rotundatis vel obtusis marginibus lepidotis glandulis schizogenis prominentibus. Corolla 3.5-3.7 mm longa, tubo 1.3-1.5 mm longo ubique glabro, lobis ovatis crassiusculis 2.1-2.5 x 1.1-1.4 mm extus glabris intus glandulari-granulosis, ad apicem rotundatum vel acutum attenuatis, marginibus glandulari-granulosis, glandulis schizogenis prominentibus. Stamina 3.8-3.9 mm longa cum tubo corollae 1.7-2.0 mm adnata, filamentis 0.1-0.3 mm longis haud glandulosis in tubum haud connatis, antheris dorsifixis anguste triangularibus paullo curvatis 1.1-1.2 mm basi

## FIGURE LEGEND (49)

Fig. 49. C. spathulifolius. For legend and scales see Figure 24. B-S. Maguire 28668.



cordatis apice apiculatis attenuatis, connectivo conspicue glanduloso, glandulis schizogenis atrobrunneis. Pistillodium elongatum conicum 1.4-1.5 mm longum basi glandulari-lepidotum. Flores foeminei; Calyce subcupuliformi, 1.5-1.6 mm longo ubique glabro vel extus parce lepidoto, tubo 0.6-0.8 mm longo, lobis ovatis crassiusculis 0.8-1.0 x 0.8-0.9 mm apice rotundatis vel obtusis marginibus glabris glandulis schizogenis prominentibus. Corolla 2.7-3.5 mm longa, tubo 0.9-1.0 mm longo, lobis ovatis vel elliptico-ovatis crassiusculis 1.7-2.0 x 0.7-1.0 mm apicem rotundatum attenuatis extus glabris intus glandulari-granulosis, glandulis schizogenis prominentibus. Staminodia 2.2-2.3 mm longa cum tubo corollae 0.9-1.0 mm adnata, filamentis 0.3-0.4 mm longis in tubum connatis, thecis sterilibus dorsifixis ovatis vel triangular-ovatis 0.8-0.9 x 0.3-0.4 mm basi cordatis apice rotundato attenuatis, connectivo conspicue glanduloso, glandulis schizogenis prominentibus. Pistillum 1.6-1.8 mm longo, ovario 0.8-0.9 mm longo ca. 0.8 mm diametro dense glandulari-lepidoto inconspicue glanduloso, stylo 0.6-0.8 mm longo, stigmate capitato, ovulis 2-3. Fructus 0.5-0.6 mm longus 0.7-0.8 mm diametro; pseudo-arillo exiguo ad semen endocarpiumque adnato; endospermio typo III; embryone curvato ca. 3 mm longo.

Shrub or small tree. Branchlets densely lepidote. Petiole 0.1-0.2 cm long, densely lepidote. Leaf blades narrowly obovate, coriaceous, 8-19 cm long, 3-7 cm broad; base truncate to cuneate, decurrent; apex rounded to shortly acuminate; margin flat; midrib raised on lower surface and depressed on the upper; nerves 30-60 pairs, raised on both surfaces or inconspicuous above; marginal nerve conspicuous, 1-2 mm from the margin; upper surface smooth to somewhat reticulate in dry specimens, densely lepidote when young, becoming glabrous with age; lower surface densely lepidote. Inflorescence an axillary raceme or a panicle branched at the base, 2-4 cm long; peduncle, branches, axis, and pedicels densely to sparingly lepidote; peduncle very short, up to 0.1 cm long; pedicels at anthesis 1.0-1.5 mm long, in fruit 1.5-2.5 mm long; bracts depresso-ovate, fleshy, 0.6-0.8 mm long, rounded or obtuse at apex, densely lepidote dorsally. Flowers 4- or rarely 5-merous. Staminate flowers: calyx cupuliform, 1.0-1.2 mm long, sparsely lepidote externally, glabrous internally; tube 0.3-0.4 mm long; lobes deltate or deltate-ovate, fleshy, 0.7-0.8 mm long, ca. 0.8 mm broad, the apex attenuate to an obtuse or rounded tip, the margin lepidote, the schizogenous glands prominent, orange above, dark brown below. Corolla 3.5-3.7 mm long; 1.3-1.5 mm long, glabrous on both surfaces; lobes ovate, fleshy, 2.1-2.5 mm long, 1.1-1.4 mm broad, glabrous externally, densely glandular-

granulose internally, attenuate to an acute or rounded tip at apex, the margin glandular-granulose, the schizogenous glands prominent, orange above, dark brown below. Stamens 3.8-3.9 mm long, adnate 1.7-2.0 mm to the corolla tube; filaments 0.1-0.3 mm long, not glandular, not connate in a tube; anthers dorsifixed, narrowly triangular, slightly curved, 1.1-1.2 mm long, ca. 0.4 mm broad, cordate at base, attenuate to an apiculate tip at apex, the connective prominently glandular, the schizogenous glands dark brown. Pistillode 1.4-1.5 mm long, the base glandular lepidote, the style prominently glandular. Pistillate flowers: calyx cupuliform, 1.5-1.6 mm long, glabrous inside and outside; tube 0.6-0.8 mm long; the lobes ovate to depresso-ovate, fleshy, 0.8-1.0 mm long, 0.8-0.9 mm broad, obtuse or rounded at apex, entire and glabrous at the margin, schizogenous glands prominent. Corolla 2.7-3.5 mm long; tube 0.9-1.0 mm long, glabrous on both sides; lobes ovate to elliptic-ovate, fleshy, 1.7-2.0 mm long, 0.7-1.0 mm broad, the apex attenuate to a round tip, glabrous outside, papillate inside and at the margins, glands prominent. Staminodes adnate 0.9-1.0 mm to the corolla tube, 2.2-2.3 mm long, filaments short, 0.3-0.4 mm long; staminal tube 1.0-1.1 mm high, bearing lobes alternating with the petals; anthers dorsifixed near the base, ovate or triangular-ovate, 0.8-0.9 mm long, 0.3-0.4 mm broad, cordate at base, apex attenuate to a round tip, connective with 3-5 prominent schizogenous

glands. Pistille 1.6-1.8 mm long; ovary sub-globose, 0.8-0.9 mm high, 0.8 mm diameter, lepidote outside; style slender, 0.6-0.8 mm long, glabrous; stigma capituliform, lobulate; ovules 2-3, immersed, enclosed in the placenta. Fruits: 0.6-0.7 cm long, 0.7-0.8 cm diameter; endocarp smooth externally; "aril" scanty, adnate to seed and endocarp; endosperm type III; embryo curved, ca. 3 mm long.

Type. Venezuela, Territorio Federal Amazonas, Cerro Sipapo, south rim and east rim; shrub or small tree, flowers yellowish-brown, alt. 6000-6500 feet, 26-28 I 1949, Bassett Maguire & Louis Politi 28658 (holotype, NY).

Distribution. Known only from the Guayana highlands in southern Venezuela in the Territorio Federal Amazonas, at altitudes of 1500-2000 m (Fig. 5)

VENEZUELA. Terr. Federal Amazonas: Cerro Sipapo (Paraqué), S rim and E rim, alt. 6000-6500 feet, 26 I 1949, Maguire & Politi 28658 (holotype, NY; isotypes, VEN, US, S); S Basin, alt. 2000-2160 m, 26-28 I 1949, Maguire & Politi 28668 (type, NY); Rio Cuao, Rio Orinoco, Upper E Basin, alt. 1600-1850 m, 20 I 1949, Maguire & Politi 28461 (NY).

The closest relative of Cybianthus spathulifolius seems to be C. laurifolius, an allopatric species from the Andes of Colombia and Venezuela. They are the only two species in section Conomorpha with type III endosperm. C. spathulifolius can be distinguished from C. laurifolius and the other species in the section by the combination of

obovate leaf blades which are 8-19 cm long, the flat leaf margin, the very short petioles, the prominent schizogenous glands of the flower, the corolla 3.5-3.7 mm long, the short filaments, and the inconspicuous staminal tube.

The specific epithet refers to the obovate (spathulate) leaf blades.

21. Cybianthus laurifolius (Mez) Agostini, comb. nov.

(Fig. 50).

Conomorpha laurifolia Mez in Engler, Pflanzenreich  
4(236): 259. 1902.

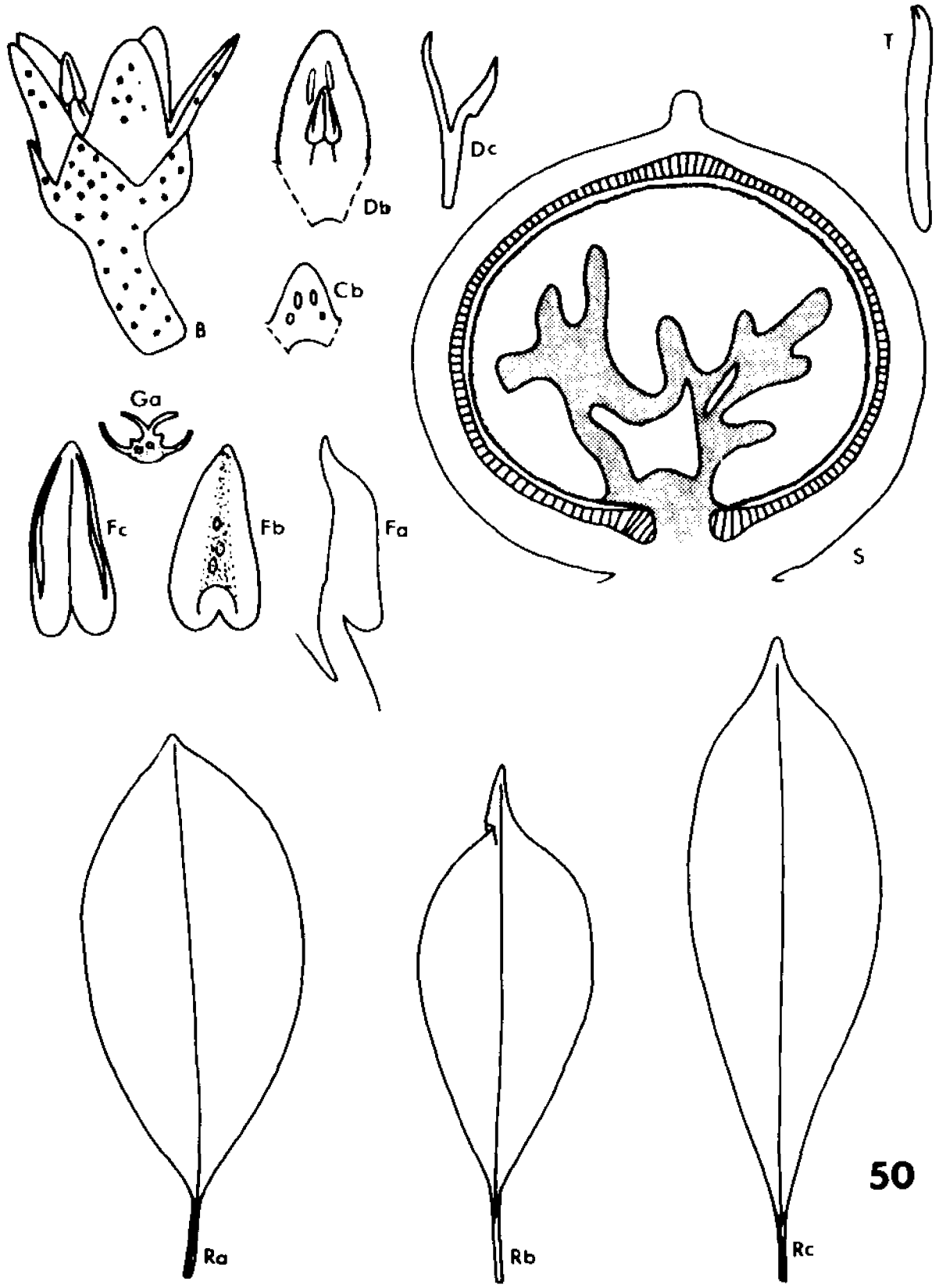
Conomorpha hieronymoides Steyermark, Fieldiana  
Bot. 28(3): 460. 1953. Type: Venezuela, Lara,  
above Los Aposentos, W of Humocaro Bajo, alt.  
2530 m, 5 II 1944, J. A. Steyermark 55295  
(holotype, F; isotypes, NY, VEN).

Type: Venezuela, Aragua, prope Colonia Tovar, 1854-1855,  
A. Fendler 756 (lectotype, G; isotypes, K, NY, P).

Tree to 8 m. Branchlets densely lepidote. Petioles 1.0-1.5 cm long, densely lepidote; leaf blades obovate, elliptic-obovate, narrowly obovate or narrowly elliptic-obovate, coriaceous or chartaceous, 5-12 cm long, 2-4 cm broad, ratio 2.0-3.6; margin revolute; base acute or cuneate, decurrent; apex acuminate; midrib raised on lower surface, depressed on the upper; nerves 8-12 pairs, slightly raised on both surfaces or inconspicuous in the upper one; upper surface smooth or reticulate, densely lepidote when young, becoming sparsely lepidote with age, shallowly scrobiculate; lower surface sparsely lepidote. Inflorescence a raceme or a panicle with 1-3 branches from the base, 2.5-5.0 cm long; peduncle, axis, and branches densely lepidote; peduncle 0.2-0.3 cm long; pedicels at anthesis 1-3 mm long; bracts and bracteoles narrowly triangular, usually longer than the pedicels, 1.5-3.0 mm long, 0.6-0.7 mm broad, densely lepidote

## FIGURE LEGEND (50)

Fig. 50. C. laurifolius. For legend and scales see Figure 24. B-F, Rc. Smith 1723. Ra. Fendler 756. Rb. Fosberg 21970.



dorsally. Flowers 4- or 5-merous. Staminate flowers: calyx cupuliform, 0.7-1.2 mm long, sparsely lepidote externally, glabrous internally; tube 0.2-0.3 mm long; lobes triangular or deltate, fleshy, 0.7-1.0 mm long, 0.7-0.8 mm broad, the apex attenuate to a round tip, the margin lepidote, the schizogenous glands pale brown, not prominent. Corolla 2.1-2.5 mm long; tube 0.7-0.8 mm long, glabrous on both surfaces; lobes elliptic or ovate, fleshy, 1.3-1.6 mm long, 0.8-0.9 mm broad, sparsely glandular-lepidote externally, densely glandular-granulose internally, the apex rounded or attenuated to a round tip, the margin glandular-granulose, the schizogenous glands pale brown, not prominent. Stamens 1.8-2.2 mm long, adnate 0.8-1.0 mm to the corolla tube; filaments flattened, 0.4-0.5 mm long, not glandular, not connate in a tube; anthers dorsifixed, narrowly triangular, slightly curved, 0.8-0.9 mm long, ca. 0.4 mm broad, cordate at base, attenuate to an apiculate tip at apex, the connective dark and inconspicuously glandular. Pistillode conic, 1.8-2.0 mm long, the base glandular-lepidote. Pistillate flowers: not seen. Fruit: 4.0-5.5 mm long, 5-7 mm diameter; endocarp smooth; aril copious, free from seed and endocarp; endosperm type III; embryo straight, 2.8-3.2 mm long.

Distribution. Venezuela and Colombia. This species is found at altitudes of 1800-2800 m (Fig. 6).

**COLOMBIA.** Magdalena: Sierra de Perijá, 10 km E NE of Manaure, 46 km E of Valledupar, alt. 2550 m, 4 II 1945, Grant 10289 (NY); Santa Marta, VII 1903, Smith 1727 (A, GH, NY, K); Cerro Quemado region, near Santa Marta, 2 III 1932, Espina & Giacometto 20946 (F, NY); Cerro de La Danta, alt. 1800 m, Espina & Giacometto 20975 (F, NY); Filo de Palmidal, headwaters of Rio Frio, W drainage of Sierra Nevada, alt. 2080 m, 27 VI 1944, Kernan 143 (US). Norte de Santander: Eastern slope of Páramo del Hatico, Toledo-Pamplona route, alt. 2900 m, 12 III 1927, Killip & Smith 20600 (NY); road from Pamplona to Toledo, crossing the divide between Rio La Teja and Rio Mesme, alt. 2800-3000 m, 27 II 1927, Killip & Smith 19940 (NY). Santander: vicinity of Charta, alt. 2600 m, 1 II 1927, Killip & Smith 18951 (COL, NY). Boyacá: Buenavista, headwaters of Rio Pauto, ridge E of quebrada Laja, 30 km ESE of Socha, alt. 2700-2900 m, 10 XI 1944, Fosberg 22229 (NY). Cundinamarca: 10 km S of Gachalá, on Trail to Medina, Cordillera de Los Parallones, alt. 2150 m, 28 V 1944, Fosberg & Grant 21970 (NY); Patio Bonito, Batatas Valley, Cordillera Helicon, 12 km SE of Gachalá, alt. 2460 m, 22 IX 1944, Grant 10228 (NY).

**VENEZUELA.** Lara: Las Sabanetas, above Los Aposentos, W of Humocaro Bajo, alt. 2530 m, 5 II 1944, Steyermark 55295 (F, NY, VEN). Aragua: Colonia Tovar, Fendler 756 (G, K, NY, P); La Mesa, Parque Nacional "H. Pittier", 19 I 1949, Delgado 593 (VEN); Colonia Tovar, Karsten s. n. (W). Táchira: Cabeceras del Rio Quinimarí, faldas de El Banco,

debajo del cerro Las Copas, 20 km S of San Vicent de la Revancha, SO of Santa Ana, alt. 2500-2700 m, 15 I 1968, Steyermark, Dunsterville & Dunsterville 100970 (VEN), 13 I 1968, 100875 (NY); Faldas inmediatamente debajo del Páramo de Tamá, alt. 2750-2950 m, 20 V 1967, Steyermark, Dunsterville & Dunsterville 98559 (VEN), 20 V 1967, 98562 (VEN); base of Páramo de Tamá, 4-10 km above Betania, alt. 2500-2895 m, 15 VII 1944, Steyermark 57354 (P).

The closest relative to C. laurifolius seems to be C. spathulifolius, an allopatric species of the Guayana highlands of southern Venezuela. These are the only two species in section Conomorpha that have type III seed endosperm. C. laurifolius can be distinguished from C. spathulifolius and all the other species in the section by the combination of prominently ribbed branchlets, the leaf blades 5-12 cm long with a revolute margin, the petioles 1.0-1.5 cm long, the flower pedicels 1-3 mm long, the corolla 2.1-2.5 mm long, the corolla lobes externally glandular-lepidote, the free portion of the filaments 0.4-0.5 mm long, and the staminal tube inconspicuous in the staminal flowers.

C. laurifolius can be distinguished from the sympatric C. frigidicola by the acuminate apex and the anthers only 0.5-1.0 mm long.

The name Conomorpha hieronymoides was applied by J. A. Steyermark to specimens from the State of Lara in Venezuela. These specimens show unusually thick leaf

blades but can not be distinguished otherwise from the bulk of the species.

Specimens collected in the western range of the species tend to have less coriaceous leaf blades with a reticulation on the upper surface. There are collections made in the Venezuelan Andes that intergrade with the eastern populations which tend to have thicker leaf blades and no reticulation on the upper surface. As there are no other morphological characters correlated with the reticulation, it has been decided to maintain these extremes within the range of C. laurifolius and not to recognize any subspecific categories.

Local names. Manteca colorada (Venezuela: Lara); olivo (Colombia: Magdalena); caimito macho (Colombia: Magdalena).

Economic uses. The thick leaves of this species are used to clean iron pots, pans, and other vessels (fide Steyermark).

22. *Cybianthus frigidicola* (Steyermark) Agostini, comb.  
 nov. (Fig. 51).

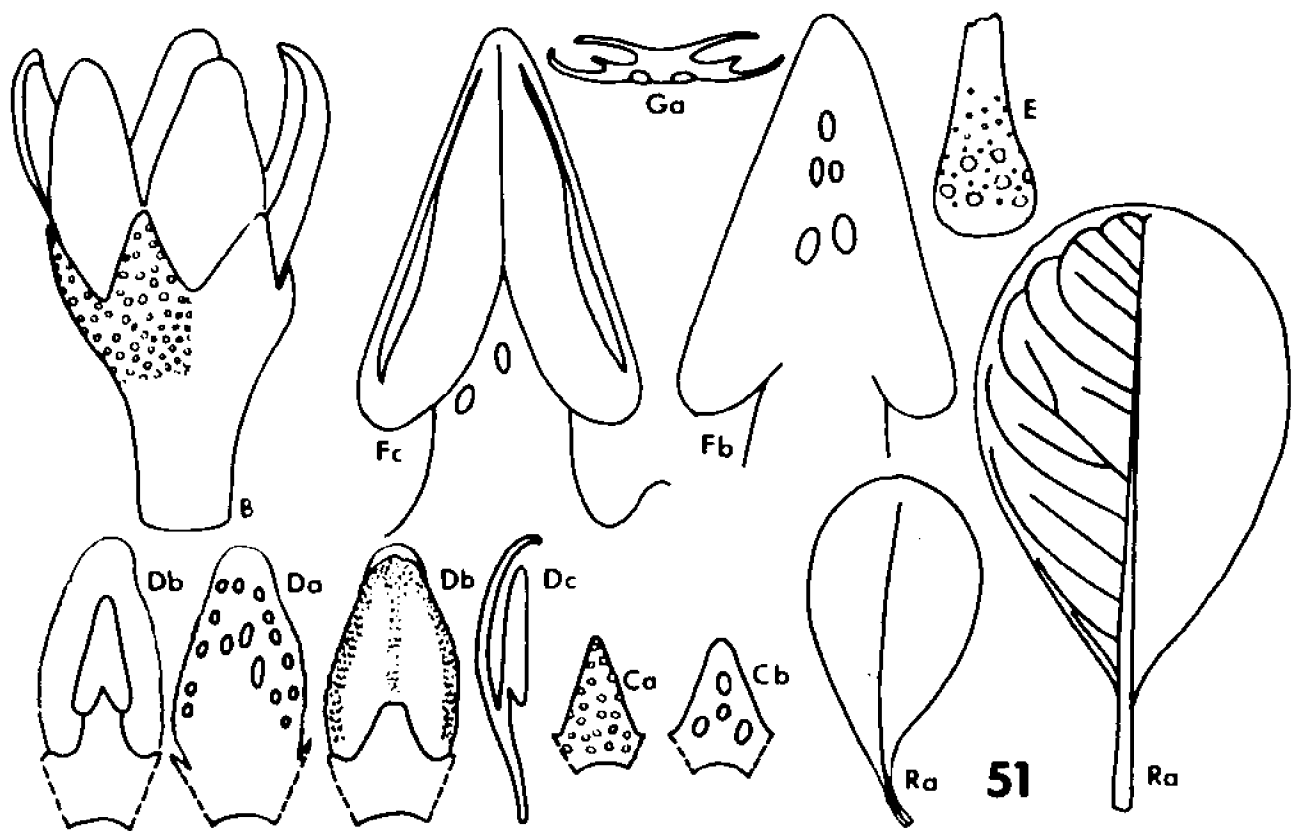
*Conomorpha frigidicola* Steyermark, Fieldiana Bot.  
 28(3): 459. 1963.

Type: Venezuela, Mérida, dwarf cool forest between El  
 Molino and Ridge above San Isidro Alto, alt.  
 2430-2895 m, 14 V 1944, J. A. Steyermark 56516  
 (holotype, F; isotypes, NY, VEN).

Tree to 13 m. Branches and branchlets densely lepidote.  
 Petiole 1.5-2.0 cm long, densely or sparingly lepidote.  
 Leaf blade obovate, obovate-elliptic or elliptic, coriaceous,  
 5.0-7.5 cm long, 2.5-4.5 cm broad, ratio 1.6-1.8; margin  
 revolute; base acute, decurrent; apex rounded; midrib raised  
 on lower surface, slightly depressed on the upper; nerves  
 8-14 pairs, raised beneath, inconspicuous above; upper surface  
 densely lepidote when young, becoming glabrous with age,  
 pusticulate when dry; lower surface sparingly lepidote.  
 Inflorescence an axillary panicle with 1 or 2 branches from  
 the base, rarely a raceme, 2-5 cm long; axis, branches, and  
 pedicels densely to sparingly lepidote; peduncle 0.3-0.5 cm  
 long; pedicels at anthesis 0.7-2.0 mm long; bracts and  
 bracteoles 1.8-2.5 mm long, densely lepidote ventrally.  
 Flowers unisexual, dioicous, 4-5-meri. Staminate flowers:  
 calyx cupuliform, 1.0-1.5 mm long, sparingly lepidote out-  
 side, glabrous inside; tube 0.3-0.4 mm long; the lobes  
 triangular, fleshy, 1.0-1.3 mm long, 0.7-0.8 mm broad,  
 attenuate to a round or acute tip, lepidote on margin, glands

## FIGURE LEGEND (51)

Fig. 51. C. frigidicola. For legend and scales  
see Figure 24. B-R. Steiermark 56516.



4-5, clear. Corolla 2.5-3.0 mm long; tube 0.3-0.6 mm long; lobes elliptic to elliptic-obovate, fleshy, 2.2-2.6 mm long, 1.2-1.4 mm broad, the apex attenuate to a round cucullate tip, sparingly lepidote outside, papillate inside, glands clear. Stamens 2.4-2.7 mm long, adnate 0.9-1.2 mm to the corolla tube; filament flattened, 0.2-0.3 mm long, glabrous with 2-3 inconspicuous clear glands; staminal tube bearing lobes 0.1 mm high alternating with the petals; anthers dorsifixed near the base, triangular, 1.3-1.4 mm long, 0.7-0.8 mm broad, cordate at base, attenuate to a round tip at apex, connective clear and with 5-7 clear glands. Pistillode 2.2-2.4 mm long, attenuate to a stylar elongation; base hollow, empty, lepidote outside. Pistillate flowers: not seen. Fruits: not seen.

Distribution. Known only from the type locality in the State of Mérida, Venezuela (Fig. 6).

The closest relative to C. frigidicola seems to be the sympatric species C. laurifolius. C. frigidicola can be distinguished from C. laurifolius and the other species in the section by the combination of prominently ribbed branchlets, the petioles 1.5-2.0 cm long, the obovate leaf blades with a round or obtuse apex, the flower pedicels 0.7-2.0 mm long, the corolla 2.5-3.0 mm long, and the anthers 1.3-1.4 mm long.

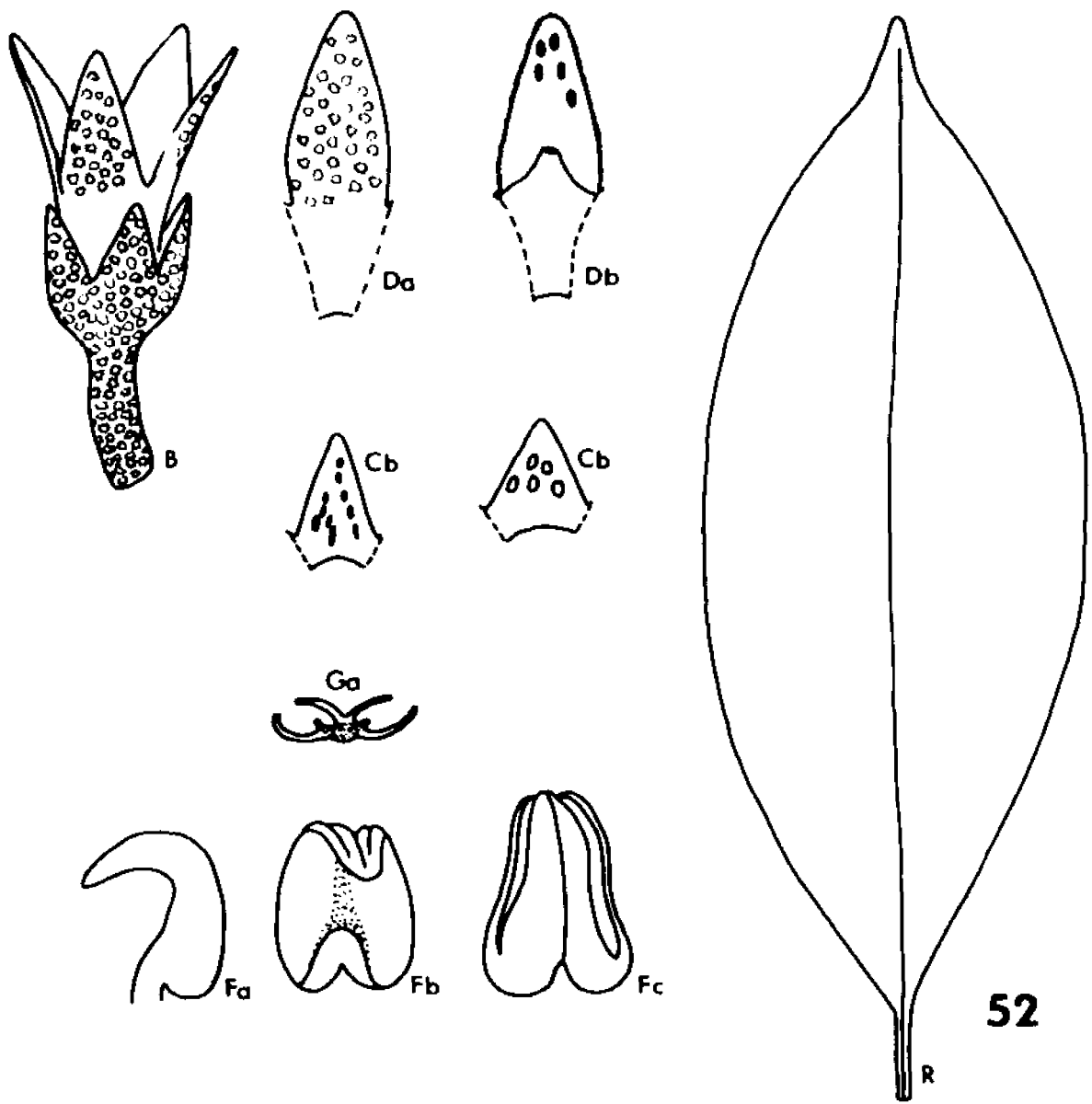
The type specimen (Steiermark 56516) is a pistillate individual with immature flowers. In the original description the inflorescence is cited as a raceme, but close examination reveals that it is usually a panicle branched at the base.

23. *Cybianthus* cuatrecasasi Agostini, sp. nov. (Fig. 52)

Arbor ad 6-metralis. Ramuli dense lepidoti. Petioli 1.0-1.5 cm longi dense lepidoti, laminis ellipticis vel elliptico-obovatis chartaceis 8.0-16.0 x 3.5-6.5 cm, basi acutis decurrentibus, apice abrupte acuminatis acumine 0.5-1.0 cm longo, supra pustulatis juveniliter dense lepidotis maturitates glabrescentibus subtus dense lepidotis, costa media subtus elevata supra sulcata, nervis lateralibus utrinque 26-34 supra paullo elevatis. Inflorescentia paniculata basi 2-4-ramosa 4.0-6.5 cm longa, pedunculo axi ramulis pedicellisque dense lepidotis, pedunculo 0.1-0.4 cm longo, pedicellis anthesi 1.0-1.5 mm longis, bracteis bracteolisque triangularis vel triangulari-ovatis pedicellis brevioribus 1.2-1.5 x ca. 0.6 mm, dorso dense lepidotis. Flores 4-meri. Flores masculi: Calyx cupuliformis 1.3-1.4 mm longum, extus dense lepidotus, intus glabro, tubo 0.2-0.4 mm longo, lobis triangularibus vel triangulari-ovatis crassiusculis 1.0-1.2 x 0.6-0.9 mm, ad apicem rotundatum attenuatis, marginibus lepidotis, glandulis schizogenis paucis paullo prominentibus brunneis. Corolla 3.0-3.5 mm longa, tubo 1.2-1.3 mm longo ubique glabro, lobis ovatis chartaceis 2.0-2.2 x 1.0-1.1 mm extus dense lepidotis intus glandulari-granulosis, ad apicem rotundatum attenuatis, marginibus glandulari-granulosi, glandulis schizogenis atrobrunneis paullo prominentibus. Stamina 2.5-2.8 mm longa cum tubo corollae 1.5-1.8 mm adnata, filamentis ca. 0.3 mm longis haud glandulosis in tubum connatis, antheris

## FIGURE LEGEND (52)

Fig. 52. *C. cuatrecasasi*. For legend and scales  
see Figure 24. B-R. Fosberg 22376.



52

dorsifixis ovatis paullo curvatis 0.8-1.0 x 0.5-0.6 mm, basi cordatis apice acutato attenuatis, connectivo atrofusco haud glandulosis. Pistillodium ampulliforme 1.6-1.8 mm longum, basi glandulari-lepidotum. Flores foeminei non visi. Fructus ca. 5 mm longus ca. 8 mm in diametro, endocarpio extus laeve, pseudo-arillo exiguo ad semen endocarpiumque adnato, endospermio typo II, embryo recto ca. 3 mm longo.

Small tree to 6 m. Branchlets densely lepidote. Petioles 1.0-1.5 cm long, densely lepidote; leaf blades elliptic or elliptic-obovate, chartaceous, 8-16 cm long, 3.5-6.5 cm broad, ratio 2.1-2.4; base acute, decurrent; apex abruptly acuminate, the acumen 0.5-1.0 cm long; midrib raised on lower surface, depressed on the upper; nerves 26-34 pairs, slightly raised above, prominent below; upper surface smooth when dry, densely lepidote when young, becoming glabrous and pusticulate with age; lower surface densely lepidote. Inflorescence a panicle with 2-4 branches from the base, 4.0-6.5 cm long; peduncle, axis, branches, and pedicels densely lepidote; peduncle 0.1-0.4 cm long; pedicels at anthesis 1.0-1.5 mm long; bracts and bracteoles triangular or triangular-ovate, shorter than the pedicels, 1.2-1.5 mm long, ca. 0.6 mm broad, densely lepidote dorsally. Flowers 4-merous. Staminate flowers: calyx cupuliform, 1.3-1.4 mm long, densely lepidote externally, glabrous internally; tube 0.2-0.4 mm long; lobes triangular or triangular-ovate, fleshy, 1.0-1.2 mm long, 0.6-0.9 mm broad, the apex attenuate to a round tip, the margin lepidote, the

schizogenous glands few, pale brown, slightly prominent. Corolla 3.0-3.5 mm long; tube 1.2-1.3 mm long, glabrous on both surfaces; lobes ovate, chartaceous, 2.0-2.2 mm long, 1.0-1.1 mm broad, densely lepidote externally, densely glandular-granulose towards the apex internally, the apex attenuate to a round tip, the margin glandular-granulose, the schizogenous glands dark brown and slightly prominent. Stamens 2.5-2.8 mm long, adnate 1.5-1.8 mm to the corolla tube; filaments ca. 0.3 mm long, not glandular, connated in a tube, 1.2-1.3 mm high, the staminal tube not bearing lobes alternating with the petals; anthers dorsifixed, ovate, curved, 0.8-1.0 mm long, 0.5-0.6 mm broad, cordate at the base, attenuate to an acute tip at apex, the connective darkened, not glandular. Pistillode flask-shaped, 1.6-1.8 mm long, the base glandular-lepidote. Pistillate flowers not seen. Fruits: ca. 5 mm long, ca. 8 mm diameter; endocarp smooth externally; "aril" scanty, adnate to seed and endocarp; endosperm type II; embryo straight, ca. 3 mm long.

Type. Colombia, Dept. Cauca (or Huila): Roblal, on Moscopán Highway, Moscopán Region, drainage of Rio La Plata, 43 km SE of Popayán, lat. 2° 20' N, long. 76° 14' W; occasional in open, Chusquea-filled forest on steep slopes, alt. 2160 m, 26 XI 1944, F. R. Fosberg 22326 (holotype, US; isotype, NY).

Distribution. Southern Colombia and Ecuador, at altitudes of 2000-2600 m (Fig. 6).

COLOMBIA. Huila: Ridge between drainages of Rio Guarapas and Rio Guachicas, above Palestina, SW of Pitalito, alt. 2000-2300 m, 6 II 1943, Fosberg 19969 (NY, US); 15 km NE of Algeciras, near Campamento La Girona, alt. 7200-8500 feet, 26 III 1944, Little, Jr. 7481 (COL, NY, US). Cauca: drainage of Rio La Plata, 43 km SE of Popayán, alt. 2160 m, 26 XI 1944, Fosberg 22376 (US, NY); region de Moscapán, hoya del Rio San José, La Chorrera de Candelaria, bosques circundantes, alt. 2100-2350 m, 1 II 1947, Cuatrecasas 23583 (F, US). ECUADOR. Santiago-Zamora: along Quebrada Honda, vicinity of Rancho Achupallas, alt. 2500-2700 m, 10 X 1943, Steyermark 54552 (NY).

The closest relatives of this species seem to be the other Andean species, particularly C. occigranatensis and C. laetus. They all are highland species which have type II seed endosperm. From these and the other species in the section, C. cuatrecasasi can be distinguished by the combination of petioles 1.0-1.5 cm long, leaf blades chartaceous and 8-16 cm long, acuminate at flower pedicels 1.0-1.5 mm long, corolla 3.0-3.5 mm long, corolla lobes internally glandular-granulose, filaments short, and presence of a conspicuous staminal tube in the staminal flowers.

C. cuatrecasasi has been confused with C. peruvianus from which it can be distinguished by the larger leaf blades, the longer corolla, and the longer flower pedicels.

This species is named after Dr. José Cuatrecasas

who is a perceptive student of the tropical American flora  
and an active collector in Colombia.

24. *Cybianthus occigranatis* (Cuatrecasas) Agostini,  
 comb. nov. (Fig. 53).

*Conomorpha occigranatis* Cuatrecasas, Rev. Acad.

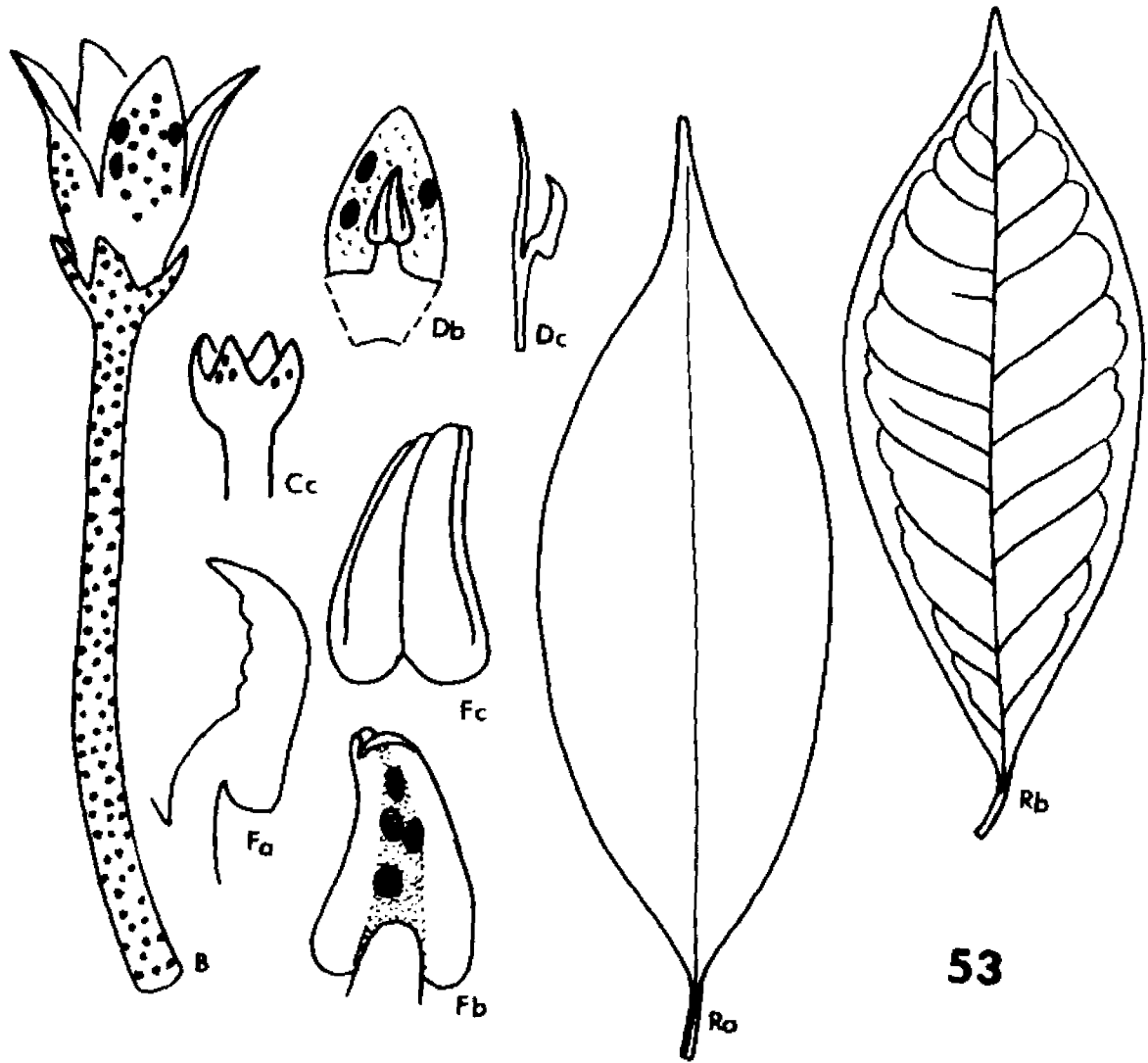
Colomb. Cienc. 8(31): 320. 1951.

Type: Colombia, Departamento del Valle: Cordillera Occidental, vertiente occidental, hoya del Rio Digua, lado izquierdo del Rio San Juan en la region de Quereamal, 1540-1650 m alt., Quebradita del km 51; arbolito, hoya coriacea, verde plumiza haz, ocraceo ferruginosa envés, calyx sepia claro, corola blanco ocrácea; 25 II 1947, J. Cuatrecasas 23734 (holotype, P).

Shrub or small tree to 4 m. Branchlets densely lepidote. Petioles 1.0-1.5 cm long, canaliculate above, densely lepidote; leaf blades elliptic or elliptic-obovate, membranaceous or chartaceous, 11-14 cm long, 4-5 cm broad; ratio 2.6-2.8; margin revolute; base acute, decurrent; apex acuminate; midrib raised on lower surface, depressed on the upper; nerves 8-12 pairs, raised on the lower surface. sulcated on the upper one; upper surface smooth, densely lepidote when young, becoming pusticulate and sparsely lepidote or glabrous with age; lower surface densely lepidote. Inflorescence a raceme or a panicle with 1-3 branches from the base, 4-8 cm long; peduncle, axis, and branches densely lepidote; peduncle 0.1-0.4 cm long; pedicels at anthesis 1.5-6.0 cm long; bracts and bracteoles ovate, shorter than the pedicels, 0.7-1.1 mm

## FIGURE LEGEND (53)

Fig. 53. C. occigranatensis. For legend and scales see Figure 24. B-F. Pennell 5147. Ra. Cuatre-casas 22131. Rb. Little 8532.



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long, 0.4-0.5 mm broad, densely lepidote dorsally. Flowers 4-merous. Staminate flowers: calyx subcupuliform, 0.8-1.0 mm long, sparsely lepidote externally, glabrous internally; tube 0.2-0.3 mm long; lobes triangular or deltate, fleshy, 0.5-0.9 mm long, 0.4-0.8 mm broad, the apex attenuate to an acute or round tip, the margin lepidote, the schizogenous glands dark brown, not prominent. Corolla 2.4-2.7 mm long; tube 0.7-0.8 mm long, glabrous on both surfaces; lobes ovate, membranous, 1.6-1.8 mm long, 1.0-1.3 mm broad, sparsely lepidote externally, glandular-granulose internally, the apex attenuate to a round tip, the margin glandular-granulose, the schizogenous glands dark brown, not prominent. Stamens 1.8-1.9 mm long, adnate 0.8-0.9 mm to the corolla tube; filaments 0.2-0.3 mm long, not glandular, not connate in a tube; anthers dorsifixed, triangular, curved, 0.8-1.0 mm long, 0.5-0.6 mm broad, cordate at base, attenuate to an acute tip at apex, the connective dark and prominently glandular. Pistillode flask-shaped, ca. 1.5 mm long, the base glandular-lepidote. Pistillate flowers: not seen. Fruit: ca. 4 mm long, ca. 4.5 mm diameter, the endocarp smooth externally, the aril scanty and adnate to both the seed and the endocarp; endosperm type II; embryo straight, ca. 3 mm long.

Distribution. Colombia and Ecuador, at altitudes of 1000-2000 m (Fig. 6).

COLOMBIA. Valle: Hoya del Rio Digua, lado izquierdo del Rio San Juan, alt. 1540-1650 m, 25 II 1947, Cuatrecasas 23734 (type, F); hoya del Rio Digua, Piedra de Moler, alt. 900-1180

m, 20 VIII 1943, Cuatrecasas 14918 (paratype, F); hoya del Rio Sanquiní, La Laguna, 1250-1400 m alt., 10 XII 1943, Cuatrecasas 15658 (paratypes, F, US); monte La Guarida, filo de la Carbonera, entre Las Brisas y Albán, alt. 1950-2000 m, 16 X 1940, Cuatrecasas 22131 (paratypes, F, US, VEN); San Antonio, W of Cali, alt. 1900-2350 m, 26 II 1939, Killip & Garcia 33898 (paratypes, A, BM, F, NY); La Cumbre, 7 V 1922, Pennell 5147 (K, NY, US). Huila: Rio Suaza, SW of Alejandra, alt. 5500 feet, 23 VIII 1944, Little, Jr. 8532 (COL). ECUADOR. Santiago-Zamora: between Campanas and Arenillas, along Rio Tintas, 10 leagues SE of El Pan, at 2195 m, 13 VII 1943, Steyermark 53550 (NY).

The closest relatives of this species seem to be the other Andean species, particularly C. cuatrecasasi and C. laetus. They are all highland species which have type II endosperm. From these and all other species in the section, C. occigranatensis can be distinguished by the combination of petioles 1.0-1.5 cm long, the leaf blades 11-14 cm long, the apex acuminate, the flowering pedicels 1.5-6.0 mm long, the corolla 2.4-2.7 mm long, the corolla lobes glandular-granulose internally, the short filaments, and the staminal tube inconspicuous in the staminate flowers.

C. occigranatensis has been confused with C. peruvianus from which it can be distinguished by the sulcate lateral nerves in the leaf blades, the longer pedicels, and the absence of a staminal tube in the staminate flowers.

25. Cybianthus laetus (Mez) Agostini, comb. nov. (Fig. 54).

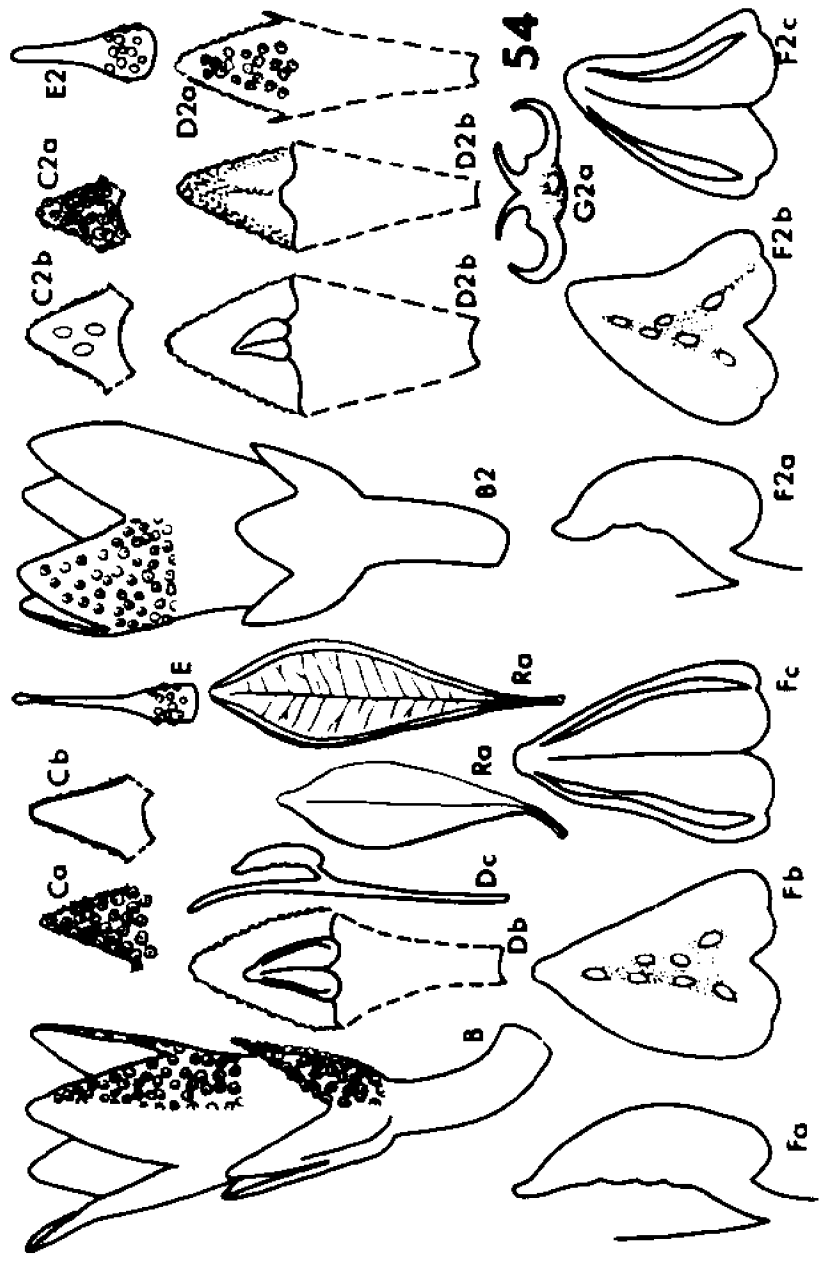
(Conomorpha laeta Mez in Engler, Pflanzenreich  
4(236): 257. 1902

Type: Peru, Amazonas, Taulia, 1835, Mathews 1561  
(holotype, K).

Shrub or small tree to 2 m. Branchlets densely lepidote. Petiole 0.5-0.7 cm long, densely lepidote. Leaf blades obovate to elliptic-obovate, subcoriaceous to coriaceous, 3.0-4.5 cm long, 1.2-1.6 cm broad, ratio 2.7-3.0; margin revolute; base attenuate, decurrent; apex acute or shortly acuminate; midrib raised on lower surface, depressed on the upper; nerves 14-18 pairs, inconspicuous on both surfaces or slightly raised beneath; upper surface wrinkled in dry specimens, densely lepidote when young, glabrescent with age; lower surface densely lepidote. Inflorescence a raceme or a panicle with one or two branches from the base, 2-3 cm long; axis, branches, and pedicels densely lepidote; peduncle 0.1-0.3 cm long; pedicels at anthesis, 0.9-1.5 mm long; bracts and bracteoles narrowly ovate, 1-2 mm long, densely lepidote ventrally. Flowers 4-merous. Staminate flowers: calyx cupuliform, 1.2-1.8 mm long, densely or sparingly lepidote outside, glabrous inside; tube 0.2-0.3 mm long; the lobes triangular or deltate, fleshy, 0.8-1.0 mm long, 0.6-0.8 mm broad, apex attenuate to a round tip, lepidote on margin, with 2-4 clear or inconspicuous schizogenous glands. Corolla

## FIGURE LEGEND (54)

Fig. 54. C. laetus. For legend and scales see  
Figure 24. B-F, Ra. Weberbauer 4354. B2-G2, Rb. Ma-  
thews 1561.



3.2-3.4 mm long; tube 1.8-2.0 mm long, densely lepidote outside, glabrous inside; lobes ovate, triangular-ovate or deltate-ovate, fleshy, 0.8-0.9 mm long, 0.3-0.4 mm broad, the apex attenuate to a rounded tip, densely lepidote outside, glabrous and papillate inside and at the margins, without conspicuous schizogenous glands. Stamens 2.6-2.7 mm long, adnate 1.7-1.8 mm to the corolla tube; filaments very short, 0.1-0.2 mm long; staminal tube bearing lobes ca. 0.1 mm high alternating with the petals; anthers dorsifixed, ovate, 0.6-0.9 mm long, 1.8-1.9 mm broad, cordate at base, attenuate to an apiculate or rounded tip at apex, the connective darkened and inconspicuously glandular. Pistillode conic elongate, hollow, 1.5-2.0 mm long, lepidote-glandular towards the base. Pistillate flowers: not seen. Fruit: not seen.

Distribution. Peru, Department of Amazonas, at altitudes of about 2000 m (Fig. 6).

PERU. Amazonas; Taulia, 1835, Mathews 1561 (K); east of Chachapoyas, alt. 2000 m, Weberbauer 4354 (G); Molinopampa, 1906, Weberbauer 4354 (fragment F).

The closest relatives to this species seem to be the other Andean species, particularly C. cuatrecasasi and C. occigranatis. All are highland species which have type II endosperm. From these and all other species in the section, C. laetus can be distinguished by the

combination of small leaf blades 3-5 cm long, 1.0-1.6 cm broad, the apex acute or acuminate, the petioles 0.5-0.7 cm long, the flower pedicels 0.9-1.5 mm long, the corolla 3.2-3.4 mm long, the short filaments, and the presence of a staminal tube in the staminate flowers.

C. laetus may be confused with C. crotonoides, an allopatric species from the Guayana highlands. It can be distinguished from C. crotonoides by the usually obovate leaf blades, the corolla tube longer than the calyx, the sepals connate less than 1/3 of the calyx length, and the ovary in the pistillate flowers without dark scales.

26. *Cybianthus brasiliensis* (Mez) Agostini, stat. nov.

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(Fig. 55).

Conomorpha peruviana var. brasiliensis Mez in

Engler, Pflanzenreich 4(236): 262. 1902.

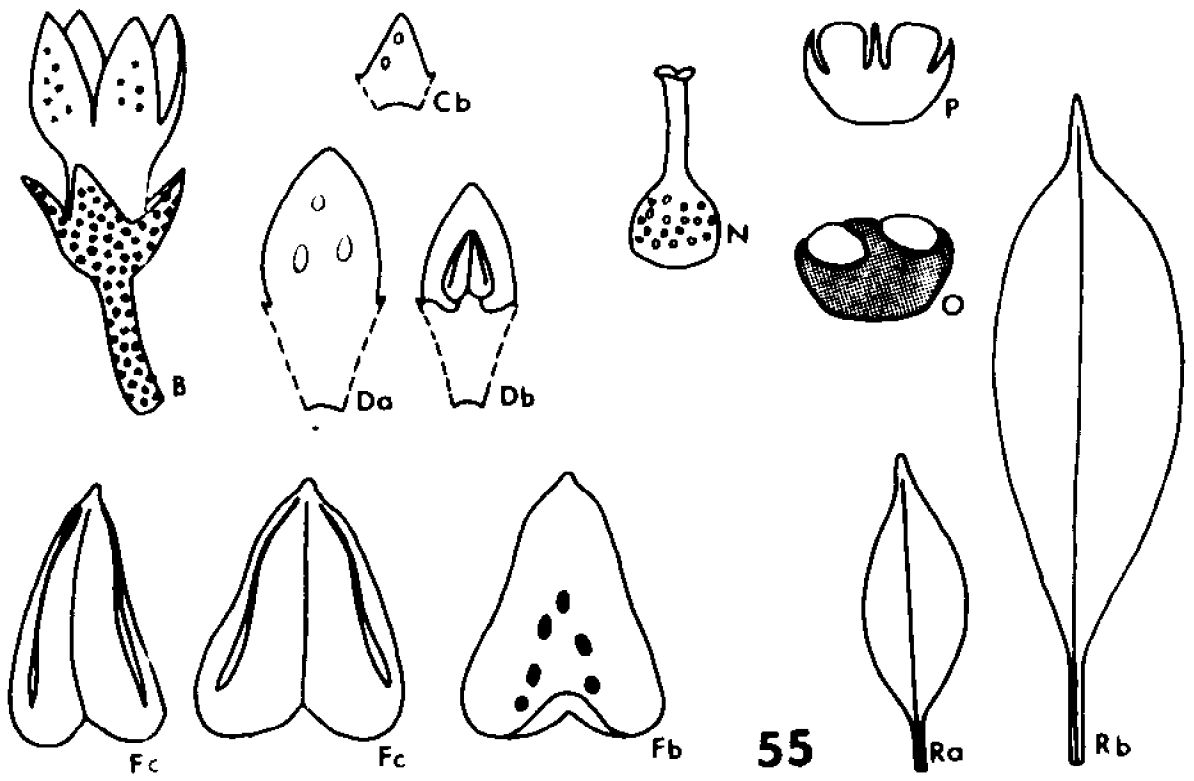
Type: Brazil, Rio de Janeiro, Alto Macahé, IV 1889,

A. Glaziou 17689 (lectotype, C; isotypes, A, K).

Shrub or small tree to 5 m. Branchlets densely lepidote. Petioles 0.5-1.0 cm long, canaliculate above, densely lepidote; leaf blades elliptic, elliptic-obovate or narrowly elliptic, chartaceous to coriaceous, (3.0)-5.0-6.5-(10.0) cm long, (1.0)-1.5-2.3-(3.5) cm broad, ratio 2.3-2.8; margin revolute; base acute, decurrent; apex acuminate; midrib raised on lower surface, depressed on the upper one; nerves 8-20 pairs, inconspicuous on both surfaces or slightly raised on the lower one; upper surface smooth, densely lepidote when young, becoming sparsely lepidote or glabrous with age; lower surface densely lepidote with dark scales. Inflorescence a raceme or a panicle with 1-3 branches from the base, 1.5-4.0 cm long; peduncle, axis and branches densely lepidote; peduncle 0.1-0.3 cm long; pedicels at anthesis 1.0-1.5 mm long; bracts and bracteoles narrowly ovate or triangular-ovate, 1.0-1.5 mm long, 0.5-0.6 mm broad, densely lepidote dorsally. Flowers 4- rarely 3-merous. Staminate flowers: calyx cuculiform, 0.9-1.2 mm long, densely lepidote externally with dark scales, glabrous internally; tube

## FIGURE LEGEND (55)

Fig. 55. C: brasiliensis. For legend and scales  
see Figure 24. B-F. Dusón 13798. N-P. Tessman 5-11-47.  
Ra. Lima 341. Rb. Reitz and Klein 1107.



0.2-0.3 mm long; lobes triangular or triangular-ovate, chartaceous, 0.6-0.8 mm long, 0.6-0.7 mm broad, attenuate to a round tip at apex, the margin lepidote, the schizogenous glands dark or pale brown, inconspicuous, not prominent. Corolla 1.8-2.6 mm long; tube 1.0-1.1 mm long, glabrous on both surfaces; lobes ovate or narrowly ovate, membranaceous, 1.0-1.5 mm long, 0.7-1.1 mm broad, sparsely lepidote externally, densely glandular-granulose internally, the apex round or attenuate to a round tip, the margin glandular-granulose, the schizogenous glands few, pale brown, inconspicuous, not prominent. Stamens 1.6-2.2 mm long, adnate 1.0-1.2 mm to the corolla tube; filaments 0.3-0.4 mm long, not glandular, connate in a tube, the staminal tube bearing lobes alternating with the petals; anthers dorsifixed, triangular or triangular-ovate, slightly curved, 0.6-0.8 mm long, 0.3-0.7 mm broad, cordate at base, attenuate to an acute or apiculate tip at apex, the connective not darkened, prominently glandular. Pistillode elongate conic, 1.0-1.2 mm long, the base glandular lepidote. Pistillate flowers: calyx, corolla, and staminodes as in staminate flowers. Pistil ca. 2 mm long; ovary 0.8-0.9 mm long, 0.8-0.9 mm diameter, lepidote externally; style elongate, ca. 1 mm long, not glandular; stigma capitate; ovules 2. Fruit 4-5 mm long, 5-6 mm diameter, the endocarp smooth externally, "aril" well-developed and free or slightly adnate to the seed; endosperm type II; embryo straight, 3-4 mm long.

Distribution. Known from southern and southeastern Brazil, from Goiás and Minas Gerais to Santa Catarina at altitudes of 5 to 1500 m (Fig. 4).

**BRAZIL.** Goiás: Serra dos Pyreneus, XI 1892, Ule 327 (F, R, RB). Minas Gerais: Pico de Cata Branca, Município de Itabirito, alt. 1300 m, 21 VI 1945, Williams & Assis 2386 (R); Taguaral, Ouro-Preto, 7 X 1892, Schwacke 8691 (RB), 21 XI 1891, Schwacke 7472 (RB); Serra do Ouro Preto, IV 1892, Ule 2628 (F, R), 8 XII 1896, Schwacke 12746 (RB); sine loco speciali, 1843, Claussen s. n. (P), 1816-1821, Saint-Hilaire s. n. (P). Espírito Santo: Município de Castello-Forno Grande, alt. 1000-1700 m, 6 XII 1956, Pereira 2114 (F, NY, R). São Paulo: Alto da Serra, 19 XI 1917, Hoehne 1113 (NY, SP), 6 X 1936, Hoehne & Gehrt 2595 (NY, SP), 2 IX 1931, Lemos 28182 (SP), 28 XII 1943, Handro s. n. (SP); Praia Grande, 18 X 1898, Loefgren 10917 (SP); Campo Grande, alt. 800 m, XI 1913, Brade 6977 (SP), 1 II 1962, Handro 1001 (SP), Handro 966 (SP); Boracôa, Estação Experimental, 17 XII 1940, Lima & Silva 6035 (SP); Bertiooga, margem do Rio Itaguaré, Kuhlmann s. n. (SP). Rio de Janeiro: Morro da Carangola, pres da Petrópolis, Glaziou 14087 (NY); Alto Macahé, 1889, Glaziou 17689 (C, A, K; isotypes A, K), 1889, Glaziou 17688 (G, K, P); Santa Magdalena, Pedra da República, IV 1936, Lima 346 (F, NY, RB); Santa Magdalena, Alto do Desengano, Lima 341 (RB); Salto de Imbé, Pedra República, alt. 1500 m, IV 1932, Brade & Lima 11737 (R); Maná (Restinga), 17 III 1903, Dusén 1954 (F), s. n. (U, UPS), 16 XI 1890, Schwacke 6990

(RB); sine loco speciali, IV 1883, Glaziou 14047 (BR, C, G, K, R), Glaziou 8221 (BR, C, G, K, P, S). Paraná: Yacareby, 2 XII 1909, Dusén 8649 (S, Z), 27 VI 1946, 15230 (BR, S, Z), 5 X 1915, 17231 (G, NY, S), 12 XII 1914, 16092 (S); Desvio Ypiranga, 4 IX 1911, Dusén 12141 (G, NY, S); Guaratuba, 24 XII 1911, Dusén 13798 (BR, NY, S); Coioba, 5 XI 1947, Tessmann s. n. (RB); Rio Taquary, Campina Grande do Sul, 9 XII 1956, Hatschbach 3938 (L, US); Serra de Aracatuba, Mun. Guaratuba, 22 XI 1959, Hatschbach 6579 (L); Picada Rio Guaraguassu-Cambara, Mun. Paranagua, 1 X 1950, Hatschbach 2101 (S); Muitinga, 4 I 1921, Dusén 13611 (S). Santa Catarina: Morro Spitzkopf, Blumenau, 23 X 1959, Reitz & Klein 9211 (G), 2 XI 1948, Reitz 2256 (RB); Bom Retiro, Blumenau, alt. 450 m, 17 IX 1959, Reitz & Klein 9109 (NY); Barra do Sul, Araquari, alt. 5 m, 10 VIII 1953, Reitz & Klein 919 (NY), 10 VIII 1953, Reitz & Klein 927 (G, NY, S, U), 29 X 1953, Reitz 5783 (NY, S); Morro da Resacada, Itajaí, alt. 300 m, 15 IX 1955, Klein 1526 (NY), 18 XI 1955, Klein 1776 (NY), 24 I 1956, Reitz & Klein 1830 (NY); Pilões, Palhoça, alt. 200 m, 18 I 1956, Reitz & Klein 2414 (NY); Hôrto Florestal I.N.P., Ibirama, alt. 350-700 m, 15 VI 1956, Klein 2095 (NY), 15 IX 1956, Klein 2070 (U), Reitz & Klein 1107 (NY, U, US); Paraty, 20 X 1928, Hoehne 23185 (SP); Azambuja, Brusque, Eq. Ecologia 51c (RB); Araquari, mata do inferninho, 30 V 1951, Veloso 51b (RB).

Local name. Capororoca (Veloso 51, Santa Catarina).

The closest relatives of this species seem to be the Andean C. cuatrecasasii, C. laetus, and C. occigranatis. From these and the other species in the section, C. brasiliensis can be distinguished by the combination of the petioles 0.5-1.0 cm long, the leaf blades 3-10 cm long, acuminate at the apex, revolute at the margin, the flower pedicels 1.0-1.5 mm long, the corolla lobes glandular-granulose internally, the filaments short, and the staminal tube prominent in the staminate flowers.

This taxon was considered by Carl Mez to be a variety of C. peruvianus. Close examination of abundant material has shown that its status as a species should be recognized. Besides having a characteristic range restricted to south and southeastern Brazil, C. brasiliensis can be distinguished from C. peruvianus by the type II endosperm, the abundant "aril", the shorter petioles, the usually smaller leaf blades, the scales on the lower surface of blades, the flowers usually dark brown, and the longer flower pedicels.

C. brasiliensis has been confused with C. comperuvianus from which it can be distinguished by the type II endosperm, the prominent lenticels usually present in the branchlets, the usually dark scales of branchlets and flowers, the usually shorter leaf blades, revolute at the margin, and the shorter flower pedicels.

C. brasiliensis is the only species in section Conomorpha that develops occasional 3-merous flowers, a

character reminiscent of species of section Triadophora.

The lectotype was selected from among a number of collections seen by C. Mez and cited by him in the original description.

Index to the numerical order of species  
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| 5. <i>C. dussii</i> (Mez) Agost.            | 19. <i>C. roraimae</i> (Steud.) Agost.               |
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| 7. <i>C. guyanensis</i> (A. DC.) Miq.       | 21. <i>C. laurifolius</i> (Mez) Agost.               |
| 8. <i>C. pseudoicacoreus</i> (Miq.) Agost.  | 22. <i>C. frigidicola</i> (Steud.) Agost.            |
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| 10. <i>C. comperuvianus</i> Agost.          | 24. <i>C. occigranatis</i> (Cuatr.) Agost.           |
| 11. <i>C. peruvianus</i> (A. DC.) Miq.      | 25. <i>C. laetus</i> (Mez) Agost.                    |
| 12. <i>C. punctatus</i> (Mez) Agost.        | 26. <i>C. brasiliensis</i> (Mez) Agost.              |
| 13. <i>C. oblongifolius</i> (A. DC.) Agost. |  |
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C. discolor Mez = Geissanthus

C. jacquinoides Griseb. = Wallenia jacquinoides

C. longistyla Cuatr. = Geissanthus longistylus (Cuatr.) Agost.

C. myriantha Mansf. = Geissanthus myrianthus (Mansf.) Agost.

C. pyramidata Mez = Geissanthus pyramidatus (Mez) Agost.

C. scrobiculata Cuatr. = Geissanthus

C. sodiroana Mez = Geissanthus mezianus Agost.

Cybianthus costaricana Hemsl. = Grammadenia costaricana

(Hemsl.) Mez

C. foliosos Rusby = Stylogyne

C. glauca Rusby = Stylogyne

C. humboldtii A. DC. = Ardisia guyanensis (Aubl.) Mez

C. jacquinioides Gomez = Wallenia jacquinioides

C. myrtifolius Griseb = Schinus myrtifolius (Griseb.) Cabrera

(Anacardiaceae)

C. principis A. DC. = Ardisia principis (A. DC.) Macbr.

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