

A REVISION OF THE GENUS ODONTONEMA
(ACANTHACEAE)

by

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(Acanthaceae)

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ABSTRACT

Title of Thesis: A revision of the genus Odontonema Nees (Acanthaceae)

Thesis submitted by: Vicki M. Baum, Master of Science, 1982

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Odontonema Nees (Acanthaceae, Acanthoideae, Acanthatae, Odontonem-
eae) is a New World tropical or subtropical genus of 26 species and two
varieties. Members of the genus are distributed from coastal central
Mexico southward throughout Latin America into northern South America,
with one species located on the southeastern coast of Brasil (a second
species from Brasil is from an unknown location). Odontonema also is
found on the Caribbean Islands.

The genus consists of four major groups which, at this time, are
not given formal taxonomic recognition: 1) red-purple (rarely white)
flowered species (O. callistachyum and its relatives); 2) red flowered
species with typically a bottle-shaped corolla (O. schomburgkianum and
its relatives); 3) white-purple flowered species with a more strongly
bilabiate corolla (O. nitidum and its relatives); and 4) yellow flowered
species (O. hondurensis and its relatives).

Although a few members of Odontonema may be seen in cultivation,
the present revision is based on an examination of herbarium material
found in both New and Old world herbaria, a numerical analysis of macro-
morphological features, and an examination of pollen morphology. The
four groups within Odontonema defined above were established after the
numerical analysis, and all species save one (O. cuspidatum) were found
to have 3-colporate pollen characteristic of sect. *Odontonemeae*. Des-
criptions were prepared of each species based on available herbarium
specimens, and the nomenclature determined by the examination of criti-

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TABLE OF CONTENTS

ACKNOWLEDGMENTS	i
TABLE OF CONTENTS	iv
LIST OF FIGURES	v
LIST OF TABLES	viii
LIST OF MAPS	ix
INTRODUCTION	1
HISTORICAL REVIEW	2
MORPHOLOGY	5
TAXONOMY	6
EXCLUDED SPECIES	144
BIBLIOGRAPHY	147
INDEX	152

22. SEM photomicrograph of tectum of <u>Odontonema mertonii</u>	25
23. SEM photomicrograph of tectum of <u>Odontonema cuspidatum</u>	25
24. SEM photomicrograph of tectum of <u>Odontonema cuspidatum</u>	25
25. SEM photomicrograph of tectum of <u>Odontonema barleriodes</u>	25
26. SEM photomicrograph of tectum of <u>Odontonema rutilans</u>	25
27. SEM photomicrograph of tectum of <u>Odontonema fuchsiodes</u>	25
28. Illustration of <u>Odontonema callistachyum</u>	37
29. Illustration of <u>Odontonema cuspidatum</u>	44
30. Illustration of <u>Odontonema amicorum</u>	48
31. Illustration of <u>Odontonema tubiforme</u>	51
32. Illustration of <u>Odontonema glaberrimum</u>	57
33. Illustration of <u>Odontonema sessile</u>	61
34. Illustration of <u>Odontonema microphyllum</u>	67
35. Illustration of <u>Odontonema rubrum</u>	70
36. Illustration of <u>Odontonema bracteolatum</u>	75
37. Illustration of <u>Odontonema album</u>	80
38. Illustration of <u>Odontonema laxum</u>	83
39. Illustration of <u>Odontonema ampelocaulis</u>	86
40. Illustration of <u>Odontonema fuchsiodes</u>	89
41. Illustration of <u>Odontonema speciosum</u>	92
42. Illustration of <u>Odontonema schomburgkianum</u>	95
43. Illustration of <u>Odontonema rutilans</u>	99
44. Illustration of <u>Odontonema amplexicaule</u>	103
45. Illustration of <u>Odontonema barleriodes</u>	106
46. Illustration of <u>Odontonema nitidum</u> var. <u>nitidum</u>	113
47. Illustration of <u>Odontonema nitidum</u> var. <u>album</u>	117
48. Illustration of <u>Odontonema brevipes</u>	120

49.	Illustration of <u>Odontonema</u> <u>albiflorum</u>	123
50.	Illustration of <u>Odontonema</u> <u>steyermarkii</u>	129
51.	Illustration of <u>Odontonema</u> <u>glabrum</u>	132
52.	Illustration of <u>Odontonema</u> <u>hondurensense</u>	136
53.	Illustration of <u>Odontonema</u> <u>breedlovei</u>	140
54.	Illustration of <u>Odontonema</u> <u>mortonii</u>	143

LIST OF TABLES

TABLE	PAGE
1. Characters used in numerical analysis	11
2. Label data for vouchers in the pollen studies	26

LIST OF MAPS

MAP	PAGE
1. Distribution of <u>Odontonema callistachyum</u> , <u>O. cuspidatum</u> , <u>O. amicum</u> , <u>O. tubiforme</u> and <u>O. glaberrimum</u>	40
2. Distribution of <u>Odontonema sessile</u> , <u>O. microphyllum</u> , <u>O.</u> <u>rubrum</u> , <u>O. bracteolatum</u> , <u>O. album</u> , <u>O. laxum</u> , <u>O. ampelo-</u> <u>caule</u> , <u>O. fuchsiodes</u> , <u>O. speciosum</u> , <u>O. schomburgkianum</u> , <u>O. rutilans</u> and <u>O. barleriodes</u>	64
3. Distribution of <u>Odontonema nitidum</u> var. <u>nitidum</u> , <u>O. nitidum</u> var. <u>album</u> and <u>O. brevipes</u>	110
4. Distribution of <u>Odontonema albiflorum</u> , <u>O. steyermarkii</u> , <u>O. glabrum</u> , <u>O. hondurense</u> , <u>O. breedlovei</u> and <u>O. mertonii</u> .	126

INTRODUCTION

The genus Odontonema Nees (Acanthaceae Juss.) is a New World tropical genus of 26 species and two varieties. A member of subfamily Acanthoideae (= Imbricatae Lindau), these plants occur from the subtropical regions of coastal central Mexico southward through Central America to northern South America, and on the West Indians in the Caribbean Sea. One species is found on the southeastern coast of Brazil, but a second species is from an unknown locality in Brazil.

Members of Odontonema are perhaps best known for their ornamental beauty, and many may be found in botanical gardens throughout the warmer regions of the world. Its firey red flowers are an impressive sight when the showy inflorescences reach full anthesis, and these shrubs or subshrubs are highly prized in the garden. Some members of the genus have been used medicinally, as by the Huartec Indians of southern Mexico, who use O. callistachyum (Schlecht. & Cham.) Kuntze and O. tubiforme (Bertol.) Kuntze for the treatment of women a few weeks after childbirth who suffer from a fever and a rapid loss of weight (Alcorn, personal communication). While it is impossible to predict the potential value of other species of Odontonema in the treatment of disease, it is clear that more members of the genus could be exploited horticulturally, and several other species not yet in cultivation would make excellent additions.

This paper represents a basic revision of the genus; it is also the fourth in a series of papers dealing with Odontonema. Already published are two papers dealing with the complex nomenclatural history of the generic name (Baum & Reveal 1980, 1982), and currently in press in Brittonia is a paper describing several new species of Odontonema as

well as making a few necessary combinations (Baum 1982). A peripheral paper relating to this project is now in press in Systematic Botany. That paper describes a new genus of Acanthaceae, Pulchranthus, which includes three species once referred to Odontonema (Baum et al. 1982). The present paper is a classical taxonomic revision based on morphological characters found in the genus as obtained from herbarium specimens. Although some species have been seen in gardens, no detailed field work has been possible. Pollen morphology has been reviewed using scanning electron microscopy (SEM), and a possible phenetic relationship has been established using numerical techniques.

HISTORICAL REVIEW

The history of Odontonema as a generic name is complex and even at this date is still not fully resolved. Specimens of Odontonema were gathered early in the history of botanical explorations in the New World. Sir Hans Sloane, found the genus when he visited the West Indies from 1687 to 1689, described his collection in 1696 under the name "Teucroides filiculafum foliis laurinis, floribus galeatis & labiatis." Sloane was indicating that this plant was an unique member of the mints (Lamiaceae), but not any known genus. As the plant was not a member of Lamiaceae, but Acanthaceae, the use of the name Teucroides as opposed to Teucrium, was significant. As Sloane did not provide an illustration of O. nitidum (Jacq.) Kuntze, it remained for Jacquin to rediscover the species and to formally describe the first species of Odontonema after 1753, and then the species was placed in the genus Justicia. Justicia was defined in a broad sense to include numerous members of Acanthaceae so that by the 1840s the genus was entirely unnatural. During the 1840s, Nees monographed the family and created numerous new genera for

species placed in Justicia by previous workers. In addition, Nees carefully examined many herbarium and garden specimens then available in Europe and was able to describe several new species. One of the segregates proposed by Nees (1842) was the genus Odontonema.

The manuscript describing Odontonema was submitted to the journal Linnaea where Endlicher saw the paper. Endlicher was writing a new edition of Genera plantarum (Endlicher 1842), and used the Nees name in his book. Unfortunately, for nomenclatural reasons, Endlicher's book appeared in print a few weeks before Nees' paper was published. Thus, the first publication of Odontonema was that proposed by Endlicher.

In both Endlicher's (indirectly) and Nees' (directly) 1842 articles reference is made to Justicia lucida Andr. While details of this may be gleaned elsewhere (Baum & Reveal 1980), J. lucida proved to be a species of Justicia while the plant Nees was actually attempting to describe was a specimen of Odontonema rubrum (Vahl) Kuntze (Baum & Reveal 1982). Later, when Nees (1847b) realized his error, he proposed a new generic name, Thyrsacanthus. In so doing, however, he made direct reference to Odontonema and thus Thyrsacanthus was nomenclaturally a superfluous name. In 1980, and following the rules of the International Code then in force, these names were rejected and it was proposed that Odontonema Nees ex Kuntze (1891) be conserved over Odontonema Nees ex Endlicher. As noted by Nicolson (1980) in an editorial note following this paper, the nomenclatural problems presented by the Odontonema example could only be resolved by changes in the International Code. In 1981 the rules of nomenclature were modified so that it will be possible to conserve Odontonema Nees over Odontonema Nees ex Endlicher with a new type specimen. As of this writing it is certain that the generic name Odontonema

will be conserved, but it is uncertain just how an international committee established by the International Code will accomplish this. A proposal (Baum & Reveal 1982) has been submitted at their request.

Nees monographed Odontonema at the species level in deCandolle's Prodromus in 1847 using the generic name Thyrsacanthus. This name continued to be used until 1891 when Kuntze once again took up Odontonema. Odontonema has been used almost consistently since that date. In 1847 Nees described several new species, and while a number of other species were described by other workers, it was until the studies of Leonard in the 1950s that interest in Odontonema was once again in the forefront. Leonard described several new species from the more remote regions of Colombia, Venezuela and portions of Central America. Local and regional floristic studies were written which included reviews of Odontonema, but none of these efforts was monographic in scope.

Above the species level, however, the revision of Acanthaceae by Lindau (1895) has been the single most important effort since 1847. Lindau described the tribe Odontonemae, defined it on the basis of a pollen type ("Spagenpollen"), and associated several other genera with Odontonema from both the Old and New World tropics. Lindau also described a number of new species in a series of papers that extended into the second decade of the present century.

While the present revision is based on the cumulative efforts of many generations of botanists, it is still only a revision. Without careful field work, and a detailed study of the variation within the several species complexes in Central America and in northern South America, which cannot be accomplished within the confines of a Master's Thesis, a full understanding of the genus cannot be obtained. The

present paper is to be taken as a developmental stage in the revision of the genus. Hopefully, the work can continue.

MORPHOLOGY

Members of Odontonema are predominately woody subshrubs to shrubs or rarely lianas. Two species and one variety appear to be herbaceous perennials. None of the plants exceeds 5 m in height.

LEAVES: The leaves of Odontonema (as in most Acanthaceae) are opposite. They vary in shape from lanceolate to narrowly elliptic or elliptic, or oblong to ovate. The leaves vary from glabrous with only a few hairs along the costa to scabrous or pilose. Cystoliths are generally present and usually more numerous on the upper surface. The margin are entire but maybe crenate or undulate. The blade usually narrows to a cuneate base, but some may be rounded or auriculate. The apex of the blade is often a typical drip point characteristic of many tropical plants, but some species have acuminate to cuspidate apices. For the most part, leaf characteristics (except in O. amicorum V. M. Baum) are not taxonomically significant. Leaf lengths recorded in the descriptions were taken from the apex of the leaf to the tip of the petiole.

INFLORESCENCES: The inflorescences of Odontonema vary from spike-like racemes to racemes, racemose panicles to dense thyrses. In this case, a thyrse is defined sensu Lawrence (1959). Within this treatment, characters of the inflorescence have been weighted heavily. In the yellow-flowered O. hondurensis (Lindau) D. Gibson complex, species are defined on the basis of the inflorescence, with other features supporting this arrangement. The presence or absence of hairs on the rachis, and whether or not it is glandular, sets apart the O. schomburgkianum (Nees) Kuntze complex within the genus. In addition, the presence of secondary

branching of the rachis (sometimes referred to as secondary peduncles by past authors) is another character that seems to have some significance at least at the species level. Only in O. nitidum are inflorescences found with both primary and secondary branching.

BRACTS AND BRACLETS: Subtending each pedicel is a bract which varies from subulate to narrowly triangular or lanceolate. Within each bract, or up along the pedicel itself, are small bractlets which are similar to the bracts except for their size. Both the bracts and bractlets may bear hairs (usually as ciliolate margins), otherwise they are glabrous.

FLOWERS: Within Odontonema floral features may be used to define species. The flowers vary in color from white to red, purple or yellow, reflecting pollinator vectors. Most flowers are tubular with subregular to weakly bilabiate zygomorphy. In a few species the bilabiate condition is more pronounced (e.g., O. albiflorum Leonard, O. nitidum and O. brevipes Urban) and hints at a relationship with the prominently bilabiate genus Pulchranthus which has recently been separated by Odontonema (Baum et al. 1982). Members of the O. schomburgkianum complex have a "bottle-shaped" corolla which is unique in the genus. Corolla length is significant in some species as is the width of the corolla throat.

ANDROECIUM AND GYNOCYTIUM: Heterostyly occurs in Odontonema. In some species, however, only one condition is currently known; some descriptions reflect the lack of information regarding the opposite condition.

TAXONOMY

Odontonema Nees, *Linnaea* 16:300. 1842, nom. cons. prop.

Odontonema Nees, *Linnaea* 16:300. 1842. TYPE: Garden specimen without location, date or collector, GZU!, typ. cons. prop. [= Odontonema rubrum (Vahl) Kuntze]; see Baum & Reveal 1982.

Odontonema sensu Nees ex Endlicher, Gen. Pl. Suppl. 2, 63. 1842.

Thyrsacanthus sensu Nees in Mart., Fl. Brasil. 9:97. 1847.

Diateinacanthus Lindau, Bull. Herb. Boissier II, 5:369. 1905.--

TYPE: D. hondurensis Lindau (= Odontonema hondurense (Lindau) D. Gibson)

Shrubs or subshrubs, rarely perennial herbs or lianas; stems terete to subquadrangular, glabrous or pilose; leaves opposite, lanceolate to narrowly elliptic to elliptic or oblong to ovate, glabrous or glabrous and with a few hairs along the costa along the lower surface, scabrous or pilose, cystoliths present and mainly on the upper surface, the margin entire to crenate or undulate with acuminate to cuspidate apically and cuneate to narrowly rounded or auriculate basally, sessile or petiolate; inflorescences terminal or rarely axillary spikelike racemes, racemose-panicles, panicles or dense thyrses with few to many flowers per fascicle, the rachis glabrous or pilose, tomentose, hirtellous or puberulent, sometimes glandular-puberulent, the bracts lanceolate to narrowly triangular or subulate, the bractlets narrowly triangular to subulate, these found inside the bracts or on the pedicel; calyx 5-merous, the segments narrowly triangular or subulate, glabrous to puberulous or pilose, hirtellous or hirsute, or glandular-puberulent, the margins sometimes ciliolate; corolla red, sometimes yellow, infrequently white, lilac, violet or pink, subregular to weakly bilabiate, tubular or bottle-shaped, glabrous or densely pubescent to glandular-puberulent without, glabrous or pilose to glandular-puberulent within, the upper two lobes elliptic to narrowly oblong or oblong, ovate, rounded or suborbicular, the lower three lobes oblong to elliptic, ovate to oval or orbicular, some with ciliolate tips; stamens 2, included or exerted due to heterostyly, the filament glabrous

or pubescent at least basally, the anthers typically glabrous, rarely pubescent; ovary mostly glabrous, rarely pubescent; capsules clavate, mostly 4-seeded; pollen shed as monads at maturity, subprolate or sometimes spheroidal, $14.1\text{--}21.8\ \mu\text{P} \times 11.9\text{--}19.6\ \mu\text{E}$; aperatures 3 (rarely 4 as in O. cuspidatum) colporate, the ectoaperatures elongated colpi, the endoaperatures ovoid, 6 (8 in O. cuspidatum) pseudocolpi ("colpoid streaks" sensu Raj 1961), one on each side of each aperature; tectum almost complete, psilate-punctate, the punctae uniformly distributed.

Rare to locally infrequent mostly in dense moist forests usually near streams throughout most of Latin America extending from Sinaloa and Veracruz, Mexico, southward into northern South America from Colombia southward to Ecuador, eastward into northern Venezuela and the Amazon Basin of Venezuela and Brazil to Guyana, with disjunct populations along the east coast of Brazil, and on the Caribbean Islands from Cuba and Jamaica to Tobago.

Odontonema belongs to the tribe Odontonemeae (Lindau 1895), a taxon that is currently not well-defined. Members of the tribe are characterized by a (4-) 5-parted calyx, a bilabiate corolla, 2 (4) stamens, two staminodes (when present), and 3-colporate pollen termed by Lindau "span-genpollen." Within the New World members of Odontonemeae, Odontonema is related to Anthacanthus Nees in DC. which may be readily distinguished by its axillary spines. Odontonema may also be confused with Chileranthemum Oersted, a Mexican genus of two species, which differs in having few-flowered axillary cymes. Members of Odontonema which have strongly bilabiate flowers was recently placed in a newly described genus of four species, Pulchranthus Baum, Reveal & Nowicke, a taxon restricted to northern South America (Baum et al. 1982). The widespread genus, Pseuder-

anthemum Radlkofer, is closely related to Odontonema, and species of both genera have been placed in the other. The floral tube of Pseuderanthemum, which is long and narrow with a generally abruptly flaring salverform throat, readily distinguishing most species of Pseuderanthemum from Odontonema. In Pulchranthus the flower is strongly bilabiate with a short floral tube and arching and spreading lobes. Odontonema differs from these two genera in having a subregular or weakly bilabiate corolla with a long and slender tube. Among the Old World members of the Odontomeae, Odontonema is similar only to Graptophyllum Nees in Wallich, a plant with four fertile stamens. According to Lindau (1895), Graptophyllum has "rahmenpollen", a type unlike that found in Odontonema.

A numerical analysis was done to establish the phenetic relationships among the species of Odontonema. All 26 species of the genus were evaluated using the Sinnott Method (Sinnott 1981). Sixteen characters were used initially, but four were discarded as insignificant (see Table I). The similarities established by the Sinnott Method were used to establish clusters (fig. 1) and a modified PRIM network (fig. 2). This work was done on programs written by Quinn P. Sinnott of the University of Maryland. These data were used to draw an illustration showing the phenetic relationships within Odontonema (fig. 2). From this phenetic diagram, and with an intuitive knowledge of the genus, a possible phylogenetic diagram was constructed (fig. 3).

As shown in figures 2 and 3, Odontonema callistachyum is the basic species of the genus from which all others seem to be phenetically derived; this species also appears to be phylogenetically the least specialized member of Odontonema. There appears to be four major groups of species in the genus, both phenetically and intuitively. One group is

Table I. Characters Used in Numerical Analysis

Character 1. Habit

- 0-herbaceous
- 1-suffruticose
- 2-fruticose
- 3-liana
- *2. Width of leaves (in cm)
- *3. Petiole length (in cm)
- *4. Inflorescence length (in cm)
- 5. Vestiture of the rachis
 - 0-presence of glandular hairs
 - 1-presence of non-glandular hairs
 - 2-glabrous
- 6. Inflorescence branching type
 - 0-raceme
 - 1-panicle with no branching
 - 2-panicle with secondary branching
 - 3-thyrse
- *7. Pedicel length (in mm)
- 8. Calyx segment length (in mm)
- 9. Corolla color
 - 1-purple to pink
 - 2-white
 - 3-yellow
 - 4-red
- 10. Corolla length (in mm)
- 11. Width of corolla base (in mm)
- 12. Width of corolla throat (in mm)
- 13. Filament length (in mm)
- 14. Staminode length (in mm)
- 15. Style length (in mm)
- 16. Degree of zygomorphy
 - S-subregular
 - Z-weakly bilabiate

* Character deleted as insignificant (see text)

TABLE I

Species	Characters															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
callist.	1-2	4-12	3-12	20-40	1	0-1	4-9	3-5	1	15-40	2	4-5	2-12	1-2	8-20	Z
steyer.	1-2	4-5	10-15	60-70	2	2	4-9	3-5	1	20-30	2-3	4-6	10	1	10	Z
glaber.	2	2-6	1-7	15-25	1-2	0-1	3-11	3-4	4	25-30	2-3	5-6	4-7	0.8-1.5	10-15	S
sessile	2	4-8.5	5-10	15-25	1	2-3	4-8	4	4	20-31	3	5-9	4	1-2	25	S
rubrum	1-2	1-5	3-7	2-16	1	0-2	2.5-5	3-4	4	25-35	2-3	5-7	6-25	2.5-5	12-23	S
laxum	1	5-6	0-9	15-25	1	2	1.5	2	4	18	1	3	10	1.5-4	18	S
bracteata.	1	4.5-11	5-50	8-15	1	3	1-2	1-3	4	35-42	2	4-6	15	1-6	16-22	S
album	2	3-4	3-7	2.5	1	0	4	5-7	2	30	1.5	5	15	1.5-2	30	S
cuspidata.	1-2	4-9.5	3-10	15-45	1	0-1	5-7	1.5-2	4	25-35	2-2.5	3-4	1.5-3	.5-1.3	18-20	S
tubiforme	1-2	4-12	8-10	7-49	1	0-1	4-8	2-4	4	20-30	2-3	5-6	5-15	2-3	12-25	S
microphy.	2	1-2	2-5	4-7	1-2	0	3-6	2-4	4	23	2	6	15	2.5-3	12	S
mortonii	2	4-7	7-15	17-26	2	0-1	3-4	2	3	18-25	2.5	5	11	1-2	25	S
glabrum	2	3-9	4-12	20-30	2	2	3-6	3	3	28	2	5	14	1-10	16-25	Z
honduren.	2	3-9	5-14	6-20	1	1	3-5	1-3.5	3	20-30	1-3	3-6	6-13	.7-1	5-15	S
breedlov.	2	6-8	10-30	22	1	3	5	3.5	3	23	3	4	10	25	10	S
amicorum	3	4-6	3-5	5-8	1	0	2-3	3	4	28	2-3	4-5	10	.8-1	10	S
barler.	1	4-10	10-20	10-15	1	0	8	3	4	48	2-3	3-5	18-25	5-10	38-45	S
amplexi.	0	3.4-7	0	23-28	1	0	4-5	3	4	18-30	1	3-5	20	1.5-5	25-35	S
fuchsiod.	1	5	3-7	14	1	0	3-6	5	4	25	1-2	5-6	17	3-5	27	S
rutilans	0	2.5-7	5-10	23-45	0	0	5-9	5-8	4	25-50	2.5	7-8	40	.5-10	52	S
ampeloc.	3	6.8	8	25	1	0	8	3-4	4	25	3	6	2.5	2-2.2	4	S
schombur.	1	2-15	10-30	9-58	0	0-1	11	5-8	4	40-50	2	10	38	1.5-2	45	S
speciosum	0	4.7	8-15	14	0	0	6	8	4	40	3	13	15-25	1-1.5	40	S
albiflor.	1-2	4-8	5-12	4-15	1-2	3	2-3	2	1-2	18	1-1.5	1-2	1.8-11	.7-2	5-12	Z
nitidum	0-1	3-4.8	5-15	15-37	2	0-1	5-6	2	1-2	15-16	1.5-2	2.5-4	2-10	.5-2	5-13	Z
brevipes	1	3.5-7	3-6	13	1	1	1-3	2-3	1-2	7.5-8	1.5	2	.8-4	.5-2	2-6	Z

Fig. 1. Phenogram of phenetic relationships among the various species of Odontonema as determined by average linkage clustering analysis. 1. O. callistachyum; 2. O. steyermarkii; 3. O. glaberrimum; 4. O. sessile; 5. O. rubrum; 6. O. laxum; 7. O. bracteolatum; 8. O. album; 9. O. cuspidatum; 10. O. tubiforme; 11. O. microphyllum; 12. O. mortonii; 13. O. glabrum; 14. O. hondurense; 15. O. breedlovei; 16. O. amicorum; 17. O. barlerioides; 18. O. amplexicaule; 19. O. fuchsioides; 20. O. rutilans; 21. O. ampelocaule; 22. O. schomburgkianum; 23. O. speciosum; 24. O. albiflorum; 25. O. nitidum; 26. O. brevipes. Percent similarity is given on the vertical axis.

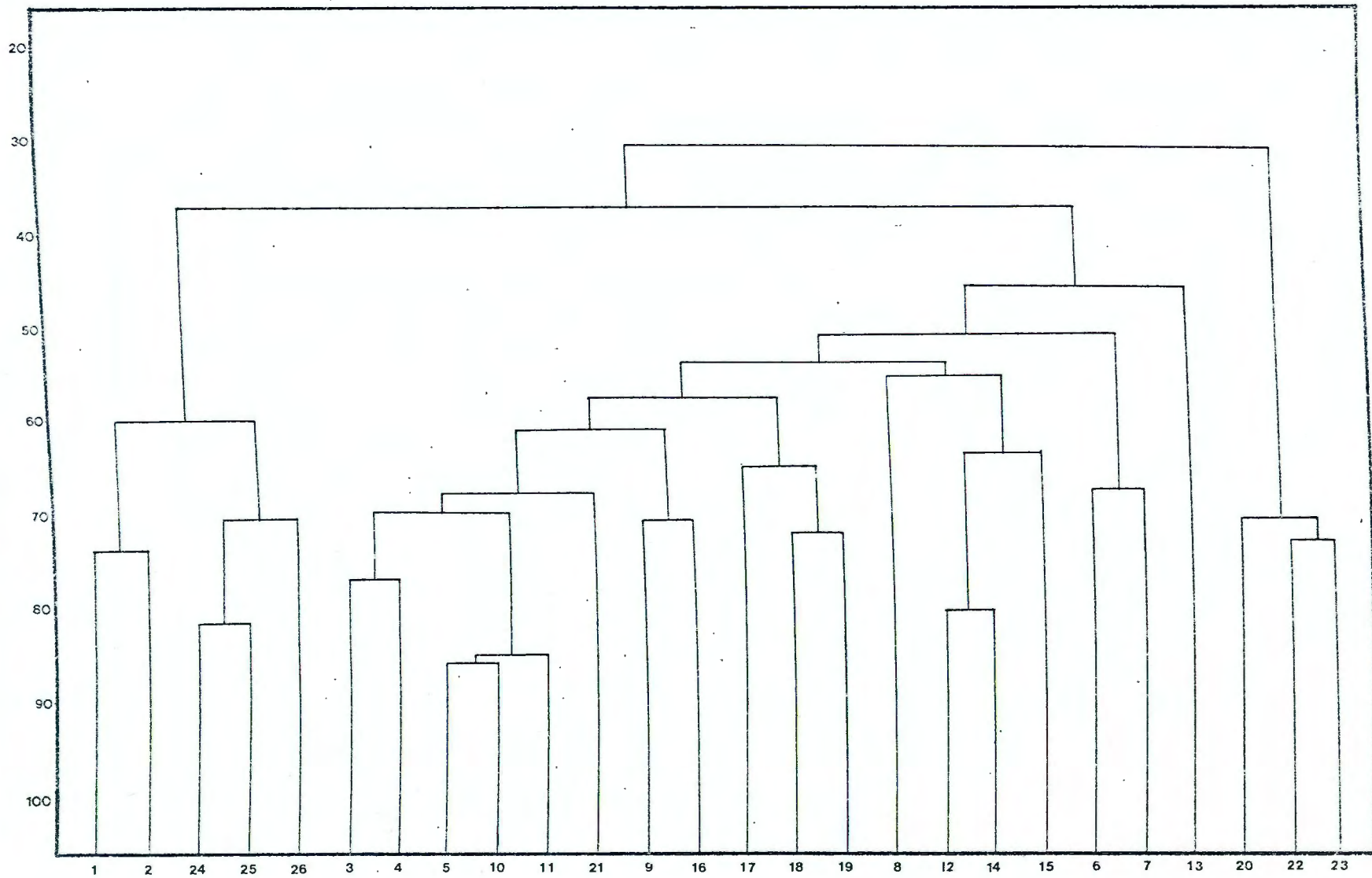


Fig. 2. PRIM network illustrating phenetic relationship among the various species of Odontonema based on single-linkage (see Sinnott 1981).

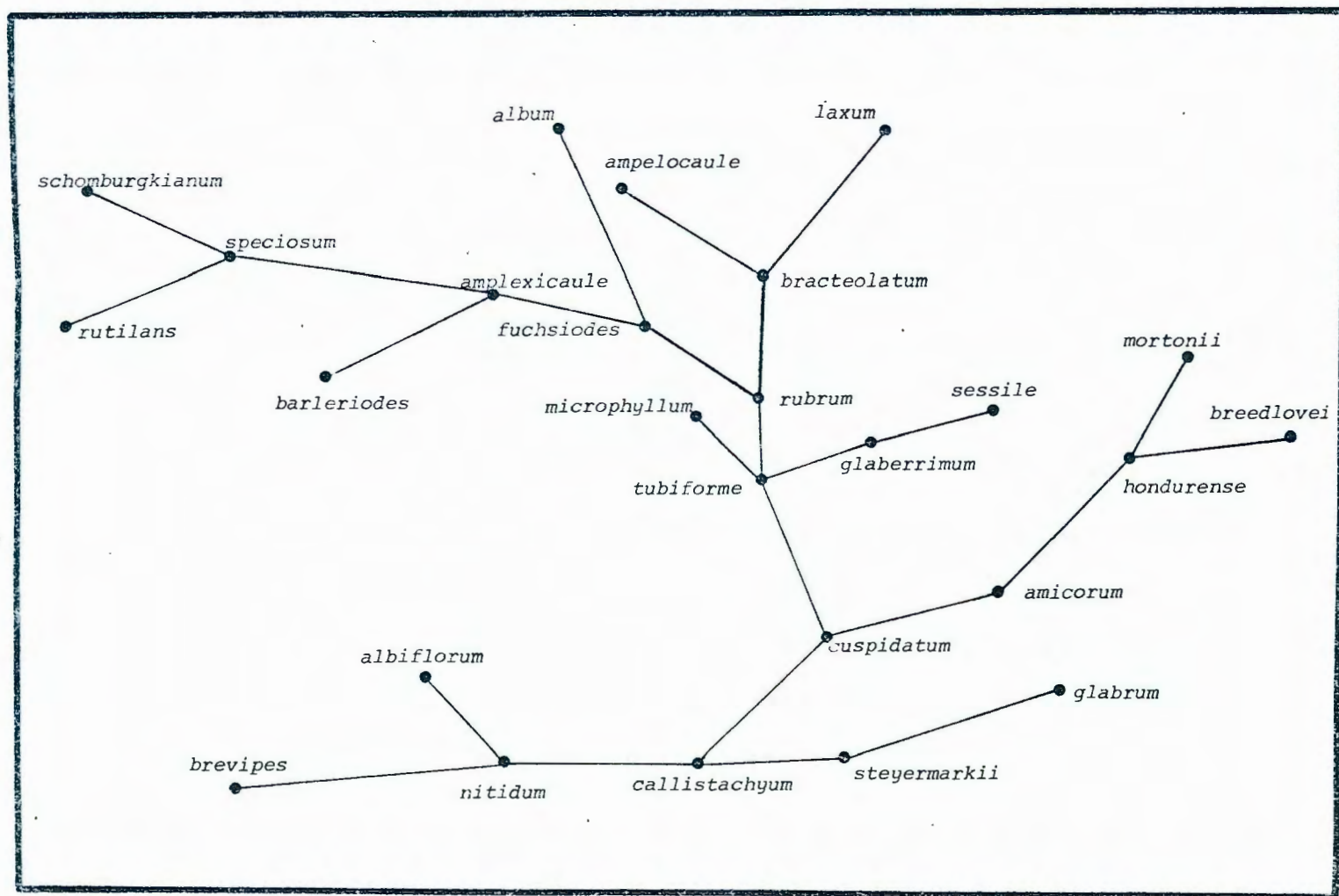
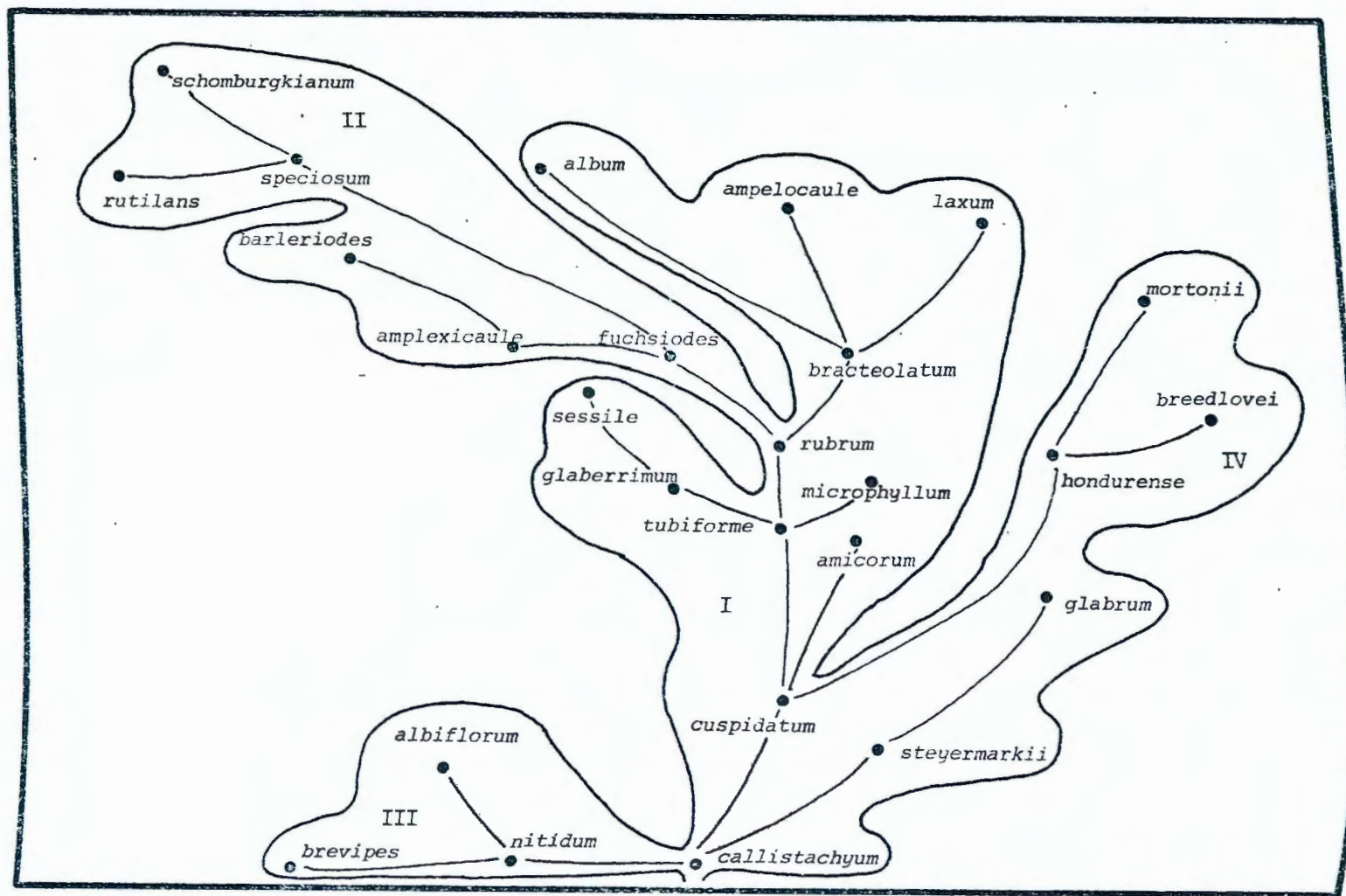


Fig. 3. Supposed phylogenetic relationship among the various species of Odontonema based on an intuitive understanding of the genus.



composed of mostly red-flowered, tubular, weakly bilabiate or subregular species with variable inflorescence types and a generally shrubby (infrequently lianous) habit. This group is characterized by such species as O. callistachyum, O. tubiforme and O. rubrum. Plants of this group occur nearly throughout the entire range of the genus as they are found from Mexico and Central America southward to northern South America, and on the islands of Cuba and Dominican Republic. While most are distinctly red-flowered, members may vary from purple to pink as in O. callistachyum and O. steyermarkii Leonard, or white as in O. album V. M. Baum of Venezuela. This is the largest group within the genus as it is composed of half the species, 13 in all.

The second group of species in Odontonema is characterized by a basically bottle-shaped corolla with a consistently red-flowered hue. The habit varies from shrubs to herbs with generally red exfoliating bark or epidermis and typically a glandular-puberulent rachis. This group is composed of only six species, but all occur in South America, ranging from Colombia eastward through Venezuela to Guyana southward into the Amazon Basin and coastal Brazil. Odontonema schomburgkianum and O. barleriodes (Nees in Mart.) Kuntze are representatives of the second group.

The third group of species in Odontonema consists of three North American species which differ from the others in having weakly bilabiate corollas with a white to purple hue. Odontonema nitidum and O. brevipes Urban are restricted to the Caribbean Islands; on the mainland from southern Mexico to Belize and Guatemala is O. albiflorum Leonard. Odontonema nitidum was collected in French Guiana in the early 1800s, but as it has not been rediscovered in that South American country, it is

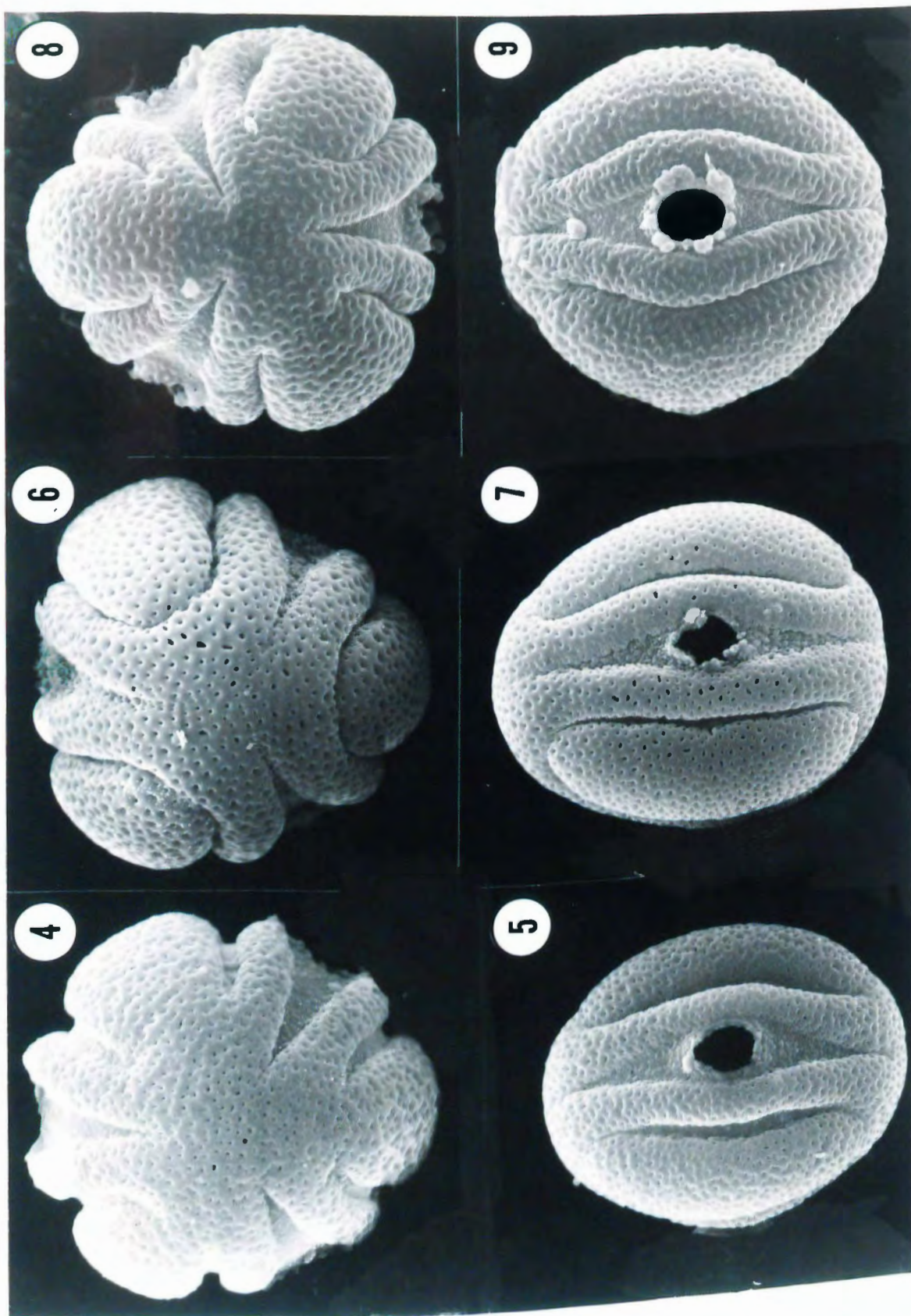
assumed that it was a labeling error or a plant that was found in cultivation.

The last major group of Odontonema species is characterized by the presence of yellow flowers. These plants occur in Mexico and northern Central America, and all are shrubs. The flowers are tubular except in O. glabrum T. S. Brandegee where the flowers are weak bilabiate and therefore resemble those of O. callistachyum and O. steyermarkii. The inflorescences of the yellow-flowered species tend to be rather large, but variable. The inflorescences range from narrowly terminal panicles to lax open panicles, thyrsoid panicles or terminal racemes. There are only four species, but one, O. hondurense (Lindau) D. Gibson, was the type of a monotypic genus, Diateinacanthus Lindau (1905), the genus being established on the open, lax inflorescence.

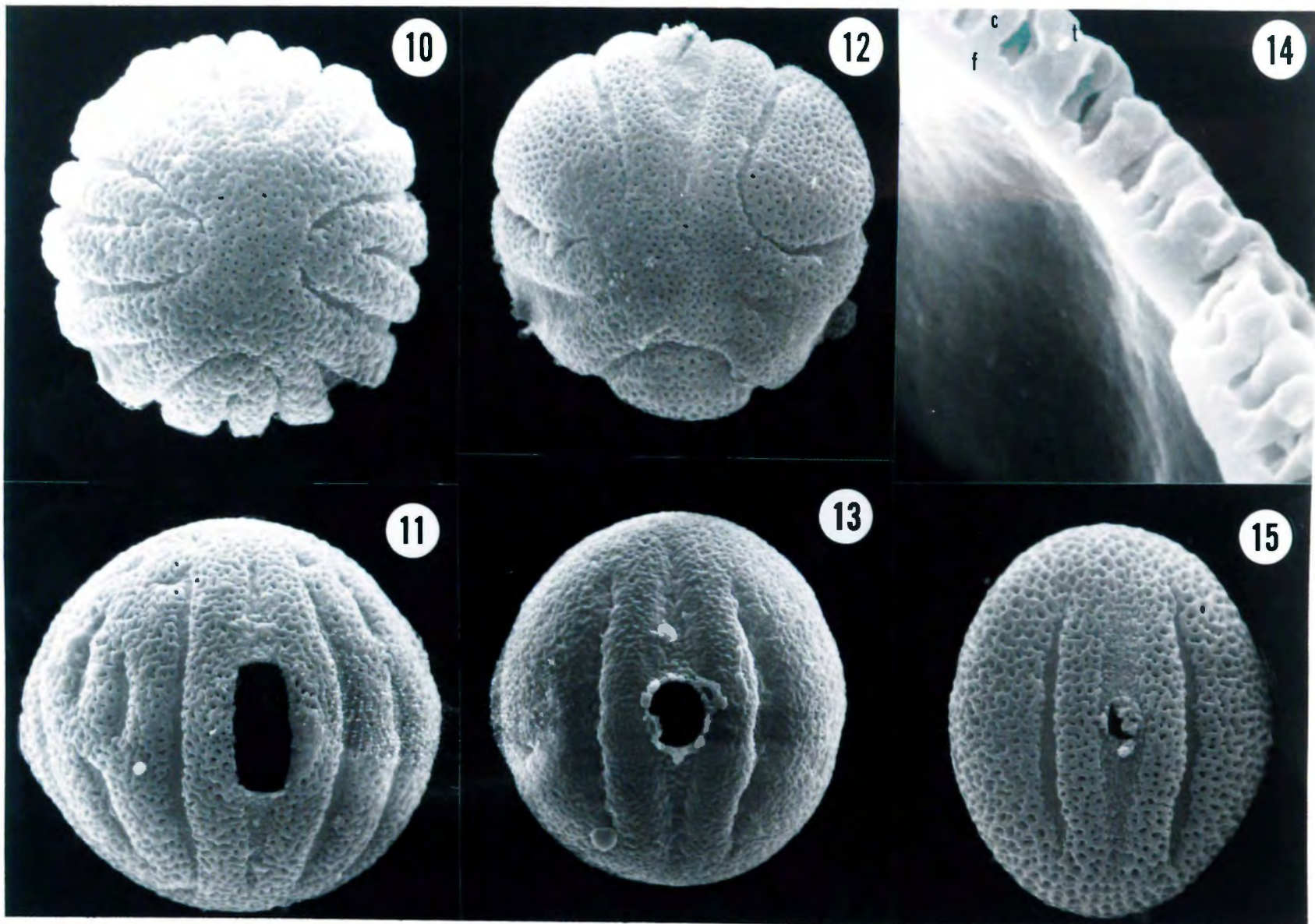
Pollen from 36 collections representing 20 species of Odontonema (Table II) was examined using light microscopy (LM) and scanning electron microscopy (SEM). All samples were acetolyzed according to Erdtman (1966) and mounted in glycerin jelly. The measurements are based on only ten grains of each collection examined, and therefore these data should be treated with reserve. Slides of all samples are deposited at the Palynological Laboratory, Department of Botany, National Museum of Natural History, Smithsonian Institution.

The pollen of Odontonema is the typical 3-colporate pollen characteristic of the tribe Odontonemeae (Lindau 1895; see figs. 4-27), and while slightly variable, the variation is not taxonomically significant. The pollen of O. cuspidatum is the only exception. It is 4-colporate (figs. 10, 11).

Fig. 4-9. SEM photomicrographs of Odontonema pollen. 4, 5. O. albiflorum. 4. Polar view of 3-colporate grain, x2000. 5. Equatorial view, x1800. 6, 7. O. nitidum. 6. Polar view of 3-colporate grain, note that pseudocolpi of adjacent apertures unite at pole, x2200. 7. Equatorial view, x 1850. 8, 9. O. brevipes. 8. Polar view, x2550. 9. Equatorial view, x2400.



Figs. 10-15. SEM photomicrographs of Odontonema pollen. 10, 11. O. cuspidatum. 10. Polar view illustrating 4 aperatures each with 2 pseudocolpi for a total of 8, x1900. 11. Equatorial view of slightly irregular grain, x1950. 12. O. rutilans, polar view of 3-colporate grain, x1500. 13. O. rubrum, equatorial view, pseudocolpi are less well-defined and tectum is almost continuous, x1900. 14. O. nitidum, fracture illustrating stratified exine, with foot layer (f), columellae (c) and tectum (t), x10000. 15. O. fuchsiodes, equatorial view, note reduced endoaperture and larger perforations of tectum, x 1450.



Figs. 16-27. High magnification of tectum of Odontonema pollen grains illustrating near perfect continuum from a relatively complete tectum (fig. 16) to a relatively incomplete tectum (fig. 27). 16. O. hondurense. 17. O. brevipes. 18. O. bracteolatum. 19. O. callistachyum. 20. O. glabrum. 21. O. tubiforme. 22. O. mortonii. 23. O. cuspidatum. 24. O. cuspidatum. 25. O. barlerioides. 26. O. rutilans. 27. O. fuchs-
iodes. All x7500.

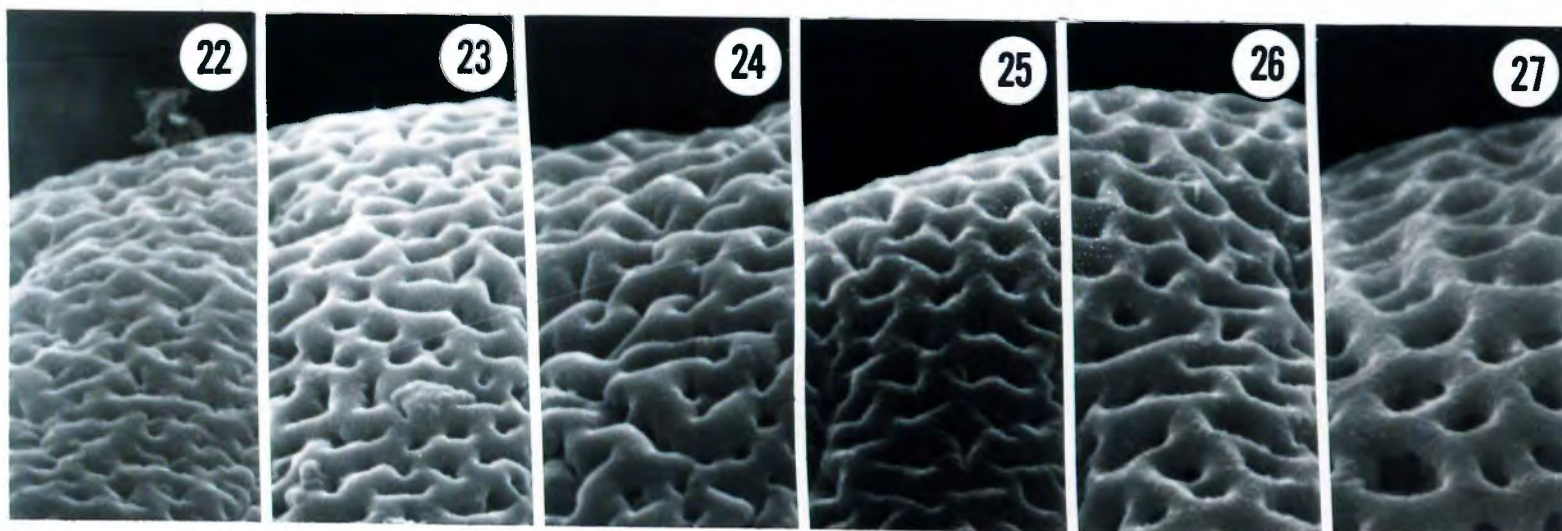
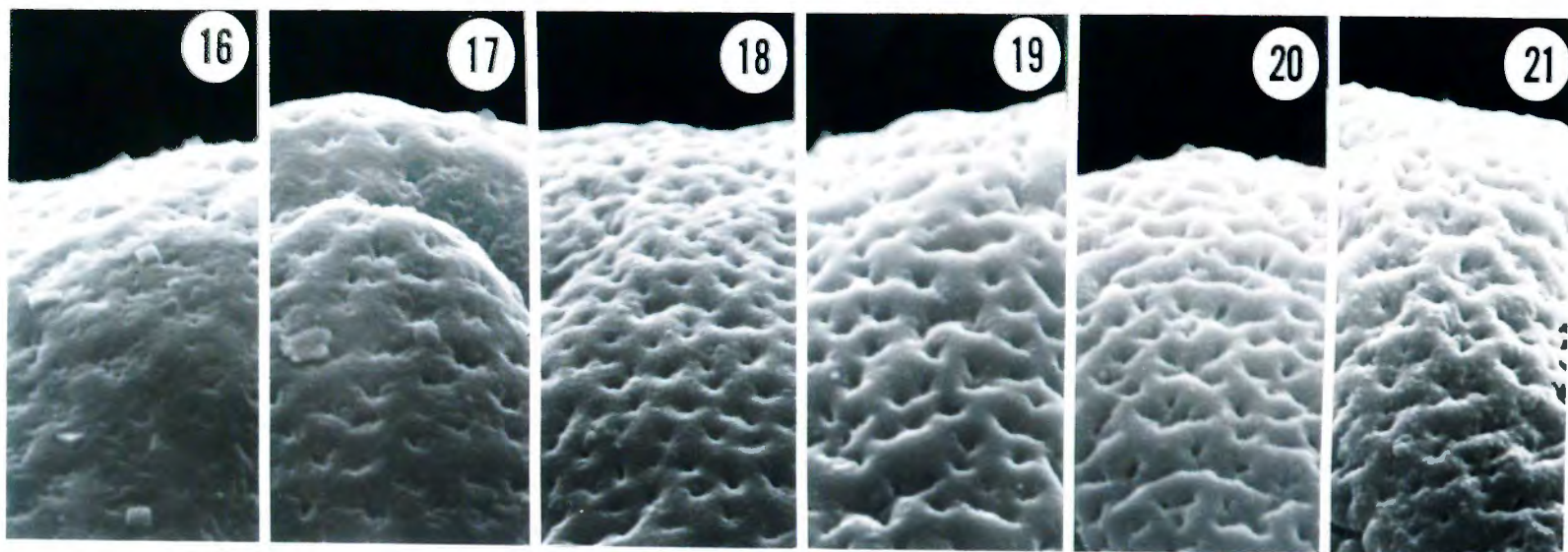


TABLE II

Label Data for Vouchers in the Pollen Studies

1. O. nitidum (Jacq.) Kuntze
Shaefer 626 NY
Montserrat-West Indies Acanthaceae 1
2. O. nitidum (Jacq.) Kuntze
Cooley 8221 GH
West Indies-St. Vincent Acanthaceae 2
3. O. amicorum V. M. Baum
Schipf 1353 K
British Honduras Acanthaceae 5
4. O. bracteolatum (Jacq.) Kuntze
Maguire 31780 NY
Venezuela Acanthaceae 8
5. O. schomburgkianum (Nees in Mart.) Kuntze
Cowan 2207 NY
British Guinea Acanthaceae 9
6. O. glaberrimum (M. E. Jones) V. M. Baum
McVaugh 23562 MICH
Mexico Acanthaceae 10
7. O. callistachyum (Schlecht. & Cham.) Kuntze
Breedlove 32845 DS
Mexico Acanthaceae 11
8. O. callistachyum (Schlecht. & Cham.) Kuntze
Shilom Ton 3317 DS
Mexico Acanthaceae 12
9. O. albiflorum Leonard
Williams et al. 40429 F
Guatemala Acanthaceae 13
10. O. glabrum T. S. Brandege
Breedlove & Thorne 30621 DS
Mexico Acanthaceae 14
11. O. brevipes Urban
Webster & Walker 9852 US
Tobago Acanthaceae 15
12. O. hondurensis (Lindau) D. Gibson
Gentle 2136 F
Belize Acanthaceae 16

(Table II, cont.)

26. O. albiflorum Leonard
Sohns 1703 MICH
Mexico Acanthaceae 30
27. O. nitidum (Jacq.) Kuntze
Hodge 850 G
Dominica Acanthaceae 31
28. O. nitidum (Jacq.) Kuntze
Cooley 8705 GH
St. Lucia Acanthaceae 32
-

Key to the Species

- A. Flowers purple, weakly bilabiate, the lower lip reflexed; rachis tomentose, sometimes only sparsely so; shrubs or subshrubs, 1--4.5 tall; southern Mexico, Belize and Guatemala..... 1. O. callistachyum
- AA. Flowers red to pink, rarely lilac (O. steyermarkii) or yellow, or if purple then plants of the Caribbean Islands.
- B. Flowers red, or if white then plants from Venezuela.
- C. Rachis glabrous or pubescent with non-glandular hairs; flowers 1.5--5 cm long, glabrous or pubescent, typically tubular.
- D. Styles less than 30 mm long; filaments less than 20 mm long (except in O. rubrum); leaves petiolate or if sessile then not auriculate; plants not of Brasil.
- E. Corolla 3--4 mm wide at the throat; style 10--20 mm long.
- F. Corolla 25--35 mm long; staminodes less than 1.5 mm long.
- G. Plants shrubby; inflorescence 13--48 cm long, the pedicels 5--7 mm long; Mexico, Cuba and the Dominican Republic..... 2. O. cuspidatum
- GG. Plants lianous; inflorescence 5--8 cm long, the pedicels 2--3 mm long; Belize..... 3. O. amicorum
- FF. Corolla less than 20 mm long; staminode 1.5--4 mm long; Ecuador..... 11. O. laxum
- EE. Corolla 4--9 mm wide at the throat; styles various.

- F. Staminodes 0.8--2 mm long; filaments 4--7 mm long.
- G. Styles less than 15 mm long; bark smooth; leaves elliptic-ovate; inflorescence a terminal raceme or panicle; corolla glabrous, 5--6 mm wide at the throat; Mexico..... 5. O. glaberrimum
- GG. Styles more than 15 mm long; bark with scattered corky lenticels; leaves oblong; inflorescence a dense terminal thyrses; corolla pubescent, 5--9 mm wide at the throat; Colombia..... 6. O. sessile
- FF. Staminodes more than 2 mm long (rarely 1 mm long in O. bracteolatum, 1.5--2 mm long in the white-flowered O. album); filaments mostly more than 7 mm long (rarely less in O. rubrum and O. ampe-locaule).
- G. Plants subshrubs to shrubs, not lianous.
- H. Leaves less than 5 cm long (rarely so in O. rubrum); inflorescence to 7 cm long (2.5 cm long in the white-flowered O. album of Venezuela); corolla red to red-orange, 2.3 cm long, 6 mm wide at the throat; Panama..... 7. O. microphyllum
- HH. Leaves more than 5 cm long.
- I. Flowers red or reddish, not white.
- J. Corolla less than 35 mm long.

K. Lobes of the upper lip of the corolla elliptic-oblong, 3--4 mm long, those of the lower lip ovate, 4--6 mm long; secondary branching lacking; Mexico and Central America..... 4. O. tubiforme

KK. Lobes of the upper lip of the corolla elliptic-ovate, 4--5 mm long, those of the lower lip elliptic-oblong, 8--14 mm long; secondary branches, when present, 3--8 mm long; Panama to Colombia and Venezuela.. 8. O. rubrum

JJ. Corolla 35--42 mm long, red; inflorescence a dense terminal thyse, more than 5 cm long; Venezuela.... 9. O. bracteolatum

II. Flowers white, 3 cm long; inflorescence a short terminal raceme to 2.5 cm long; Venezuela..... 10. O. album

GG. Plants lianous; rachis densely hirtellous; stems often with exfoliating bark; inflorescence a loose terminal raceme to 25 cm long; Colombia..... 12. O. ampelocaulis

DD. Styles 25--45 mm long; filaments 18--25 mm long; leaves

sessile and auriculate or distinctly petiolate; herbs or subshrubs; Brazil.

E. Leaves sessile with auriculate bases; flowers 2--6 per node, less than 3 cm long; staminodes 1.5--5 mm long..... 17. O. amplexicaule

EE. Leaves all petiolate; flowers in crowded dense verticels, more than 3 cm long; staminodes 5--10 mm long..... 18. O. barlerioides

CC. Rachis glandular-puberulent (hirtellous in O. fuchsioides); flowers 2.5--5 cm long, typically bottle-shaped (tubular in O. speciosum of Brazil).

D. Corolla 2.5 cm long (or less), glandular-puberulent without, puberulent within, the throat 5--6 mm wide; rachis hirtellous; inflorescence racemose; leaves glabrous; coastal regions of northern Colombia. 13. O. fuchsioides

DD. Corolla 2.5--5 cm long, the throat more than 6 mm wide; rachis glandular-puberulent; not of coastal Colombia.

E. Corolla throat 10--13 mm wide; filaments 15--38 mm long; styles 40--45 mm long; herbs or shrubs.

F. Plants herbaceous; flowers tubular, 13 mm wide at the throat, sparsely pilose without; filaments 15--25 mm long, sparsely pilose; staminodes 1--1.5 mm long; Amazona Basin, Brazil.....
..... 14. O. speciosum

FF. Plants subshrubby; flowers bottle-shaped, 10 mm wide at the throat, puberulous with some glandular hairs throughout; filaments 35--38 mm long,

glabrous; staminodes 1.5--2 mm long; Guyana

..... 15. O. schomburgkianum

EE. Corolla throat 7--8 mm wide, bottle-shaped, puberulous throughout; filaments 40 mm long, pilose basally; plants herbaceous; staminodes 0.5--10 mm long;

Colombia, Venezuela and Guyana..... 16. O. rutilans

BB. Flowers white, pink or yellow, sometimes purple on the Caribbean Islands.

C. Flowers white to pink or purple; weakly bilabiate.

D. Corolla white or if purple then on the Caribbean Islands.

E. Inflorescence a raceme or panicle, the rachis glabrous or minutely puberulent; plants of the Caribbean Islands.

F. Corolla 15--16 mm long, 2.5--4 mm wide at the throat, white or purple; style 5--13 mm long; filaments 2--10 mm long; herbs or shrubs to 2 m tall; widespread throughout the Caribbean Islands from St Croix to St. Vincent and Barbados.....

..... 19. O. nitidum

FF. Corolla 7--8 mm long, 2 mm wide at the throat, white to pale violet; style 6 or 8--12 mm long; filaments 0.8--4 mm long; subshrubs to 1 m tall; endemic to Tobago..... 20. O. brevipes

EE. Inflorescence a spike-like terminal thyrse, the rachis \pm tomentose; corolla 1.8 cm long, white with dark purple dots on the lower lip; style 5--12 mm long; filaments 1.8--11 mm long; subshrubs to shrubs

0.7--4 m tall; southern Mexico, Belize and Guatemala

..... 21. O. albiflorum

DD. Corolla lilac-pink, weakly bilabiate, 3 cm long, 4--6 mm wide at the throat, glabrous; filaments 9--10 mm long, glabrous; staminodes 1 mm long; inflorescence a terminal, multi-branched, compound panicle, the rachis glabrous;

Guatemala..... 22. O. steyermarkii

CC. Flowers yellow, tubular (weakly bilabiate in O. glabrum).

D. Inflorescence a narrow terminal panicle, a lax open panicle, or a terminal thyse, not at all racemose; plants of Chiapas, Mexico, southward to Belize, Guatemala and Honduras.

E. Inflorescence a narrow or open panicle.

F. Rachis glabrous; inflorescence a narrow panicle to 30 cm long, with short secondary branches 3--10 mm long; corolla glabrous, the upper lip of shallowly rounded lobes 2 mm long and wide; Mexico, and Guatemala..... 23. O. glabrum

FF. Rachis minutely puberulent; inflorescence a lax, open panicle 5.5--22 cm long, without secondary branches; corolla puberulent within and without at the base of the tube, the upper lip of ovate lobes 4--6 mm long, 1.5--3 mm wide; Belize, Honduras and Guatemala..... 24. O. hondurensis

EE. Inflorescence a terminal thyse 22 cm long; rachis densely pilose; corolla glabrous without, sparsely glandular-hairy within; Chiapas, Mexico.....

..... 25. O. breedlovei

DD. Inflorescence a terminal raceme, or if a single, branched panicle, then the plants of Oaxaca, Mexico, 17--26 cm long, glabrous; corolla glabrous..... 26. O. mertonii

1. Odontonema callistachyum (Schlecht. & Cham.) Kuntze (Fig. 28)

Odontonema callistachyum (Schlecht. & Cham.) Kuntze, Revisio Gen. Pl. 2:493. 1891, based on Justicia callistachya Schlecht. & Cham., Linnaea 6:370. 1831.--TYPE: MEXICO. Veracruz: Misantlae, 1828, Schiede s.n. (holotype, B, not seen and apparently destroyed).--Thyrsacanthus callistachyus (Schlecht. & Cham.) Nees in DC., Prodr., 11:326. 1847.

Thyrsacanthus callistachyus (Schlecht. & Cham.) Nees in DC. var. amplus Nees in DC., Prodr. 11:326. 1847.--TYPE: MEXICO. Veracruz: in ravines at 3000 ft elev in mountains near Veracruz, Dec 1840, Galeotti 926 (lectotype, K!; duplicates of the lectotype, BR!, G!, P!)

Thyrsacanthus geminatus Donn.-Smith, Bot. Gaz. 13:75. 1888.--TYPE: GUATEMALA. Alta Verapaz: Pansamala forest, May 1885, Turckheim 740 (holotype, US!; isotypes, F!, G!, GH!, M!, NY!).--Odontonema geminatum (Donn.-Smith) Blake, Contr. Gray Herb. 52:104. 1917.

Plants suffruticose to fruticose, 1--4.5 m tall; stems subquadrangular, mostly glabrous in older portions, puberulent on the younger portions; leaves narrowly to broadly elliptic, the blade 10--35.5 cm long, 4--12 cm wide, glabrous except for a few hairs along the costa on the

Fig. 28. Illustration of Odontocnema callistachyum (a-habit; b-open flower with long style; c-staminode; d-open flower with short style).

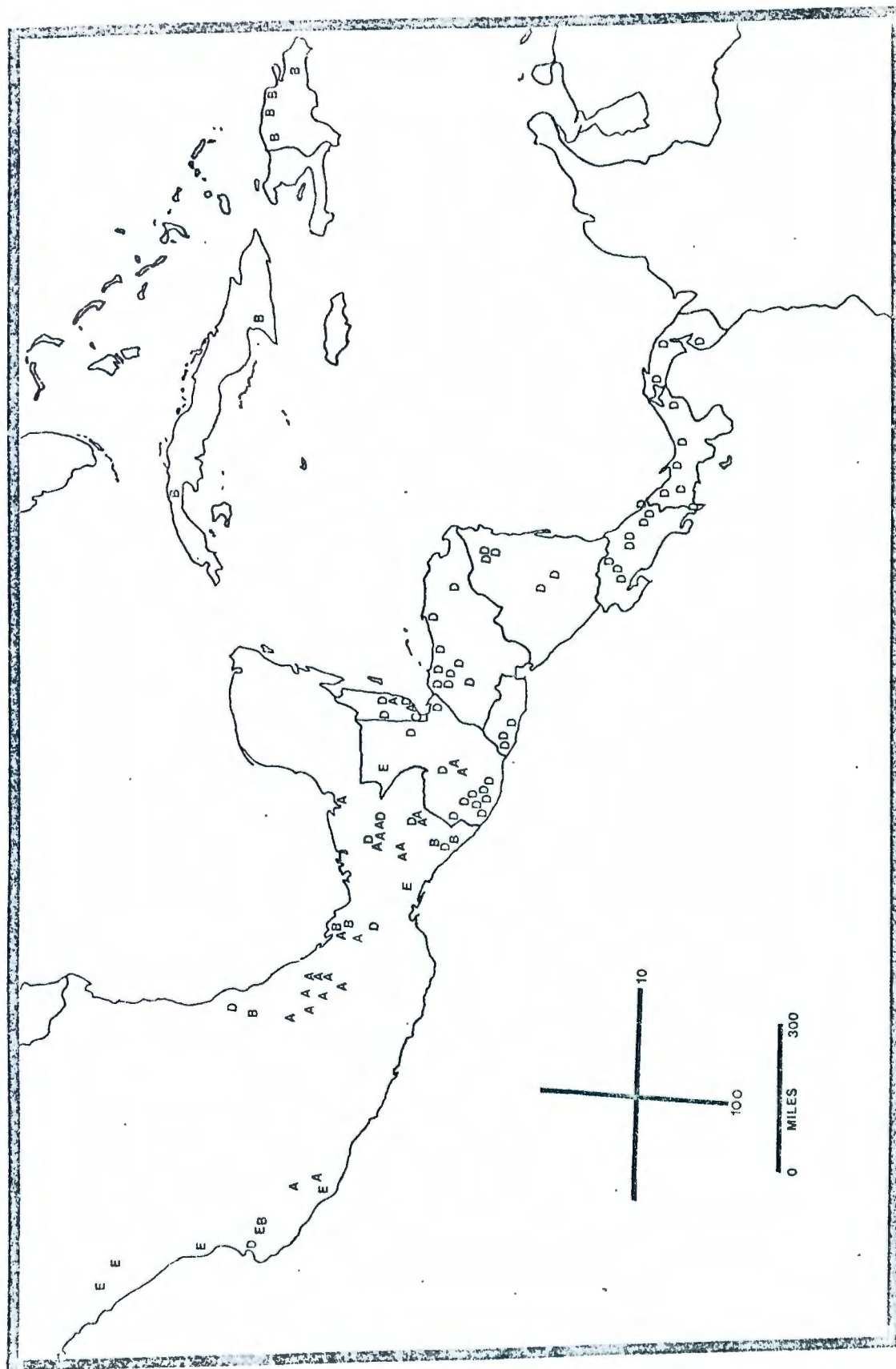


lar-puberulent; inflorescence a terminal racemose panicle 17--40 cm long with numerous multifasciculate flowers along the tomentose to sparsely tomentose rachis, the pedicel 4--9 mm long, tomentose, the bracts subulate to lanceolate, 3--5 mm long, 0.5--1 mm wide basally, the bractlets subulate, 1.5--3 mm long, all puberulent with ciliolate margins; calyx segments narrowly triangular, 3--5 mm long, 0.5 mm wide basally, puberulous; corolla purple, weakly bilabiate, 1.5--4 cm long, 2 mm wide at the base, 4--5 mm wide at the throat, glabrous without, glandular-puberulent within along the lobes and the upper throat, the upper lip shallowly lobed with the elliptic to ovate lobes 2--5 mm long, 1.5--3 mm wide basally, the lower lip bent downwardly with the oblong to elliptic lobes 5--8 mm long, 2.5--4 mm wide basally, all tips with ciliolate hairs; stamens included or exserted, the filaments 2--3.5 or 10--12 mm long due to heterostyly, glabrous, the anthers 2--2.5 mm long, glabrous; stamino-odes 1--2 mm long, glabrous; pistil included, the stigma 2-lobed, glabrous, the style 8.5--10 or 15--20 mm long due to heterostyly, puberulent; ovary glabrous; capsules clavate, 2--2.5 cm long, 2--3 mm broad, 4 mm thick, glabrous, 4-seeded.

Widespread and common in mostly moist forests of southern Mexico southward into Belize and Guatemala. Map 1.

REPRESENTATIVE SPECIMENS: BELIZE. Stann Creek District: Stann Creek Valley, Mt. Cow Creek, 27 Jan 1941, Gentle 3501 (A, F, MICH, NY). GUATEMALA. Alta Verapaz: Pansamalá, Apr 1889, Smith 1728 (G, GH, K); along Rio Frio S of Santa Cruz, Standley 90210 (F, US); between Tactic and Tamahu, 30 Jan 1969, Williams 40345 (F, MO). MEXICO. Chiapas: Shaki 'US' um, Mahbenchauk, 25 Nov 1964, Breedlove 7585 (DS, F, MICH, US); Lagot, 30 mi E of La Trinitaria, 14 Apr 1965, Breedlove 9752 (DS,

Map 1. Distribution of Odontonema callistachyum (A); O. cuspidatum (B); O. amicorum (C); O. tubiforme (D) and O. glaberrimum (E).



LL, MICH, US); barrio of Tih Ha, Mahbenchauk, 28 Oct 1966, Shilom Ton 1417 (DS, F, MICH, US). Hidalgo: San Bartolo Tutotepec, 16 Apr 1972, Leyva 575 (CAS). Jalisco: Atoyac, 13 May 1937, Matuda 1405 (MICH). Michoacan: Coalcomán, 16 Nov 1939, Hinton 12585 (DS, K, US). Oaxaca: near Chiltepec, Jul 1940-Feb 1941, Calderon 518 (A, LL, UC, US); 4 mi S of La Chao, 14 Mar 1965, Rzedowski 19546 (MICH). Puebla: Xicotepec de Juarez, 19 Apr 1964, Quintero 777 (DS, MICH). Veracruz: Cordoba Valley, 10 Jan 1866, Bourgeau 1689 (BR, C, G, GH, K, P); near Jalapa, Apr 1899, Pringle 8137 (BM, BR, F, G, GH, M, NY, P, UC, US, W); Ricon Barrientas Cuauhtlapan, 25 Jan 1968, Rosas 1085 (A, C, CAS, F).

As here defined Odontonema callistachyum may be easily recognized by its multifascicles of purple flowers arranged in a terminal raceme or panicle. The lower lip is bent downwardly so that the flower appears more bilabiate than most flowers of Odontonema. It is closely related to O. steyermarkii as both share the purplish flower color (although in O. steyermarkii the flowers are more lilac than purple, and will often be pink, a condition not found in O. callistachyum). Nonetheless, O. steyermarkii differs from O. callistachyum in its inflorescence type which has well defined secondary branches.

In the past Odontonema callistachyum has been confused with both O. cuspidatum and O. tubiforme. From both O. callistachyum differs in its purple rather than red flowers, and its more bilabiate flower construction. It differs from O. cuspidatum in its pollen morphology, flowers size and construction, and in the multifasciculate inflorescences with tomentose rachises. From O. tubiforme, the distinction is more difficult, for while the flowers are different in both color and construction, the strict, narrow inflorescence of O. tubiforme versus the more

paniculate inflorescence of O. callistachyum is not always markedly distinct especially in immature specimens.

2. Odontonema cuspidatum (Nees in DC.) Kuntze (Fig. 29)

Eranthemum coccineum Lemaire, Fl. Serres 3:240. Jun 1847.

--TYPE: Probably a garden specimen but none cited in the original publication; herbarium and types unknown (according to Stafleu & Cowan 1979); at this time, and unless otherwise determined by further research, the figure will serve currently as representative of the name; this is not to be considered a lectotypification, however.--Thysacanthus lemairianus Nees in DC., Prodr. 11:729. Nov 1847, nom. superfl., non Odontonema coccineum Leonard, Contr. U.S. Natl. Herb. 31:388. 1958, see O. sessile.

Odontonema cuspidatum (Nees in DC.) Kuntze, Revisio Gen. Pl. 2: 493. 1891, based on Thysacanthus cuspidatus Nees in DC., Prodr. 11:323. Nov 1847.--LECTOTYPE: MEXICO. Zacatecas: near Río Teapa, without date, Linden 180 (Lectotype, G!).

Plants suffruticose to fruticose, 1.5--2.5 m tall; stems subquadrangular, pilose; leaves elliptic-ovate, the blade 9.5--27 cm long, 4--9.5 cm wide, glabrous except for a few hairs along the costa on the lower surface, cystoliths prominent on the upper surface, the margins undulate with an acuminate-cuspidate apex and cuneate base, the petiole 0.3--1 (2.5) cm long, puberulent; inflorescence a terminal raceme or panicle, 13--17 (48) cm long with 3-many flowers in fascicles on a puberulent-hirtellous rachis, the pedicel 5--7 mm long, puberulent, the bracts subulate 1.5--4 mm long, 0.5--1 mm wide basally, the bractlets subulate, 1--1.5 mm long, 0.5 mm wide, all margins ciliate; calyx segments

Fig. 29. Illustration of Odontonema cuspidatum (a-habit;
flower; c-staminode).



subulate, 1.5--2 mm long, 1 mm wide basally, the margins ciliolate; corolla red, tubular, 2.5--3.5 cm long, 2--2.5 mm wide at the base, 3--4 mm wide at the throat, glabrous, the upper lip with the elliptic-ovate lobes 2--2.5 mm long, 1.5--2 mm wide basally, the lower lip with the elliptic-ovate lobes 3--5 mm long, 2--2.5 mm wide basally, the lobes tipped with ciliolate hairs; stamens included, the filaments 1.5--3 mm long (Lemaire shows longer stamens indicating the alternative heterostylous form exists, but none seen in this study), glabrous, the anthers 2.5--3 mm long; staminodes 0.5--1 mm long, glabrous; pistil included, the stigma 2-lobed, glabrous, the style 18--20 mm long, puberulent; ovary glabrous; capsules clavate, 1.5--2 cm long, 2--4 mm broad, 3--4 mm thick, glabrous, 4-seeded.

Near rivers and streams in montane rainforests from Zacatecas southward to Chiapas, Mexico, with disjunct populations in Cuba and Dominican Republic. Map 1.

REPRESENTATIVE SPECIMENS: CUBA: Oriente: Sierra Maestra, Río Oro, ca. 30 km S of Bayamo, 17 Aug 1951, Webster 4124 (GH). La Habana Vedado: Salto del Caburni, tope de Collantes, 17 Jul 1957, Liogier 6417 (GH). La Habana: Santiago de las Vegas, 1904, Hermann 315 (BM, NY). DOMINICAN REPUBLIC: Thickets Toblazo, Río Nagua, 18 Apr 1964, Augusto 1534 (NY); El Ranchito, Ocampo, 31 Aug 1947, Jimenez 1453 (US); S of Sabana de la Mar, 21-23 Jan 1972, Liogier 18438 (NY, P, US). MEXICO: Chiapas: Huixtla, 16 Jan 1972, Breedlove & McClintock 23784 (DS); Selva Negra, 10 km above Rayon Mezcalpa on road to Jifotol, 25 Jan 1973, Breedlove & Smith 32417 (DS); Chochovi, 15 Aug 1972, Ventura 5862 (CAS). Hidalgo: between Huejutla and Macuxteptla on road to Xaltocan, 4 Dec 1946, Moore 2226 (GH). Oaxaca: Vista Hermosa, Comaltepec, 15 Dec 1970,

MacDougall s.n. (NY). Veracruz: Playa de Vaca, 10 Oct 1967, Calderon 1517 (A, CAS, F, MICH); biological station at Los Tuxtlas, 13 Jul 1968, Calderon 1724 (A, C, CAS, F, MICH, US); near Tapalapan, NW of Santiago, 11 Aug 1953, Dressler & Jones 41 (GH, MICH, NY, UC).

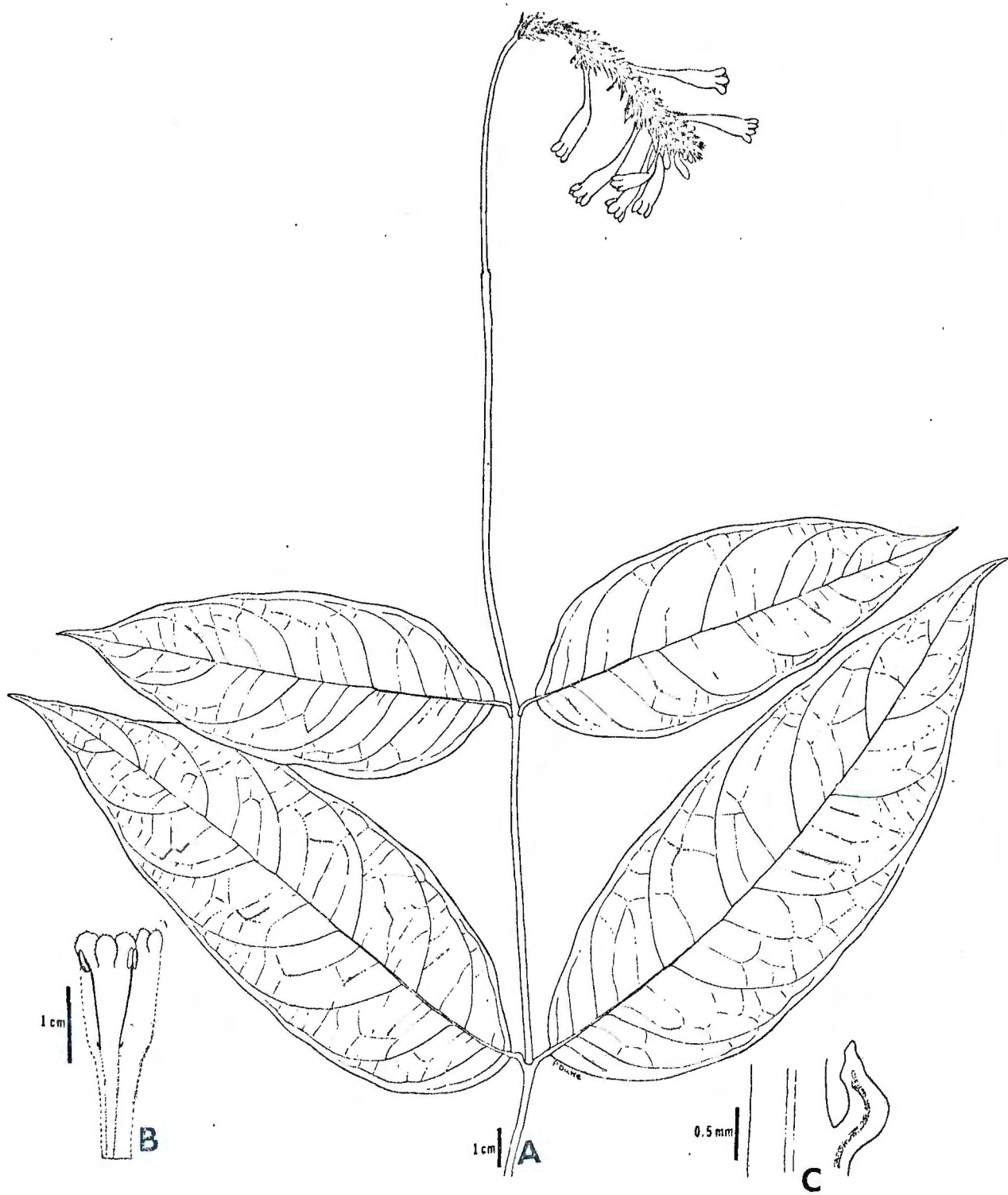
Odontonema cuspidatum is a commonly cultivated species and as such is widely distributed in tropical regions of the world. It is frequently planted by local peoples as the species is occasionally found in villages and towns. It may be readily recognized by its long, narrow tubular flower. It is closely related to O. tubiforme, and in some parts of Mexico the two species are difficult to distinguish, especially in areas where the two overlap in their ranges. Palynologically the two species may be distinguished as O. cuspidatum is 4-colporate while O. tubiforme is 3-colporate.

3. Odontonema amicorum V. M. Baum (Fig. 30)

Odontonema amicorum V. M. Baum, *Brittonia* 34:000. 1982.--TYPE: BELIZE. Toledo: Temash River, 1935, Schipp 1353 (holotype, K!; isotypes, A!, F!, G!, GH!, MICH!).

Plants lianous; stems subquadrangular to terete, glabrous; leaves oblong, the blade 12--20 cm long, 4--6 cm wide, glabrous or with a few marginal hairs, cystoliths present on both surfaces, the margin undulate with an acuminate apex and a rounded base, the petiole 0.3--0.5 mm long, pilose; inflorescence a narrow compact, spikelike terminal raceme, 5--8 cm long, on a sparsely pubescent rachis, the pedicel 2--3 mm long, the lowermost bracts linear and sterile, 6 mm long, the uppermost bracts lanceolate and fertile, 6 mm long, 1 mm wide basally, the bractlets smaller, 3 mm long, all ciliolate; calyx segments triangular, 3 mm long, 1 mm wide basally, glabrous or with a few hairs at the tip; corolla red,

Fig. 30. Illustration of Odontonema amicorum (a-habit; b-open flower; c-staminode).



tubular, 2.8 cm long, the tube 2--3 mm wide at the base, 4--5 mm wide at the throat, glabrous, the upper lip with the oblong lobes 4 mm long, 2 mm wide basally, the lower lip with the ovate lobes 3 mm long and wide, all with ciliolate tips; stamens extended to the base of the corolla lobes, the filament 10 mm long, glabrous, the anthers 2.5 mm long; staminodes 0.8--1 mm long, glabrous; pistil included, the stigma 2-lobed, glabrous, the style 10 mm long, glabrous; ovary glabrous; capsules not seen.

Known only from the type area in southern Belize. Map 1.

This species, Odontonema amicorum, known only from the type collection cited above, is a liana that differs from related species in the O. callistachyum complex by its oblong leaf blades and compact, terminal racemes of red flowers.

4. Odontonema tubiforme (Bertol.) Kuntze (Fig. 31)

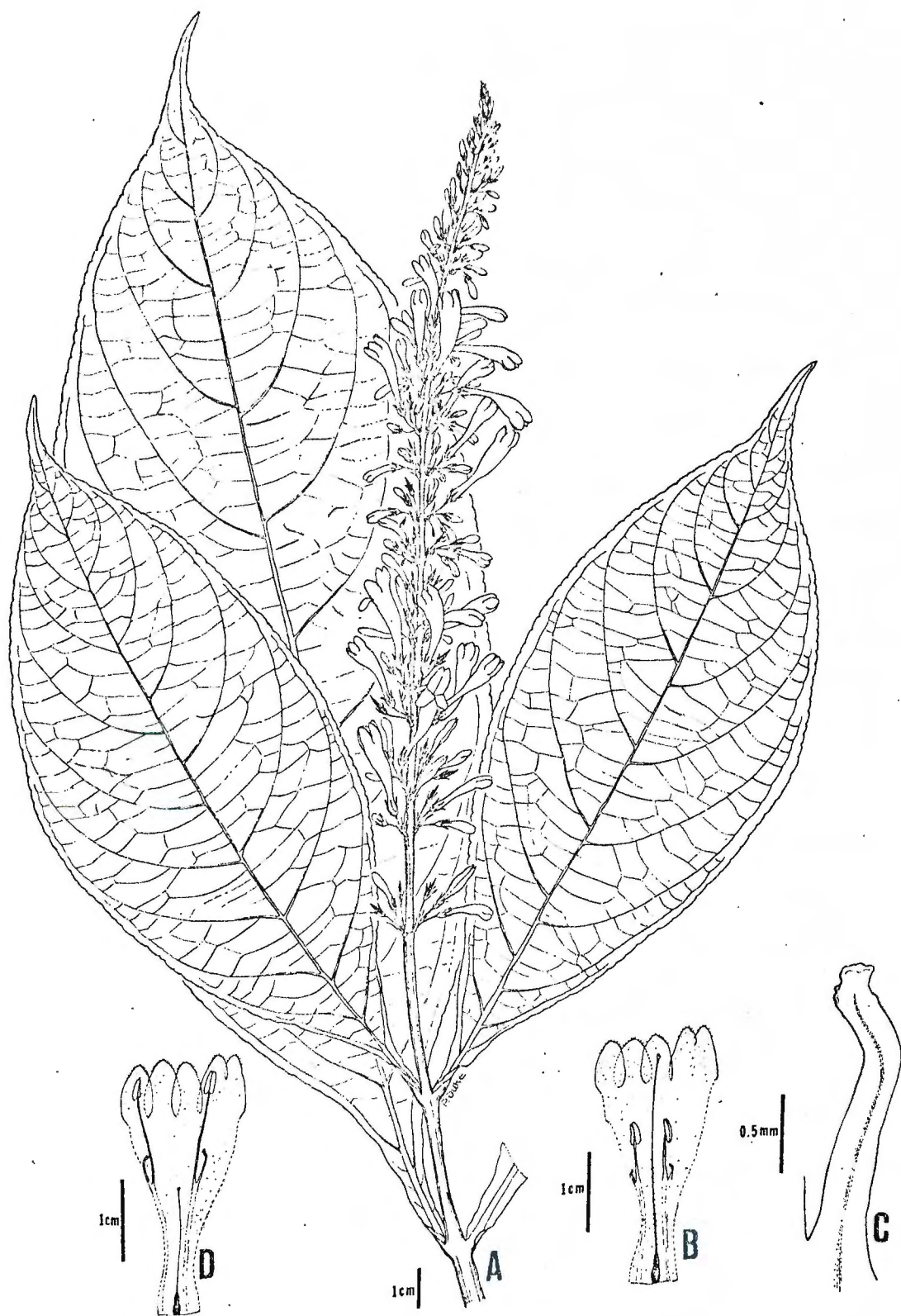
Odontonema tubiforme (Bertol.) Kuntze, Revisio Gen. Pl. 2:493.

1891, based on Justicia tubiformis (as tubaeformis) Bertol., Novi Comment. Acad. Sci. Inst. Bononiensis 4:405. 1840.--TYPE: GUATEMALA. Esquintla: Esquintla, without date, Velasquez s.n. (holotype, probably BOLO, not seen).--Thyrsacanthus tubiformis (Bertol.) Nees in DC., Prodr. 11:324. 1847.

Thyrsacanthus strictus Nees in DC., Prodr. 11:324. 1847.--TYPE: HONDURAS. Without location or date, Armstrong s.n. (holotype, K!)--Odontonema strictum (Nees in DC.) Kuntze, Revisio Gen. Pl. 2:493. 1891.

Thyrsacanthus longifolius Oersted, Vindensk. Meddel. Dansk. Naturhist. Foren. Kjøbenhavn 1854:146. 1855.--TYPE: NICARAGUA. Without locality, 1846-1848, Oersted s.n. (holotype, C!).--Odontonema longifolium (Oersted) Kuntze, Revisio Gen. Pl. 2:493. 1891.

Fig. 31. Illustration of Odontonema tubiforme (a-habit;
open flower with long style; c-staminode; d-open flower with
style).



Thyrsacanthus flagellus Oersted, Vindensk. Meddel. Dansk. Naturhist. Foren. Kjøbenhavn 1854:146. 1855.--TYPE: COSTA RICA. Turrialba: Cartago, 1846-1848, Oersted s.n. (holotype, C!).--Odontonema flagellum (Oersted) Kuntze, Revisio Gen. Pl. 2:493. 1891.

Thyrsacanthus pantasmensis Oersted, Vindensk. Meddel. Dansk. Naturhist. Foren. Kjøbenhavn 1854:146. 1855.--TYPE: NICARAGUA. Segovia, 1846-1848, Oersted s.n. (holotype, C!).--Odontonema pantasmense (Oersted) Kuntze, Revisio Gen. Pl. 2:493. 1891.

Plants suffruticose to fruticose, 0.3--3 m tall; stems subquadrangular with pilose hairs in the grooves of the angles; leaves lanceolate to elliptic or oblong, the blade 11.5--33 cm long, 3.5--12 cm wide, glabrous except for a few hairs along the margins, cystoliths present on both surfaces, the margin undulate to crenate with a cuspidate apex and a narrow cuneate base, the petiole to 1 cm long, pilose; inflorescence a terminal raceme, rarely a sparsely branched panicle, 10--50 cm long with (3) 6-many flowers per node along the glabrous or puberulent rachis, the pedicel 4--8 mm long, the bracts subulate to lanceolate, 1.5--7 mm long, 0.5--1.5 mm wide basally, the bractlets narrowly triangular, 1.5--3 mm long, all margins ciliate, often puberulent throughout; calyx segments narrowly triangular, 2--4 mm long, 0.5 mm wide basally, glabrous or with ciliolate margins; corolla red, tubular, 2--3 cm long, 2--3 mm wide at the base, 5--7 mm wide at the throat, glabrous without, glandular-puberulent within along the lobes, sparsely puberulent below, the upper lip with the elliptic to oblong lobes 3--4 mm long, 2 mm wide basally, the lower lip with the ovate lobes 4--6 mm long, 3--3.5 mm wide basally, the tips ciliolate; stamens included to exserted, inserted about midway up the lobes of the corolla, the filaments 5 or 10--15 mm long due to heter-

ostyly, glabrous, the anthers 2.5--3 mm long; staminodes 2--3 mm long, glabrous; pistil included or exserted, the stigma 2-lobed, the style 12--14 or 25 mm long due to heterostyly, sparsely puberulent basally; ovary glabrous; capsules clavate, 1.5--2.7 cm long, 2--5 mm broad, 3--5 mm thick, glabrous, 4-seeded.

Widespread and common in moist forests throughout much of Latin America from southern Mexico to Panama. Map 1.

REPRESENTATIVE SPECIMENS: BELIZE. N of El Cayo, 19 Feb 1931, Bartlett 11952 (CAS, MICH); on trail to Esperanza from Colombia Forest Station, 12 Jun 1973, Croat 24228 (F, GH, NY); Gracie Rock, Sibun River, 18 Mar 1935, Gentle 1538 (GH, LL, MICH, MO). COSTA RICA. Alajuela: 9.7 km N of Los Angeles de San Ramon near Riola Balsa, 23 Feb 1978, Almeda & Nakai 3843 (CAS). Cartago: near Río Tuis along road from Turrialba to Monavia, 19--20 Dec 1966, Burger & Ramirez 3982 (G, LL). Guanacoste: near Tilarán, 10--31 Jan 1926, Standley & Valerio 45680 (US). Heredia: Finca La Selva, 7 Feb 1976, Durkee 7630 (F). Limon: Drenaje de Río Valle Estrella, 26-28 Oct 1951, Shank & Molina 4544 (GH). Tecurzique: Las Veltas, May 1899, Tonduz 13159 (G, K, M, P). Turrialba: Cartago, Jan 1949, Leon 1463 (US). EL SALVADOR. La Libertad: S of Santa Tacla, 14 Jan 1946, Carlson 83 (F, UC). Morazan: Cerro Cacaguatique, 3 Jan 1942, Tucker 702 (F, G, K, LL, MICH, UC, US). San Salvador: near San Salvador, 2--7 Feb 1922, Standley 20539 (GH, NY); Sonsonate: near Izalco, 19--24 Mar 1922, Standley 21870 (GH, US). GUATEMALA. Alta Verapaz: E of Tactic on road to Tamahu, 9 Apr 1939, Standley 71336 (F, US); SW of Lanquin, 21 Feb 1942, Steyermark 44118 (A, F, NY, US). Escuintla: Escuintla, Mar 1890, Smith 2031 (F, G, K, P, US). Izabal: 3 km N of Hwy. 9 from Km 269, 11 Nov 1970, Harmon & Feintes 1919 (F, GH, MO). Peten:

Santa Cruz, 27--28 Mar 1931, Bartlett 12389 (CAS, MICH, MO); between
 Yalpemecha and San Diego, 25 Mar 1942, Steyermark 45349 (F, LL, US).
 Quezaltenango: Patzulin, Oct 1934, Skutch 1412 (A, F, US). Retalhuleu:
 between Neuva Linda and Champerico, 18 Feb 1941, Standley 87653 (F, US).
 San Marcos: S slope of Volcan Tajumuko, 9 Mar 1940, Steyermark 37318
 (F). Totonicapan: near Villa Las Crusas 8 km SE of Tontonicapán, 13 Dec
 1963, Williams et al. 23974 (F, LL, NY, US). HONDURAS. Atlantida: 15 mi
 E of Ceiba, 21 Jul 1938, Yuncker et al. 8563 (F, G, GH, K, MICH, NY, UC).
 Comayagua: near Taulabu, 8 Apr 1947, Standley et al. 7004 (F). Cortes:
 Barbara, 21 Dec 1950, Molina 3857 (F, GH, US). Intibuca: Quebrada del
 Polon de Guise, 9 Apr 1950, Molina 6407 (F, LL). Olancho; Quebrada
 Catacamas, Montaña Peña Blanca, 28 Apr 1957, Molina 8341 (F). Yoro:
 near Progreso, 24 Jan 1928, Standley 55035 (A, F). MEXICO. Chiapas:
 near San Quintin, 23 Feb 1965, Breedlove 9121 (DS, F, US); Yaxchilan, 26
 Feb 1973, Breedlove 33909 (DS, MICH). Jalisco: gorge of Río Hercones S
 of Puerto Vallarta, 2 Nov 1971, Dieterle 3990 (MICH). Michoacan: La
 Soledad, 28 Mar 1899, Langlasse 974 (G, GH, K). Oaxaca: Yaveo, 15 Mar
 1938, Mexia 9150 (CAS, G, GH, NY, UC, US). Pueblo: Huauhohinango Fala-
 pilla, 23 Jan 1903, Seler 3770 (GH, NY). NICARAGUA. Boaco, 24 Jan
 1970, Atwood 3836 (GH, NY, UC); near La Luz-Siuna, NNE of La Luz, 11
 Mar 1961, Bunting & Licht 542 (F, NY); Choutales, Jun 1870, Levy 502
 (G, P); Tuma Grade 8 km of Matagalpa, 14 Jan 1963, Williams et al. 27566
 (F). PANAMA. Bocas del Toro: Fish Creek Mts. near Chiriqui Lagoon, 24
 Apr 1941, Wedel 2327 (GH, MO). Chiriqui: Burica Peninsula, 20 km W of
 Puerto Armuelles, 22 Feb 1973, Busey 540 (MO). Coclé: N rim of El Valle
 de Anton, 12 Feb 1939, Allen 1620 (F, GH, MO, NY, US); 6 km S of Port
 Obelo, 6 Oct 1973, Nee 7262 (MO, US). Darien: between Morti and Sasondi,

6--7 Mar 1967, Duke 10690 (MO); W ridge of Cerro Mali, 23 Jan 1975, Gentry & Mori 13839 (MO). Veraguas: between Alto Piedra School and Rio Coloveboro, 4 Apr 1976; Croat & Folsom 34089 (MO).

Odontonema tubiforme and O. rubrum are closely related, differing only in various vegetative features (such as staminodes) and flower size. The white to tan bark of O. rubrum will distinguish it from O. tubiforme, but in portions of Panama, where the two overlap, they are often difficult to consistently separate. In northern Central America and southern Mexico, O. tubiforme closely approaches O. cuspidatum. Odontonema tubiforme differs from O. cuspidatum in having 3-colporate pollen and a broad corolla tube. In Panama O. microphyllum can be quickly separated from O. tubiforme by its smaller leaves.

Within Odontonema tubiforme, as circumscribed herein, there are two minor expressions. The typical phase of the species is a plant with a short, compact inflorescence. The second phase (including the type of O. strictum and O. flagellum) is a plant with a rather elongated inflorescence. It will require further field work to elucidate the variation in this species.

The type of Odontonema tubiforme has not been seen, and in reading Nees (1847b), it is obvious that he did not see the type either. Bertoloni's types are at Bologna (BOLO), but some are reportedly destroyed (Stafleu & Cowan 1976). It will require a search of the herbarium to determine if the type of this taxon is extant.

5. Odontonema glaberrimum (M. E. Jones) V. M. Baum (Fig. 32)

Odontonema glaberrimum (M. E. Jones) V. M. Baum, Brittonia 34:

000. 1982, based on Anisacanthus glaberrimus M. E. Jones, Contr.

W. Bot. 15:151. 1927.--TYPE: MEXICO. Sinloa: El Tigre Mina,

Fig. 32. Illustration of Odontonema glaberrimum (a-habit; b-open flower; c-staminode).



Acaponeta, 1 Mar 1927, M. E. Jones 22976 (holotype, POM!).

Plants fruticose to 3 m tall; stems subquadrangular, glabrous, the bark smooth, whitish; leaves elliptic-ovate, the blade 10--16 cm long, 2.3--6 cm wide, glabrous except for a few hairs on the costa on the lower surface, cystoliths visible on the upper surface, the margin slightly undulate with an acuminate to cuspidate apex and acuminate base, the petiole sessile to 0.7 cm long, glabrous; inflorescence a terminal raceme or panicle to 25 cm long with flowers in fascicles of 4 along a glabrous to puberulent, jointed, rachis, the pedicel 3--11 mm long, glabrous or puberulent, the bracts subulate, 2--2.5 mm long, 1 mm wide basally, the bractlets 1--2 mm long, 0.5 mm wide basally, all margins ciliolate; calyx narrowly triangular, 3--4 mm long, 1 mm wide basally, the margins ciliolate; corolla light red, tubular, 2.5--3 cm long, 2--3 mm wide at the base, 5--6 mm wide at the throat, glabrous without, glandular-puberulent within along the lobes, the upper lip with the elliptic lobes 2--3 mm long, the lower lip with the elliptic lobes 8--10 mm long, 2--3 mm wide basally; stamens exerted, the filaments 4--7 mm long, glabrous, the anthers 3 mm long; staminodes 0.8--1.5 mm long, enlarged apically, glabrous; pistil included, the stigma 2-lobed, glabrous, the style 10--15 mm long, puberulent; ovary glabrous; capsules clavate, 2.7--3 cm long, 4 mm broad, 3 mm thick, glabrous, 4-seeded, the seeds lenticular, 4.5 mm in diameter.

Moist slopes in deciduous tropical forests of Mexico from Sinoloa southward to Yucatan and Chiapas, and in northernmost Guatemala. Map 1.

REPRESENTATIVE SPECIMENS: GUATEMALA. Peten: Laguna Perdida, 1 May 1932, Lundell 1646 (LL, MICH). MEXICO. Chiapas: 13 km N of Arriaga along Mex. Hwy. 195, 15 Jan 1972, Breedlove & McClintock 23724 (DS). Durango: Río Tamazula between Azua Caliente and La Bajada, 19 Mar 1972,

Breedlove 24478 (CAS). Jalisco: Atoyac, 19 Jan 1938, Hinton 11215 (MICH, NY, UC, US). Michoacan: Aquila, 19 Mar 1941, Hinton 15812 (K, MICH, NY, UC, US). Sinoloa: Sierra Surutato on road from Morcorito to Surutato, 3 Mar 1971, Breedlove 19029 (CAS, F, US); Cerro Colorado, 4 Feb 1940, Gentry 5482 (GH, MICH, NY, US); 6--12 km NE of Miramar on road to Jalcocotan, 11 Apr 1965, McVaugh 23562 (MICH).

Odontonema glaberrimum has long been confused with O. callistachyum (Baum 1982) and included within the circumscription of that species. The two species are certainly related, with O. glaberrimum having a decidedly red flower as opposed to the purplish flower of O. callistachyum. In addition, the white-colored bark of O. glaberrimum and its generally more western (and northern) distribution separate the two.

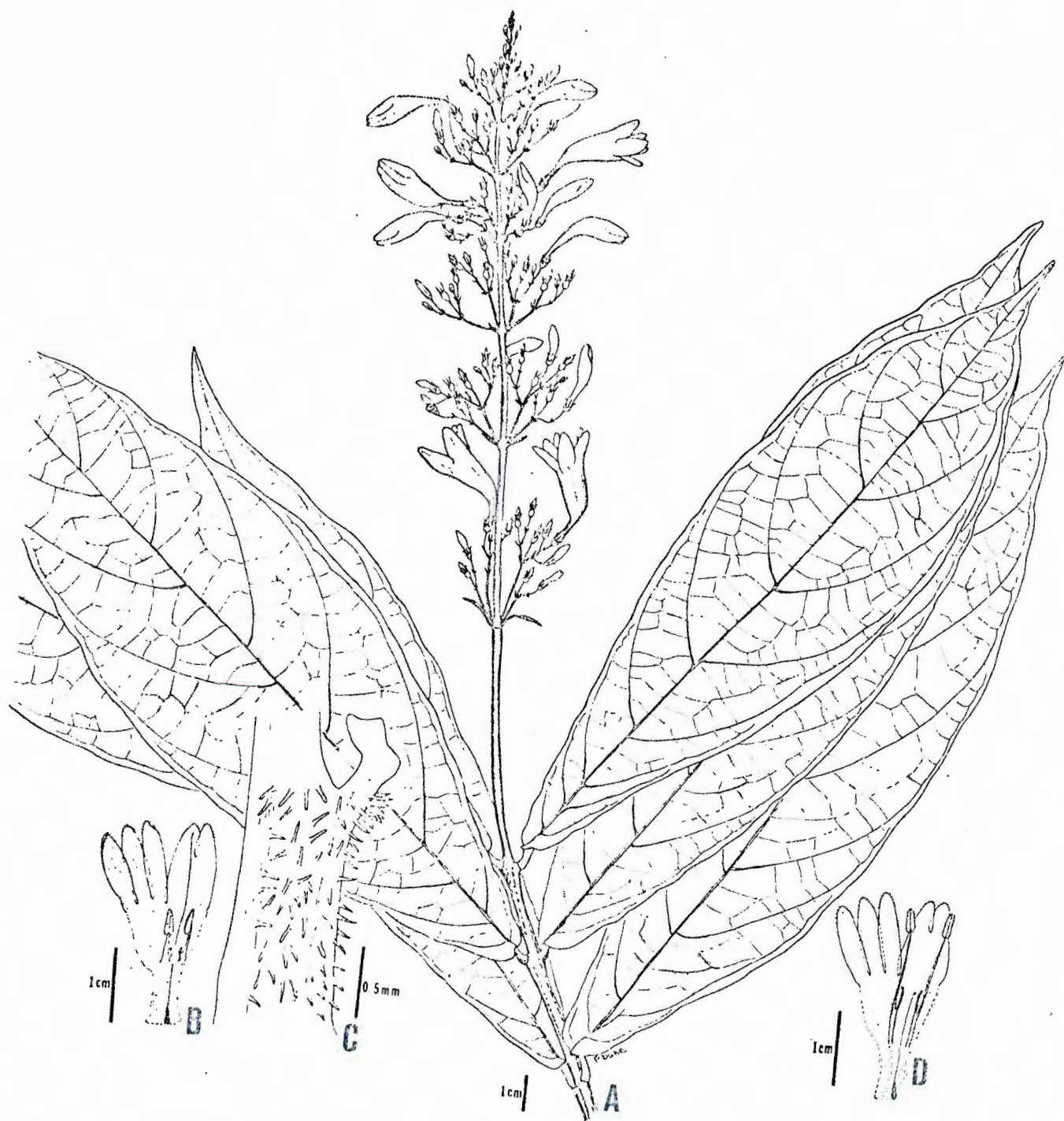
6. Odontonema sessile (Nees in DC.) Kuntze (Fig. 33)

Odontonema sessile (Nees in DC.) Kuntze, Revisio, Gen. Pl. 2:493. 1891, based on Thyrsacanthus sessilis Nees in DC., Prodr. 11:324. 1847.--TYPE: COLOMBIA. Without location, 1840-1844, Lobb s.n. (holotype, K!).

Odontonema coccineum Leonard, Contr. U. S. Natl. Herb. 31:388. 1958.--TYPE: COLOMBIA. Santander: Viscaina Creek, 31 km S of El Sogamosa and the Río Carere, 3 Nov 1936, Haught 2055 (holotype, US!; isotypes, F!, K!, NY!, UC!).

Plants fruticose, 1--2 m tall; stems slender and erect, subquadrangular, glabrous, with scattered, circular or elliptical, corky lenticels; leaves oblong, the blade to 24 cm long, 4--8.5 cm wide, glabrous, cystoliths mostly visible on the lower surface, the margin entire, undulate or shallowly and indistinctly crenate, with an acuminate apex bearing an obtuse tip, narrowed to a rounded and narrowly auriculate base, the

Fig. 33. Illustration of Odontonema sessile (a-habit; b-open flower with long style; c-staminode; d-open flower with short style).



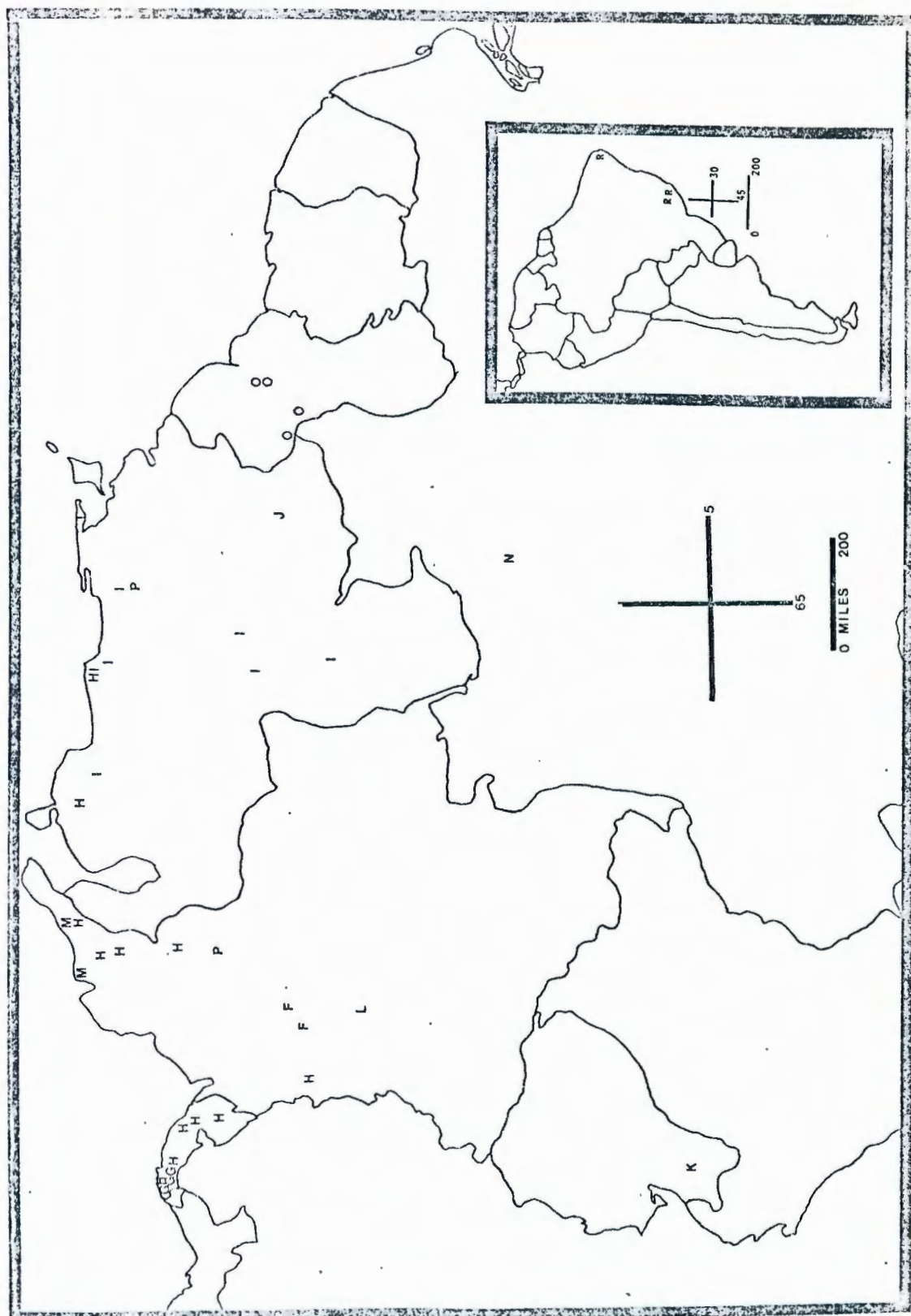
petiole 0.5--1 cm long, glabrous to pilose; inflorescence a dense terminal thyrse to 25 cm long with many flowers in fascicles arranged on the 1 cm long secondary branches, the rachis sparsely hirtellous, the pedicel 4--8 mm long, sparsely hirtellous, the bracts subtending the secondary branches narrowly triangular, 2 mm long, those subtending the primary branches up to 10 mm long and 0.5--1 mm wide basally, the bractlets 1.5 mm long, all sparsely hirtellous and ciliolate; calyx segments narrowly triangular, 4 mm long, 1 mm wide basally, glabrous or sparsely hirtellous; corolla bright scarlet, 2--3 cm long, 3 mm wide at the base, 5--9 mm wide at the throat, densely pubescent throughout with both long and short septate hairs, the upper lip with the narrowly oblong lobes 6--11 mm long, 4--5.5 mm wide basally, rounded at the tip, the lower lip with the oblong lobes about the same length or slightly shorter, all tips ciliolate; stamens included to slightly exerted beyond the throat, the filaments 4 or 15 mm long due to heterostyly, glabrous or sparsely hirtellous basally, the anthers 4 mm long, densely pubescent; staminodes 1--2 mm long, located halfway up the filament with a tuft of hairs basally; pistil included, the stigma 2-lobed, glabrous, the style 12--13 or 25 mm long due to heterostyly; ovary glabrous; capsules clavate, glabrous, 2.5 cm long, 6 mm broad, 4.5 mm thick, 4-seeded, the seeds suborbicular, 6 mm in diameter, 1.5 mm thick, brown and furrowed.

Rare and local in dense forests of Colombia. Map 2.

SPECIMENS EXAMINED: COLOMBIA. Antioquia: between Puerto Berrio and Rio Nus, 12 Dec 1884, Lehmann 4104 (US). Santander: near Barranca Bermeja, 7 Oct 1934, Haught 1379 (NY, UC), 11 Jun 1939, Haught 2841 (F, US). Without data, Purdie s.n. (K).

Odontonema sessile may be distinguished from the multitude of red-

Map 2. Distribution of Odontonema sessile (F); O. microphyllum (G); O. rubrum (H); O. bracteolatum (I); O. album (J); O. laxum (K); O. ampelocaula (L); O. fuchsioides (M); O. speciosum (N); O. schomburgkianum (O); O. rutilans (P) and (in the insert) O. barlerioides (R).



flowered species in this genus by the well developed secondary branches of its thyrsoid inflorescence and the narrowly auriculate leaf bases. The distinctiveness of O. sessile has gone unnoticed until now. In large part this was due to the limited material in herbaria, and Leonard's failure to associate the Haught and Lehmann collections (which he called O. coccineum) with the Lobb specimen.

7. Odontonema microphyllum Durkee (Fig. 34)

Odontonema microphyllum (as microphyllus) Durkee, Ann. Missouri Bot. Gard. 65:245. 1978--TYPE: PANAMA. Colon: abandoned lumber road N of Agua Clara rain gauge, Santa Rita, 4 Mar 1973, Kennedy 2762 (holotype, MO!; isotype, MO!).

Plants fruticose to 1.5 m tall, often decumbent; stems subquadrangular in younger branches, glabrous to puberulous, appearing jointed at the internodes; leaves elliptic to elliptic-ovate, the blade 2.5--5 cm long, 1--1.8 cm wide, glabrous, the cystoliths minute, visible only on the upper surface, the margin entire to undulate with an acuminate apex and an attenuate base, the petiole 0.2--0.5 mm long, glabrous; inflorescence a loose, terminal or sometimes axillary raceme to 7 cm long with 6-many flowers in fascicles on a glabrous to puberulous rachis, the pedicel 3--6 mm long, puberulous, the bracts subulate to narrowly triangular, 0.5--1 mm long, 0.5 mm wide at the base, the two bractlets immediately inside each bract and of similar shape and slightly smaller; calyx segments narrowly triangular, 2--4 mm long, 0.5 mm wide basally, ciliolate; corolla red or red-orange, tubular, often curved to one side, 2.3 cm long, 2 mm wide at the base, 6 mm wide at the throat, puberulous without, puberulent within particularly at the base of the tube, the upper lip with the ovate lobes 3 mm long and wide, the lower lip 5.5 mm

Fig. 34. Illustration of Odontonema microphyllum (a-habit; b-open flower; c-staminode).



long, 3 mm wide basally, all with violet tips; stamens extending to just beyond the notch of the upper lip, the filaments glabrous, 15 mm long, the anthers 2 mm long; staminodes 2.5--3 mm long, glabrous, apically apiculate and curved to one side; pistil included, the stigma 2-lobed, the style 12 mm long, basally puberulent; ovary glabrous; capsules clavate, 2 cm long, 4 mm broad, 4 mm thick, minutely puberulous, 4-seeded, the seeds oval, 3 mm long, 2.5 mm wide, 1 mm thick, roughened.

Infrequent in low forests and mountain slopes of Panama. Map 2.

REPRESENTATIVE SPECIMENS: PANAMA: Panama: La Eneida, Cerro Jefe, 16 Dec 1967, Dressler 3220 (MO); Cerro Jefe, Duke 8004 (MO); slopes of Cerro Jefe beyond Cerro Azul, ca. 5.5 mi on road to La Eneida, 2700-3000 ft elev, 25 Jan 1921, Wilbur & Terri 13639 (F).

This shrubby species is characterized by its small leaves and reddish flowers. It is related to O. rubrum, and some specimens of O. rubrum in portions of Panama are difficult to distinguish from O. microphyllum.

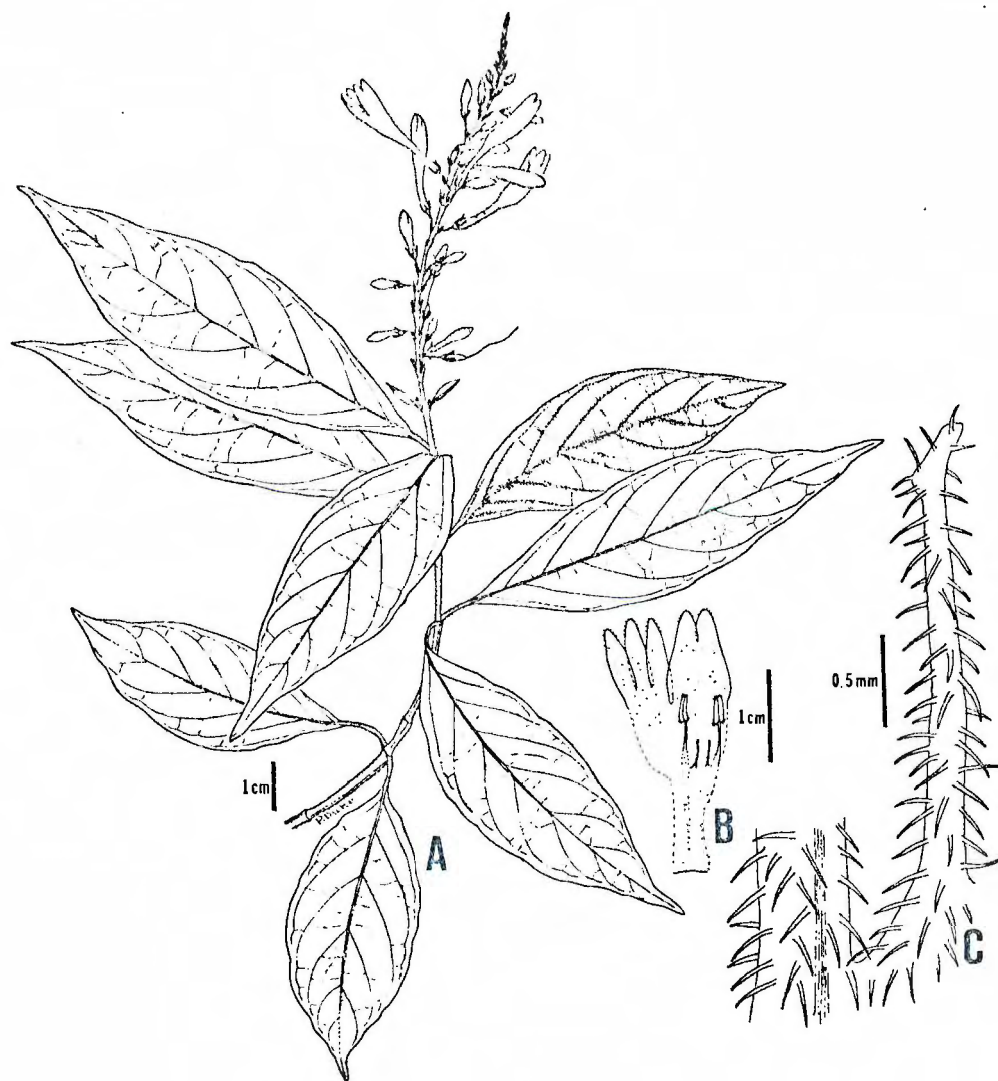
8. Odontonema rubrum (Vahl) Kuntze (Fig. 35)

Odontonema rubrum (Vahl) Kuntze, Revisio Gen. Pl. 2:492. 1891, based on Justicia rubra Vahl, Ecol. Amer. 2:1. 1798.--TYPE: COLOMBIA. Magdalena: Santa Marta, without date, Rohr 73 (holotype, C!; isotype, BM!).

Odontonema bracteolatum (Jacq.) Kuntze var. parviflorum Leonard, Contr. U. S. Natl. Herb. 31:399. 1958.--TYPE: COLOMBIA. Magdalena: Santa Marta Mountains, May 1899, H.H. Smith 1389 (holotype, US!; isotypes, NY!, PH).

Plants suffruticose to fruticose, 1--4 m tall; stems terete and

Fig. 35. Illustration of Odontonema rubrum (a-habit; b-open flower; c-staminode).



white in the older lower portions, subquadrangular and red in the younger upper portions, sometimes slightly angled or keeled, mostly glabrous except for pilose hairs at the nodes; leaves lanceolate to elliptic, the blade 3.5--15 cm long, 1--5 cm wide, glabrous except for pilose hairs on the costa on the lower surface and ciliate margins, cystoliths visible on both surfaces, the margin entire and undulate with an acuminate apex and cuneate base, the petiole 0.3--0.5 (1) cm long, puberulent with appressed hairs; inflorescence a terminal raceme, rarely a panicle, 2--16 cm long with 2-many flowers per node or in cymes of the primary, or when present, along the 3--8 mm long secondary branches, the rachis puberulent to pilose, the pedicel 2.5--5 mm long, puberulent, the bracts narrowly triangular, 2--3 mm long, 0.5 mm wide basally, the bractlets narrowly triangular, 1--2 mm long, located along the pedicel, all puberulent; calyx segments narrowly triangular, 2.5--3.5 mm long, 0.5--1 mm wide basally, puberulent; corolla bright scarlet-red, tubular, (1.5) 2.5--3.5 cm long, 2--3 mm wide at the base, 5--7 mm wide at the throat, puberulous without, glandular-puberulent within, the upper lip with the elliptic to ovate lobes 4--5 mm long, 2--3 mm wide basally, the lower lip with the elliptic-oblong lobes 8--14 mm long, 2--3 mm wide basally, all lobes with a few hairs at the apex; stamens included, extending to just beyond the base of the lower lip, the filaments 6--10 or 25 mm long due to heterostyly, pilose, the anthers 3 mm long, glabrous; staminoïdes 2.5--5 mm long, apically capitate with a rudimentary anther, pilose; pistil included or exserted, the stigma deeply 2-lobed, glabrous, the style 12--14 or 23 mm long due to heterostyly, glabrous; ovary glabrous; capsules clavate, 2 cm long, 3 mm broad, 5 mm thick, 4-seeded, the seeds lenticular, white.

Local and infrequent mainly in the rainforest from Panama southward into the mountains of Colombia and extreme western Venezuela. Map 2.

REPRESENTATIVE SPECIMENS: COLOMBIA. Bolivar: Yumil, 13 Dec 1962, Castañeda 9297 (NY); Quimari Occidental, 11 Mar 1942, Sneidern 5689 (MICH, MO). Cesar: 6 km N of Codazzi, 8 Oct 1943, Haught 2055 (NY, UC, US). Choco: between Río Curiche and Alto Curiche, 31 Jan 1967, Duke 9639 (US); Alto Guillermo near Sautata, 8 Mar 1968, Duke 15391 (US). Guajira: at Km Post 61 on road SE of Riohacha, 8 Dec 1944, Haught 4484 (NY, UC, US). Magdalena: Magdalena Valley, 16 Dec 1924, Allen 866 (K, MO). Norte de Santander: near La Esmeralda, 19 Mar 1927, Killip & Smith 20932 (NY, US); near Río Zuila, 21 Dec 1948, Molina et al. 18N.S.O.65 (US). PANAMA: Colon: near Río Indio on road from Portobello to Nombre de Dios, 23 Mar 1976, Croat 33607 (MO); near Peluca on Río Boquerón, 27 Jan 1973, Dressler 4263 (MO). Darien: Río Sambo, above Río Venada, 18 Jan 1967, Duke 9256 (US); Río Pierre, 16 Mar 1973, Kennedy 2879 (MO). Panama: Quebrada Ancha, 18 Dec 1934, Dodge & Steyermark 17043 (DS, G, MICH); above Chepo, Oct 1911, Pittier 4726 (GH, NY, US). VENEZUELA: Falcon: Sierra de San Luis, between Hotel Parador and Montaña de Paraguariba, 21 Jul 1967, Steyermark 99429 (F, NY, US). Federal District: Caracas, 1843, Funck 442 (P).

The true identify of Odontonema rubrum has been overshadowed by the misapplication of the name O. bracteolatum to this species. It is closely related to both O. bracteolatum and to the Panamanian endemic O. microphyllum. It may be distinguished from the former by its smaller flowers, and from the latter by its larger leaves. However, absolute measurements do not clearly distinguish the three species, and it is sometimes difficult to determine fragmentary material.

As noted under Odontonema bracteolatum, the misapplication of that name to O. rubrum began with Nees' (1847b) treatment of the genus, and the error continued until now. Even Leonard (1958) failed to realize the significance of the subtle differences between the two, and considered the type of O. bracteolatum to be within his definition of what is here called O. rubrum. Later (Leonard 1961), Leonard would recognize the expression named by Jacquin as O. venezulense but still he failed to associate the original type material gathered near Caracas with the same species from Amazonas, Venezuela.

The smaller flowered expression of Odontonema rubrum, described by Leonard (1958) as a variant of O. bracteolatum, does not seem to be consistent morphologically or to represent a geographically distinct population. It is placed in synonymy.

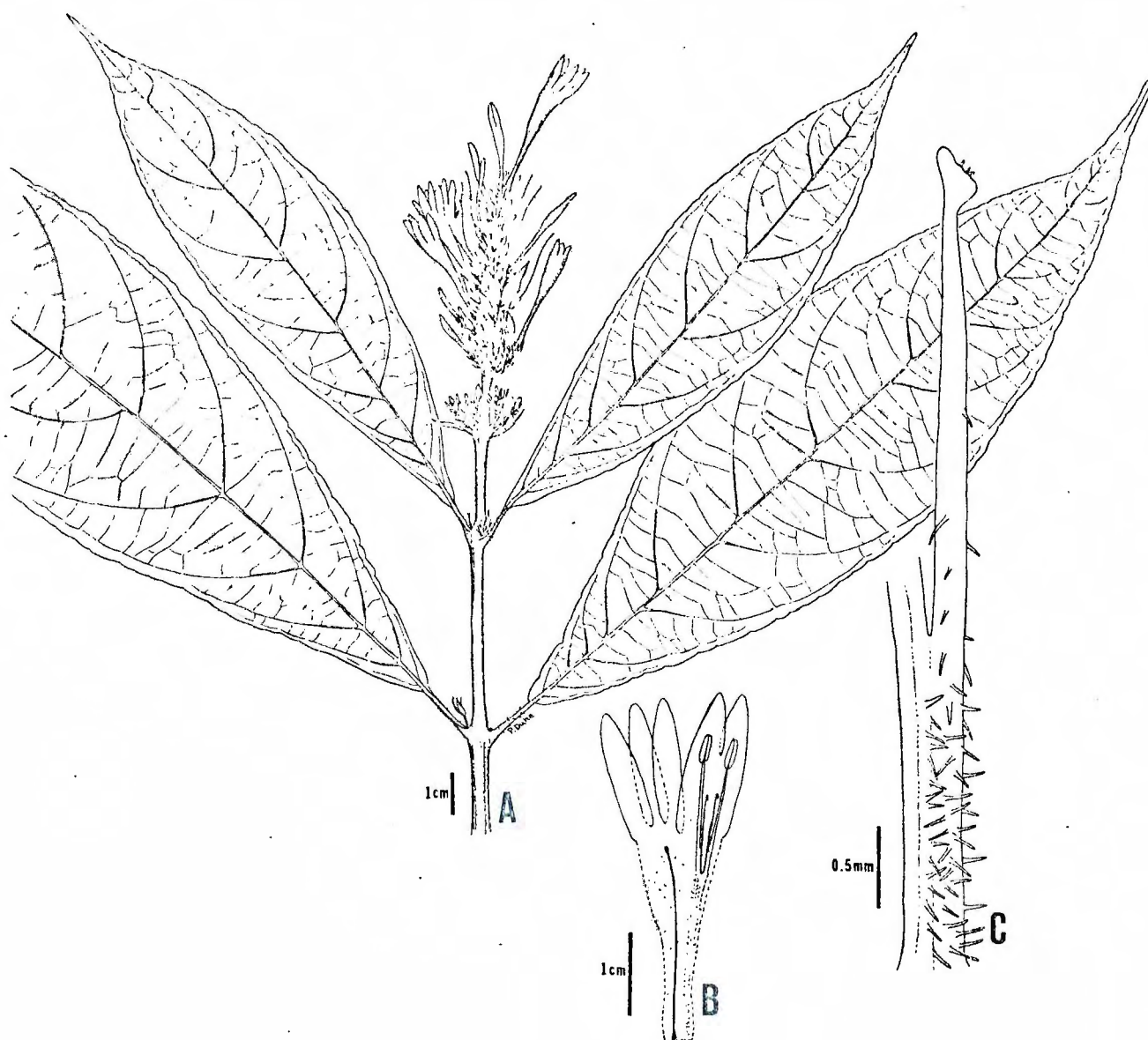
Specimens of Odontonema rubrum are highly variable. The species in Panama and Choco, Colombia, tend to be narrow leaved compared to the typical, broad leaved phase of central and eastern Colombia. Some specimens of O. rubrum approach those of O. microphyllum, yet the leaves are never as small, and for this reason (even though the flower sizes overlap) there is no confusion between the two species.

Odontonema rubrum (as "O. bracteolatum") was frequently cultivated and has been introduced into a number of gardens. An excellent illustration of this species was presented by Hooker (1849).

9. Odontonema bracteolatum (Jacq.) Kuntze (Fig. 36)

Odontonema bracteolatum (Jacq.) Kuntze, Revisio Gen. Pl. 2:493. 1891, based on Justicia bracteolata Jacq., Collectanea 3:253. 1791.
--TYPE: VENEZUELA. Federal District: Caracas, 1786-1788, Bredemeyer s.n. (holotype, W, type photograph seen!).--Thyrsacanthus

Fig. 36. Illustration of Odontonema bracteolatum (a-habit; b-open flower; c-staminode).



bracteolatus (Jacq.) Nees in DC., Prodr. 11:325. 1847.

Odontonema venezuelense Leonard, Mem. New York Bot. Gard. 4:55. 1961.--TYPE: VENEZUELA. Bolivar: Rfo Paraguaza at Raudel Maraca about 110 km from the mouth of the river, 31 Dec 1955, Wurdack & Monochino 41054 (holotype, US!; isotype, NY!).

Plants suffruticose, 1.5--3 m tall; stems subquadrangular, glabrous or hirsute to pilose with raised lenticels on the often well-defined angles; leaves lanceolate to oblong or ovate, the blade 14.5--33 cm long, 4.5--11 cm wide, glabrous except for the hirtellous to pilose veins, cystoliths minute and visible on both surfaces, the margin crenulate, with an acuminate to cuspidate apex and cuneate to rounded base, the petiole 0.5--5 cm long, hirtellous; inflorescence a narrow, dense terminal thyrse to 15 cm long with (4) 5-numerous flowers in fascicles along the hirtellous rachis, the pedicel 1--2 mm long, minutely puberulous, the bracts subulate, 1--2 mm long, 0.5--1 mm wide basally, the bractlets similar only 1 mm long and 0.5 mm wide; calyx segments narrowly triangular, 1--3 mm long, 0.5--1 mm wide basally, puberulent; corolla red, tubular, 3.5--4.2 cm long, 2 mm wide at the base, 4--6 mm wide at the throat, puberulent without, with longer more spreading hairs within on the lower part of the tube, the upper lip with the oblong lobes 17 mm long, 5 mm wide basally, the lower lip similar only the lobes 2--4 mm wide; stamens extended to the lower edge of the throat of the corolla, the filaments 15 mm long, pilose basally, the anthers 4--5 mm long; staminodes 1--6 mm long, adnate to the filament for nearly 4 mm and tipped with a rudimentary anther, pilose basally; pistil included, the stigma 2-lobed, the style 16--22 mm long; ovary glabrous; capsules clavate, 2--4 cm long, 3--5 mm broad, 6 mm thick, 4-seeded, the seeds 5 mm long, 4 mm

wide, pitted and grooved, the base oblique.

Local and infrequent in the forests of Venezuela. Map 2.

REPRESENTATIVE SPECIMENS: VENEZUELA: Amazonas: Serranía Parí, Río Parí, Caño Asisa Río Ventuari, 13 Feb 1951, Cowan & Wurdack 31441 (NY, US); between Cuelebra and Camp Cerro Huachamacari, Río Cunucunumu, 21 Dec 1950, Maguire et al. 29972 (NY, US). Bolívar: Río Nichare near Sierra Maigualida and Sierra Cervantana, 25 Apr 1966, Steyermark & Gibson 95665 (NY, US). Federal District: Los Caracas, Feb 1959, Aristequieta 3831 (NY, US). Sucre: Peninsula de Paria, Cerro de Humo, near Santa Isabel, 9 Aug 1966, Steyermark & Rabe 96168 (F). Yaracuy: between Marin and Carbonero, 11 Apr 1925, Pittier 11766 (US).

The epithet, Odontonema bracteolatum, has long been mistakenly applied to specimens of O. rubrum. This error was apparently initiated by Nees (1847b) when he referred garden specimens of O. rubrum to O. bracteolatum and based his description of that species on specimens of O. rubrum (Baum & Reveal 1982). Odontonema bracteolatum may be distinguished from O. rubrum on the basis of its larger overall size, especially in leaf, flower and fruit length. In general, O. bracteolatum occurs to the east of O. rubrum in the mountains to the south and east of Caracas, or, unlike O. rubrum, may be found in the Amazon Basin of southern Venezuela.

D'Arcy (1970) noted that some Jacquin names were based on specimens gathered by members of the Austrian botanical expeditions after Jacquin's own field studies in the 1750s. D'Arcy reports Bredemeyer (note spelling) and Schücht collected in the New World from 1785 until 1788; Lanjouw (1945) states that only Bredemeyer was in Venezuela, and then only from 1786 to 1788. As there is no Jacquin specimen of Odontonema

bracteolatum, and as it was described after Jacquin sold his herbarium to Sir Joseph Banks, the specimen in Vienna (W), cited above, is the only possible specimen which Jacquin saw and is thus taken to be the holotype.

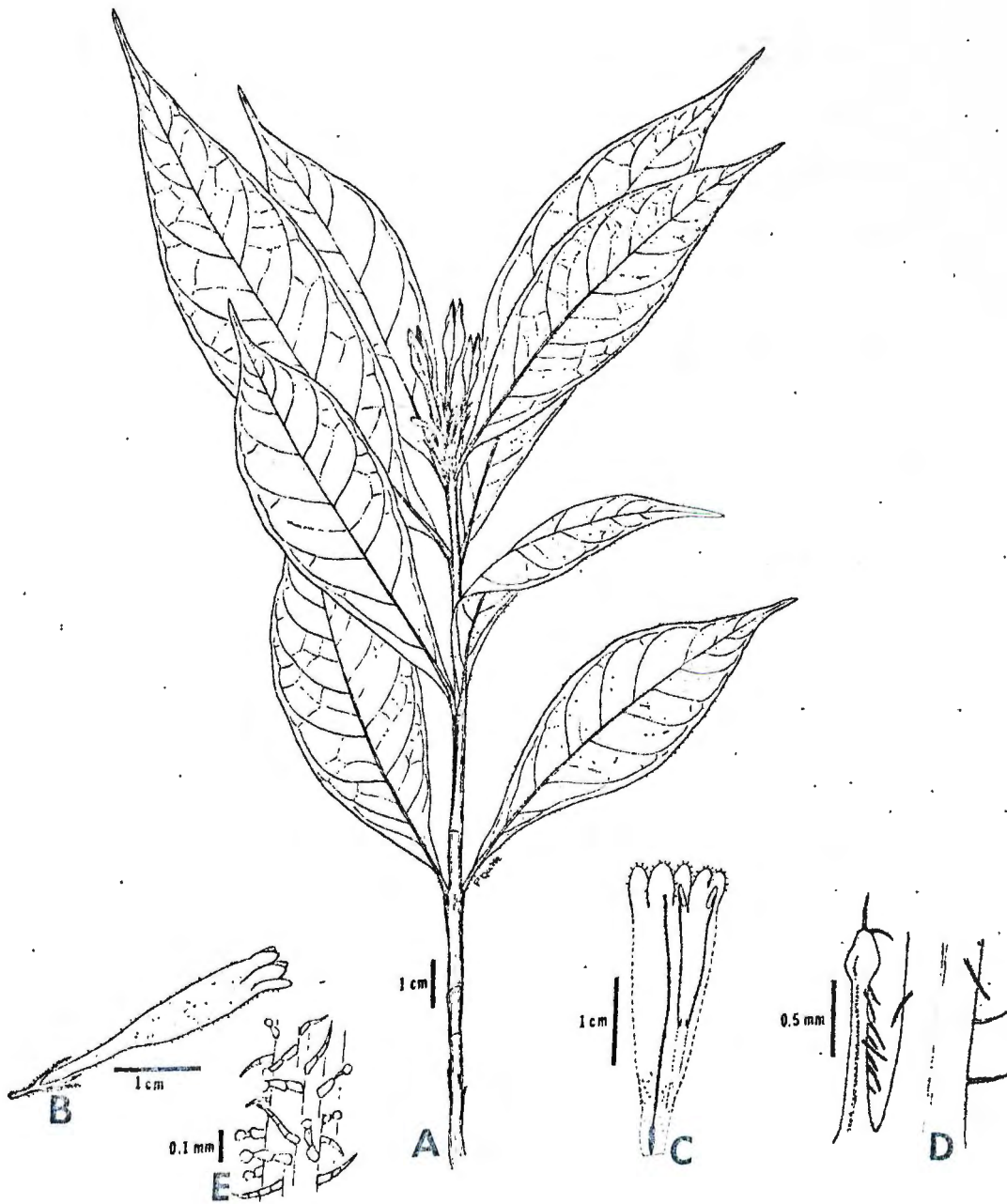
10. Odontonema album V. M. Baum (Fig. 37)

Odontonema album V. M. Baum, Brittonia 34:000. 1982.--TYPE:

VENEZUELA. Bolivar: NNE of Misión de Campamento Sanidad del Río Kanarakuni, along the Río Kanarakuni, 17-29 Mar 1967, Steyermark 97805 (holotype, US!).

Plants fruticose to 2 m tall; stems terete in older portions to subquadrangular in younger portions, glabrate; leaves elliptic-lanceolate, the blade 9.5--14 cm long, 3--3.5 cm wide, scabrous on both surfaces, cystoliths sparsely present on the upper surface, the margin obscurely crenate with a cuspidate apex and a narrow, cuneate base, the petiole 0.5 cm long, with appressed hairs; inflorescence a short terminal raceme to 2.5 cm long, the flowers crowded along the pilose rachis, the pedicel 4 mm long, glandular-puberulent, the bracts lanceolate, 1--1.5 mm long, the bractlets 0.8--1 mm long; calyx segments narrowly triangular, 5--7 mm long, 0.5 mm wide basally, glandular-puberulent; corolla white, tubular, up to 3 cm long, the tube 1.5 mm wide at the base, 5 mm wide at the throat, glandular-puberulent without, pilose within at the base, the upper lip with the elliptic-ovate lobes 2.5 mm long, 1.5 mm wide basally, the lower lip with the elliptic-oblong lobes 4 mm long, 2 mm wide basally, the tips glandular-puberulent; stamens extended to the edge of the corolla lobes, the filament 15 mm long, pubescent basally, the anthers 2--3 mm long; staminoides 1.5--2 mm long, with retrorse pilose hairs, apically capitate with a rudimentary anther; pistil includ-

Fig. 37. Illustration of Odontonema album (a-habit; b-closed flower; c-open flower; d-staminode; e-glandular pubescence of rachis)



ed, the stigma 2-lobed, glabrous, the style 30 mm long, sparsely pilose; ovary glabrous; capsules clavate, 30 mm long, 5 mm thick, glandular-puberulent, 4-seeded.

Known only from the type area in Venezuela. Map 2.

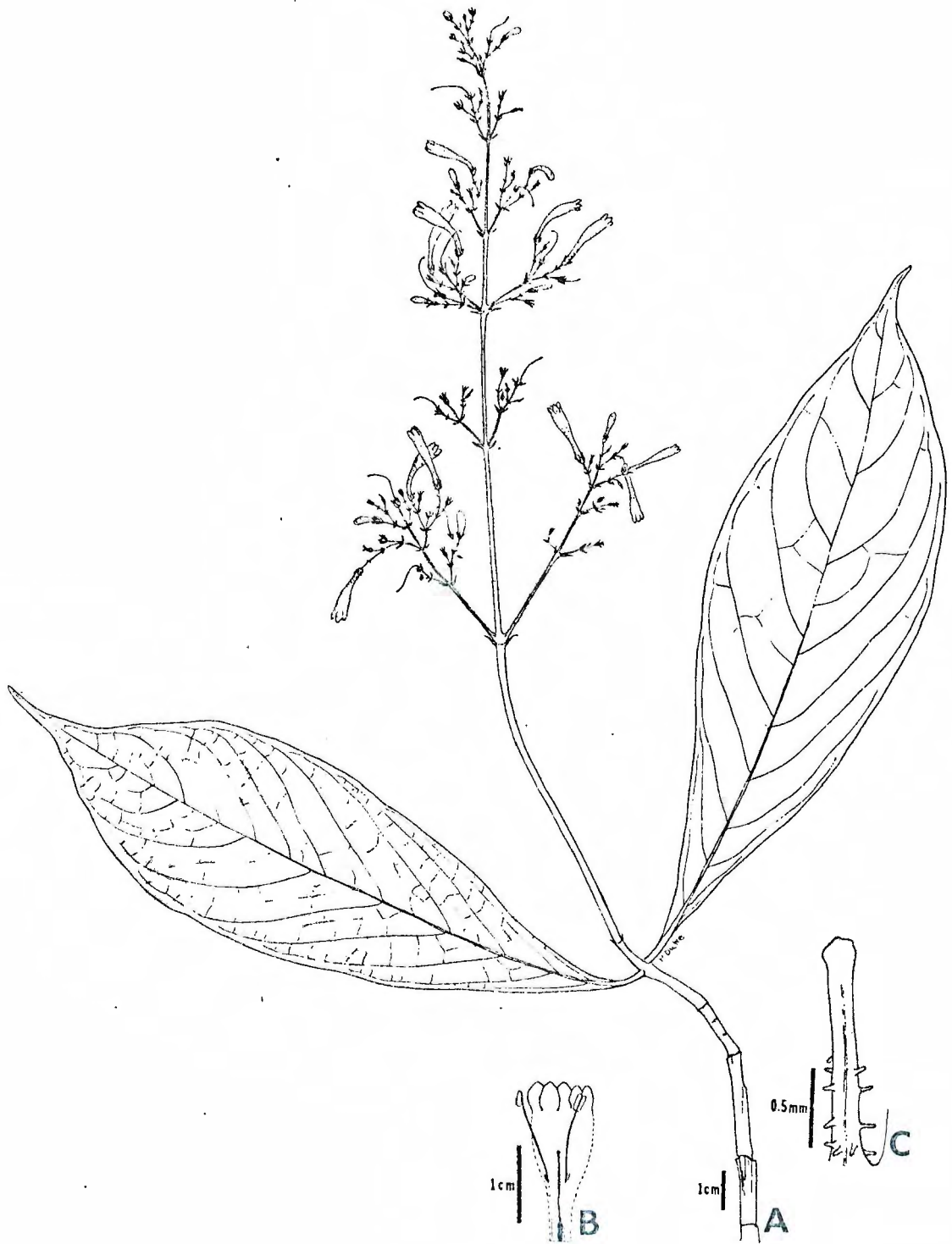
Odontonema album is readily distinguished by its white flowers and its short, racemose inflorescences. It is apparently related to O. bracteolatum. However, O. album is the only member of this group of species with white flowers in an otherwise all red-flowered species complex.

11. Odontonema laxum V. M. Baum (Fig. 38)

Odontonema laxum V. M. Baum, Brittonia 34:000. 1982.--TYPE: ECUADOR. Azuay: Steep slopes along Río Patul between Hacienda Yubay and Hacienda San José de Caimotán, near Sanagufín, 28 May 1943, Steyermark 52714 (holotype, US!).

Plants suffruticose; stems terete to subquadrangular, the bark tarnish-red, exfoliating, glabrous; leaves elliptic, the blade 16--18 cm long, 5--6 cm wide, glabrous, cystoliths visible on both surfaces, the margin obscurely undulate with a cuspidate apex and an attenuate to auriculate base, the petiole absent or 0.5--0.9 cm long, glabrous; inflorescence a loose terminal panicle to 26 cm long with the cymose flowers on a pilose rachis, the pedicel 4 mm long, pilose, the bracts subtending the secondary branches of the rachis narrowly triangular, 3 mm long, the bracts subtending the pedicel narrowly triangular, 1.5 mm long, the bractlets 2 per flower, 0.7 mm long, subulate, all pilose; calyx segments narrowly triangular, 2 mm long, 0.3 mm wide basally, pilose; corolla red, tubular, up to 1.8 cm long, the tube 1 mm wide at the base, 3 mm wide at the throat, sparsely glandular-puberulent without, with a few short hairs near the base of the tube, the upper lip with the

Fig. 38. Illustration of Odontonema laxum (a-habit; b-open flower; c-staminode).



shallowly elliptic lobes 1 mm long and wide, the lower lip with the ovate lobes 3 mm long, 1.5 mm wide basally; stamens extended to the edge of the corolla lips, the filament 10 mm long, pubescent basally, the anther 1.7 mm long; staminodes 1.5--4 mm long, pubescent basally; pistil included, the stigma 2-lobed, glabrous, the style 18 mm long, glabrous; ovary glabrous; capsules not seen.

Known only from the type area. Map 2.

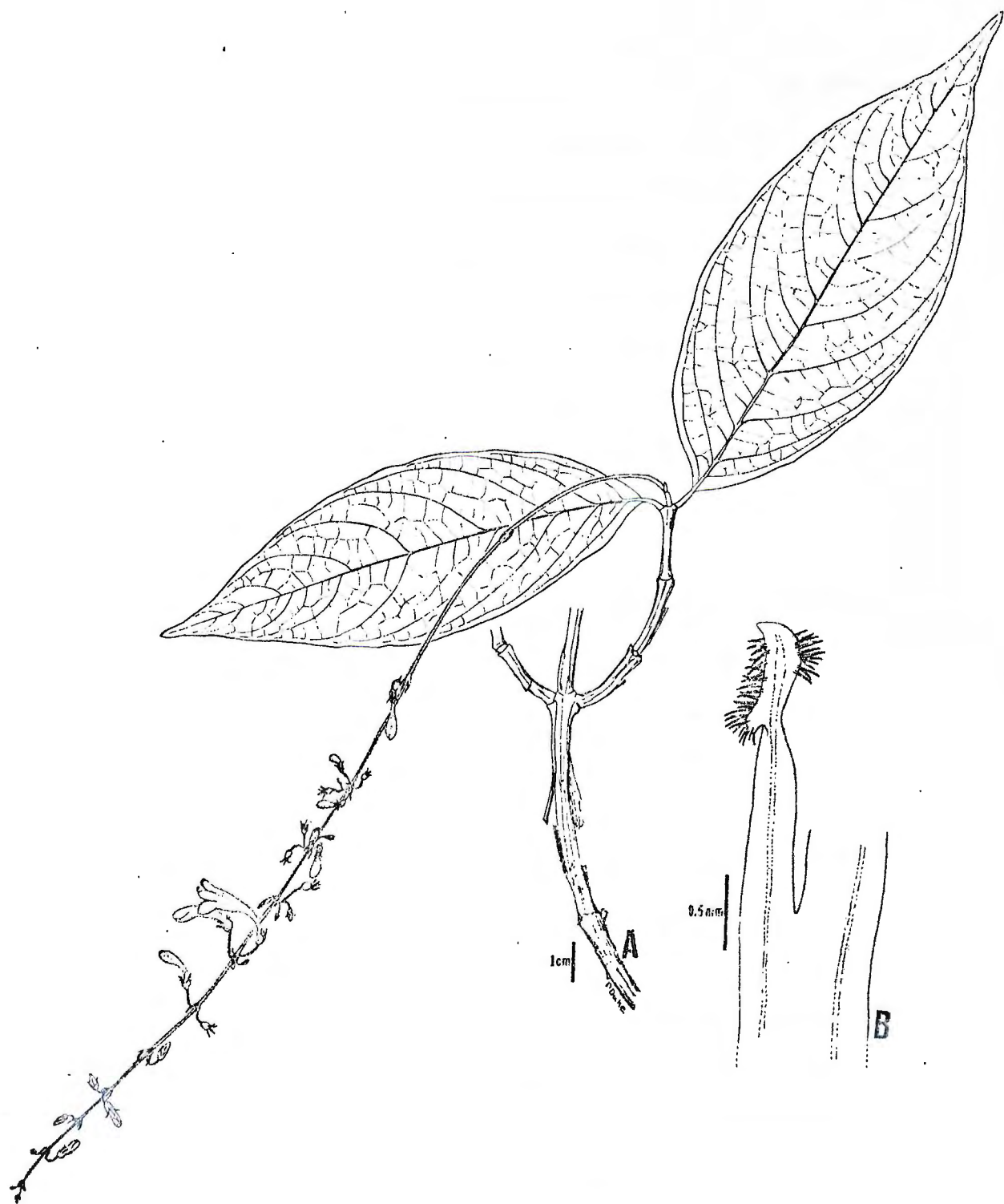
This species is closely related to Odontonema rubrum differing in its larger, elliptic leaves and loose inflorescence.

12. Odontonema ampelocaula Leonard (Fig. 39)

Odontonema ampelocaula Leonard, Contr. U.S. Natl. Herb. 31:393. 1958.--TYPE: COLOMBIA. Cundinamarca: Hacienda Curiche, El Peñón, between ríos Bunque and Mirca, 1--3 Aug 1947, García-Barriga 12473 (holotype, US!).

Plants lianous; stems subquadrangular, thick, glabrous or sparsely and minutely strigose, the bark sometimes exfoliating in shreds, these often remaining loosely attached to the stems; leaves oblong-elliptic, the blade to 19.5 cm long and 6.8 cm wide, glabrous except for a few strigose hairs along the costa of the lower surface, cystoliths minute, prominent on the upper surface, the margin entire or undulate, with a short- acuminate apex, narrowing to a cuneate base, the petiole up to 0.8 cm long, glabrous or sparingly strigose; inflorescences a loose terminal raceme up to 25 cm long with 2--6 flowers in fascicles at each node on a densely hirtellous rachis, the pedicel slender, to 8 mm long, hirtellous, the bracts linear-lanceolate, to 5 mm long and 0.5 mm wide at the base, the lowermost sterile, the bractlets narrowly-triangular, 1.5 mm long, 0.25 mm wide at the base, acute, all sparingly hirtellous and

Fig. 39. Illustration of Odontonema ampelocaula (a-habit;
staminode).



ciliolate; calyx segments subulate, 3--4 mm long, 0.5 mm wide basally, sparingly hirtellous; corolla red, tubular, to 2.5 cm long, 3 mm wide at the base, 6 mm wide at the throat, pilose throughout especially on the lower portion of the corolla-tube within, the upper lip with the rounded lobes 4--5 mm long, 2.5--3 mm wide basally, the lower lip similar; stamens extended to the tip of the corolla lip, the filaments 2.5 mm long (probably due to heterostyly), glabrous or with a few hairs, the anthers 3.2 mm long; staminodes 2--2.2 mm long, bearing sterile, pilose anthers; pistil included, the stigma 2-lobed, glabrous, the style 4 mm long, glabrous; ovary glabrous; capsules not seen.

Known only from the type area. Map 2.

This rare species is allied to Odontonema fuchsioides but differs in its lianous habit. Based on the thickened stem, it is thought that the plant must reach considerable height.

13. Odontonema fuchsioides (Nees in DC.) Kuntze (Fig. 40)

Odontonema fuchsioides (Nees in DC.) Kuntze, Revisio Gen. Pl 2:

493. 1891, based on Thyracanthus fuchsioides Nees in DC., Prodr.

11:325. 1847.--TYPE: COLOMBIA. La Guajira: Riohacha, without date,

Purdie s.n. (holotype, K!).

Plants suffruticose; stems spreading, the upper portion subtetragonal, rather sparingly hirtellous with spreading or ascending hairs, the lower portion subterete, glabrous; leaves oblong, lanceolate to elliptic, the blade 9--12.5 cm long, 2--6 cm wide, glabrous, cystoliths more prominent on the lower surface, the margin entire, undulate, with a short acuminate apex, narrowed at the base, the petiole up to 0.5 cm long, glabrous or sparingly hirsute; inflorescence a slender terminal raceme up to 14 cm long with 2 flowers per node on a hirtellous rachis,

Fig. 40. Illustration of Odontonema fuchsiodes (a-habit; b-open
flower; c-staminode).



the pedicels 3--6 mm long, hirtellous, the bracts lanceolate, the lowermost pair 10 mm long and 1.5 mm wide at the base, the others successively reduced upwardly, glabrous or sparingly hirsute, the bractlets similar only more reduced; calyx segments narrowly triangular, 5 mm long, 1 mm wide basally, acute, sparingly to moderately puberulous; corolla red, bottle-shaped, 2.5--3 cm long, 1--2 wide at the base, 5--6 mm wide at the throat, glandular-puberulent without, puberulent within, the upper lip with the suborbicular lobes 4--5 mm long, 2--3 mm wide basally, the lower lip similar; stamens extended to the edge of the corolla lips, the filaments glabrous, 17 mm long, the anthers 3.5 mm long; staminodes 3--5 mm long, glabrous; pistil exserted, the stigma 2-lobed, the style up to 27 mm long with glandular hairs at the base; ovary glabrous; capsule not seen.

Known only from the coastal regions of northern Colombia. Map 2.

SPECIMENS EXAMINED: COLOMBIA. Magdalena: Santa Marta, 1898-1899, Smith 1390 (BM, G, K, LL, MICH, MO, P, UC, US).

Odontonema fuchsiodes is recognized by its small red bottle-shaped flowers on slender, terminal racemes. It differs from other members of the O. schomburgkianum complex (species 13 through 16) in having much shorter flowers (less than 2.5 cm long) and a hirtellous rachis.

14. Odontonema speciosum V. M. Baum (Fig. 41)

Odontonema speciosum V. M. Baum, Brittonia 34:000. 1982.--

TYPE: BRAZIL. Amazonas: Along the Rio Araca at Itaubal, 26 Oct 1952, Fröes & Addison 29106 (holotype, NY!).

Plants herbaceous; stems terete, the bark tannish-red, exfoliate, glabrate, pilose on the younger portions; leaves elliptic, the blade 17.5 cm long, 4.7 cm wide, sparsely scabrous on both surfaces, cysto-

Fig. 41. Illustration of Odontonema speciosum (a-habit;
inode; c-glandular pubescence of rachis).



liths not visible, the margin obscurely crenate with an acuminate apex and attenuate base, the petiole 0.8--1.5 cm long, with appressed hairs; inflorescence a terminal raceme to 14 cm long with 2 flowers per node on a glandular-pubescent rachis, the pedicel 6 mm long, glandular-puberulent, the bracts narrowly triangular, 4 mm long, the bractlets two per flower, 2 mm long, all curved upwardly and glandular-puberulent; calyx segments narrowly triangular, 8 mm long, 1 mm wide basally, glandular-puberulent; corolla dark red, tubular, up to 4 cm long, the tube 3 mm wide at the base, 13 mm wide at the throat, sparsely pilose throughout, the upper lip with the lobes elliptic-oblong, 8 mm long, 4 mm wide at the base, the lower lip with the lobes elliptic-oblong, 14 mm long, 5 mm wide at the base, the margin somewhat ciliolate; stamens extended slightly beyond the corolla lobes, the filaments 15--25 mm long, sparsely pilose, the anthers 3.5 mm long; staminodes 1--1.5 mm long, glabrous; pistil included, the stigma capitate, glabrous, the style 40 mm long, glabrous; ovary glabrous; capsules not seen.

Known only from the type area. Map 2.

This species may be distinguished by its dark red, broadly tubular flowers arranged in a terminal raceme. Both Odontonema speciosum and O. rutilans are herbaceous while the related species, O. schomburgkianum, is more woody.

15. Odontonema schomburgkianum (Nees) Kuntze (Fig. 42)

Odontonema schomburgkianum (Nees) Kuntze, Revisio Gen. Pl. 2:493.

1891, based on Thyrsacanthus schomburgkianus Nees, London J. Bot.

4:636. 1845.--TYPE: GUYANA. Without locality or date, Schomburgk

157 (holotype, K!; isotypes, BM!, G!, OXF!, P!).

Odontonema macrophyllum Gleason, Bull. Torrey Bot. Club 53:300.

Fig. 42. Illustration of Odontonema schomburgkianum (a-habit; b-open flower; c-staminode).



1926.--TYPE: GUYANA. Kangaruma on the Potaro River, above Tumatumai, 25--27 Jun 1921, Gleason 213 (holotype, NY!; isotype, GH!)

Plants suffruticose to 1.7 m tall; stems leafless below, subtetragonal above, mostly glabrous except for a few hairs near the apex, the bark red, exfoliating; leaves elliptic to ovate or obovate, sometimes oval, the blade 3--25 cm long, 2--15 cm wide, glabrous except for a few hairs along the margins on the lower surface, sometimes with crooked, pilose hairs 1.2--2 mm long on the lower surface and on the margin of the upper surface, cystoliths visible only on the upper surface, the margin entire, undulate, with an acuminate to cuspidate apex and a cuneate base, the petiole 1--3 (4) cm long, sparsely pilose; inflorescence an elongate, terminal raceme or rarely a branched panicle, 9--58 cm long, with 2--4 (rarely many) flowers per node on the conspicuously glandular-puberulent rachis, the lowermost bracts lanceolate and sterile, 5--9 mm long, the upper bracts reduced, 4 mm long, 0.5 mm wide basally, the bractlets immediately inside each bract and similar, only somewhat reduced in size; calyx segments narrowly triangular or subulate, 5--8 mm long, 1 mm wide basally, with spreading, purplish, conspicuously glandular hairs throughout, these hairs 0.5 mm long; corolla red, bottle-shaped, 4--5 cm long, 2 mm wide at the base, 10 mm wide at the throat, slightly curved in the middle, puberulous throughout with some glandular hairs, the upper lip with shallow ovate lobes 3--4 mm long and wide, the lower lip similar; stamens exserted beyond the corolla lips, the filaments 35--38 mm long, glabrous, the anthers 3--4 mm long; staminodes 1.5--2 mm long, glabrous, apically capitate; pistil exserted, the stigma 2-lobed, the style 15 mm long, glabrous; ovary glabrous; capsules clavate, 2 cm long, 5 mm broad and thick, ciliolate, 4-seeded, the seeds

oval; $2n=42$ (Grant 1955).

Infrequent in lowland forests along rivers in Guyana. Map 2.

REPRESENTATIVE SPECIMENS: GUYANA. Pomeroon River, 14--20 Jan 1923, Cruz 2989 (F, MO, NY, UC, US); Rockstone, 15 Jul-1 Aug 1921, Gleason 699 (NY); Potaro River Gorge, 27 Apr 1944, Maguire & Fanshawe 23044 (K, NY); Moraball Creek near Bartica Essequiboriver, 19 Aug 1929, Sandwith 52 (K, NY).

Odontonema schomburgkianum is easily recognized by its large, red, hummingbird-visited flowers with a slightly curved corolla tube. It resembles O. rutilans, but the herbaceous habit and the straight, not recurved bottle-shaped flowers of that species readily distinguish it from O. schomburgkianum. In addition, the inflorescence of the present species are more elongate than those of O. rutilans.

Gleason (1926) distinguished Odontonema macrophyllum from O. schomburgkianum on the basis of the slightly larger leaves and the pubescent leaves, rachis, bracts, pedicels and calyx segments. Future field work might show O. macrophyllum to be distinct from typical O. schomburgkianum at some infraspecific rank.

16. Odontonema rutilans (Planchon) Kuntze (Fig. 43)

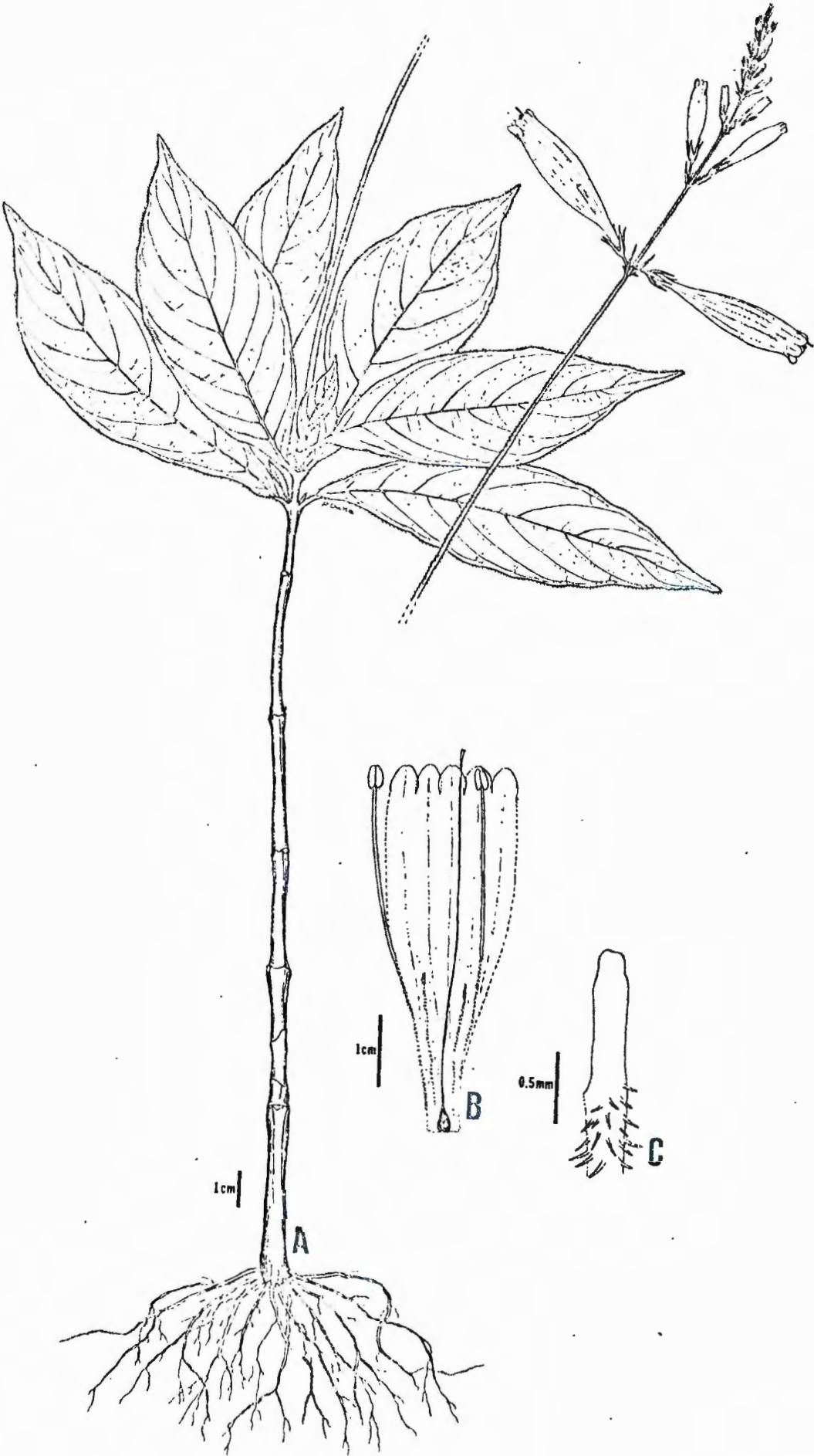
Odontonema rutilans (Planchon) Kuntze, Revisio Gen. Pl. 2:493.

1891, based on Thyrsacanthus rutilans Planchon, Fl. Serres 7:241.

1852.--LECTOTYPE: COLOMBIA. Norte de Santander: Ocaña, 1853, Schlim 463 (lectotype, K!; duplicates of the lectotype: G! P!).

Plants herbaceous up to 13 cm tall; stems subquadrangular, glabrous; leaves oblong-lanceolate, the blade 7--19 cm long, 2.5--7 cm wide, sparsely pilose, cystoliths conspicuous on both surfaces, the margin entire, undulate, with an acuminate-acute apex and an angled base, the

Fig. 43. Illustration of Odontonema ruvilans (a-habit; b-open flower; c-staminode).



petiole 0.5--1 cm long; inflorescences a terminal raceme 23--45 cm long with 2 flowers per node on a conspicuously septate-pilose and glandular rachis, the pedicel 5--9 mm long, the bract lanceolate, 7--10 mm long, 0.5--1 mm wide at the base, the lowermost sterile, the bractlets 2, immediately inside each bract and similar in shape but smaller, mostly 4 mm long; calyx segments narrowly triangular, 5--8 mm long, 1 mm wide basally, glandular-puberulent; corolla red, bottle-shaped, 2.5--5 cm long, 2.5 mm wide at the mouth, 7--8 mm wide at the throat, puberulous throughout, the upper lip with the ovate lobes 4 mm long, 3.5 mm wide basally, the lower lip similar; stamens extended to the edge of the corolla lips, the filaments pilose basally, up to 40 mm long, the anthers 3 mm long; staminodes 0.5--10 mm long, pilose, separated by a filament; pistil exserted, the stigma minutely 2-lobed, glabrous, the style to 52 mm long, glabrous; ovary glabrous; capsules not seen; $2n=$ 42 (Takizawa 1957).

Rare and infrequent, disjunct in Surinam, Venezuela and Colombia.
Map 2.

SPECIMENS EXAMINED: COLOMBIA. Known only from the type. GUYANA. without location, 22 Nov 1879, Bivage s.n. (G), 11 Mar 1889, Bivage s.n. (G). VENEZUELA. Tachira: cloud forest bordering pasture along steep slopes leading to Cerro Azul, at Cerro Las Minas, 18 km SE of Santa Ana, 11 Nov 1979, Steyermark et al. s.n. (US).

Odontonema rutilans is apparently a perennial herb with large, straight, red, bottle-shaped flowers restricted to a terminal, glandular-pilose raceme. It is widely cultivated. It is not known what its native distribution might be as there is only one collection (saved, perhaps Guyana) for each country, and only one modern collection.

17. Odontonema amplexicaule (Nees in Mart.) Kuntze (Fig. 44)

Odontonema amplexicaule (Nees in Mart.) Kuntze, Revisio Gen. Pl. 2:493. 1891, based on Thyrsacanthus amplexicaulis Nees in Mart., Fl. Brasil. 9:98. 1847.--TYPE: BRAZIL. Without locality, Sello 272 (947) (holotype: B, type photograph seen, specimen probably destroyed; isotypes, BM!, K!).

Plants herbaceous; stems subterete, glabrous except for a few hairs near the apex, the bark reddish, exfoliating on the older, thicker portions; leaves oblong, the blade 12--25 cm long, 3.4--7 cm wide, loosely pilose on the upper surface, mostly glabrous on the lower surface except for a few bristly hairs along the costa, cystoliths more prominent on the upper surface, the margin entire, ciliolate, with an acuminate apex and narrow, auriculate base, the petiole lacking; inflorescence a terminal raceme to 24.5 cm long with 2--6 flowers per node on densely pilose rachis, the pedicel 4--5 mm long, puberulent, the bracts lanceolate, 5--7 mm long, 1 mm wide basally, hirsute, the bractlets subulate, 2 mm long; calyx segments narrowly triangular, 3 mm long, 0.8--1 mm wide basally, densely puberulent; corolla purple (fide Martius) but appearing red, tubular, 1.8--3 cm long, 1--3 mm wide at the base, 3--6 mm wide at the throat, puberulent without, glabrous within, the upper and lower lips similar, the lobes ovate, 3 mm long and wide, with ciliolate tips; stamens extended to the edge of the lips, the filament 20 mm long, glabrous, the anthers 3 mm long; staminodes 1.5--5 mm long, capitate with a rudimentary anther, pilose; pistil included, the stigma 2-lobed, the style 25--35 mm long, glabrous; ovary glabrous; capsules not seen.

Known only from the type collection. Not mapped.

Odontonema amplexicaule is related to O. barlerioides but differs in

Fig. 44. Illustration of Odontonema amplexicaule (a-habit;
b-open flower; c-staminode).



having auriculate leaf bases, smaller corollas and styles, and fewer-flowered (2--6) fascicles rather than dense verticels.

This species is rather distinctive, but is still known only from its type collection.

18. Odontonema barleriodes (Nees in Mart.) Kuntze (Fig. 45)

Odontonema barleriodes (Nees in Mart.) Kuntze, Revisio Gen. Pl. 2: 493. 1891, based on Thysacanthus barleriodes Nees in Mart., Fl. Brasil. 9:97. 1847.--LECTOTYPE: BRAZIL. Minas Gerais: in forest near Praesidium San Juan Baptista, Martius s.n. (lectotype, M, not seen).

Thysacanthus barleriodes Nees in Mart. var. floribunda Wawra, Intin. Prin. S. Coburs. 1:86. 1883.--TYPE: BRAZIL. Rio de Janeiro: Itatiaia, 1879, Wawra II 435 (holotype, probably W, not seen).

Odontonema latifolium Rizz., Arch. Jard. Bot. Rio de Janeiro 9: 59. 1949.--TYPE: BRAZIL. Rio de Janeiro: Itatiaia, Porto 2251 (holotype, ICN, not seen).

Plants suffruticose to 1.3 m tall; stems erect, subquadrangular, pilose; leaves oblong-elliptic, the blade 10--25.7 cm long, 4--10 cm wide, pilose on both surfaces especially along the veins of the lower surface and margin, cystoliths prominent on the upper surface, the margin undulate with an acuminate apex and narrow, attenuated base, the petiole 1--2 cm long, pilose; inflorescence a terminal raceme, 10.5--14.5 cm long with the flowers crowded in dense verticels on a puberulous to densely pilose rachis, the pedicel up to 8 mm long, the bracts lanceolate, two on either side of the verticel, 6--10 mm long, 1 mm wide basally, the bracts one at the base of each pedicel, 4 mm long, with two bractlets on the inside of each bract only slightly smaller, all with ciliolate margin; calyx segments narrowly triangular, 3 mm long, 1 mm

Fig. 45. Illustration of Odontonema barleriodes (a-habit; b-open flower; c-staminode).



wide basally, puberulent; corolla red, tubular, 4.8 cm long, 2--3 mm wide at the base, 3--5 mm wide at the throat, glandular-puberulent without, glabrous within, the upper and lower lips similar, the lobes ovate-obtuse, 3--4 mm long, 2--3 mm wide basally; stamens included, the filament 18--25 mm long, glabrous, the anthers 3--4 mm long; staminodes 5--10 mm long, glabrous, the apex slightly enlarged; pistil included, the stigma deeply 2-lobed, glabrous, the style 38--45 mm long, glabrous; ovary glabrous; capsules clavate, 2.3 cm long, 2.5 mm wide, 2.5 mm thick, glabrous, 4-seeded.

Rare in moist forest of coastal southeastern Brazil. Map 2.

REPRESENTATIVE SPECIMENS: BRAZIL. Paraiba: Nova tima, Santa Rita, Baretto 120 (US). Rio de Janeiro: Rio de Janeiro, 1816-1821, St-Hilaire 1041 (P).

The shrubby habit, distinctly petiolate leaves and crowded, verticillate flowers separate Odontonema barlerioides from its closely related species, O. amplexicaule.

19. Odontonema nitidum (Jacq.) Kuntze

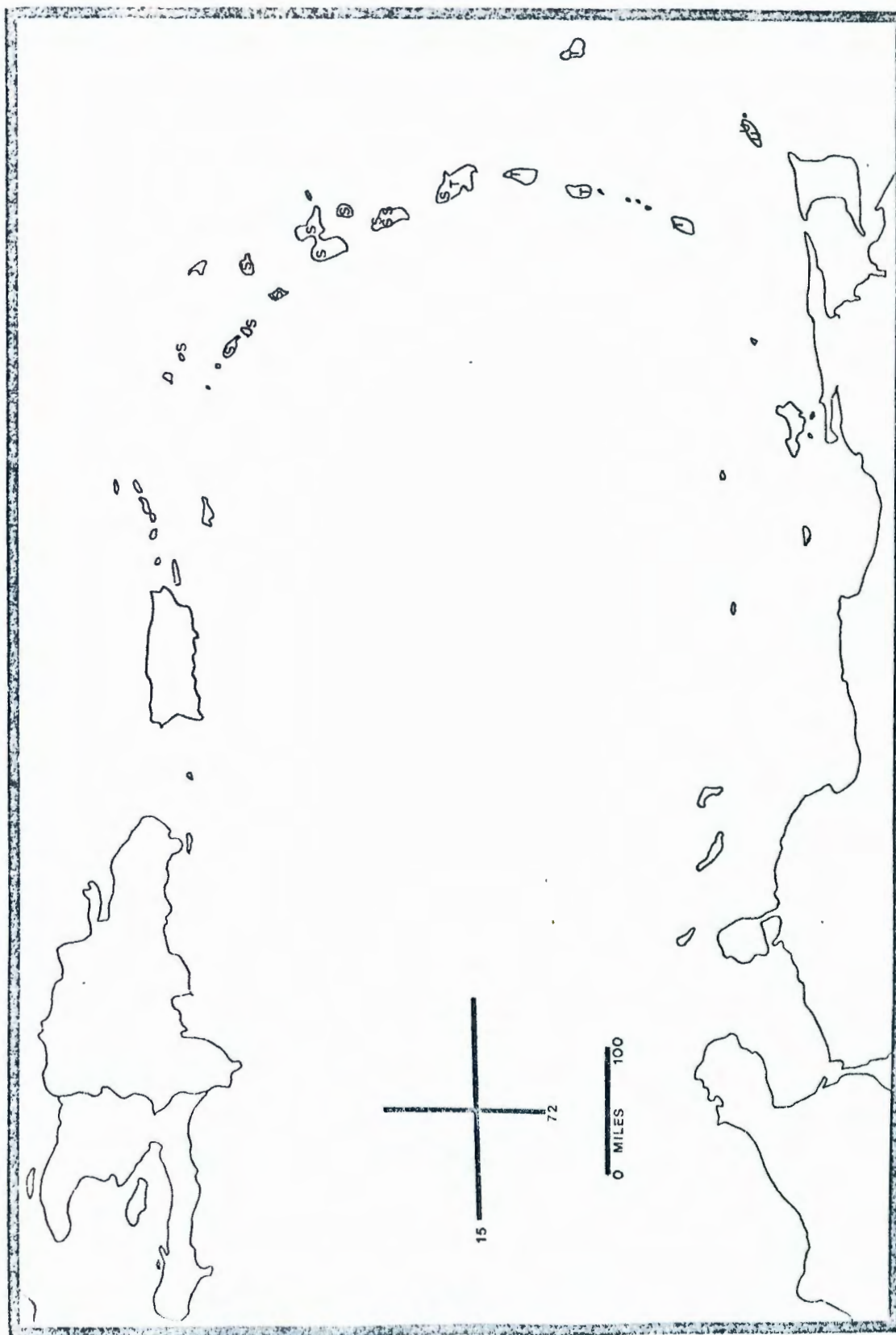
Plants herbaceous to suffrutescent, to 2 m tall; stems terete to subquadrangular, glabrous; leaves elliptic to narrowly oblong, the blade 10--18 cm long, 3--4.8 cm wide, glabrous, cystoliths visible on both surfaces (also on the rachis, calyx and pedicels), more conspicuous on the upper surface, the margin entire or undulate to crenate with a cuspidate apex and a narrow, cuneate base, the petiole 0.5--1.5 cm long, glabrous; inflorescence a terminal racemose panicle 15--37 cm long with 3-many flowers per fascicle along the glabrous rachis, the pedicel 5--6 mm long, glabrous, the bracts narrowly triangular to lanceolate, 4--6 mm long, the bractlets subulate to narrowly triangular, 1.5 mm long, all

margins ciliate; calyx segments narrowly triangular, 2 mm long, 0.5 mm wide basally, the margin ciliate; corolla white or purple, weakly bilabiate, 1.5--1.7 cm long, the tube 6--15 mm long, 1.5--2 mm wide at the base, 2.5--4 mm wide at the throat, glabrous without, pilose within at the base of the tube, the upper lip with the elliptic to oblong lobes 3.5--4 mm long, 1.5--2 mm wide basally, the lower lip similar only 4--6 mm long, 2 mm wide basally; stamens exserted, the filaments 2--3 or 10 mm long due to heterostyly, pilose basally, the anthers 2 mm long; staminodes 0.5--2 mm long, apically tipped with a rudimentary anthers, pilose basally; pistil included, the stigma 2-lobed, glabrous, the style 5--6 or 12--13 mm long due to heterostyly, glabrous; ovary glabrous; capsules clavate, 1.8 cm long, 2--4 mm broad, 3--4 mm thick, glabrous, 4-seeded.

Local and infrequent to common along roadsides or on mountain slopes on many of the West Indian islands. Map 3.

Odontonema nitidum is easily recognized by its white or purple, weakly bilabiate flowers arranged in racemose panicles. The species is closely related to O. brevipes, a small-flowered species endemic to Tobago; these two species are the only white or purple flowered species of Odontonema on the Caribbean Islands. Both of these species have flowers with purplish spots on the lower corolla lobes, and they along with O. albiflorum of Central America, are outwardly similar to the northern South American genus Pulchranthus (Baum et al. 1982). The relatively long, straight corolla tube with straight filaments and glabrous rachis distinguish these species of Odontonema from the strongly bilabiate, short-tube, curved corolla found in Pulchranthus which have arched filaments and glandular-puberulent rachises.

Map 3. Distribution of Odontonema nitidum var. nitidum (S); O. niti-
dum var. album (T); and O. brevipes (U).



Within Odontonema nitidum two variants may be distinguished; a white-flowered phase and a purple-flowered phase, each of which was described by Stehlé (1962) as formae of O. nitidum. As the flower-color differences are reinforced by other morphological features and geographic distribution, the rank has been elevated to the varietas level. Mixed populations do occur on islands in the center of the distribution of the species.

Historically Odontonema nitidum has been involved nomenclaturally in the typification of the generic name. Nees (1847b) noted that garden specimens in Berlin Garden called Justicia lucida were actually specimens of O. nitidum. As already noted, specimens of O. rubrum were also called J. lucida in early garden collections, and such specimens lead Nees (1842) to conclude (incorrectly) that J. lucida was not a member of Justicia but representative of a new genus, Odontonema (see Baum & Reveal 1980, 1982 for more information).

The two varieties may be distinguished as follows:

- A. Flowers purple; plants suffruticose; inflorescence paniculate, often with secondary branches; northern antilles..... var. nitidum
- AA. Flowers white; plants herbaceous or infrequently suffruticose; inflorescence racemose-paniculate, usually without secondary branches; southern antilles..... var. album

19a. Odontonema nitidum (Jacq.) Kuntze var. nitidum (Fig. 46)

Odontonema nitidum (Jacq.) Kuntze, Revisio Gen. Pl. 2:493. 1891, based on Justicia nitida Jacq., Enumeratio Syst. Pl. 11. 1760.--
NEOTYPE: MARTINIQUE, 1867-1870, Hahn 416 (Neotype, BM!; duplicates of the neotype, G!, P!).--Thyrsacanthus nitidus (Jacq.) Nees in DC., Prodr. 11:327. 1847.

Fig. 46. Illustration of Odontonema nitidum var. nitidum (a-
b-open flower with short style; c-staminode of short style flower;
d-open flower with long style; e-staminode of long style flower).



Odontonema nitidum (Jacq.) Kuntze f. purpureum Stehlé, Bull. Soc. Bot. France 109:29. 1962.--TYPE: GUADELOUPE. St. Rose, 6 Dec 1937, Stehlé 2993 (holotype, P, not seen; isotype, NY!).

Plants suffruticose to 2 m tall; leaves elliptic to narrowly oblong, glabrous; inflorescence a terminal panicle 15--37 cm long, the flowers usually on well developed secondary branches, these 0.8--2.5 cm long; corolla purple, the upper lip with lobes 4 mm long, 2 mm wide basally, the lower lip with lobes 5 mm long, 2 mm wide basally.

Local and infrequent to common in the northern antilles of the West Indians from St Croix and St. Thomas to Martinique.

REPRESENTATIVE SPECIMENS: ANTIGUA. Sugar Loaf Mtn., 1 May 1937, Box 739 (BM, NY, US). DOMINICA. Sylvania, Aug 1938, Hodge 850 (GH); near Belle View, Aug 1937, Hodge 851 (BM, GH, NY, UC); near Rosequet Sulfur Springs, 2 Jun 1950, Howard 11747 (B, BM, GH, MICH, NY). GUADELOUPE. Without location, 8 Jun 1939, Stehlé 7 (NY). MONSERRAT. Above Salem, 5--14 Jan 1961, Howard 15102 (A, BR); Richmond, 20 Jan 1907, Shafer 115 (C, F, NY). NEVIS. Nevis Peak, 11 Apr 1956, Smith 10498 (A). ST. KITTS. Along track between Molyneux Estate and Phillips Level, 17 Mar 1959, Proctor 19544 (US). ST. MARTIN. Above Colombier, 10 Jan 1959, Proctor 18723 (A).

The var. nitidum is more shrubby a plant compared to var. album, and the flowers are distinctly purplish in color. Mixed populations of the two varieties occurs on the islands of Guadeloupe, Marie Galante, Dominica, Martinique, and possibly St. Lucia.

Jacquin did not always collect herbarium specimens to voucher his New World collections (fide Stafleu & Cowan 1979) and no material attributable to Jacquin has been discovered. As there is no illustration, a

neotype has been selected.

- 19b. Odontonema nitidum (Jacq.) Kuntze var. album (Stehlé) V. M. Baum
(Fig. 47)

Odontonema nitidum (Jacq.) Kuntze var. album (Stehlé) V. M. Baum,
Brittonia 34:000. 1982, based on O. nitidum f. album Stehlé, Bull.
Soc. Bot. France 109:30. 1962.--TYPE: MARTINIQUE. Vauelin, 1 Sep
1912, Stehlé 5202 (holotype, W, not seen; isotype, P, not seen).

Odontonema christii Lindau, Symb. Antill. 7:384. 1912.--TYPE:
HAITI. Cape Haiten, 12 Sep 1909, Christ 2200 (holotype, B, not
seen and probably destroyed; isotypes GH!, NY!).

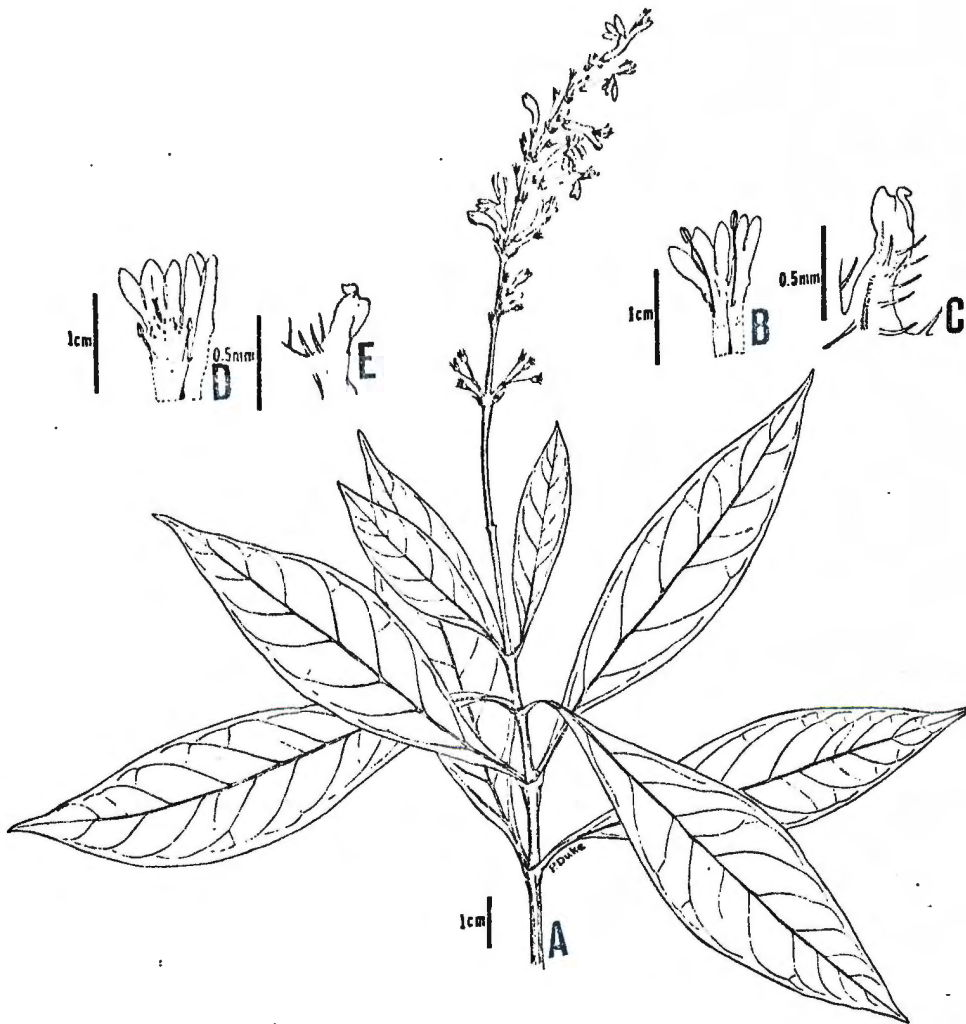
Plants mostly herbaceous, only infrequently suffruticose, to 2 m
tall; leaves elliptic, glabrous; inflorescences in terminal racemes,
rarely in panicles, mostly less than 15 cm long, the flowers on the main
axis, rarely on poorly developed secondary branches; corolla white, the
upper lip with lobes 3.5 mm long, 1.5 mm wide basally, the lower lip
4--6 mm long, 2 mm wide basally.

Local and infrequent to common in the southern antilles of the West
Indians islands from Martinique to St. Vincent and Barbados.

REPRESENTATIVE COLLECTIONS: BARBADOS. Sion Hill Gulley, 19 Feb
1924, Miller 66 (US). GRENADA. St. Mark, 0.7 mi SE of Victoria, 30
Oct--11 Dec 1957, Proctor 17145 (A). MARTINIQUE. Riviere Madana, 28
Feb 1945, Stehlé 5741 (A, US). ST. LUCIA. Barre d'Isle, Castries-
Dennerly Road, 14 Apr 1959, Cowan 1576 (GH, NY, UC, US). ST. VINCENT.
Monsron Hills, 26 Dec 1889, Eggers 6559 (A, US).

The var. album is a white-flowered herbaceous phase of the species
found in the southern part of the species' range. The type of Odontonema
christii does not seem to differ in any way from collections of var.

Fig. 47. Illustration of Odontonema nitidum var. album (a-h
b-open flower with short style; c-staminode of short style flower
open flower with long style; e-staminode of long style flower).



album found in the southern antilles. As the plant has never been re-collected in Haiti, it is thought that the Christy collection represents an introduction.

20. Odontonema brevipes Urban (Fig. 48)

Odontonema brevipes Urban, Symb. Antell. 7:385. 1912.--TYPE:

TOBAGO. "In sylvia montis dor haud in frequens," Nov 1889; Eggers 5838 (holotype, K!; isotypes, C!, M!).

Plants suffruticose to 1 m tall; stems angled on the older portions, subquadrangular on the younger portions, pilose with short spreading hairs; leaves elliptic to oblong or oval, 7--17 cm long, 3.5--7 cm wide, glabrous except for a few scattered hairs on both surfaces, the margin entire with an acuminate to cuspidate apex and a narrow cuneate base, the petiole 0.3--0.6 cm long, puberulent; inflorescence a terminal panicle to 13 cm long with several flowers in cymes along the minutely puberulent rachis, the pedicel 1--3 mm long, the bracts lanceolate, 3--5 mm long, 1 mm wide basally, the bractlets narrowly triangular, 1.5 mm long, all with ciliolate margins; calyx segments narrowly triangular, 2.2--3 mm long, 0.3--1 mm wide basally, glabrous; corolla white to pale violet, weakly bilabiate, 0.7--0.8 cm long, 1.5 mm wide at the base, 2 mm wide at the throat, glabrous without, pilose within at the base of the tube near the filaments, the upper lip with the elliptic lobes 3 mm long, 1 mm wide basally, the lower lip with the two outer orbicular lobes 2--2.5 mm long, 1.5 mm wide basally, the median lobe slightly smaller and not as pronounced; stamens included, extending to the base of the upper lip, the filaments 0.8--1 or 4 mm long due to heterostyly, pilose, the anthers 0.8--1 mm long with the thecae unequally inserted on the filament; staminodes 0.3--0.5 mm long, capitate, pilose; pistil

Fig. 48. Illustration of Odontonema brevipes (a-habit; b-open flower; c-enlarged open flower; d-stamens and staminodes).



included, the stigma 2-lobed, glabrous, the style 6 or 12 mm long due to heterostyly, glabrous; ovary glabrous; capsules clavate, 2 cm long, 2 mm wide, 4 mm thick, 4-seeded.

Local and infrequent in the rainforest of Tobago.

REPRESENTATIVE SPECIMENS: TOBAGO: near Easterfield, 11 Mar 1910, Broadway 3516 (BM, F, NY); Mt. Saint George, 31 Mar 1940, Cheeseman 13534 (US); Roxborough-Parlatourier Road, 4 Apr 1959, Cowan 1425 (NY, US); Northside Road between Man of War Bay and Bloody Bay, 23 Aug 1959, Webster & Walker 9852 (A, US).

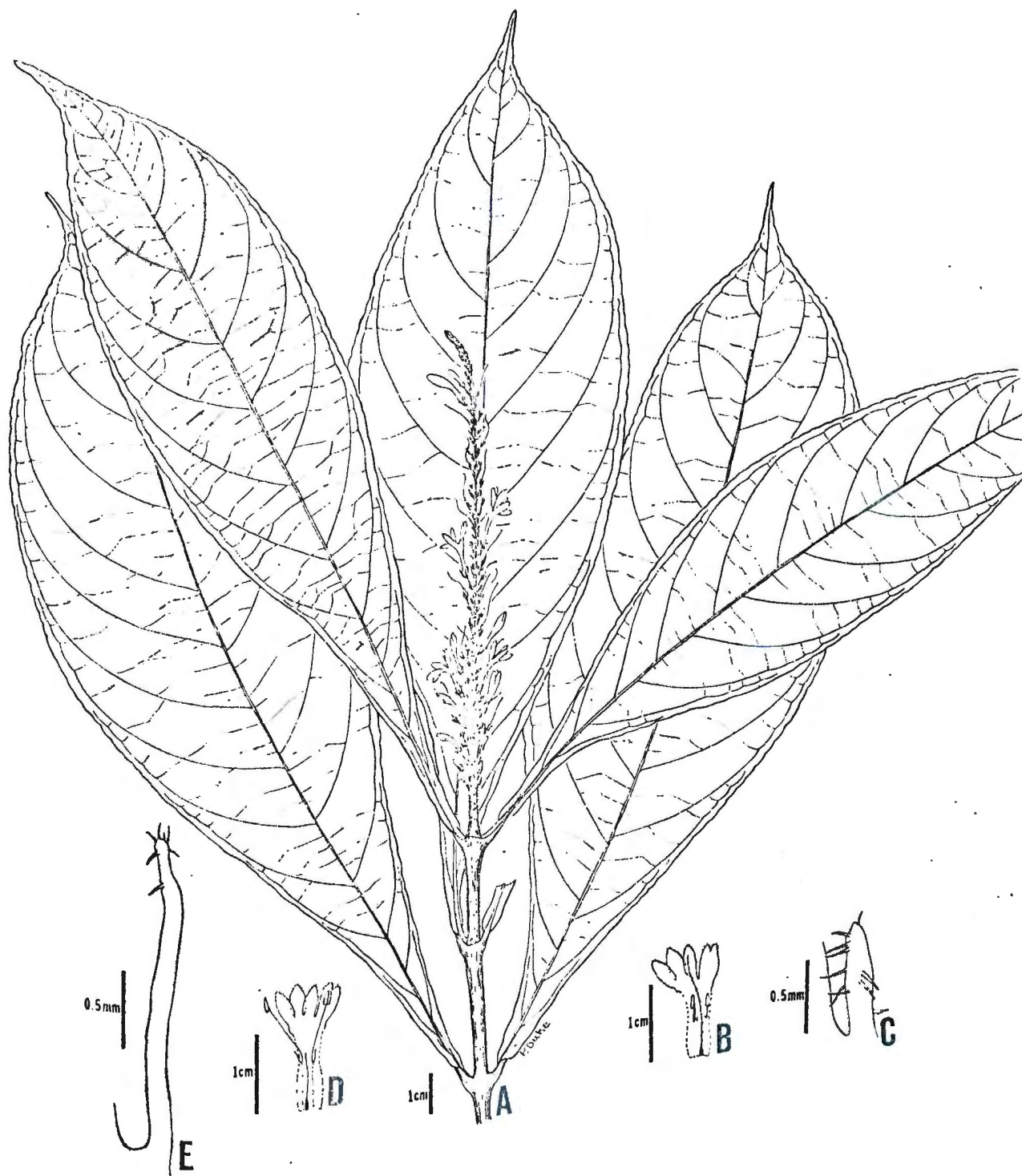
This species has the smallest flowers of the genus, and is also the only species of the genus endemic to a single island in the Caribbean Sea. It is closely related to O. nitidum, but the two do not overlap geographically, and they may be readily separated on the basis of flower size. The unequally inserted anther thecae of O. brevipes is unique in Odontonema; its significance is not known.

21. Odontonema albiflorum Leonard (Fig. 49)

Odontonema albiflorum Leonard, Publ. Carnegie Inst. Wash. 461:219. 1936--TYPE: GUATAMALA. Alta Verapaz: Cubilquitz, Feb 1901, Von Tuerkheim 7937 (holotype, US!).

Plants suffruticose to fruticose, 0.7--4 m tall; stems subquadrangular, puberulent; leaves oblong-elliptic, the blade 11--30 cm long, 4--8 cm wide, glabrous on both surfaces except for a few minute hairs on the costa below, cystoliths visible on both surfaces, the margin crenate with a cuspidate-caudate apex and rounded to narrowly auriculate base, the petiole 0.5-1.2 cm long, puberulent; inflorescence a narrow spikelike terminal thyrse, 4--15 (23) cm long, simple or rarely branched at the base with crowded fascicles of 6 or more flowers along the \pm tomentose

Fig. 49. Illustration of Odontonema albiflorum (a-habit; b-open flower with long style; c-staminode of long style flower; d-open flower with short style; e-staminode of short style flower).

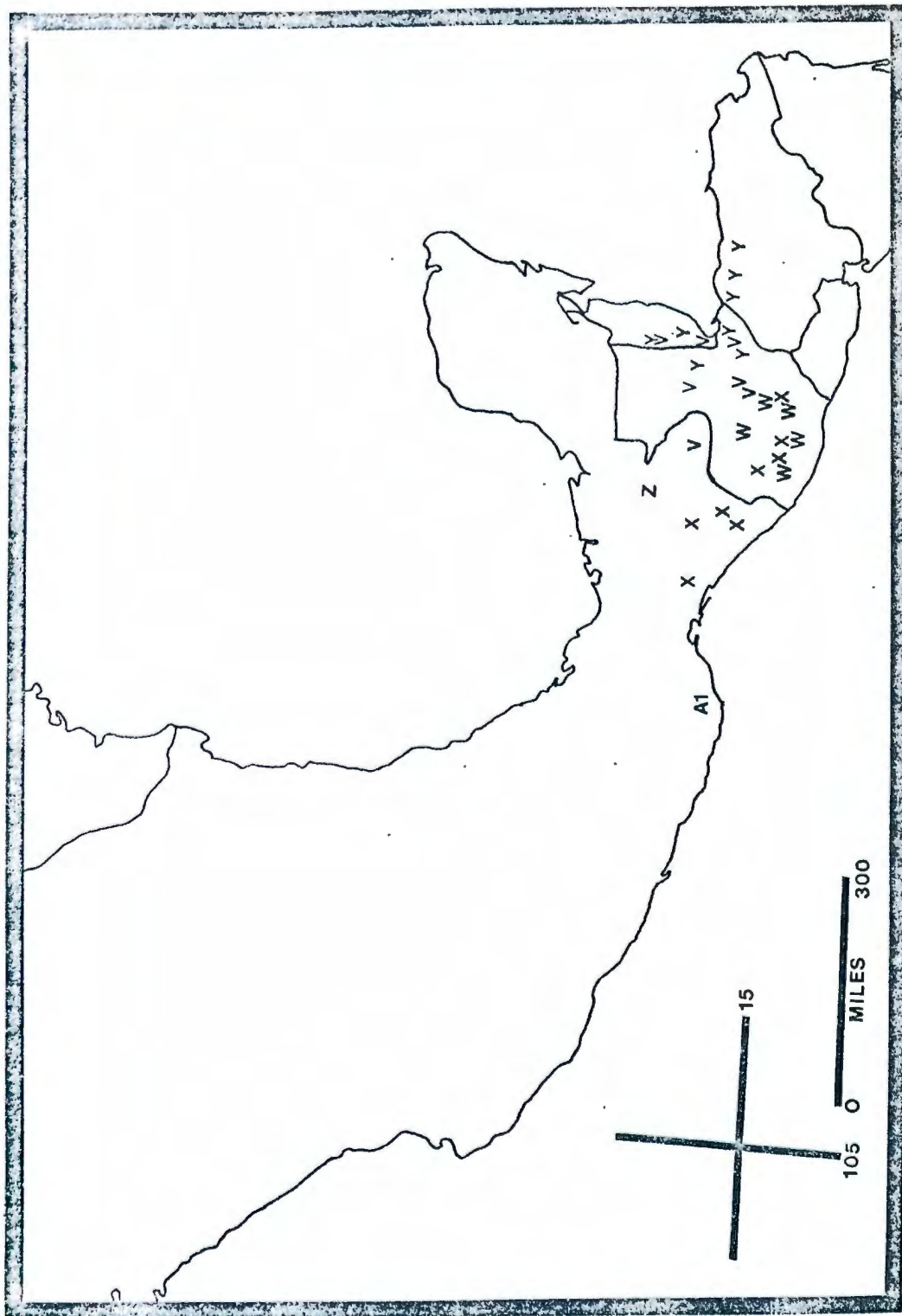


rachis, the pedicel 2--3 mm long, pilosulous, the bracts narrowly triangular, 2.5--5 mm long, 1 mm wide basally, acuminate and awn-tipped, the bractlets 2 per flower and somewhat smaller, all ciliolate; calyx segments subulate, 2 mm long, 1 mm wide basally, ciliolate; corolla white with dark purple dots on the lower lip, weakly bilabiate, glabrous throughout, up to 1.8 cm long, 1--1.5 mm wide at the base, 1--2 mm wide at the throat, the upper and lower lips with oblong lobes 5--6 mm long, 1--1.5 mm wide basally, the lobes tipped with ciliolate hairs; stamens included or exserted, the filaments glabrous, 1.8--11 mm long due to heterostyly, the anthers 2 mm long, purplish-tinged; staminodes 0.7--2 mm long, sparsely pubescent, united with the filament basally; pistil included, the stigma 2-lobed, the style 5--12 mm long due to heterostyly, pilosulous; ovary glabrous; capsules 1--2.5 cm long, 4 mm wide, 3--4 mm thick, glabrous, 2--4-seeded, the seeds lenticular.

Mostly in forests near streams or moist places from Chiapas, Mexico, southward through Belize into the mountains of Guatemala. Map 4.

REPRESENTATIVE SPECIMENS: BELIZE: San Antonio, 6 May 1931, Bartlett 13065 (CAS, MICH); near Vaco, El Cayo, Gentle 2440 (A, F, K, LL, MICH); Mullins River Road, 9 Jan 1932, Schipp S278 (A, F, G, GH, K, MICH, NY, UC). GUATEMALA: Alta Verapaz: 0.5--2 mi S of Cubilguitz, 1 Mar 1942, Steyermark 44374 (F, US). Baja Verapaz: Sierra de las Minas, 3 km SE of Purulha, 6 Jan 1974, Williams et al. 43391 (F, MICH). Izabal: trail between Río Frio and Cayo Piedra, 20 Dec 1941, Steyermark 41648 (F, LL). Peten: San Pedro, 3 Dec 1970, Tun Ortiz 1436 (F, NY, US). Province unknown, near St. Thomas, 29 May 1909, Deam 6057 (F, GH, MICH, MO, NY). MEXICO: Chiapas: near junction of Río Perias and Río Jatate at San Quintín, near Laguna Mframmar, 22 Mar 1955, Sohns 1703 (DS, MICH,

Map 4. Distribution of Odontonema albiflorum (V); O. steyermarkii (W); O. glabrum (X); O. hondurensense (Y); O. breedlovei (Z); and O. mortonii (A1).



UC, US).

Odontonema albiflorum is distinguished by its small, white flowers which are arranged in crowded, multi-flowered fascicles on one or two narrow, spikelike terminal thyrses. It is related to O. nitidum and O. brevipes, but those species are found on the islands of the Caribbean Sea.

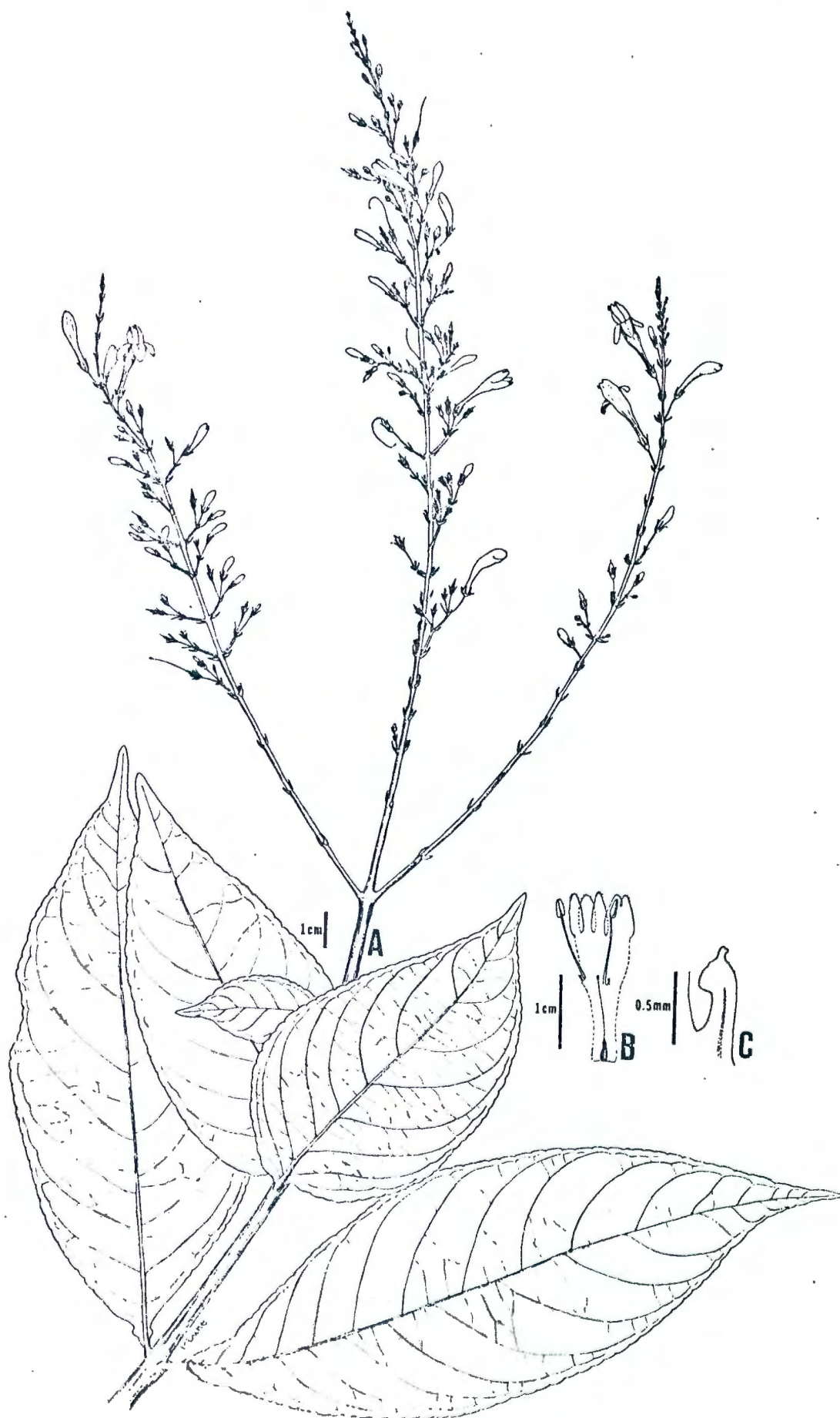
22. Odontonema steyermarkii Leonard (Fig. 50)

Odontonema steyermarkii Leonard, J. Wash. Acad. Sci. 33:71. 1943.

--TYPE: GUATEMALA. Quezaltenango: along road between Finca Pirineos and Calahuache, 27 Jan 1940, Steyermark 35020 (holotype, F!; isotype, US!).

Plants suffruticose to 2 m tall; stems subquadrangular, glabrous; leaves elliptic-ovate, the blade 13--15 cm long, 4.5 cm wide, glabrous except for a few hairs on the costa on the lower surface, cystoliths visible on the upper surface, the margin entire to slightly undulate with a cuspidate apex and acuminate base, the petiole 1--1.5 cm long, puberulent; inflorescence a terminal, multi-branched, compound panicle to 70 cm long with secondary branches to 2.5 cm long, the flowers grouped in cymes, the rachis glabrous, the pedicel to 9 mm long, glabrous, the bracts narrowly triangular, 5--7 mm long, 1--1.5 mm wide basally, the bractlets narrowly triangular, to 2.5 mm long, all margins ciliate; calyx segments narrowly triangular, to 5 mm long, 1 mm wide basally, puberulent; corolla lilac or pink, + weakly bilabiate, to 3 cm long, 2--4 mm wide at the base, 4--6 mm wide at the throat, glabrous, the upper lip with the ovate lobes fused nearly to their apices, 1.2--1.5 mm long, the lower lip strongly bent downwardly with the ovate lobes 5 mm long, 2--4 mm wide basally, all lobes ciliate at their apices with glandular hairs;

Fig. 50. Illustration of Odontonema steyermarkii (a-habit; b-open flower; c-staminode).



stamens exserted, the filaments glabrous, 9--10 mm long, the anthers 2 mm long; staminodes 1 mm long, glabrous; pistil included, the style 8--10 mm long, glabrous; ovary glabrous; capsules not seen.

Local and infrequent along streams in the forests of Guatemala.

Map 4.

REPRESENTATIVE SPECIMENS: GUATEMALA: Chimaltenango: Finca El Pacayan, 28--29 Jan 1944, White 5204 (MICH). Escuintla: Río Gauilán, NE of Escuintla, 16 Mar 1941, Standley 89559 (F). Huehuetenango: between Ixcan and Finca San Rafael, Sierra de los Cuchumatanes, 24 Jul 1942, Steyermark 49383 (F). Retalhuleu: San Felipe, Apr 1892, Smith 2697 (G, GH, K, US). Suchitepeques: near Pueblo Neuvo, 1 Mar 1939, Standley 66957 (F).

Odontonema steyermarkii is intermediate in its features between O. callistachyum and the typical yellow-flowered species of the genus such as O. hondurensis. Nonetheless, O. steyermarkii is markedly different from both, differing from O. callistachyum in its inflorescence type, yet retaining a hint of the reddish flower color common in that and other related species. As for its relationship with O. hondurensis, it is similar to that species in its highly branched inflorescence.

23. Odontonema glabrum T. S. Brandege (Fig. 51)

Odontonema glabrum T. S. Brandege, Univ. Calif. Publ. Bot. 6: 195. 1915.--TYPE: MEXICO. Chiapas: Finca Irlanda, May-Jun 1914, Purpus 7286 (holotype, UC!; isotype, DS!).

Odontonema galbanum Leonard, J. Wash. Acad. Sci. 33:72. 1943.--TYPE: GUATEMALA. Escuintla: moist forest near Baranca Honda, above Lake Lajas, 1 Jan 1931, Standley 63875 (holotype, US!; isotype, F!).

Fig. 51. Illustration of Odontonema glabrum (a-habit; b-open flower with short style; c-staminode of short style flower; d-open flower with long style; e-staminode of long style flower).



Plants fruticose to 2 m tall; stems subquadrangular, glabrous except for a few hairs at the nodes; leaves lanceolate to elliptic or oblong, the blade 6.5--22 cm long, 2.7--9 cm wide, glabrous, cystoliths mostly on the upper surface, inconspicuous on the lower surface, the margin crenate-undulate with a cuspidate apex and cuneate, acute to rounded base, the petiole 0.4--1.2 cm long, glabrous; inflorescence a narrow terminal panicle to 30 cm long, the flowers fasciculate or in few-flowered cymes on short, 3--10 mm long secondary branches, the rachis glabrous, the pedicel 3--6 mm long, glabrous, the bracts narrowly triangular or subulate, 3--5 mm long, 0.5--1 mm wide basally, keeled, ciliate, the bractlets 2 per flower, similar to the bracts only smaller; calyx segments subulate, 3 mm long, 0.5 mm wide basally, glabrous; corolla yellow, tubular, to 2.8 cm long, 2 mm wide at the base, 5 mm wide at the throat, glabrous, the upper lip with the rounded shallow lobes 2 mm long and wide, the lower lip with the oval lobes 4 mm long, 2 mm wide basally; stamens included or exserted due to heterostyly, the filament glabrous, 14 mm long, the anthers 4 mm long; staminodes 1--10 mm long, with 1--2 hairs at the apex; pistil included, the stigma 2-lobed, glabrous, the style 16--25 mm long due to heterostyly, glabrous; ovary glabrous; capsules clavate, 2 cm long, 4 mm broad, 2 mm thick, glabrous, 2-seeded, the seeds lenticular.

Local and infrequent in moist forests from Chiapas, Mexico, southward to Guatemala. Map 4.

REPRESENTATIVE SPECIMENS: GUATEMALA. Escuintla: Escuintla, Apr 1880, Smith 1993 (G, GH, K, M, NY). Sactepequez: near Barranco Hondo, SE of Alotenango, 9 Feb 1939, Standley 65014 (F). MEXICO. Chiapas: 13 km N of Arriaga, 23 Dec 1972, Breedlove & Thorne 30621 (DS, F, MICH,

NY); Río Cuztepeques near Finca Cuztepeques, 26 Mar 1968, Ton 3842 (DS, LL, MICH).

Odontonema glabrum belongs to a complex characterized by yellow flowers with the species essentially differentiated by inflorescence types. The inflorescence of O. glabrum is a terminal racemose-panicle with flowers on well-defined secondary branches. In O. mertonii, the raceme is strict or with a single, branched panicle; at no time are secondary branches present. In O. hondurensis the inflorescence is a loose, terminal panicle, while that of O. breedlovei is a terminal thyrses. All of these species are restricted to southern Mexico and northern Central America.

The supposed differences between Odontonema glabrum and O. galbanum cannot be supported. The smaller flowers of the latter species seem to be due to the immaturity of the specimens.

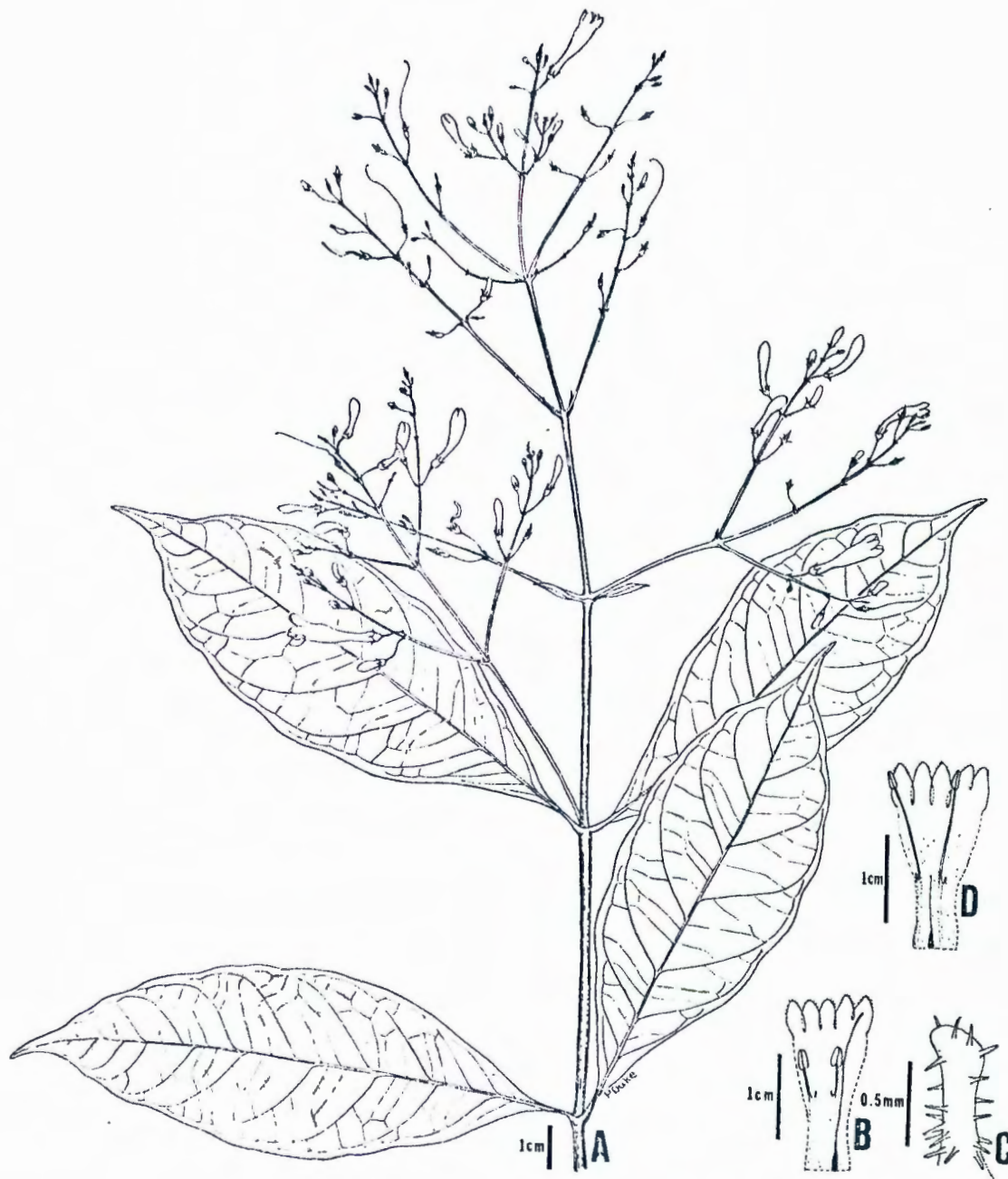
24. Odontonema hondurensis (Lindau) D. Gibson (Fig. 52)

Odontonema hondurensis (Lindau) D. Gibson, Fieldiana, Bot. 34:74. 1973, based on Diateinacanthus hondurensis Lindau, Bull. Herb. Boissier II, 5:369. 1905.--TYPE: BELIZE. Peninsula Honduras near Point Sierra, near the Boletis Plantation, Nov 1903, Wilson 129 (holotype, NY!).

Odontonema paniculiferum Blake, Contr. Gray Herb. 52:104. 1917.--TYPE: BELIZE. Near Manatee Lagoon, 8 Jan 1906, M. E. Peck 278 (holotype, GH!; isotypes, F!, K!).

Plants fruticose to 3 m tall; stems subterete, thickened and two-edged, brown, glabrous; leaves elliptic to oblong-elliptic, the blade 7--20 cm long, 2.5--8.5 cm wide, glabrous on both surfaces except for the sparsely strigose costa, cytoliths more conspicuous on the upper

Fig. 52. Illustration of Odontonema hondurens (a-habit; b-open flower with long style; c-staminode; d-open flower with short style).



surface, the margin entire to sinuate-crenate with an acuminate cuspidate apex and acute or cuneate base, the petiole 5--14 mm long, glabrous; inflorescence a lax, open panicle 5.5--22 cm long with 2 flowers per node on the minutely puberulent rachis, the pedicel 3--5 mm long, sparsely puberulent, the bracts subulate, 1--1.5 mm long, 0.5 mm basally, the bractlets 2 per flower, 0.5--2 mm long, 0.5 mm basally, all pubescent with ciliolate margins; calyx segments narrowly triangular-subulate, 1--3.5 mm long, 0.5--1 mm wide basally, minutely puberulent; corolla yellow, tubular, puberulent within and without at the base of the tube, 2--3 cm long, 1--3 mm wide at the base, 3--6 mm wide at the throat, the upper lip with the ovate lobes 4--6 mm long, 1.5--3 mm wide basally, ciliate along the margin, the lower lip similar only slightly smaller; stamens extended to the base or below the lobes of the corolla, the filament 6--13 mm long due to heterostyly, sparsely pubescent basally, the anthers 1.5--2.2 mm long; staminodes 0.7--1 mm long, pubescent; pistil included, the stigma 2-lobed, glabrous, the style 5--15 mm long due to heterostyly, puberulent; ovary minutely puberulent apically; capsules clavate, 1.5--2 cm long, 1.5--4 mm wide, 2--3 mm thick, 2--4-seeded, the seeds lenticular.

Infrequent to occasional near streams and rivers on mountain slopes and on the coastal plains of Belize, Guatemala and Honduras. Map 4.

REPRESENTATIVE SPECIMENS: BELIZE. El Cayo District: Vaca, 11 Mar 1938, Gentle 2336 (LL, MICH, NY); Stann Creek District: Big Creek, 19 Dec 1937, Gentle 2136 (A, DS, F, K, LL, MICH, NY, US); Stann Creek Railway, 16 Jun 1929, Schipp 222 (A, BM, F, G, GH, MICH, NY, UC). Toledo District: Bolo Camp near upper reaches of Golden Stream, 6 Apr 1944, Gentle 4506 (LL, MICH). GUATEMALA. Izabal: El Benque, La Evidosa, en la Carretero hacia Peten, 15 Mar 1977, Tun Ortiz 2434 (F, NY, US).

HONDURAS. Atlantida: Lancetilla Valley near Tela, 6 Dec 1927-20 Mar 1928, Standley 52615 (A, F); near La Ceiba, Jun-Aug 1938, Yuncker et al. 8590 (F).

Gibson (1973) correctly reduced Diateinacanthus to Odontonema, the open, lax paniculate inflorescence not generically distinctive now that the yellow-flowered species of Odontonema are better known. Blake (1917) proposed O. paniculiferum apparently unaware that Lindau (1905) had already described the species. (See discussion under O. glabrum for review of species differences among the yellow-flowered species).

25. Odontonema breedlovei V. M. Baum (Fig. 53)

Odontonema breedlovei V. M. Baum, Brittonia 34:000. 1982.--TYPE: MEXICO. Chiapas: along small streams near Bacanjá, Municipio de Ocosingo, 2 Apr 1973, Breedlove 34473 (holotype, CAS!).

Plants fruticose; stems subquadrangular, pilose; leaves elliptic, the blade 10--23 cm long, 6--8 cm wide, glabrous except for the pilose costa on the lower surface, cystoliths present on the upper surface, the margin obscurely crenate with a cuspidate apex and a narrow base, the petiole 1--3 cm long, pilose; inflorescence a terminal thyrses to 22 cm long with the flowers in fascicles of up to 6 on a densely pilose rachis, the pedicel 5 mm long, pilose, the bracts lanceolate, 2.5--4 mm long, 1 mm wide basally, the bractlets subulate, 1.5 mm long; calyx segments narrowly triangular, 3.5 mm long, 0.5 mm wide basally, pilose; corolla yellow, tubular, up to 2.3 cm long, the tube 3 mm wide at the base, 4 mm wide at the throat, glabrous without, sparsely glandular-hairy within, the upper lip with the elliptic-ovate lobes 3 mm long, 2 mm wide basally, the lower lip with the elliptic-oblong lobes 5--6 mm long, 2 mm wide basally, the margins ciliolate; stamens extended to the middle of the

Fig. 53. Illustration of Odontonema breedlovei (a-habit; b-open flower; c-staminode).



upper lip, the filament 10 mm long, glabrous, the anthers 2 mm long; staminodes 2.5 mm long, glabrous; pistil included, the stigma 2-lobed, glabrous, the style 10 mm long, with a few hairs basally; ovary glabrous; capsules clavate, 1 cm long, 2 mm wide, 4--5 mm thick, (3) 4-seeded.

Known only from the type area. Map 4.

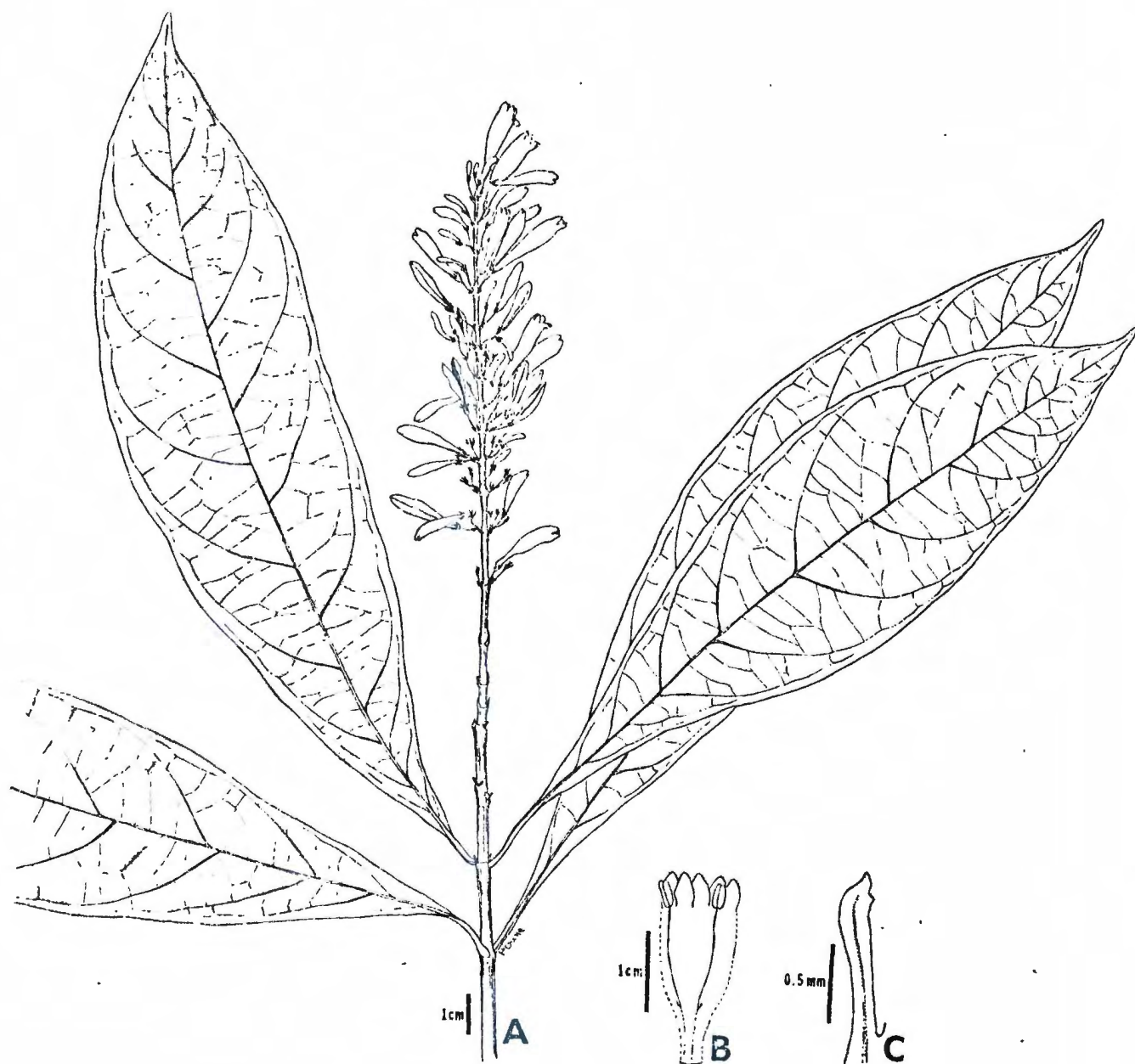
The multifasciculate flowers arranged on a dense, pilose terminal thyrse quickly distinguishes this species from the other yellow-flowered species of Odontonema.

26 Odontonema mortonii V. M. Baum (Fig. 54)

Odontonema mortonii V. M. Baum, Brittonia 34:000. 1982.--TYPE: MEXICO. Oaxaca: Near Cafetal Concordia, 1--15 Apr 1933, Morton & Makrinius 2356 (holotype, US!; isotypes, A!, F!, K!, NY!, US!).

Plants fruticose to 2 m tall; stems subquadrangular, glabrous; leaves oblong, the blade 15--23 cm long, 4.5--7 cm wide, glabrous, cystoliths present and numerous on both surfaces, the margin obscurely crenate with an acuminate apex and attenuate base, the petiole 0.7--1.5 cm long, glabrous; inflorescence a terminal raceme or rarely a single branched panicle, 17--26 cm long with up to four flowers in fascicles along the glabrous rachis, the pedicel 3--4 mm long, glabrous, the bracts and bractlets similar, subulate, 1.5--2 mm long, 0.5--1 mm wide basally, with a few hairs along the margin; calyx segments narrowly triangular, 2 mm long, 0.5 mm wide basally, glabrous except for a few hairs along the margin; corolla yellow, tubular, 1.8--2.5 cm long, the tube 2.5 mm wide at the base, 5 mm wide at the throat, glabrous, the upper lip with the ovate lobes 1.5--2 mm long, 1.5 mm wide basally, the lower lip with the ovate or rarely elliptic lobes, 4--5 mm long 2 mm

Fig. 54. Illustration of Odontonema mertonii (a-habit; b-open flower; c-staminode).



wide basally; stamens extended to the edge of the corolla lobes, the filament 11 mm long, glabrous, the anthers 2.5--3 mm long; staminodes 1--2 mm long, apically capitate, glabrous; pistil included, the stigma 2-lobed, glabrous, the style 12--25 mm long, glabrous; ovary glabrous; capsules clavate, 1.8--2 cm long, 3 mm wide, 2 mm thick, 2--4-seeded.

Moist forests near streams, Oaxaca, Mexico. Map 4.

Specimens examined: MEXICO. Oaxaca: on river bank below Candelaria Loxicha, 1 Feb 1945, Alexander 444 (MICH).

The strict terminal raceme differentiates this species from Odontonema glabrum and related members of the genus with yellow flowers. It is the only yellow-flowered species of the genus in Oaxaca.

EXCLUDED SPECIES

Justicia calycotricha Link & Otto, Icon. Pl. Select. 9:113. 1826.

Thyrsacanthus calycotricus (Link & Otto) T. Anderson, J. Agric.

Hort. Soc. 1:284. 1868. = Schaueria calycotricha (Link & Otto)

Nees in DC., Prodr. 11:316. 1847.

Justicia coccinea Aublet, Hist. Pl. Guiane 1:10. 1775. Thyrsacanthus

coccineus (Aublet) T. Anderson, J. Agric. Hort. Soc. 1:284. 1868.

= Jacobinia coccinea (Aublet) Hiern, Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1876:84. 1877.

Justicia interrupta H.B.K., Nova Gen. Sp. Pl. 2:188. 1817. Thyrsacanthus

interruptus (H.B.K.) Nees in DC., Prodr. 11:326. 1847. Odontonema

interruptum (H.B.K.) Kuntze, Revisio Gen. Pl. 2:493. 1891. = Pseud-

eranthemum interruptum (H.B.K.) V. M. Baum, Brittonia 34:000. 1982.

Justicia longistamina Ruiz & Pavon, Fl. Peruv. Chilen. 1:8. 1798. Thyr-

sacanthus longistaminus (Ruiz & Pavon) Nees in DC., Prodr. 11:326.

1847. = Stenostephanus longistaminus (Ruiz & Pavon) V. M. Baum,

Brittonia 34:000. 1982.

Justicia lucida Andrews, Bot. Repos. 5:313. 1803. Odontonema lucidum (Andrews) Nees, Linnaea 16:300. 1842. Not J. lucida (Nees) Lindau. = Justicia secunda Vahl, Symbol. Bot. 2. 1790.

Justicia variegata Aublet, Hist. Pl. Guiane 1:12. 1775. Thyrsacanthus variegatus (Aublet) Nees in DC., Prodr. 11:325. 1847. Odontonema variegatum (Aublet) Kuntze, Revisio Gen. Pl. 2:493. 1891. = Pulchranthus variegatus (Aublet) Baum, Reveal & Nowicke, Syst. Bot. 7:000. 1982.

Odontonema adenostachyum Lindau, Bull. Herb. Boissier II, 4:404. 1904. = Pulchranthus variegatus (Aublet) Baum, Reveal & Nowicke, Syst. Bot. 7:000. 1982.

Odontonema congestum Lindau, Notizbl. Königl. Bot. Gart. Berlin 6:197. 1914. = Pulchranthus congestus (Lindau) Baum, Reveal & Nowicke, Syst. Bot. 7:000. 1982.

Odontonema dubiosum Lindau, Bull. Herb. Boissier II, 7:928. 1907. = Streblacanthus dubiosum (Lindau) V. M. Baum, Brittonia 34:000. 1982.

Odontonema scandens Lindau, Notizbl. Königl. Bot. Gart. Berlin 6:198. 1914. = Anisacanthus malmei Lindau, Bull. Herb. Boissier II, 5:662. 1897.

Odontonema stenostachyum Leonard, Contr. U.S. Natl. Herb. 31:391. 1958. = Pseuderanthemum stenostachyum (Leonard) V. M. Baum, Brittonia 34:000. 1982.

Odontonema surinamense Bremek., Meded. Bot. Mus. Herb. Rijks. Univ. Utrecht 45:164. 1938. = Pulchranthus surinamensis (Bremek.) Baum, Reveal & Nowicke, Syst. Bot. 7:000. 1982.

Schaueria paniculata Nees. in Mart., Fl. Brasil. 9:106. 1847. = Odonto-

- nema paniculatum (Nees in Mart.) Lindau in Engler & Prantl, Nat. Pflanzenfam. IV(3b):335. 1895. = Pseuderanthemum paniculatum (Nees in Mart.) V. M. Baum, Brittonia 34:000. 1982.
- Thyrsacanthus cuspidatus Nees in DC. var. micranthus (as micrantha) Nees in DC., Prodr. 11:324. 1847.--TYPE: PERU. Junin: Pangoa, Mathews 1196 (holotype, K!) = Pseuderanthemum weberbaueri Mildbr., Notizbl. Bot. Gart. Berlin-Dahlem 11:68. 1930.
- Thyrsacanthus dissitiflorus Nees in Mart., Fl. Brasil. 9:98. 1847. Odontonema dissitiflorum (Nees in Mart.) Kuntze, Revisio Gen. Pl. 2: 493. 1891. = Not an Odontonema, but placement is uncertain.
- Thyrsacanthus foliaceo-bracteatus Oersted, Vindensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1854:146. 1855. Odontonema foliaceo-bracteatum (Oersted) Kuntze, Revisio Gen. Pl. 2:493. 1891 (as foliobracteatum). = Buceragenia foliaceo-bracteata (Oersted) V. M. Baum, Brittonia 34:000. 1982.
- Thyrsacanthus hookerianus Nees in DC., Prodr. 11:324. 1847. Odontonema hookerianum (Nees in DC.) Kuntze, Revisio Gen. Pl. 2:493. 1891. = Pseuderanthemum hookerianum (Nees in DC.) V. M. Baum, Brittonia 34:000. 1982.
- Thyrsacanthus indicus Nees in DC., Prodr. 11:325. 1847. = Eranthemum indicum (Nees in DC.) C. B. Clarke in Hook.f., Fl. Brit. India 4 (12): 497. 1884.
- Thyrsacanthus lindenianus Nees in DC., Prodr. 11:326. 1847. Odontonema lindenianum (Nees in DC.) Badillo in Pittier et al., Cat. Fl. Venezolana 2:417. 1947. = Pseuderanthemum cuspidatum (Benth.) V. M. Baum, Brittonia 34:000. 1982.
- Thyrsacanthus ramossimus Moric., Pl. Nouv. Amér. 9:165. 1847. = Anisacanthus ramossimus (Moric.) V. M. Baum, Brittonia 34:000. 1982.

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INDEX

*Anisacanthus**glaberrimus*, 55*malmei*, 145*ramossum*, 146*Buceraenia**foliaceo-bracteolata*, 146*Diateinacanthus**hondurensis*, 134*Eranthemum**coccineum*, 42*indicum*, 146*Jacobina**coccinea*, 144*Justicia**bracteolata*, 73*calycotrichya*, 144*coccinea*, 144*interrupta*, 144*longistamina*, 144*lucida*, 145*nitida*, 111*rubra*, 68*secunda*, 145*tubiformis*, 49*variegata*, 145*Odontonema**adenostachyum*, 145*albiflorum*, 121*amicorum*, 46*album*, 78*ampelocaulis*, 84*amplexicaule*, 101*barlerioides*, 104*bracteolatum*, 73*parviflorum*, 68*breedlovei*, 138*brevipes*, 118*callistachyum*, 35*christii*, 115*coccineum*, 59*congestum*, 145*cuspidatum*, 42*dissitiflorum*, 146*dubiosum*, 145*flagellum*, 52*foliaceo-bracteatum*, 146*fuchsioides*, 87*galbanum*, 130*geminatum*, 35*glaberrimum*, 55*glabrum*, 130*hondurensis*, 134

- hookerianum, 146
interruptum, 144
latifolium, 104
laxum, 81
lindenianum, 146
longifolium, 49
lucidum, 145
macrophyllum, 93
microphyllum, 65
mortonii, 141
nitidum, 107
 album, 115
 nitidum, 111
 purpureum, 114
paniculatum, 146
paniculiferum, 134
pantasmense, 52
rubrum, 68
rutilans, 97
scandens, 145
schomburgkianum, 93
sessile, 59
speciosum, 90
sterostachyum, 145
steyermarkii, 127
strictum, 49
surinamense, 145
 tubiforme, 49
 variegatum, 145
 venezuelense, 76
Pseuderanthemum
 cuspidatum, 146
 hookerianum, 146
 interruptum, 144
 paniculatum, 146
 stenostachyum, 145
 weberbaueri, 146
Pulchranthus
 congestus, 145
 surinamensis, 145
 variegatus, 145
Schaueria
 calycotrichya, 144
 paniculata, 145
Stenostephanus
 longistaminus, 144
Streblacanthus
 dubiosum, 145
Thyrsacanthus
 amplexicaulis, 101
 barleriodes, 104
 floribunda, 104
 bracteolatus, 76
 callistachyus, 35

amplus, 35
calycotricus, 144
coccineus, 144
cuspidatus, 42
 micranthus, 146
dissitiflorus, 146
flagellus, 52
foliaceo-bracteatus, 146
fuchsiodes, 87
geminatus, 35
hookerianus, 146
indicus, 146
interruptus, 144
lemairianus, 42
lindenianus, 146
longifolius, 49
longistaminus, 144
nitidus, 111
pantasmensis, 52
ramossum, 146
rutilans, 97
schomburgkianus, 93
sessilis, 59
strictus, 49
tubiformis, 49
variegatus, 145