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A revision of *Syngonium* Schott (Araceae — Caladieae) for Mexico, Central America, and the West Indies.

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Abstract—The genus *Syngonium* is revised for Mexico, Central America and the West Indies with a total of 31 species in Mexico and Central America and two species, *S. auritum* Schott and *S. purpureospathum* Croat & Raz in the West Indies. Species are described and illustrated, and a dichotomous key is provided for determination.

Key words: Araceae, *Syngonium*, Central America

Dedication — This work is dedicated to Dr. Tom Ray, a retired Professor at the University of Oklahoma. His Ph.D. Thesis from Harvard University, which involved the growth habit of *Syngonium*, caused him to learn a very great deal about *Syngonium* and it was Tom's interest in the genus as well as his discovery of several new or interesting species that led to my involvement with it, resulting in a full revision. Ray earned undergraduate degrees in biology and chemistry at Florida State University. He received his Masters and Doctorate in Biology from Harvard University, specializing in plant ecology. He was a member of the Society of Fellows of the University of Michigan at Ann Arbor. In 1981 he joined the faculty of the University of Delaware, School of Life and Health Sciences. In 1993 he received a joint appointment in Computer and Information Science at the University of Delaware, and was appointed to the External Faculty of the Santa Fe Institute. In August of 1993 he joined the new Evolutionary Systems Department at ATR (Advanced Telecommunications Research Institute International) Human Information Processing Research Labs in Kyoto, Japan, as an invited researcher. In August 1998 he became a Professor of Biology at the University of Oklahoma, with an adjunct appointment as Professor of Computer Science. In July 2021 he retired from OU to work full-time for Mindstate Design Labs, a company of which he is the scientific co-founder.

From 1974 to 1989, Ray worked as a tropical biologist who studied the evolution, ecology, and natural history of a variety of organisms inhabiting rain forests. His work focused primarily on the foraging behavior of vines in the family Araceae, which he considers to be the "primates of the plant kingdom." He also studied ants, butterflies, and beetles. Most of his field work was conducted in the lowland rain forests of northern Costa Rica, initially at Finca La Selva operated by the Organization for Tropical Studies. After 1982, he worked principally at nearby Finca El Bejuco which he owns and operates. He was deeply involved in rain forest conservation in Costa Rica.

From 1990 to 2001, Ray conducted research on digital evolution, which means exploring

what happens when evolution by natural selection is embedded in the medium of digital computation. He is known for creating the first compelling example of "artificial life", a challenge presented by John von Neumann a half-century earlier.

From 2001 to the present, Ray has studied how the diverse set of psychoactive drugs collectively represents a rich set of tools for probing the chemical architecture of the human mind. This led to fundamental discoveries of mechanisms regulating consciousness in humans, and to the foundation of his company, Mindstate Design Labs.

INTRODUCTION

The genus *Syngonium* was last fully revised in 1982 (Croat, 1982 '1981'). Prior to that revision there was a revision of the genus by Adolf Engler & Kurt Krause in 1920 in Das Pflanzenreich (Engler & Krause, 1920) which treated 13 *Syngonium* species, all but four of which were Central American and/or West Indian. Even earlier, the revision by H.W. Schott in the *Prodromus* (1860) treated 20 species, 11 of which are from the study area. Prior to the 1982 study by Croat, Monroe Birdsey conducted extensive studies with *Syngonium* for an unpublished Ph.D. thesis (Birdsey, 1955). That work contained a proposal to recognize three distinct species, two of which were officially published by George Bunting (Bunting, 1966), namely *Syngonium erythrophyllum* Birdsey ex Bunting and *S. mauroanum* Birdsey ex Bunting, while the third was published by Croat (1982), *S. triphyllum* Birdsey ex Croat.

Another individual who worked with *Syngonium* for his thesis is Tom Ray, a former student at Harvard who studied growth behavior of the genus for his Ph.D. thesis (Ray, 1981). He also published many other papers dealing with this subject and especially dealing with the growth correlations in aroid stems (Ray, 1986) and cyclic heterophylly dealing with long term growth patterns in *Syngonium* (Ray, 1987). For a greater understanding of his work see the Dedication of this work above.

Since the 1982 revision of *Syngonium*, eight further species were published for Central America, beginning with the publication of *S. oduberi* T.Ray (Ray, 1980), followed by *S. castroi* Grayum and *S. rayi* Croat & Grayum (Grayum, 1997). Four species, *Syngonium adsettiorum* Croat, O.Ortiz & J.S.Harrison, *S. bastimentosense* Croat & O.Ortiz**,** *S. churchillii* Croat & O.Ortiz and *S. tacotalpense* Diaz Jim. & Croat were published most recently (Croat et al., 2019), together with one Jamaican species, *Syngonium purpureospathum* Croat & Raz.

This current work was deemed necessary owing to the large number of new taxa in Central America since the 1982 revision. That work should be consulted for a history of the classification of *Syngonium* as well as for other matters including generic relationships, the infrageneric classification, a discussion of general morphology, cytology, growth habits and phytogeography. South American species are not included here since no new species from that continent have been published since the 1982 revision.

1982 sectional classification of *Syngonium*

In 1982 Croat classified *Syngonium* as having four sections following what appeared to be natural separations based on leaf blade shape and corresponding to the following:

1. Blades elongated and with little development of posterior lobes: Section *Oblongata* with three species, *S. armigerum*, *S. llanoense & S. oduberi.*
2. Blades simple and ovate-cordate to ovate-sagittate: Section *Cordata* with ten species.
3. Blades sagittate with the three primary lobes pinnately lobed: Section *Pinnatiloba* with one species. *S. steyermarkii*
4. Blades pedately compound with three or more lobes, Section *Syngonium* with 34 species.

New sectional classification of *Syngonium*

The discovery of several additional species in Central America has blurred the lines of distinction between species with oblong blades and those with cordate blades, with the realization that these groups are not natural. Therefore, the two sections are combined, and sect. *Oblongata* is synonymized with sect. *Cordata,* the latter name being more appropriate owing to the preponderance of truly cordate species in the group.

Sect. *Pinnatiloba* remains unchanged containing one species, *Syngonium steyermarkii*, and is distinguished by its sagitttate pinnately lobed blades. Sect. *Syngonium* is not modified but an additional species, *S. chiapense* Matuda, is moved from its former position in sect. *Cordata* to sect. *Syngonium* since it may produce simple or compound leaves while in flowering condition.

Methods
Descriptive terminology roughly follows that prescribed by Croat and Bunting (1979) for *Anthurium*. Descriptions have been upgraded since the 1982 revision of the genus. Ecological statements are based on the Holdridge Life Zone System (Holdridge, 1967).

Because of the abundance of collections of some species, the lists of additional specimens may be abbreviated. For a complete list, go to tropicos.org.
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Notes on typifications are provided in the Appendix.

THE GENUS SYNGONIUM

Syngonium Schott, Wiener Z. Kunst 1829(3): 780. 1829. — Type: *Syngonium auritum* (L.) Schott (*Arum auritum* L.)
Porphyrospatha Engl. in A.DC. & C.DC., Monogr. Phan. 2: 289. 1879. — Type: *Porphyrospatha schottiana* (Wendl. ex Schott) Engl. (*Syngonium schottianum* Wendl. ex Schott; lectotype, designated by Engler, 1920: 120, see Nicolson, 1967).

Epiphytes or nomadic vines; sap of most parts milky; stems scandent or short-creeping, usually unbranched, internodes long or short, nodes usually rooting heavily; juvenile plants usually terrestrial. LEAVES with first blades ovate to elliptic, simple, with succeeding stages usually sagittate and climbing; adult leaves simple or variously divided, trisect to pedatisect with 5–11 leaflets, rarely incised-lobate; petioles sheathed in part, rarely throughout their length, upper part subterete, usually with an obtuse medial rib; simple blades usually ovate, sometimes oblong-elliptic, frequently ± sagittate; blades usually moderately thin, median segments usually more or less equilateral, lateral segments of trisect or pedatisect blades often conspicuously inequilateral and auriculate; primary lateral veins spreading, forming up to 3 or more collective

veins. INFLORESCENCES 1 or more per axil; **peduncle** erect in flower, pendent in fruit, commonly rounded on one side, obtusely angular on other side; **spathe** tube ovoid to ellipsoid, green at anthesis, frequently tinged with purple, often red, orange or yellow in fruit, usually reopening to expose syncarp, sometimes brightly colored within at maturity; spathe blade white to greenish white and opening broadly at anthesis, usually ovate-elliptic, often acuminate at apex, normally much constricted at base, always drying soon after anthesis, usually deciduous; **spadix** much shorter than spathe, basal pistillate part cylindrical to truncate-conical, green to orange, apical staminate part longer than pistillate part, clavate, white, with larger, more irregular, sterile flowers at the base, sterile staminate part usually ± swollen and wider than the pistillate part; flowers unisexual, naked; staminate flowers consisting of 3 or 4 stamens united into a synandrium, synandria truncate to somewhat rounded at apex, connective of the anthers thick, dehiscent below apex of connective by a short slit, rounded or obtuse at the base; pistillate flowers connate, the ovary obovoid or oblong-obovoid, normally 2-celled (rarely 3- or 1- celled); ovules 1 (rarely 2) per cell, erect, anatropous; stigmas usually discoid or bilabiate, rarely orbicular or cup-shaped. INFRUCTESCENCE: fruits baccate, connate into an ovoid syncarp, this usually brown, sometimes white at maturity; seeds obovoid or ovoid; funicle short; testa smooth, thin, black or dark brown, shiny; endosperm lacking.

Syngonium section ***Cordata*** ('*Cordatum*') Croat, Ann. Missouri Bot. Gard. 68: 588. 1982. — Type species: *Syngonium schottianum* Wendl. ex Schott.
Section *Oblongata* ('*Oblongatum*') Croat, Ann. Missouri Bot. Gard. 68: 588. 1982. — Type species: *Syngonium llanoense* Croat.

Syngonium section *Cordata* differs from section *Pinnatiloba* Croat and section *Syngonium* by having leaf blades simple and without pinnately lobed leaf margins, ranging from blades that are oblong and without prominent lobes to broadly ovate and cordate to sagittate blades but all together lacking pinnate or palmate divisions or lobes.

Ten species: *S. armigerum, S. brewsterense, S. castroi, S. chocoanum, S. hastiferum, S. llanoense, S. oduberi, S. rayi, S. sagittatum, S. schottianum*

Syngonium section ***Pinnatiloba*** ('*Pinnatilobum*') Croat, Ann. Missouri Bot. Gard. 68: 604-605, Figs. 31, 37–39. 1982. — Type species: *S. steyermarkii* Croat.

One species: *S. steyermarkii* Croat

Syngonium section **Syngonium. —** Type as for genus.

Twenty one Species: *S. adsettiorum, S. angustatum, S. auritum, S. bastimentoense, S. chiapense, S. churchillii, S. erythrophyllum, S. glaucopetiolatum, S. hoffmannii, S. laterinervium, S. macrophyllum, S. mauroanum, S. neglectum, S. peliocladum, S. podophyllum, S. purpureospathum, S. salvadorense, S. standleyanum, S. tacotalpense, S. triphyllum, S. wendlandii*

Key to the sections of *Syngonium*

1a. Leaf blades of adult plants simple; leaf blades of juvenile and the pre-adult climbing phases not markedly different from those of the adult. ..... Section *Cordata*

lb. Leaf blades of adult plants markedly divided, trisect, 5–11-palmatisect or incised-lobate; leaf blades of juvenile and pre-adult climbing phases markedly different from those of the adult

2a. Leaf blades of adult plants incised-lobate (i.e. the primary divisions pinnately lobed); leaf shape of pre-adult climbing phase usually not simple, usually variously lobed but not as deeply lobed as the adult .....Section *Pinnatiloba*

2b. Leaf blades of adult plants trisect or 5–11-pedatisect; leaf shape of pre-adult climbing phase simple, usually hastate or sagittate .....Section *Syngonium*

Key to the species of *Syngonium* in Mexico, Central America, and West Indies

1a. Leaf blades not divided into segments (Section *Cordata* and some S. *chiapense)* 2

1b. Leaf blades either trilobed, trisect, 5–11-pedatisect or incised-lobate 13

2a. Leaf blades oblong-elliptic or ovate-elliptic, merely rounded to subcordate at the base; petioles sheathed nearly their entire length 3

2b. Leaf blades ovate to hastate or sagittate, conspicuously lobed at the base; petioles sheathed 1/3–3/4 their length 6

3a. Blades mostly less than 15 cm long; primary lateral veins arising from the lower half of the blade ..... *S. armigerum* (Standl. & L.O.Williams) Croat

3b. Blades commonly more than 15 cm long; primary lateral veins uniformly distributed along the blade 4

4a. Petioles 6–10 cm long, the sheath less than 1 cm wide (when flattened), usually ending well below the base of the blade, acute at the apex; blades 14–23 cm long; peduncle to 4 cm long (in fruit) .....*S. oduberi* T.Ray

4b. Petioles 9–33 cm long, the sheath 2–3 cm wide when flattened (narrower for S. castroi), usually extending over the base of the blade, rounded at the apex (sometimes extending over base of blade but acute at apex for *S. castroi*); blades 13–34 cm long; peduncle 6–8 cm long (to 10 cm long in fruit) 5

5a. Petioles with sheath 2–3 cm wide, usually not extending over the base of the blade; Panama .....*S. llanoense* Croat

5b. Petioles with sheath less than 1 cm wide; Costa Rica ..... *S. castroi* Grayum

6a. Stems glaucous; juvenile blades thick, cordate; adult blades thick, the veins not..... .....*S. chiapense* Matuda

6b. Stems not glaucous; juvenile blades thin, often hastate or sagittate; adult blades thin, the veins prominent 7

7a. Adult blades markedly hastate with pronounced, pointed, posterior lobes directed outward at ca. 45° angle, the anterior lobe sometimes somewhat constricted at the base 8

7b. Adult blades ovate, oblong-ovate or elliptic-hastate, not markedly hastate, the posterior lobes rounded or, if pointed, then much smaller than the anterior lobe, usually directed mostly downward, the anterior lobe usually not markedly constricted at the base (except some sometimes for *S. hastiferum*) 10

8a. Leaf blades velvety on upper surface; 0–1500 m, Costa Rica & Panama .... *S. rayi* Croat & Grayum

8b. Leaf blades not at all velvety on upper surface.....9

9a. Leaf blades narrowly triangular sagittate-hastate, moderately constricted at the base of the anterior lobe; sinus broadly spreading at apex, then turned inward to form a constriction; primary lateral veins 5 or 6 per side; Panama, 800–850 m...*S. brewsterense* Croat & Delannay

9b. Leaf blades narrowly ovate-elliptic, scarcely or not at all constricted at the base of the anterior lobe; sinus very narrow at apex then flaring out; basal veins 3 or 4 pairs; primary lateral veins ca 13 per side; Costa Rica, 20–680 m.....*S. hastiferum* (Standl. & L.O.Williams) Croat

10a. Blades with the lower surface pale, matte, whitish; basal veins fusing to form a posterior rib more than 3 cm long; Costa Rica and Panama ..... *S. schottianum* Wendl. ex Schott.

10b. Blades with the lower surface semiglossy or matte but never whitish; basal veins forming a distinct posterior rib or nearly free to the base.....11

11a. Blades elliptic-hastate, usually weakly or strongly constricted between the anterior and posterior lobes, the posterior lobes usually narrowly angular; Costa Rica. .... *S. hastiferum* (Standl. & L.O.Williams) Croat

11b. Blades ovate or oblong-ovate, not constricted between the anterior and posterior lobes, the posterior lobes rounded or obtuse, not acutely angular; Mexico or South America and western Panama.....12

12a. Blades lacking a well-developed posterior rib (united basal vein), the posterior rib lacking or less than 1 cm long, the basal veins all or nearly all submarginal to the sinus; spathe tube less than 5 cm long at anthesis..... *S. chocoanum* Croat

12b. Blades with a well-developed posterior rib usually more than 1 cm long, the posterior rib naked for some distance from the apex of the sinus; spathe tube usually 6.5–15.0 cm long at anthesis; Mexico (northern Oaxaca & Veracruz).....*S. sagittatum* G.S.Bunting

13a. Blades incised-lobate; Guatemala and Mexico; Section *Pinnatiloba*..... *S. steyermarkii* Croat

13b. Blades trilobed, trisect or 5–11-pedatisect Section *Syngonium*.....*14*

14a. Spathe tube cylindroid, frequently more than 6 cm long; spathe blade usually twice as long as the staminate portion of the spadix; fruiting spadix (syncarp) elongate, more or less cylindroid; West Indies.....*S. auritum* (L) Schott.

14b. Spathe tube ellipsoid or ovoid (oblong-ovoid for *S. atrovirens*), rarely more than 6 cm long (to 8 cm long for *S. neglectum*); spathe blade usually only slightly longer than staminate portion of the spadix; fruiting spadix (syncarp) ellipsoid; Central America 15

15a. Adult blades trisect or trilobed, sometimes appearing almost 5-parted because of conspicuous auricles on lateral segments.....16

15b. Adult blades either 5–11-pedatisect or incised lobate (i.e., the segments of the anterior lobe pinnate) 38

16a. Blades with the lateral segments merely inequilateral, not markedly auriculate or if markedly auriculate, the auricle at least not pinched off to appear like another segment 17

16b. Blades with the lateral segments bearing conspicuous auricles, these pinched off to appear like separate segments (some leaf blades of *S. triphyllum* with the lateral segments not pinched off) 31

17a. Median lobe of the adult blade with the primary lateral veins departing the midrib at almost 90° (rarely at less than 65°); Costa Rica, Panama or Jamaica.....18

17b. Median lobe of the blade with the primary lateral veins in the lower third of the leaflet sharply ascending, departing the midrib at usually less than 60° 19

18a.Medial lobe and lateral lobes subequal; medial lobe oblong-elliptic, less than 6 cm wide; spathe blade white on inner surface; Costa Rica .....*S. laterinervium* Croat

18b. Medial lobe and lateral lobes markedly unequal; medial lobe broadly ovate, more than 7 cm wide; spathe blade purplish on inner surface; Jamaica..... *S. purpureospathum* Croat & Raz

19a. Lateral segments of the adult blade with a conspicuous, usually ± hastate auricle 20

19b. Lateral segments not prominently auriculate or, if auriculate, the auricle at least not at all hastate.....22

20a. Young leaves, peduncle and spathe tube pruinose (peduncle sometimes glaucous on *S. hoffmannii*); leaves 30-45 cm wide; highland species occurring in wet forest at elevations above 1300 m in Chiriquí (western Panama).....*S. glaucopetiolatum* Croat

20b. Young leaves, peduncle and spathe tube not pruinose; leaf blades less than 25 cm wide (rarely to 35 cm wide in *S. salvadorense*); principally lowland species occurring below 700 m, primarily in tropical forest on the Pacific slope from Chiapas, Mexico, and Guatemala to Panama 21

21a. Peduncle 9–18 cm long (to 25 cm long in fruit); leaf blades with 3–5 primary lateral veins on each side, these mostly restricted to the lower half of the blade; stems usually pruinose; southern Mexico to El Salvador .....*S. salvadorense* Schott

21b. Peduncle 3.5-9.0 cm long; leaf blades with 6 or more primary lateral veins on each side, ± equally distributed throughout the blade; stems not pruinose; Costa Rica and Panama ....*S. mauroanum* Birdsey ex G.S.Bunting

22a. Lateral segments with the auricles moderately conspicuous and directed downward, more or less in line with the midrib of the segment; stems, petioles and peduncles glaucous or the segments silky due to conspicuous papillae on the upper surface; spathe tube dark red inside ..23

22b. Lateral segments with auricles conspicuous or not, but usually not directed downward more or less in line with the midrib of the segment; plants lacking silky upper blade surfaces; plants usually not glaucous or if glaucous, the lateral segments definitely lacking conspicuous auricles, spathe tube variously colored within 24

23a. Stems, petioles and peduncles glaucous; blades not silky pubescent due to papillae on the surface..... *S. hoffmannii* Schott

23b. Stems, petioles and peduncles not glaucous; blades silky on the upper surface due to papillae.....*S. wendlandii* Schott

24a. Lateral leaflets narrowly acute to attenuate or somewhat rounded at the base, not the least auriculate 25

24b. Lateral leaflets usually conspicuously inequilateral and auriculate (or at least with the outer margin broadly rounded) 26

25a. Leaf blades drying dark brown; all the lobes obtuse to rounded at base; below 500 m, Honduras to Costa Rica .....*S. standleyanum* G.S.Bunting

25b. Leaf blades drying somewhat greenish; all the lobes attenuate at base, 800 m, Panama (Panamá- Cerro Jefe), 783 m..... *S. adsettiorum* Croat, O.Ortiz & J.Harrison

26a. Leaf blades moderately thin, the veins conspicuously sunken.....27

26b. Leaf blades moderately thick to coriaceous, the veins not conspicuously sunken.....28

27a. Median leaflet with 5–9 pairs of primary lateral veins, drying greenish brown; juvenile blades sagittate; inflorescences 1 or 2 per axil; tropical moist and premontane moist forest, Costa Rica and Panama.....*S. mauroanum* Birdsey ex G.S.Bunting

27b. Median leaflet with 10–16 primary lateral veins per side, drying black or gray; juvenile blades elliptic; inflorescences 1–5 per axil; Tropical wet and Premontane wet forest; Honduras to Panama, 100–800 m. .....*S. triphyllum* Birdsey ex Croat

28a. Blades mostly less than 20 cm long, the lateral leaflets mostly narrowly rounded at the apex; juvenile leaves purplish violet on the lower surface; adult blades and stems drying conspicuously brown; tropical moist and premontane wet forest, central Panama.....
.....*S. erythrophyllum* Birdsey ex G.S.Bunting

28b. Blades mostly more than 20 cm long, the lateral leaflets usually acute at the apex; juvenile leaves green beneath; adult blades and stems drying mostly green to black (the stems sometimes drying brown) 29

29a. Peduncles 4–11 per axil, usually less than 9 cm long, to 13 cm long in fruit .....
.....*S. podophyllum* Schott

29b. Peduncles 1–3 per axil, usually more than 9 cm long, and frequently 14–25 cm long in fruit.....30

30a. Juvenile blades broadly ovate-cordate; adult blades thick, the median segments 28–52 cm long, the lateral segments smaller (10–20 cm long), directed nearly backwards; peduncle and spathe tube blue glaucous; Mexico (Chiapas, mostly eastern, and southern Veracruz).....
.....*S. chiapense* Matuda

30b. Juvenile blades hastate or sagittate; adult blades thin, the median lobe less than 28 cm long, the lateral segments not markedly smaller, mostly directed forward; peduncle and spathe tube green; southwestern Mexico (Chiapas) and western Guatemala to Costa Rica .....
.....*S. salvadorense* Schott

31a. Stems with large, elongate projections.....*S. peliocladum* Schott

31b. Stems lacking elongate projections.....32

32a. Upper blade surface silky due to papillae; Costa Rica.....*S. wendlandii* Schott

32b. Upper blade surface lacking papillae.....33

33a. Median leaflets with 10–16 prominently sunken primary lateral veins per side; spathe tube red inside .....*S. triphyllum* Birdsey ex Croat

33b. Median leaflets with usually fewer than 8 primary lateral veins, these not conspicuously sunken; spathe tube green or red to violet purple inside.....34

34a. Inflorescence solitary; leaf blades drying greenish both surfaces; Panama..... ..... *S. bastimentoense* O.Ortiz & Croat

34b. Inflorescence usually several per axil; leaf blades drying usually blackened to dark brown on both surfaces (or if greenish not markedly bicolorous 35

35a. Spathe tube red to violet purple inside; inflorescences 1–4 per axil, usually no more than 3; blades usually drying black; Tropical wet, Premontane wet or more commonly Lower montane rainforest, Costa Rica to Panama ..... *S. hoffmannii* Schott

35b. Spathe tube green or yellowish inside; inflorescences 4–11 per axil (to 3 for *S. churchillii*); blades usually drying green or brownish 36

36a. Stems glaucous (at least in northern Central America), smooth, lacking any emergences; leaf segments usually somewhat unequal, not of relatively uniform size and shape; petioles subterete or with only an obtuse medial rib; staminate flowers truncate at the apex with an indication of the line of fusion .....*S. podophyllum* Schott

36b. Stems not glaucous, sometimes with numerous rough emergences; leaf segments usually slender (only 3 subelliptic segments for *S. churchillii*), of nearly equal size and shape; petioles subterete, usually with a sharp medial rib; rachis usually gradually curved, not angular between each segment; staminate flowers deeply retuse at the apex (not retuse for *S. churchillii*), showing no indication of the line of fusion 37

37a. Stems sometimes with numerous rough emergences; leaf segments slender, not markedly elliptic; staminate flowers deeply retuse at the apex; Mexico to Costa ..... *S. angustatum* Schott

37b. Stems lacking numerous rough emergences; leaf segments sub-elliptic, not particularly slender; staminate flowers not deeply retuse at the apex; Panama..... .....*S. churchillii* Croat & O.Ortiz

38a. Stems with conspicuous, elongate, projections; sea level to 1000 m, Costa Rica and Panama on the Atlantic slope (Alajuela to Bocas del Toro)..... *S. peliocladum* Schot

38b. Stems lacking conspicuous, elongate projections; geographical ranges various.....39

39a. Peduncles usually 1 (sometimes 2 or 3); entire inflorescence usually 20–40 cm long (or in *S. mauroanum* less than 20 cm long with the leaf blades thin and with many sunken veins); spathe tube not glaucous; staminate part of the spadix 8.5–14.0 cm long (or less in *S. mauroanum*); Mexico, Costa Rica and Panama.....40

39b. Peduncles usually numerous (unless collected when flowers are first beginning to develop); entire inflorescence usually less than 20 cm long; spathe tube often glaucous; staminate part of spadix 2.5–9 cm long; Mexico to Ecuador, Brazil and Bolivia.....41

40a. Inflorescence less than 20 cm long; staminate part of the spadix less than 8 cm long; stems less than 1.5 cm diam.; Premontane moist forest, western Panama and Costa Rica .... *S. mauroanum* Birdsey ex G.S.Bunting

40b. Inflorescence usually more than 20 cm long; staminate part of the spadix more than 8 cm long; stems more than 1.5 cm diam.; blades chartaceous, the veins not sunken; not occurring in premontane moist forest, Mexico ..... *S. neglectum* Schott

41a. Adult leaf blades thick, the upper surface very smooth, the median leaflet often more than 35 cm long; juvenile blades thick, large, cordate; peduncles 10–20 cm long; spathe tube usually glaucous, even in fruit; mature infructescence usually more than 10 cm long, 5–8 cm wide .... *S. macrophyllum* Engl.

41b. Adult leaf blades thin, the upper surface not smooth, the median leaflet usually less than 35 cm long; juvenile leaves thin, sagittate or hastate (or if cordate, very small); peduncles less than 10 cm long at anthesis; spathe tube usually not glaucous in fruit; mature infructescence usually less than 10 cm long, 4.5 cm wide 42

42a. Leaf blades with 4–8 primary lateral veins per side; inflorescences 8–10 per axil; stem glaucous; Mexico (Tabasco, 450 m)..... *S. tacotalpense* Diaz Jim. & Croat

42b. Leaf blades with 3–5 primary lateral veins per side; inflorescences fewer than 7 per axil (*S. podophyllum*) or if more per axil the stems not glaucous and often somewhat muricate (Mexico to Central America).....43

43a. Stems not glaucous, sometimes with numerous rough emergences; leaf segments usually slender, of nearly equal size and shape; petioles subterete, usually with a sharp medial rib; rachis usually gradually curved, not angular between the segments; staminate flowers deeply retuse at the apex, showing no indication of the line of fusion; Mexico to Costa Rica..... ..... *S. angustatum* Schott

43b. Stems glaucous (at least in northern Central America), smooth, lacking any emergences; leaf segments usually somewhat unequal, not of relatively uniform size and shape; petioles subterete or with only an obtuse medial rib; staminate flowers truncate at the apex with an indication of the line of fusion; Mexico to Panama.....*S. podophyllum* Schott

TAXONOMIC TREATMENT

Syngonium adsettiorum Croat, O.Ortiz & J.S.Harrison, Novon 27: 53–54, fig. 15–17. 2019. **—** Type: PANAMA. Panamá: Altos de Cerro Azul, El Torreón, Calle Kirkpatrick, a un costado de la casa de William Adsett, 9°12'40»N, 79°24›54»W, 16 September 2015, *O.O. Ortiz*, *A.*

De Sedas, P. Palma, Y. González, J. Harrison & L. Harrison 2517 (holotype, MO-6724956; isotypes, PMA, FT).

Nomadic vine; appressed-climbing, growing to 4 m on trees; internodes longer than broad except near the apex, drying medium yellow-brown, conspicuously ridged longitudinally; sap milky. LEAVES widely scattered on stem; **petioles** (8.5)18.5–20.0 cm long, sheathed to near the apex, free portion 1.0–1.5 cm long, the sheath rolled inward, margin moderately thick, persisting; petiolules 8–10 mm long; **blades** trisect, (15.0)21.2–22.5 cm long, (16.0)18.3–27.5 cm wide, moderately coriaceous, dark green and matte above, slightly paler and semiglossy below, drying dark brown, matte and sparsely short pale-lineate above; medial lobe elliptic, rounded and weakly short-apiculate at apex, obtuse at base, (11.5)18.5–19.5 cm long, 7.7–8.6 cm wide, slightly inequilateral (one side 8 mm wider); lateral lobes (8.0)11.1–12.7 cm long, (2.8)5.0–6.4 cm wide, narrowly rounded at apex, rounded to obtuse at base; midrib weakly and obtusely sunken, concolorous above, reddish, narrow rounded, drying several-ribbed, minutely granular and nearly concolorous below; **primary lateral veins** 3 per side, departing midrib at 20–30°, the lowermost weak and near the border, the 2nd pair prominent and extending to near the apex, the uppermost pair weak; tertiary veins moderately obscure. INFLORESCENCES 4 per axil; prophylls 12–14 cm long; **peduncle** 6–8 cm long, drying finely wavy-ribbed, yellowish brown; spathe 10–11 cm long; spathe tube 5 cm long, drying 1.8–2.5 cm diam., medium green with white margins on both surfaces, drying dark green; spathe blade medium yellow-brown, initially persistent, 5.5 cm long, 4–5 cm wide, 3.5 cm wide at anthesis, white inside, creamy white on outside, flattening to 5.5 cm wide; **spadix** 8.5 cm long; staminate portion 6.7 cm long, 1.2 cm diam.; sterile staminate portion 2.5 cm long, the lower thickened staminodia 3.0–3.2 mm long, 2.0–2.5 mm wide, these immediately transitioning to longer and thicker staminodia, 4.0–4.5 mm long, 1.5-2.5 mm wide, the next 4 rows irregularly shaped staminodia 2 mm long, 1 mm wide; pistillate spadix 1.5 cm long, 9 mm diam. at base, 6 mm diam. at apex. INFRUCTESCENCES pendent with spathe tube olive-green. **Figures 1–8.**

Distribution—*Syngonium adsettiorum* is endemic to Panama, known only from the type locality in Panama in the Cerro Jefe Region at 783 m, in a *Tropical wet forest* life zone.

Comments—The species is a member of sect. *Syngonium* and is characterized by trisect, dark brown drying leaves with moderately coriaceous, more or less elliptic slightly inequilateral leaflets which are rounded a apex and with distinct petiolules as well as a cluster of up to 4 inflorescences per axil with the tube medium green on both surface and somewhat persistent, medium brown-drying spathe blades.

In the last revision of *Syngonium* (Croat, 1982) the species keys to *S. sparreorum* Croat from western slope of the Ecuadorian Andes at 250 m elevation. That species differs by having petioles sheathed only ½ to 2/3 their length, leaf blades abruptly acuminate at apex and larger inflorescences with peduncles 7–10 cm long and infructescences to 13 cm long.

Syngonium angustatum Schott, Österr. Bot. Z. 8: 175. 1858. — Type: NICARAGUA. Chontales: Punta Poderosa, 1845–1848, *A.S. Ørsted s.n*. (holotype C, barcode C10006371, photo at MO-1088614/acc.: 2286947).

Figure 1: *Syngonium adsettiorum***. Habit of flowering plant. Photo, J. Harrison**

Syngonium oerstedianum Schott ('*oerstedtianum*'), Österr. Bot. Z. 8: 178. 1858. — *Syngonium podophyllum* var. *oerstedianum* (Schott) Engl., Pflanzenr. 71 (IV.23E): 129. 1920. — Type: COSTA RICA. Guanacaste, *A.S. Oersted s.n.* (C, not found); — Schott drawing no. 3214 (neotype, W, inventory no. NHMW-AFW-Schott Icones 3214, designated here) [NYBG photo 4332].

Syngonium albolineatum W.Bull, Cat. (Bull) 60: 6. 1871. — *Syngonium podophyllum* Schott var. *albolineatum* (W.Bull) Engl., Pflanzenr. 71 (IV.23E): 129. 1920. — Type: Cult. Hort. Bull, 27 February 1877, *N.E. Brown s.n.* (neotype, K, designated here.).

Nepthytis triphylla Nash ex L.H. Bailey, Cycl. Amer. Hort. 3: 1076. 1901. — Type: (none designated; fide Birdsey, 1955).

[*Syngonium gracile* ('*gracilis*') Matuda, Anales Inst. Biol. Univ. Nac. Mexico 43, Ser. Bot. 1: 56. 1972, *nom. illeg. non Syngonium gracile* (Miq.) Schott. — Type: MEXICO. Oaxaca: Palomares, Juchitan, near Río Coatzacoalcos, 200 m, 6 February 1969, *T.B. MacDougall 8044* (holotype, MEXU)].

Nomadic vine; juvenile plants with stems not glaucous, usually sparsely muricate; petioles sheathed usually less than 1/3 their length; blades dark green, marked on upper surface along principal veins with gray-green, cordate, less than 6 cm long, anterior lobe ovate, posterior lobes suborbicular; intermediate leaves sagittate or hastate, acuminate at apex; adult stems not

Figure 2: *Syngonium adsettiorum***. Abaxial leaf surface. Photo, J. Harrison**

Figure 3: *Syngonium adsettiorum*. **Leaves, stem, and inflorescences. Photo, J. Harrison**

Figure 4: *Syngonium adsettiorum***.** Open Inflorescence**. Photo, J. Harrison**

Figure 5: *Syngonium adsettiorum*. Back of open inflorescence. Photo, J. Harrison

Figure 6: *Syngonium adsettiorum*. Habit of post-anthesis plant. Photo, J. Harrison

Figure 7: *Syngonium adsettiorum*. Infructescence. Photo, J. Harrison

Figure 8: *Syngonium adsettiorum*. Type Specimen *Ortiz et al. 2517*

glaucous, sparsely muricate; internodes mostly 2–10 cm long on flowering stems. LEAVES with **petioles** sometimes pruinose, sheathed 1/2 –4/5 their length, 15–40 cm long; **blades** pedatisect, dark green above, sometimes grayish green on midrib and rarely on lateral veins; leaflets 3–11, usually conspicuously free from one another, lowermost auriculate, median leaflet elliptic to oblong-elliptic to oblanceolate, acuminate at apex, attenuate, acute or cuneate at base, 11–31 cm long, 4–10 cm wide, rachis gradually curved, lateral leaflets inequilateral, inner margin acute to cuneate, outer margin rounded to auriculate, auricle rounded to bluntly acute, rarely slightly pinched off; **primary lateral veins** 3–5 per side, sunken above, raised beneath; tertiary veins distinct. INFLORESCENCES to ca. 7 per axil; **peduncle** glaucous, almost 3-sided, 5–10 cm long, and erect at anthesis, to 17 cm long and pendent in fruit; **spathe** 7-14 cm long; spathe tube elliptic, 2–5 cm long, 1.0–2.5 cm diam., green and usually glaucous outside, green inside; spathe blade cream on both surfaces, 6–9 cm long, 1.5–3.5 cm wide, acuminate at apex; **spadix** 3.8-10.3 cm long; pistillate portion of spadix 1.3–2.6 cm long, 5–10 mm diam., greenish, flowers irregularly hexagonal, stigma discoid; staminate portion 2.5–6.5 cm long, 5–15 mm diam., pale yellow, flowers completely fused into a synandrium with no sign of fusion, apex conspicuously retuse (notched medially). INFRUCTESCENCES usually bright red, sometimes reddish orange, sometimes glaucous; **syncarp** brown, 2.5–4.5 cm long, 1.5–2.5 cm diam. *Syngonium angustatum* apparently flowers most abundantly during the early rainy season with some flowering during the dry season as well. **Figures 9–15.**

Distribution—*Syngonium angustatum* ranges from Mexico (southern Tamaulipas) through Belize, Guatemala, Honduras, and Nicaragua to Central Panama. It is cultivated widely in Tropical areas of the world and has naturalized in many areas including Australia. Surprisingly there are few clear examples of its presence in the West Indies. One sterile collection (*G. Proctor 48296*) was collected on Grand Cayman Island.

Although most abundant at lower elevations, it ranges up to 1200 m. The species is most abundant in *Tropical moist forest* life zones, but has been collected in *Tropical dry forest* life zones in Nicaragua and Costa Rica. It is one of the most well adapted species to dry habitats and it is likely this attribute that makes it adaptable to dry habitats throughout the world where it has escaped from cultivation. It has become a weed in Borneo, New Guinea, and Australia.

Comments — The species is a member of sect. *Syngonium* characterized by its moderately long non-glaucous internodes which may be sparsely muricate, petioles sheathed 1/2–4/5th their length and sometimes pruinose, 3–11 pedatisect blades with the divisions moderately uniform and narrow with the rachis gradually curved, 3–5 primary lateral veins per side as well as by up to 7 inflorescences per axil with glaucous peduncles with the spathe tube elliptic, green and usually glaucous outside, green inside and a spadix that have the flowers completely fused into a synandrium with no sign of fusion with the apex conspicuously retuse and usually bright red, sometimes glaucous fruiting spathe.

Syngonium angustatum is closest to *S. podophyllum* but can usually be distinguished by its more uniformly slender leaflets, the papillae of the older stems, and the deeply retuse, fused staminate flowers (also see the key). According to Birdsey (1955), the species hybridizes with *Syngonium podophyllum* in Mexico.

Figure 9: *Syngonium angustatum*. Cultivated at Lyon Botanical Garden; native to El Ceibal, Peten, Guatemala. Photo, D. Scherbereich.

Figure 10: *Syngonium angustatum***.** Leaf. Sarstoon Temash National Park, Toledo, Belize**,** Holst 10020

Additional Specimens Seen—BELIZE. **Belize:** Burrell Boom to Hattieville Road, 17°34'04»N 088°24›07»W, 5–20 m, 18 September1980, *Caroline Whitefoord 2553* (MO); Mile 24 to 25, Northern Highway, 17°42'34»N 088°20›26»W, 5 m, 19 January 1974, *John D. Dwyer & Ronald L. Liesner 12043* (MO); **Cayo:** Western Highway near Belmopan, 17°15'N 88°46'W, 5–20 m, 3 June 1981, *Caroline Whitefoord 3118* (BM,MO); At Rio Frio Cave near Augustine, 16°58'N 88°59›W, 300 m, 5 July 1970, *David L. Spellman 1584* (MO); Western Highway. 47 miles W of Belize, 1 mi from Roaring Creek roadside, 17°16'12»N 88°47›02»W, 13 August 1970, *J.R. Wiley 246* (MO); Bullet Tree Falls, ca. 10 km NW of San Ignacio, 17°10›20»N 89°06'46"W, 7 August 1981, *James A. Ratter 4599* (MO); Grano de Oro, road toward Rio La Flor, vicinity of Lumber Mill; 16°40'N 89°02'W, 1700 ft, 02 June 1973, *John D. Dwyer 10890* (MO); In cohune ridge, on hillside, Hummingbird Highway, 17°09'N 88°41'W, 18 February 1955, *Percy H. Gentle 8594* (LL); **Corozal:** Cerros Maya Ruins. Lowry's Bight, coastal area, 18°20'58»N 88°21›51»W, 0–5 m, 10 March 1983, *Cathy J. Crane 338* (LL); Between Sarteneja and Chunox; 18°17'N 88°15›W, 10 m, 18 March 1987, *Gerrit Davidse & Alan E. Brant 32639* (MO); **Orange Walk:** 2 miles N of Orange Walk, 18°06'36»N 88°33›44»W, 19 August 1980, *David A. Sutton, M. C. Tebbs, Caroline Whitefoord & David M. Williams 123* (BM,MO); Between London and Carmelita along the old Northern Highway between Orange Walk and Maskall; 17°59'N 88°28'W, 50 m, 20 March 1987, *Gerrit Davidse & Alan E. Brant 32825* (MO); **Stann Creek:** 18 km N of Maya Center on Southern Highway. Secondary forest;

Figure 11: *Syngonium angustatum*. Cluster of infructescences. Sarstoon Temash National Park, Toledo, Belize. *Holst 10020*. Photo, E. Baron

16°46'N 88°23›W, 29 November 1990, *Michael J. Balick, Rosita Arvigo, Gregory Shropshire, Claudio Pinheiro & J.M. Fraz*ão *3076* (MO); Along Southern Highway ca. 3 miles south of junction with Hummingbird Highway, 6 miles west of Stann Creek; elev. near sea level, 16°56'45»N 88°19›36»W, 0–5 m, 11 June 1973, *Thomas B. Croat 24205* (MO); **Toledo:** Southern Maya Mountains, Bladen Nature Reserve, limestone hills and cliffs north of central Snake Creek Camp. Semideciduous forest with many vines, on karst limestone. Map coordinates; 16°27'59»N 88°59›03»W, 500–600 m, 31 May 1997, *Gerrit Davidse & Douglas L. Holland 36960* (BRH, CM,MO); **CARIBBEAN. Cayman Islands:** Grand Cayman. near North Side, 9 August. 1992, *George R. Proctor & et al. 48296* (MO); **Dominican Republic:** Distrito Nacional. Distrito Nacional, Jardín Botánico Nacional; en la parte norte de la reserva forestal; 18°29'N 69°57'W, 70–80 m, 6 Junio 2000, *Teodoro Clase & et al. 1582* (MO); **Trinidad & Tobago:** Trinidad. 3 Henry Pierre Terrace; 09 April 1980, *C. Dennis Adams s.n.* (MO); **COSTA RICA**. **Alajuela:** Los Chiles. Refugio Nacional de Vida Silvestre Caño Negro, cuenca del Río Frío, Caño Negro, alrededores de la Estación de Vida Silvestre, 10°53'37»N 84°47›16»W, 35 m, 12 November 1997, *Alexánder Rodríguez & Luis Diego Vargas 2750* (MO); Refugio Nacional de Vida Silvestra Caño Negro, Llanura de Guatuso, Puesto Playuelas, 10°57'00»N 84°44›24»W, 50 m, 14 January 1993, *Kattia Flores et al. 22* (CR); Refugio Nacional de Vida Silvestre Caño Negro, Llanura de Guatuso; 10°52'48»N 84°46'48"W, 30 m, 08 julio 1987, *Nelson Zamora & Isidro A. Chacón G. 1346* (CR); Refugio Nacional de Vida Silvestre Caño Negro, Llanura de Guatuso, alrededor de la Laguna Caño Negro, 10°53'24»N

Figure 12: *Syngonium angustatum*. Inflorescence showing retuse staminodia; cultivated plant

Figure 13: *Syngonium angustatum*. Juvenile plant. orig D.Gould

84°46'48"W, 40 m, 09 April 1995, *Ronald Villalobos 161* (CR, MO); San Ramón. Cordillera de Tilarán, Monteverde, San Gerardo Biological Station, Sendero Tabacón, 0.5 km east of station, old secondary patch, 10°21'36»N 84°46›48»W, 1200 m, 3 March 1995, *Darin S. Penneys 210* (CR,MO); **Guanacaste:** *A. S. Oersted s.n.* (MO); 5 km S of Peñas Blancas and 1.5 km E of main road. Pasture. Epiphytes on Crescentia. 15 km N of La Cruz; 11°11'N 85°37›W, 200 m, 29 January 1978, *Ronald L. Liesner 4658* (MO); Santa Rosa National Park, 2 km east of park headquarters; 10°51'N 85°37›W, 200–300 m, 23 June 1977, *Ronald L. Liesner & Ruth Lockwood 2419* (MO); La Cruz. P.N. Guanacaste; Cordillera de Guanacaste. Estación Pitilla, Sta. Cecilia 9 km S; 10°59›24»N 85°25'12"W, 700 m, 5 September 1993, *Elba López 73* (CR); Along Quebrada Calera headwaters, at crossing of access road, Península de Santa Elena; 10°51'36»N 85°39›00»W, 305 m, 11 January 2003, *Michael H. Grayum 11277* (MO); Laguna La Calavera and environs, Finca Lolita, along road from Carretera Interamericana to Cuajiniquil; 10°57'36»N 85°39›00»W, 310 m, 20 August 2003, *Michael H. Grayum, Evelio Alfaro & Roberto Espinoza 11702* (MO); P.N. Guanacaste. Cuenca del Sapoa. Río Sontoli; 10°57'30»N 85°36›10»W, 250 m, 10 June 1997, *Sandy Salas 312* (MO); Liberia. P.N. Santa Rosa; Península de Santa Elena. Murciélago; por el Río Murciélago; 10°54'00»N 85°43›48»W, 50–150 m, 18 August 1994, *Barry E. Hammel & Carolina Cano 19585* (CR); **Cayenne:** Ile de Cayenne, Lieu dit «Chaton», 04°50'N 52°20›W, 5 m, 16 September 1988, *Georges Cremers 10107* (CAY); GUAM. Agana, Sonder place; 16 November 1978, *F. R. Fosberg 58344* (MO);

Figure 14: *Syngonium angustatum*. *Birdsey 249*, Tabasco, Mexiso

Figure 15: *Syngonium angustatum*. *Croat 41699*, Guatemala

Mangilao village; 24 April 1980, *P. Moore 1205* (MO); **GUATEMALA. Alta Verapaz:** 9 miles up road to Oxec along gravel road which turns N off Highway 7E between Tucurú and El Estor, ca. 6 km NE of Panzós, 15°29'25"N 089°40'27"W, 800 m, 20 July 1977, *Thomas B. Croat 41699* (MO); **Izabal:** Río Dulce; 15°39›33»N 89°00'06"W, 1 m, 27 julio 1988, *Esteban M. Martínez S., Pedro Tenorio L., Herbert Droege & Ava Nury Díaz 23098* (MO); Swamp forest NW shore of Lake Izabal, 2-3 km west of El Estor. Vicinity of Lago Izabal, 15°32'05"N 89°17'05"W, 0–600 m, 21 May 1966, *Gayle C. Jones & Lynden Facey 3482* (MO); Between (W of) El Estor and plant of abandoned nickel mine. Forest, inundated savanna and pasture, 15°31'12"N 89°21'28"W, 1-10 m, 31 August 1988, *W. D. Stevens & Esteban M. Martínez S. 25286* (MO); El Estor. Refugio de Vida Silvestre Bocas del Polochic, Guamil (Icacal); 626 m, 30 noviembre 207, *C. Kraker 126* (MO); Refugio de Vida Silvestre Bocas del Polochic, Guamil (Icacal); 626 m, 30 noviembre 2007, *C. Kraker 126* (USCG); Planta procesamiento, Exmibal. 0245082/UTM 1716331–0245137/UTM 1716337, 15°30'57»N 089°22›57»W, 10 October 2004, *J. Morales Can, Rafael* Ávila & J. *García Polo 2736* (MO,USCG); Puerto Barrios. Along new dirt road ca. 1 mile east of Santo Tomás, ca. 4 miles SW of Puerto Barrios; 15°41'18»N 088°35›51»W, 50 m, 22 July 1977, *Thomas B. Croat 41836* (MO); **Petén:** Tikal National Park, [Tikal], 17°13'30»N 089°36›47»W, 9 February 1959, *Cyrus L. Lundell 15427* (LL); Tikal National Park, Tikal, 17°13›30»N 89°36'47"W, 8 February 1959, *Cyrus L. Lundell 15408* (LL); Santa Elena, 16°55›16»N 089°53›27»W, 9 May 1966, *Elias Contreras 5719* (LL); La Candelaria, 16°56›46»N 89°56'14"W, August 1877, *K. G. Bernoulli & O. R. Cario 716* (MO); Dolores. Dolores, on Río Mopan Trail about 1.7-4.0 km SE, 16°32'22"N 89°22'44"W, 18 June 1961, *Elias Contreras 2475* (LL); Dolores, about 5 km SSE of the village, 16°28'55"N 89°23'01"W, 10 October 1961, *Elias Contreras 3044* (LL); Flores. m, *J. Morales & et al. 4984* (USCG); **HONDURAS. Atlántida:** Campamento Quebrada Grande ca. 10 km south west of La Ceiba. At base of north slope of Pico Bonito, from camp to 2 km south of camp. Río Bonito, forest above, and Cacao Plantation; 15°42'N 86°51›W, 80–140 m, 14 May 1993, *Ronald L. Liesner 26309* (MO); **Colón:** Trujillo. 1 August 1980, *Janice G. Saunders 520* (MO); Wooded areas along the Honduran coast, from 1.5 to 3 miles W of Trujillo, 15°54'11»N 085°59›09»W, 0–10 m, *Robert E. Murry 449* (MO); **Comayagua:** La Trinidad. Cerro El Portillo, 35 km N de Comayagua; 14°45›26»N 087°36'16"W, 500 m, 20 May 1982, *Maria Consuelo Alvarado 183* (MO); **Cortés:** Omoa. 2-3 miles southwest of Omoa on road from Puerto Cortes to Guatamalan border; sea level; pastures with few trees; 15°45'09"N 88°04'00"W, 0 m, 2 August 1977, *Thomas B. Croat 42559* (MO); **Gracias a Dios:** Brus Laguna. Alrededores el Río Plátano, dentro de 10 km de la costa atlántica, La Mosquitia; 15°30'N 84°40'W–15°55›N 85°00'W, 17 May 1973–23 May 1973, *Andre F. Clewell & Gustavo Cruz 4050* (MO); North shore of Ibans Lagoon, town of Belén; 15°53'53»N 084°46›47»W, 0 m, 28 March 1998, *F. Mejía s.n.* (MO); **Olancho:** Catacamas. Río Catacamas, slopes of Sierra de Agalto, 14°53'28»N 85°56›00»W, 600–1400 m, 25 February 1982, *Steve Blackmore & G.L.A. Heath 1917* (BM,MO); Dulce Nombre de Culmí. Río Pueblo Viejo, between Dulci Nombre de Culmi and La Colonia. Broadleaf riverine forest, 15°07'01"N 85°30'42"W, 520 m, 7 February 1982, *Steve Blackmore & G.L.A. Heath 1734* (BM,MO); **Yoro:** Yoro. Near Puente Grande, on a tributary of the Río Agua (Río Puente Grande); 15°16'04»N 86°59›41»W, 750 m, 22 May 1987, *Steve Blackmore & Mary Chorley 4072* (MO). **MEXICO**. **Campeche:** Mpio. Calakmul. A 2 km al W de Unión 20 de Junio (Mancolona), camino a La Nueva Vida. Selva mediana subperennifolia; 18°48›45»N 89°18'04"W, 396 m, 2 August 1997, *Esteban M. Martínez S., Demetrio Álvarez M. & Santiago Ramírez A. 27954* (MO); Mpio. Calakmul. A 1.5 km al W de 16 de September (Laguna de Alvarado). Selva baja

subperennifolia, inundable; 18°01›15»N 089°16›31»W, 198 m, 14 February 1998, *Esteban M. Martínez S., Demetrio Álvarez M., B. Sanders & I. Jiménez J. 30083* (MO); Mpio. Calakmul. En Central Chiclera Bonfil, a 12 km al NE de Calakmul. Secundaria de Selva mediana subperennifolia; 18°11›09»N 089°44›49»W, 172 m, 9 August 1997, *Esteban M. Martínez S., Demetrio Álvarez M., Santiago Ramírez A. & G. Bacab W. 28223* (MO); Mun. Calakmul. 17.1 km al N de Xpujil. Selva mediana subcaducifolia inundable; 18°39›40»N 89°24'27"W, 300 m, 21 February 2002, *J. Calónico Soto, Esteban M. Martínez S. & Demetrio Álvarez M. 21826* (MO); **Chiapas:** above Finca Cuxtepec, 15°43'48»N 92°57'36»W, 1380 m, *Dennis E. Breedlove & Frank Almeda 56959* (CAS); Escuintla. Cacaluta. Coste Circo dedos; 30 August 1947, *Eizi Matuda 17793* (MO); La Trinitaria. 15 km ENE of Dos Lagos above Santa Elena; 16°06'53»N 91°33›41»W, 1000 m, 29 December 1981, *Dennis E. Breedlove 56608* (CAS); Along Highway 190, between Guatemalan border at Cuauhtémoc (El Ocotal) and San Cristóbal de las Casas; 21.4 miles N of border, 22.3 miles S of Trinitaria, small ranch W of Highway; 15°52'48»N 92°00›00»W, 760 m, 14 February 1987, *Thomas B. Croat & Dylan P. Hannon 64831* (CAS,MEXU, MO); **Quintana Roo:** Mpio. Chetumal, 3.2-6.4 km N of Tomás Garrido on the road which joins Hwy 186 W of Nicolas Bravo. Tropical evergreen forest with Manilkara zapota, Brosimum alicastrum, Bursera simarouba, Lysiloma , Cecropia, etc. on a rounded limestone ridge. An uncommon perennial growing on trees; 18°04'48"N 89°03'36"W, 150 m, 14 March 1990, *Andrew C. Sanders & et al. 9853* (MO); Municipio Othón P. Blanco, Ejido Caobas; tintal (Selva Baja Inundable) en la vía a la Sabana del Jaguactal, un desvío de unos 7 km por carretera de terracería al oeste de la carretera hacia Tres Garantías, unos 21 km al sur de la carretera principal Xpujil-Chetumal. 18°46'48»N 88°59›24»W, 28 April 1999, *Germán Carnevali & et al. 5415* (MO); **San Luis Potosí**: Tamazunchale. Barrio de San Juan; 21°15›36»N 98°47'24"W, 19 July 1937, *Mary Taylor Edwards 581* (MO); **Tabasco:** From cultivated plant at Cornell U. Originally collected as Bunting & Davies no. 69, 12-25 S of Villahermosa; 17°50'24»N 92°55'12"W, 1–25 m, 13 June 1965, *George S. Bunting 1652* (MO); Parrilla, 11 km S of Villa Hermosa, 17°54'36»N 92°54'36»W, *Monroe R. Birdsey 256* (UC); (UC); Parrilla, 11 km S of Villa Hermosa, 17°54'36»N 92°54'36»W, *Monroe R. Birdsey 247* (UC); Huimanguillo. Km 15 de la desviación de Huimanguillo hacia Francisco Rueda; 17°50›24»N 093°32›24»W, 32 m, 12 June 1979, *Clark P. Cowan, M.A. Magaña A. & M.A. Bautista 2289* (MO); **Veracruz:** 6 km a la desviación a Rodriguez Clara-Isla. Selva sabanera., 18°03'36»N 095°30›36»W, 14 September1966, *Arturo Gómez Pompa & Javier Valdés 1727* (MO); Along secondary road between Jaltipan and Hidalgotitlán, 37 km W of Bridge over Río Chiquito ca. 11 km W of Jaltipan, 2 km W of Ixpuchapan; 17°45'35"N 094°43'30"W, 150 m, 5 March 2008, *Thomas B. Croat & Pedro Díaz Jiménez 100273* (MO); Mecayapan. In saddle between Volcán Santa Marta and Volcán San Martín Pajapan, 7.5 km (by road) NE of Tatahuicapan on dirt road to Benigno Mendoza. 19°18'36»N 096°45›36»W, 300 m, 16 July 1982, *Michael H. Nee 25086* (F,MO,XAL); Santiago Tuxtla. Vic. Pixixiapan, 2.5 km W of Tibernal and 20 km SW of Santiago Tuxtla. 18°19'48»N 95°25›48»W, 35 m, 5 Apr 1983, *Michael H. Nee & K. Taylor 26459* (XAL); **Yucatán:** Mun. de Valladolid. Xuilub. Forest more than 20 years (Nukuch k'aax), 8 km from Xuilub on the road to Xocen. 20°28'48»N 88°04›48»W, 25 m, 24 October 1989, *Birgitte Mogensen 1167* (AAU,MO); Izamal. Izamal., 20°56'00"N 89°01'00»W, *George F. Gaumer 1091* (G); Izamal, 20°56'00"N 89°01'00»W, *George F. Gaumer 1091* (MO); **NICARAGUA. Atlántico Norte:** Waspam, 14°45›N 83°41'W, 30 m, 24 July 1991, *Bruce Barrett 280* (WIS); Alamikamba, bluffs above Río Prinzapolka; pasture, 13°30'N 084°13›W, 20 m, 7 May 1978, *David A. Neill 3901* (MO); Municipio de Siuna, carretera Matagalpa-Siuna, Loma La Gloria, 13°41'N 084°56'W, 100–200 m, 8 January 1983, *F. Ortiz 628*

(IBE,MO); Dept. Zelaya. Regíon Autonmica Atlantica del Norte. E of the village of Karatá on the SE shore of Laguna Karatá, about 14 air km SSW of Puerto Cabezas, in dense inland forest, 13°55'30"N 83°29'00"W, 4 m, 18 March 1994, *James L. Reveal et al. 7383* (NY,MARY); Cerro Waylawás, summit of northern range; limestone peak, 13°39'N 84°49'W, 20–268 m, 12 March 1979, *John James Pipoly, III 4513* (MO); Along banks of Río Prinzapolka, 2 km S of Waní., 13°42'N 084°50›W, 100 m, 16 March 1979, *John James Pipoly, III 4745* (MO); Río Tronquera, at junction with carretera between Waspam and Puerto Cabezas; poorly developed gallery forest in savanna of *Pinus caribaea*, 14°43'N 084°06›W, 150–200 m, 4 March 1979, *John James Pipoly, III 4044* (MO); vicinity of Puerto Cabezas, 14°01'40"N 83°23'00"W, 0–20 m, 1 February 1977, *R. Van Stelle 35* (MO); **Atlántico Sur:** Vicinity of Base Camp (ca. 3.6 km due SE of Cerro San Isidro) and 0.3-0.8 km N of Base Camp, Río Kama, 12°17'N 084°01›W, 30 m, 7 March 1966, *George R. Proctor, Gayle C. Jones & Lynden Facey 27048* (NY); Monkey Point, en la costa 200 m al S[E], 11°35›50»N 83°39'40"W, 1-10 m, 26 October 1981, *P. P. Moreno 12525* (MO); Comarca Waslala, 6.5 km al SE de Waslala, 13°16'N 085°24'W, 520-560 m, 14 September 1982, *P. P. Moreno 17252* (MO); Bluefields, al SW del campo de aterrizaje, 11°59›N 83°46'W, 10 m, 2 febrero 1982, *P. P. Moreno 14641* (MO); Comarca Bodega, 30 km al NE de Río Blanco., 13°03'N 084°58'W, 80–100 m, 2 May 1984, *P. P. Moreno 24050* (MO); Monkey Point, 1.5 km al NW; pluvioselva., 11°40›20»N 83°40'20"W, 1–5 m, 21 October 1981, *P. P. Moreno & J. C. Sandino 11960* (MO); El Bluff, near Bluefields; sandy soil [Seymour series], 12°00'N 083°41'W, 10 m, 14 December 1968, *R.B. Hamblett 613* (MEXU); El Bluff, near Bluefields; sandy soil [Seymour series], 12°00'N 083°41'W, 10 m, 14 December 1968, *R.B. Hamblett 613* (MO); **Boaco:** Camoapa; city streets and hill side pasture [Seymour series][, 12°23'N 085°31'W, 550 m, 16 January 1970–17 January 1970, *Frank C. Seymour 3523* (MO); Cerro Mombachito, 8.5 km noroeste de Camoapa., 12°24›N 85°33'W, 900–1020 m, 24 January 1980, *M. Araquistain & P. P. Moreno 998* (MO); Piedra Sembrada, 5.5 km al N de Camoapa, 12°25›N 85°31'W, 520-560 m, 29 agosto 1981, *P. P. Moreno 10599* (MO); Cerro Mombachito, al SE de la ciudad de Boaco., 12°24›N 085°33'W, 900–1000 m, 10 May 1980, *P. P. Moreno 256* (MO); Cerro Mombachito, al SE de la ciudad de Boaco, 12°24›N 85°33'W, 900–1000 m, 30 September 1980, *P. P. Moreno 3172* (MO); Along Hwy. 33 ca. 3.1 km N of Hwy. 35 intersection, ca. 2.4 km N of Río Las Cañas; roadside, wet ditch, and remnant valley forest, 12°38'N 85°33›W, 275 m, 8 January 1978, *W. D. Stevens 5848* (MO); Along Hwy 33 from Río Quilán bridge to ca 0.5 km N of bridge; roadside and gallery forest., 12°35'N 85°32'W, 300-310 m, 16 July 1978, *W. D. Stevens 9323* (MO); **Carazo:** Vicinity of Jinotepe, 11°51'N 86°12›W, 600 m, 20 May 1947, *Paul C. Standley 8576* (F); **Chontales:** Punta Poderosa, 1845–1848, *A. S. Oersted s.n.* (C,MO); Camino a Cuapa, Paso El Portillo, ca 10 km al SW de ciudad Cuapa; bosque de galería, suelo rocoso, 12°14'N 85°25'W, 200 m, 1 Marzo 1984, *Alfredo Grijalva P. & D. Bradford 3630* (MO); 4 km NW of Villa Sandino (previously Villa Somoza) by road; gallery forest remnant among pasture, 12° 3'N 85°02›W, 100 m, 2 June 1985, *Gerrit Davidse, Alfredo Grijalva P. & Mario Sousa S. 30785* (MO); 1.5 km al este de San Pedro Lóvago, 12°07›N 85°07'W, 260–280 m, 6 April 1982, *P. P. Moreno 16057* (MO); 3 km al norte de Santo Tomás carretera a San Pedro Lóvago, 12°05›N 085°07'W, 280–300 m, 6 April 1982, *P. P. Moreno 16076* (MO); Vicinity of La Libertad; dry thickets, 12°13'N 85°10›W, 500–700 m, 29 May 1947–1 June 1947, *Paul C. Standley 8904* (F); 16.2 km N of Highway 7 on road to Cuapa; disturbed gallery forest along road, 12°14'N 085°24›W, 200–220 m, 15 February 1978, *Paul C. Vincelli 271* (MO); 2.8 km N of Cuapa., 12°17'N 85°23›W, 400–500 m, 21 January 1978, *Paul C. Vincelli 15* (MO); Cuapa [Seymour series], 12°16'N 85°23›W, 300 m, 8 December 1973–9 December 1973, *S.A. Marshall &*

David A. Neill 6661 (MO); Ca. 2.8 km above (N of) Cuapa., 12°17'N 85°23›W, 400–500 m, 4 September 1977, *W. D. Stevens 3628* (MO); Along road from Juigalpa NE toward La Libertad, ca. 17.4 km NE of Río Mayales, at ford of Río El Bizcocho; pastures, gallery forest and steep cliffs S of river, 12°12'N 85°17'W, 350–400 m, 23 September 1977– 25 September 1977, *W. D. Stevens 4091* (MO); Along road from Juigalpa NE toward La Libertad, ca. 16.9 km NE of Río Mayales, pasture with scattered trees., 12°12'N 85°17'W, 400 m, 25 September 1977, *W. D. Stevens 4204* (MO); From La Libertad-Santo Tomás road along road toward Llano Los Pedro El Juste y San Bartolo, 6 km from main road and at end of passable road; fencerow in rocky pasture, 12°08'08»N 85°13›07»W, 450 m, 14 May 2011, *W. D. Stevens 31561* (HULE); **Granada:** Río Manares, Hacienda Mecatepe; bosque de galería, 11°46'N 085°57›W, 50 m, 6 May 1983, *Alfredo Grijalva P. 2484* (MO); Isla Zapatera, costado SW de Hacienda El Cerro; Bosque húmedo tropical, altamente alterado por pastizales, 11°44'N 85°49'W, 500-625 m, 25 Noviembre 1982, *Alfredo Grijalva P. 1993* (MO); Finca Mecatepe, Río Manares, ca 18 km al S de Granada; bosque seco tropical, suelo predregoso de origen volcánico, 11°46'30»N 85°57'00"W, 50 m, 15 junio 1984, *D. Soza & Alfredo Grijalva P. 60* (MO); Municipio de Nandaime, Comarca Aguas Agrias, Finca Las Plazuelas, alrededor de la Laguna Aguas Calientes, Reserva Natural Laguna de Mecatepe y Río Manares, 11°46'N 85°58'W, 100 m, 13 May 2011, *I. Coronado G. & R. M. Rueda 6088* (HULE, MO); Isla Zapatera, noreste de El Cerro, 11°44'30»N 85°49'00"W, 300–625 m, 23 January 1982, *J. C. Sandino 2088* (MO); Isla Zapatera, Ensenada y Finca Sonzapote, 11°45›N 85°48'W, 40–60 m, 20 January 1982, *J. C. Sandino 1924* (MO); Charco Muerto, al sureste de Volcán Mombacho, 11°47'43»N 85°53'45"W, 30–35 m, 30 junio 1981, *J. C. Sandino & M. Guzmán 761* (MO); Al noreste de Wiwilí, camino entre El Carmen y Wamblán, a lo largo del Río Coco, 13°43'N 85°46'W, 250–400 m, 13 marzo 1980, *M. Araquistain & D. Castro C. 1792* (MO); Quebrada La Esperanza, al sureste de Wiwilí, 13°30'N 085°43'W, 500 m, 14 marzo 1980, *M. Araquistain & D. Castro C. 1967* (MO); Santa Gertrudis, 30 km al este de Jinotega; transición entre bosque tropical seco y bosque tropical semi-húmedo, 13°11'N 85°52'W, 1000 m, 20 January 1980, *M. Araquistain & P. P. Moreno 842* (MO); Macizos de Peñas Blancas, vicinity of Finca of Manuel Estrada (El Cielo); along and on steep slopes above Río El Gusaneras., 13°15›N 85°41'W, 1200–1400 m, 13 January 1979–18 January 1979, *W. D. Stevens 11661* (MO); Along road from Hwy. 3 through La Fundadora, between Las Camelias and La Salvadora; along small tributary of Río Jigüina with steep rock sides., 13°05'30"N 85°53'30"W, 1100–1150 m, 31 October 1979, *W. D. Stevens & Alfredo Grijalva P. 15304* (IBE,MO); **León:** Municipio de León. Reparto La Providencia., 12°26›N 86°53'W, 90 m, 1 April 2000, *R. M. Rueda & L. D. Paguaga 13240* (MO); **Managua:** Llanura de Managua, julio, 12°07›N 86°10'W, 80 m, 1930–1938, *A. Garnier 774* (US); Carretera Norte, between Managua and Tipitapa; swampy ground, roadside near drainage ditch [Seymour series (#)], 12°10'30»N 86°06›50»W, 40–50 m, 26 May 1976, *David A. Neill 400 (7260)* (HNMN,MO); 2 km NE of Escuela Nacional de Agricultura y Ganaderia, 14 km E of Managua, Route 1; roadside [Seymour series], 12°10'N 86°07›W, 50 m, 16 January 1969, *Frank C. Seymour 2228* (MO); Route 1, near Tipitapa; especially in Heliconia swamp [Seymour series], 12°12'N 86°06'W, 40 m, 31 December 1969–15 January 1970, *John T. Atwood 3424* (MO); 2 km NE of Escuela Nacional de Agricultura y Ganaderia, 14 km E of Managua, Route 1; roadside [Seymour series], 12°10'N 86°07›W, 50 m, 16 January 1969, *John T. Atwood 2221* About 34 km. southwest of Managua on Pan American Highway beyond Casa Colorada, 11°55'N 86°16'W, 550 m, 23 July 1923, *Monroe R. Birdsey 323* (US); **Matagalpa:** Summit of El Tuma Road, 12°57'N 085°51›W, 1000–1100 m, 16 March 1977, *David A. Neill 1572* (MO); Municipio

de Matiguás, Cerro Quirragua, 12°55›N 85°29'W, 400 m, 5 August 2012, *I. Coronado G., R. M. Rueda & J. Reyes 6812* (HULE,MO); Norte de Ciudad Matagalpa, empalme a Tepeyac y a La Estrella, 13°01'N 85°50'W, 780–800 m, 25 febrero 1982, *J. C. Sandino 2279* (MO); Falda noroeste del Cerro Musún, trocha de Palán., 12°59'N 85°17'W, 300–600 m, 14 May 1980, *M. Araquistain & P. P. Moreno 2418* (MO); Falda norte del Cerro Musún, frente a trocha a Wanawás., 13°02›N 85°15'W–13°03'N 085°15'W, 300–500 m, 16 May 1980, *M. Araquistain & P. P. Moreno 2699* (MO); Falda norte del Cerro Musún, frente a trocha a Wanawás., 13°02›N 85°15'W–13°03'N 085°15'W, 300–500 m, 16 May 1980, *M. Araquistain & P. P. Moreno 2746* (MO); Falda norte del Cerro Musún, frente a trocha a Wanawás., 13°02›N 85°15'W–13°03'N 85°15'W, 300–500 m, 16 May 1980, *M. Araquistain & P. P. Moreno 2800* (MO); Al noroeste del Cerro Musún, sobre el filo de la montaña, en el área faldar, a partir trocha a Paylo., 13°00›N 85°15'W, 500–800 m, 15 May 1980, *M. Araquistain & P. P. Moreno 2573* (MO); **Nueva Segovia:** Along Río Solonlí (or Río Arriba de Jalapa), ca 5 km N of Jalapa; gallery forest and riverine vegetation, 13°57'N 86°08›W, 700–950 m, 5 April 1977, *David A. Neill 1608* (MO); 7 km sureste de Santa Clara, al lado del camino., 13°40'N 86°14'W, 600–700 m, 17 April 1980, *M. Araquistain & P. P. Moreno 2189* (MO); El Jícaro, Los Bancos, Río Sucio, 13°44'N 86°08'W, 540–560 m, 28 December 1980, *P. P. Moreno 5666* (MO); **Río San Juan:** Oeste de San Carlos., 11°07›45»N 84°46'45"W, 30–35 m, 17 December 1981, *J. C. Sandino 1784* (MO); Río Indio, Caño Negro., 11°02›N 83°54'W, 0–5 m, 04 December 1982, *M. Araquistain 3427* (MO); San Juan del Norte, lado este., 10°55›N 83°42'W, 0–5 m, 2 December 1982, *M. Araquistain 3396* (MO); Caño El Roble, 11°03'N 84°30'W, 40 m, 25 February 1984, *P. P. Moreno 23372* (MO); Between Río Santa Cruz and Caño Santa Crucita, La Palma; tall evergreen forest, 11°02'N 84°24'W–11°04›N 084°26›W, 40–60 m, 30 November 1984, *W. D. Stevens, O. M. Montiel J. & W. Robleto T. 23409* (MO); **Rivas:** 1856, *Charles (Carlos) Wright s.n.* (US); Isla de Ometepe, lado norte del Volcán Concepción, entrada a Los Angeles, 11°33'N 85°37'W, 400–460 m, 12 marzo 1981, *J. C. Sandino 517* (MO); Isla Ometepe, Balgüe, 11°29'N 85°30'W, 40-100 m, 18 January 1983, *P. P. Moreno 19665* (MO); Municipio de Tola, comunidad de El Brito, 11°22'16»N 85°56›50»W, 10 m, 30 November 2013, *R. M. Rueda et al. 19318* (HULE,MO); Municipio de Cárdenas, desambocadero del Río Sapoá, 11°15›05»N 85°36'30"W, 35 m, 11 May 2014, *R. M. Rueda et al. 19986* (HULE,MO); **PANAMA**. **Canal Area:** Steven's Circle, Balboa, 8°57'N 79°34›W, 25–50 m, 29 March 1970, *Thomas B. Croat 9181* (MO,SCZ); Summit Garden, 09°03'52»N 79°38›58»W, 75 m, 31 August 1971, *Thomas B. Croat 17059* (MO); **Colón:** Distro de Donosa. Area de concesion Minera Panama. Coastal road. Rio Medio., 28 January 2014, *Orlando Ortiz, Riccardo M. Baldini & Batista, J. 1959* (MO).

Syngonium armigerum (Standl. & L.O.Williams) Croat, Ann. Missouri Bot. Gard. 68: 585. 1982. Fig. 16–21. — *Philodendron armigerum* Standl. & L.O.Williams, Ceiba 3: 107. 1952. — Type: COSTA RICA. Limón?: on hills near Moravia, 1300 m. 7 April 1949, *L.O. Williams 16170* (holotype, US, transferred from EAP; isotype, MO). See notes below under Comments on the location.

Scandent nomadic vines; stems 5–6 mm diam., drying brown with longitudinal wrinkles; internodes 2–4 cm. LEAVES persisting at all nodes at least in the upper 30 cm of stem; **petioles** 5–7 cm, (that of the leaf subtending inflorescence to 10 cm), sheathed nearly to the apex, sheath 5–7 mm wide when flattened, emarginate at apex; **blades** 8–15 cm long, 3–6 cm

wide, simple, oblong to oblong-elliptic, acute to narrowly rounded at apex, apiculate, weakly lobed at base, membranous, dark green and subvelvety above, heavily tinged purple-violet below; posterior lobes broadly triangular or rounded, obtuse, lower surface with obscure black punctations, 5–7 veined at base; **primary lateral veins** 5 or 6 per side, all arising in the basal half of blade, ascending at a sharp angle to near the apex, each forming a separate collective vein; tertiary veins distinct. INFLORESCENCES usually one per axil; **peduncle** to 5.3 cm long, 5 mm diam. (dried); **spathe** dark violet purple on both surfaces of tube, greenish white on blade outside; **spadix** 8.7–9.0 cm long, staminate spadix 6.7–7.2 cm long, 0.8–1.8 cm diam.; sterile staminate segment 1.2 cm long, 0.7 cm diam. at base, the lower few spirals of staminodia subrounded to bluntly quadrangular, to 3 mm diam., mostly rounded-prismatic to trapezoidal higher up, drying yellow-brown, truncate, weakly granular; pistillate segment 1.5–1.7 cm long, 0.7 cm diam. at base, 0.8 cm diam at apex, bluntly ounded at apex; stigmas depressed globose, ca. 1 mm diam. **syncarp** coriaceous, ca. 7 cm long. Flowers known from June & August; fruits from April. **Figures 16–21.**

Distribution — *Syngonium armigerum* ranges from Costa Rica to Panama at 290–1300 m elevation in areas of *Premontane wet forest* and *Premontane rain forest*.

Comments — The species is a member of section *Cordata* and is characterized by its long sender brown-drying internodes, weakly sheathed petioles with sheath emarginate at apex, simple, oblong to oblong-elliptic blades which are acute to narrowly rounded at and apiculate at apex, weakly lobed at base, 5 or 6 primary lateral veins per side arising in the basal half of the blade, one short-pedunculate inflorescence per axil, spathe dark purple-violet on both surfaces of tube, blade greenish white outside.

The collecting locality of the Williams' material that forms the type of *S. armigerum* has been open to doubt., in particular the elevation (1300 m) on Williams's label. Mike Grayum (MO) gave the folliwng account of the possible true locality: There are numerous places in Costa Rica called 'Moravia', with that in Limón Province located at about 150 m elevation, more than 1000 m lower than that specified on the label. However, it is not inconceivable that *Syngonium armigerum* could grow in the vicinity of the lower-elevation (Limón) Moravia, especially on the nearby hills, because it has been collected down to as low as 290 m, and perhaps even lower. In fact, *Hammel & Chavarría 17068*, a superb fertile specimen of *S. armigerum*, was collected at 200–500 m (according to its) label, in Limón Province, not far from Moravia de Limón. Furthermore, 1300 m would be an unusually *high* elevation for *S. armigerum*, which has not otherwise been found above 900 m in Costa Rica. One can imagine that Williams did not get the elevation exactly right, but he was not likely off by 1000 m! Another explanation might be that Williams may have been at 'Moravia de Chirripó' which is at a similar elevation (1126 m), albeit in Cartago Province. Indeed, *Syngonium armigerum* could conceivably be found anywhere between the two Moravia's, but it is the association, on Williams's label, of the place-name 'Moravia' with the elevation '1300 m' that implicates Moravia de Chirripó (Prov. Cartago). Another bit of evidence corroborating the 'Moravia de Chirripó' hypothesis is that Williams's very next collection number, *16171*, from the same site and elevation, is a specimen of *Philodendron brenesii* Standl. There are no records of *P. brenesii*, in any part of its geographic range, from below 800 m (and it extends upslope to perhaps 1000 m above the elevation of Moravia de Chirripó). So, the chances of it occurring anywhere near the low-elevation Moravia de Limón are essentially nil. There is also a 1984 collection of *P. brenesii* (*Thompson & Rawlins*

1230) from Prov. Cartago, in the Cantón de Turrialba (which includes Moravia de Chirripó), at 1150 m. In my mind, at least, there can be no doubt that Williams was near Moravia de Chirripó, and simply got the province wrong, which is understandable (indeed, Moravia de Chirripó is in far eastern Prov. Cartago, not far from the Limón border).

Additional specimens seen — COSTA RICA. **Heredia:** Forest between Río Peje & Río Sardinalito, Atlantic slope of Volcán Barva, 10°17'30»N, 84°04'30"W, 700–750 m, 2 April 1986, *Michael H. Grayum 6677* (MO); La Zona Protectora, Northern slopes Volcán Barba, between Río Peje and Río Guacimo, at edge of desmonte between Río Guacimo and Río Sardinal, 10°16'12»N, 84°04›12»W, 900 m, 22 January 1983, *Michael H. Grayum & George E. Schatz 3260* (DUKE, MO); **Limón:** Ridge E of Río Pacuare; in forest and along road to ca. 15 km S of Pacuarito, in vicinty of community of Las Brisas, 10°00'N, 83°30'W, 200-500 m, 27 June 1988, *Barry E. Hammel & María Marta Chavarría 17068* (CR, MO); Zona Protectora Barbilla, W side of plateau separating headwaters of north fork of Río Dantas from headwaters of Quebrada Barreal, Río Barbilla drainage (SE of Siquirres), 10°00›30»N, 83°28'30"W, 600-660 m, 11 January 1987, *Michael H. Grayum, Pamela J. Sleeper, Fred Field & W. John Kress 7924* (MO). NICARAGUA. **Río San Juan:** Reserva Indio-Maiz, Municipio de San Juan del Norte, Cerro el Gigante, 10°46›N, 83°53'W, 412 m, 24 September 1998, *R. M. Rueda, I. Coronado G. & Y. Rubi 8976* (HULE, MO). **PANAMA**. **Chiriquí**: Origin Panama. Chiriqui vic. Fortuna Dam, collected by N. Cutter, 1100 m, 20 September 2005, *Thomas B. Croat 95565* (MO); **Colón:** Donoso, Teck Cominco Petaquilla mining concession, 08°49'52»N, 80°41›05»W, 290 m, 28 June 2008, *Gordon McPherson 20717* (MO).

Figure 16: *Syngonium armigerum*. Stem, Leaves, Inflorescence. *Grayum 6677,* Heredia, Costa Rica. Photo, M. Grayum

Figure 17: *Syngonium armigerum*. Stem, leaves, inflorescence. Grayum 6677, Heredia, Costa Rica. Photo, M. Grayum

Syngonium auritum (L.) Schott, Wiener Z. Kunst 1829(3): 780. 1829. — *Arum auritum* L., Syst. Nat. ed. 10, 2: 1251. 1759.. — *Caladium auritum* (L.) Vent., Descr. Pl. Nouv. sub t. 30. 1801 & in Willd., Spec. Pl., ed. 4, 4(1): 491. 1805. — Type: *P. Browne,* Herb. Linn. No. 1079.18 (lectotype, LINN, designated by Croat, 1982, '1079.17').

Syngonium plumieri Schott, Syn. Aroid.: 66. 1856. — Type: '*Arum hederaceum, triphyllum et auritum*' Plumier, Descr. Pl. Amer.: t. 58. 1693 (lectotype, designated here).

Juvenile plants with stems scandent; blades ovate, acute at the apex, sagittate to hastate at the base. Adult stems hemiepiphytic, somewhat scandent, slightly glaucous, 1.5-2.0 cm diam.; internodes 4-9 cm long, with one large feeding root and several clasping roots per node. LEAVES with **petioles** 15–48 cm long, broadly sheathed usually 4/5 their length (rarely to 2/3); **blades** usually trisect or sub-5-pedatisect, rarely 5-pedatisect, the lobes confluent, the median lobe 10-30 cm long, 6-20 cm wide, broadly elliptic, abruptly acuminate at the apex, the base obtuse, the tissue continuous with the lateral lobes, the first pair of lateral lobes ovate to elliptic, 6-21 cm long, 3-11 cm wide, acute at the apex, strongly inequilateral, usually conspicuously auriculate on the outer side at the base, the auricle sometimes free, then 4-10 cm long, to ca. 4 cm wide, the upper surface semiglossy, medium green, the lower surface paler; primary lateral veins mostly 5-7 per side, joining the midrib at 20-45° angle. INFLORESCENCES to 3 per axil; **peduncle** 7-13 cm long; **spathe** 16.2–26.5 cm; spathe tube cylindroid, 4.2-8.5 cm long, 1.0-1.9 cm diam., dark green outside, green inside with a suffusion of bronzy red at the base;

Figure 18: *Syngonium armigerum*. Closeup of open inflorescence, *Grayum 6677*, Heredia,

Figure 19: *Syngonium armigerum*. *Grayum 6677*. Photo, M. Grayum

Figure 20: *Syngonium armigerum*. Juvenile leaves, *Rueda 8976*, Nicaragua

Figure 21: *Syngonium armigerum*. *McPherson 20717*, Panama

spathe blade ovate in outline when opened, mucronate at the apex, conspicuously constricted at base, 12-18 cm long, 7-10 cm wide (flattened), creamy white on both sides, sometimes greenish white on the outside and creamy white tinged faintly with violet-purple to dark purplish reddish within; **spadix** 6.9-14.0 cm long, extending to ½ as long as the spathe blade; pistillate portion of the spadix medium yellow-green, 3.4-4.8 cm long, 9-12 mm diam., the flowers mostly rhombic to 5- or 6-sided, the stigma discoid, dark yellowish green; staminate portion of the spadix 3.5-9.2 cm long, rounded at the apex, slightly attenuate toward the apex, the sterile staminate section 7-17 mm long, creamy white to yellowish, oblong, slightly attenuate at the apex, the sterile staminate flowers larger and more irregular than the fertile staminate flowers, the fertile staminate flowers 2-5 (usually 4), the synandrium retuse at apex, the stamens fused together only on the inner side. INFRUCTESCENCE pendent; **syncarp** 7.0-7.8 cm long, 1.4-2.0 cm diam. According to Birdsey (1955) the species may flower all year, but no particular individual is in flower continuously. **Figures 22–30.**

Distribution — The species is known from Jamaica, Cuba, and Hispaniola in the West Indies.

Comments — It is the type species for the genus. The species can be recognized by its elongate spathe tube and the spathe blade which is up to twice as long as the staminate part of the spadix. An unnumbered Hitchcock collection at MO (MO-3271560) from Lucea, Jamaica, is anomalous in having the median lobe with a conspicuously sinuate margin. The species frequently has weakly irregular margins and the Hitchcock collection seems merely to be an exaggeration of this character.

Additional Specimens seen — CARIBBEAN. Dominican Republic: Peravia. Rio Yuboa, donde la carretera crusa el rio entre Rincon de Yuboa y Rnacho Arriba, o 10 km de la carretera Duarte (Santo Domingo-Santiago) en la carretera a Rincon de Yuboa y Rancho Arriba, 18°47'N 70°22›W, 400 m, 3 Sept. 1982, *Thomas A. Zanoni & et al. 23125* (MO); **Jamaica:** Port Antonio., 27 December 1890, *A.S. Hitchcock s.n.* (MO); Lucea., January 1891, *A.S. Hitchcock s.n.* (MO); Bog Halk., 17 December 1890, *A.S. Hitchcock s.n.* (MO); 07 January 1891, *A.S. Hitchcock s.n.* (MO); Luceas., *A.S. Hitchcock s.n.* (MO); Port Antonio., 26 December 1890, *A.S. Hitchcock s.n.* (MO); Luceas., 05 January 1891, *A.S. Hitchcock s.n.* (MO); Blue Mountains Parish. Portland, Stony River Base Camp., 1250 ft, 22 December 1973, *Brian D. Morley 708* (MO); Jamaica: N.W. coast W. of Montego Bay., 19 November 1979, *Monroe R. Birdsey 11-19-79A* (MO); Manchester. 2 miles due northwest of Mile Gully P.O., 1200 ft, 10 November 1979, *George R. Proctor 38363* (MO); Portland. Near Reach, W of Manchioneal, headwaters of Drivers River. Disturbed wet forest along small river., 18°02'00»N 76°18›00»W, 31 January 1980, *Alwyn H. Gentry 28279* (MO); Blue Mountains. Stony River Base Camp., 1250 ft, 20 December 1973, *Brian D. Morley & Caroline Whitefoord 686* (MO); Lower Swift River, Study Site 2 of Ecological Survey, Blue Mt. Multipurpose Project., 1000 ft, 20 October 1983, *Peter K. Bretting J-300* (MO); St. Thomas. Along track between Rowlandsfield and Big Level. John Crow Mts., 1800 ft, 15 June 1976, *Robert F. Thorne 48309* (MO); Trelawny. Cockpit Country, dirt road ending at Crown Lands., 18°15'N 077°39'W, 640 m, 13 Jan 1993, *Douglas C. Daly & Walter H. Lewis 7607* (NY); Cockpit Country, just N of Wilson Run, 5.8 miles N of bridge at Troy, Cultivated at MO., 500 m, 04 May 1981, *Marshall R. Crosby 13981* (MO); **Puerto Rico:** 0.1 mi on Rte 675 from junction with Rte. 676. Roadside., 18°24'N 066°22'W, 20 m, 31 December 1980, *James C. Solomon 5735* (MO); Km. 3.6 on Rte. 191, S of Mameyes.

Figure 22: *Syngonium auritum*. Habit of cultivated plant, Leaf adaxial surface, Kew Gardens

Sierra de Luquillo. Edge of orange grove with a few large trees., 18°19'N 065°46'W, 110 m, 27 December 1980, *James C. Solomon 5676* (MO); **COSTA RICA. Heredia:** La Tirimbina, 10°23›24»N 84°06'36"W, 220 m, 22 Feb. 1990, *J.R. Hunter 818* (WIS).

Syngonium bastimentoense O.Ortiz & Croat, Novon 27: 56, figs. 18–20. 2019. — Type: PANAMA. Bocas del Toro: Parque Nacional Bastimento, Area boscosa cerca del pueblo, bosque secundario, 09°18'56"N, 82°08'52"W, 49 m, 6 October 2013, *O.Ortiz, A. Zapata, J. Timoteo & R. Smitt 1719* (holotype, PMA-0107554).

Nomadic vine; appressed-climbing; sap milky; internodes longer than broad, epidermis drying yellowish brown, tightly, prominently and irregularly acute-ribbed, these finely and minutely granular. LEAVES with **petioles** 26.5 cm long, sheathed to 15 cm, ca half its length, coarsely ribbed with surface minutely and closely ribbed, matte; sheath acute at apex, margin persisting intact; **blades** trisect, 30.5 cm long, 30 cm wide, about at long as broad, dark green and matte above, moderately paler and weakly glossy below, drying matte greenish gray above, much paler and weakly glossy below, narrowly long-acuminate at apex, acute at base; medial lobe 26 cm long, 10.2 cm wide, markedly inequilateral, one side 4 cm narrower; lateral lobes inequilateral, 7 cm wide (one side 1.6 cm wider), bluntly acute at apex, markedly auriculate on outer margin at base; auricle 4.7 × 1.7–1.9 cm, constricted to 9–12 mm wide; **primary lateral veins** 13 to 14 per side, departing midrib at 45°–50°; primary collective veins 8 to 12 mm from margin. INFLORESCENCE solitary; **peduncle** 4.5 cm long, 4 mm diam., drying dark brown; **spathe** 8 cm long; tube 3.7 cm long, 1.7 cm diam., spathe blade green, drying

Figure 23: *Syngonium auritum*. Habit of cultivated plant; Lyon Botanical Garden. Photo, D. Scherbereich

Figure 24: *Syngonium auritum*. Inflorescence with tube cut open

Figure 25: *Syngonium auritum*. *Proctor 38363*, Jamaica

Figure 26: *Syngonium auritum*. *Solomon 5735*, Puerto Rico

Figure 27: *Syngonium auritum*. *Solomon 5735*, Puerto Rico

Figure 28: *Syngonium auritum*. *Birdsey s.n.*, Caribbean

Figure 29: *Syngonium auritum*. *Birdsey s.n.* Jamaica

Figure 30: *Syngonium auritum*. *Zanoni et al. 23125*, Dominican Republic

dark brown, matte; **spadix** drying brown, 5.8 cm; staminate portion 4.6 cm; sterile staminate portion 1.4 cm, 1 cm diam. at base, tapering slightly upward, staminodia 1.5–2.0 mm diam., subrounded; pistillate portion 1 cm in front, 7 mm in rear, 5.5 mm diam. **Figures 31 & 32.**

Distribution — *Syngonium bastimentoense* is endemic to Panama, known only from the type locality in Bocas del Toro Province at 49 m elevation in *Tropical moist forest* life zone.

Comments — *Syngonium bastimentoense* is a member of section *Syngonium* and is characterized by tri-lobed, greenish gray–drying leaf blades with prominently and narrowly auriculate lateral lobes and solitary short-pedunculate green inflorescences. The species most closely resembles *Syngonium hoffmannii* Schott, which differs by having glaucous stems and petioles, blackish drying blades, up to three inflorescences per axil, and the spathe surface purplish outside.

Syngonium bastimientoense also resembles *Syngonium mauroanum* Birdsey ex G.S.Bunting, but that species differs by having the auricle on the lateral lobes broad and more or less triangular. In Croat's *Syngonium* revision (Croat 1982), the species would key out as *S. triphyllum* Birdsey ex Croat, which differs in having sharply triangular petioles with prominently raised margins, lacking conspicuous auricles on the lateral lobes, and having more numerous and more closely spaced primary lateral veins.

Syngonium brewsterense Croat & Delannay, Novon 27(1): 56–58, fig. 20. 2019. — Type: PANAMA. Kunayala: Cerro Brewster, 800–850 m, 20 November 1985, *G. de Nevers, A. Henderson, H. Herrera, G. McPherson & L. Brako 6304* (holotype, MO, barcode MO-2295221, acc. 3320660; istotypes, K, PMA).

Nomadic vine, appressed- climbing; internodes 1.7–4.0 cm, drying 0.7–1.7 cm diam., deeply acute-ribbed, yellow- brown. LEAVES with **petioles** 21.5–45.5 cm, sheathed to within 2.0–3.3 cm from base of blade; free part drying sulcate; sheath erect, to ca. 6 mm high, somewhat free-ending, drying dark brown with sheath margins intact; **blades** narrowly sagittate-hastate, 27–35 cm long, 11.5–15.5 cm wide, (1.8)2.0–2.2 times longer than wide, broadest across tips of posterior lobes, acuminate at apex, 0.6–0.9 times as long as petioles, drying very thin and brittle, brownish and matte on upper surface, grayish yellow-green and semiglossy on lower surface; anterior lobe 22–28 cm wide, 7–10 cm wide in lower 1/3, somewhat constricted at or slightly above petiolar plexus and 6.0–9.5 cm wide; posterior lobes 7.8–9.8 cm long, 3.2–4.0 cm wide across broadest part of lobe on auricle, narrowly rounded at apex, moderately auriculate on lower margin; sinus 4–6 cm deep, 1.7–2.3 cm wide above auricles, spathulate to subrhombic; **primary lateral veins** 5 or 6 per side, lowermost to 30°, upper ones to 50°–60°; tertiary veins moderately distinct below, not markedly raised. INFLORESCENCES paired; **peduncle** 6–8 cm, 3–4 mm diam.; mature **spathe** 19 cm, spathe blade moderately coriaceous, persisting for a time on fruiting spadix; **spadix** ca. 17 cm long post-anthesis; staminate portion rotten, spathe tube 8–9 cm, 4.3–4.6 cm diam., green outside, red inside. INFRUCTESCENCES with **syncarp** 6.0–7.5 cm; seeds gray, 6–7 mm long, 3.5–4.0 mm

Figure 31: *Syngonium bastimentoense*. Habit of flowering plant. *Ortiz 1719*, Panama. Photo, O.O. Ortiz

diam., ovoid to ellipsoid. Fruiting in late November. **Figure 33.**

Distribution — *Syngonium brewsterense* is endemic to Panama, known only from the type locality on Cerro Brewster in Comarca Kunayala at 800–850 m in a *Premontane rain forest* life zone.

Comments — The species is a member of section *Cordata* and is characterized by its deeply acute-ribbed, yellow- brown internodes, petioles sheathed to near the base of blade with a somewhat free-ending, intact sheath, the narrowly sagittate-hastate acuminate blades which are shorter than the petioles and dry very thin and brittle, brownish and matte on upper surface, grayish yellow-green and semiglossy on lower surface and are somewhat constricted near the petiolar plexus, the posterior lobes moderately auriculate on lower margin as well as by the spathulate to subrhombic sinus, the paired, moderately short-pedunculate inflorescences with a large, moderately coriaceous, green spathe tube (red on inside) with gray-seeded berries.

Figure 32: *Syngonium bastimentoense*. Type, *Ortiz 1719*, Panama

Figure 33: *Syngonium brewsterense*. *DeNevers 6304*, Panama

The species is most similar to *S. hastiferum* from Costa Rica which differs by having its leaf blades narrowly ovate-elliptic and scarcely or not at all constricted at the base of the anterior lobe with a sinus that is very narrow at the apex then flaring out, as well as by its 3 or 4 pairs of basal veins and about 13 primary lateral veins per side.

The sterile collection of *S. brewsterense* (*Croat & Grayum 59733)* was included by Grayum as *S. castroi* in his treatment of *Syngonium* for the *Manual de Plantas de Costa Rica* (Grayum, 2003) based on its leaf shape and proximity to the type.

Syngonium castroi Grayum, Phytologia 82(1): 52. 1997. — Type: COSTA RICA. Puntarenas: P.N. Corcovado, Cerro Brujo, 08°38'N, 83°35'W, 600 m., 23 January 1991, *E. Castro 242* (holotype, USJ-49640).

Nomadic vine; stems appressed-climbing; LEAVES with **petioles** (9)20-21 cm, sheathed for 75–100% their total length, the cross-sectional shape unknown; **blades** simple, 17.6-32.9 long, 4.9-7.4(8.6) cm wide, lanceolate to lanceolate-elliptic or oblanceolate, cuneate or rounded to the minutely auriculate base (auricles to ca 4.5 x 3.5 mm directed more or less backward), brittle; primary lateral veins [2]8-9 per side. INFLORESCENCES 3 per axil; **peduncle** to at least 6.3 cm; **spathe** white; **spadix** ca 3.8 x 0.9 cm, yellow. Ripe fruits unknown. Fruiting in January. **Figures 34–36.**

Distribution — The species is endemic to Costa Rica, known only from the Osa Peninsula (and at the head of Golfo Dulce) in Puntarenas Province in Costa Rica, 600 m occurring in a *Tropical wet forest transition to Premontane wet forest* life zone.

Comments — *Syngonium castroi* is a member of sect. *Cordata* and is characterized by simple, narrow leaf blades that are minutely auriculate at the base, and by its small, apically subtruncate spadices. The species with the most similar leaf blade is the Panamanian *S. llanoense* Croat which differs in having the petiole sheath virtually always extending to the leaf base, and by its much larger inflorescences, usually more than twice as long as that of *S. castroi*. *Syngonium castroi* is also similar to the sympatric *S. laterinervium* Croat but the latter also has larger inflorescences (in addition to consistently trifoliolate leaf blades).

Additional Specimen seen — COSTA RICA: Puntarenas, Osa Peninsula, R.F. Golfo Dulce a 10 km de Chacarita, 1 March 1985, *T.B. Croat & M.H. Grayum 59733* (CR, MO); Sierpe, Rincon, centro del pueblo, 24 December 1997, *R. Aguilar 5333* (CR).

Syngonium chiapense Matuda, Revista Soc. Mex. Hist. Nat. 11: 94–95. 1950. — Type: MEXICO. Chiapas: Piedra de Huixtla, 24 km NW de Huixtla, en montaña sombreada de 800–900 m, 20 Jan 1949, *E. Matuda 18619* (holotype, MEXU).

Syngonium llamasii Matuda, Cact. Suc. Mex. 2: 79. 1957. — Type: MEXICO. Chiapas: El Suspiro, cerca de Ocozocuatla, en bosque húmedo, alt. 600 m, 15 April 1957, *E. Matuda 32637* (holotype, MEXU).

Figure 34: *Syngonium castroi*. Type, *E. Castro 242*, Costa Rica

Figure 35: *Syngonium castroi*. Type*, E. Castro 242*, Costa Rica

Figure 36: *Syngonium castroi*. *Aguilar 5333,* Costa Rica

Nomadic vine; juvenile plants with glaucous stems; internodes 5–23 cm long, less than 1 cm wide; petioles sheathed 1/2–3/4 their length, blades ovate-cordate, 9–30 cm long, 5–17 cm wide, acuminate at apex. Adult plants with stems green, usually glaucous; internodes 12–20 cm long, becoming closer at apex, 2–6 cm long, 2.5–4.0 cm diam. LEAVES with **petioles** 30–60 cm long, sheathed about 4/5 their length, subterete above sheath, weakly flattened on upper surface; blades ovate-cordate to 3-lobed, abruptly acuminate to obtuse-mucronate at apex, entire blade with anterior lobe 28–65 cm long, 18–35 cm wide, broadest at about middle, only slightly or not at all constricted at base; posterior lobes rounded or sub-hastate; upper surface matte, seldom weakly glossy, lower surface matte, much paler; sinus very narrow or open and broader than deep; posterior rib sometimes naked 5–20 mm; 3-lobed blades with anterior lobe broadly ovate, 28–52 cm long, abruptly constricted at base and confluent with posterior lobes, the latter ovate to obovate, 10–20 cm long, directed backwards or at ca. 90° angle to anterior lobe, acute to narrowly rounded at apex, bluntly auriculate at base on lower side; **primary lateral veins** mostly 5–8(10) per side, slightly sunken, convexly raised, tertiary veins clearly visible. INFLORESCENCES 1–3 per axil; **peduncle** to ca. 10 cm long and erect at anthesis, green and glaucous, 12–18 cm long and pendent in fruit; **spathe** tube ellipsoid to oblong-ovoid or cylindroid, greenish outside, glaucous, 5–7 cm long, to 3 cm diam. inside, yellowish white at base, purplish at apex; spathe blade broadly elliptic, white, shortly cuspidate at apex, 5–9 cm long, 5–7 cm wide; pistillate portion of **spadix** 3–4 cm long, ovary ca. 5 mm long, 3 mm wide; staminate portion of spadix ca. 5–9 cm long, to 1.5 cm diam., staminate flowers ca. 3 mm long, anthers 4, cross-shaped. INFRUCTESCENCES usually rather massive, bluish glaucous, more or less ellipsoid, ca. 8–10 cm long, 4.5–5.0 cm diam. *Tropical moist forests, Tropical wet forests*. Flowers February, April, June-July. Fruits May-July (September). **Figures 37–48**.

Distribution — *Syngonium chiapense* ranges from Mexico (Chiapas, Oaxaca, Tabasco & Veracruz) to Guatemala (Alta Verapaz) at 10–1240(1600) m.

Comments — The species is a member of section *Syngonium* and is characterized by its usually glaucous stems, moderately elongate internodes, petioles sheathed about 4/5 their length, moderately coriaceous, ovate-cordate to 3-lobed blades, with the anterior lobe broadest at about middle and only slightly or not at all constricted at base with mostly 5–8(10) primary lateral veins per side, 1–3 inflorescences per axil, the spathe greenish and glaucous outside, yellowish white at base, purplish at apex inside as well as by a massive, bluish glaucous, ellipsoid infructescences.

The species is probably most easily confused with *Syngonium schottianum* but that species differs by its non-glaucous stem and a less coriaceous blade that is whitish on the lower surface.

Additional Specimens seen — **GUATEMALA. Baja Verapaz:** Purulha. On Highway CA-14 to Cobán, 3 miles south of Purulhá., 15°12’52”N 090°12’28”W, 1500 m, 16 July 1977, *Thomas B. Croat 41218* (MO); **MEXICO. Chiapas:** NE of Tuxtla Gutierrez, 16°45›00»N 93°06’36”W, 900 m, *Monroe R. Birdsey 266* (UC); Ocozocoautla de Espinosa. 20 mi N of Ocozocouatla along gravel road to Apitpac, near km 31 marker., 16°58’15»N 93°30›10»W, 700 m, 09 July 1977, *Thomas B. Croat 40662* (MO); Along dirt road between San Fernando

Figure 37: *Syngonium chiapense*. Habit, *Croat & Hannon 65008*, Mexico

and Maravillas (near Lago Malpaso), 4-66 miles NW of San Fernando., 16°52'48»N 93°15›36»W, 840–940 m, 15 February 1987, *Thomas B. Croat & Dylan P. Hannon 65008* (CAS,EMCB,M,MO, MEXU,VDB); **Oaxaca:** Mountain slopes between 6 and 14 miles from bridge at Valle Nacional on road to Oaxaca., 580 m, 23 September 1961, *Harold E. Moore & George S. Bunting 8895* (MO); [Mun. San Juan Bautista Valle Nacional]. 4.5 mi S of Valle Nacional, on steep hills above Highway 175 between Tuxtepec and Oaxaca, 17°43'48»N 96°19›12»W, 430 m, 29 June 1977, *Thomas B. Croat 39720* (MO); [Mun. San Juan Bautista Valle Nacional]. 6 miles SW [west] of Valle Nacional on Highway 175 between Tuxtepec and Oaxaca. Steep forested ravine, 17°43'12»N 96°19›12»W, 660 m, 29 June 1977, *Thomas B. Croat 39754* (MO); Along Highway 175 between Valle Nacional and Oaxaca, 6 miles above bridge at Valle Nacional, area near shrine. [Original Label Coordinates 17°44' N 96°19› W]., 17°43'48»N 96°18›36»W, 660 m, 26 August 1996, *Thomas B. Croat 78722* (MO); [Mun. San Juan Bautista Valle Nacional]. Sierra de Juárez, along Highway 175, between Valle Nacional and Oaxaca, 10 miles SW [above/west] of Valle Nacional. Disturbed primary forest, 17°42'N 96°18›W, 700 m, 30 June 1977, *Thomas B. Croat 39805* (MO); Along road to Uxpanapa from Sarabia, 1.5 mi W of Río Corte, 9.7 mi E of Sarabia. Disturbed virgin forest just south of road on slope. Veg. type: "selva alta perennifolia", 17° 6'N 94°55›W, 220 m, 20 February 1987, *Thomas B. Croat & Dylan P. Hannon 65449* (MO); Along Rte. 175 between Valle Nacional and Oaxaca, 7-10 km S of bridge over Río San Juan Bautista at Valle Nacional. Steep roadside cliffs., 17°43'33»N 96°19'39»W–17°43'26»N 96°19›18»W, 597–666

Figure 38: *Syngonium chiapense*. Habit on cliff, *Croat 65008*, Mexico

m, 3 March 2008, *Thomas B. Croat & Pedro Díaz Jiménez 100152* (MO); Ixtlan. Municipio de Santiago Comaltepec: La Esperanza. Bosque mesófilo de montaña., 17°45›N 96°30'W, 1600 m, 8 December 1987, *Ricardo López Luna 144* (MO); Municipio de Comaltepec: La Esperanza. Bosque mesofilo de montana., 17°36'36»N 96°21›00»W, 1600 m, 8 December 1987, *Ricardo López Luna & Gary J. Martin 143* (MO); Tuxtepec. Mun. San Juan Bautista Valle Nacional. Along Highway 175 through Sierra de Juarez between Tuxtepec and Oaxaca, 1.49 miles S of bridge at Valle Nacional., 17°39'36»N 96°19›48»W, 1400 m, 19 February 1979, *Thomas B. Croat 48016* (MO); [Mun. San Juan Bautista Valle Nacional]. About 14 miles S of Valle Nacional, along Highway 175 to Oaxaca, 17°39'36»N 096°19›12»W, 1220 m, 22 August 1977, *Thomas B. Croat 43913* (MO); **Tabasco:** Huimanguillo. Cerro de las Flores, Villa Guadalupe., 17°22›26»N 93°37'51"W, 750 m, 28 April 2009, *Pedro Díaz Jiménez, A. M. de la Cruz Lopez & T. Magaña R. 774* (MO); **Veracruz:** Along road between Catemaco and Montepio, 2.6 km S of Los Tuxtlas Field Station, 9.3 beyond end of asphalt highway, 19.4 km N of Catemaco, 18°36'36»N 95°03›36»W, 50 m, 25 August 1996, *Thomas B. Croat 78694* (ENCB,MO); Along road between Catemaco and Montepio, 5 km E of junction to Tebanca, Coyame and Nanciyaga., 18°29'16»N 095°04›10»W, 477 m, 6 March 2008, *Thomas B. Croat & Pedro Díaz Jiménez 100331* (MO); Catemaco. Wet east-facing slopes 5.7-6 miles from Catemaco on road to Sontecomapan., 18°28'12»N 95°04›12»W, 380 m, 27 September 1961, *George S. Bunting & Harold E. Moore 8938* (MO); In glen beside road about 8 miles S of Catemaco near Zapoapan on road to Acayucan., 18°19'48»N 95°06›00»W, 400 m, 26 September 1961, *George S. Bunting & Harold E. Moore 8926* (MO); Coatzacoalcos. 6 miles E of Coatzacoalcos along Highway 180., 18°04'48"N 94°21'36"W, 10 m, 03 July 1977, *Thomas*

Figure 39: *Syngonium chiapense*. 3-leaflet form, *Holst 10148*, Belize. Photo, B. Host

Figure 40: *Syngonium chiapense*. Closeup of inflorescence, *Holst 10148*, Belize. Photo, Holst

Figure 41: *Syngonium chiapense*. Habit, pre-adult plant. cult at Selby, origin Belize. Toledo. Photo, A. Redfield

Figure 42: *Syngonium chiapense*. Stem and internodes of pre-adult plant, cult at Selby, origin Belize. Toledo. Photo, A. Redfield

Figure 43: *Syngonium chiapense*. Adaxial surface of pre-adult leaf blade; cult at Selby, origin Belize. Toledo. Photo, A. Redfield

Figure 44: *Syngonium chiapense*. Adult sagittate blade, stem and inflorescence, *Croat 40060*, Mexico

Figure 45: *Syngonium chiapense*. Juvenile leaves, *Croat 40060*, Mexico

Figure 46: *Syngonium chiapense*. Leaf, *Croat 65008*, Mexico

Figure 47: *Syngonium chiapense*. Leaf blade with 3 lobes, *Moore & Bunting 8895*, Mexico

Figure 48: *Syngonium chiapense*. Juvenile plant, *Croat 63161*, Mexico

B. Croat 40060 (MO); Jesús Carranza. Lomas al S de Pob. 2 (+/- 6 km al S de entronque de terracería La Laguna-Sarabia con camino al N a Pob. 2) 17°12›00»N 94°37'48"W, 200 m, 2 July 1987, *Thomas L. Wendt & et al. 5775* (MO); San Andrés Tuxtla. Estación de Biología Tropical "Los Tuxtlas", ca. 31 km (by road) N of Catemaco along road to Montepío., 18°34'48»N 95°03›36»W, 250–300 m, 5 June 1987, *Michael H. Grayum & Pamela J. Sleeper 8354* (MO); Estación de Biología Tropical Los Tuxtlas, N of San Andrés Tuxtla between Sontecomapan and Montepio. Along broad trail and new border road through virgin forest. Veg. type: "selva alta perennifolia", 18°34'48»N 095°03›36»W, 150-200 m, 17 January 1987, *Thomas B. Croat & Dylan P. Hannon 63161* (F,K,MEXU,SEL, AAU,CAS,MO,NY,US,B); Cima del Volcán San Martin Tuxtla. Bosque mesófilo de montaña., 18°33'N 095°11›W, 1590 m, 30 July 2005, *Thorsten Krömer & Amparo Acebey 2438* (MO); Ejido Barrio Lerdo, Falda del Volcán San Martín. Bosque mesófilo de montaña., 18°33'N 095°11›W, 1500 m, 14 May 2005, *Thorsten Krömer & Amparo Acebey 2204* (MO); El Palmar del Arrayanal, Cima del Volcán San Martin. Bosque mesófilo de montaña., 18°33'N 95°12›W, 1375 m, 19 May 2005, *Thorsten Krömer & Amparo Acebey 2244* (MO); Soteapan. Alrededores del Poblado de Santa Martha, 18°24'36»N 94°55›48»W, 1240 m, 20 December 1978, *R.V. Ortega O. & et al. 1091* (F).

Syngonium chocoanum Croat, Ann. Missouri Bot. Gard. 68(4): 590–591. 1982. — Type: COLOMBIA, Chocó: Mun. Novita, slope N of Cerra Torra Fila ridge E of Río Surama, along trail to Alto del Osa, 500–600 m., 23 February 1977, *E. Forero, A. Gentry, A. Sugden, & D. Daley 3324* (holotype, COL, barcode COL 000046599).

Nomadic vine; appressed-climbing; stems ca. 2 cm diam.; internodes short, those on upper part of stem ca. 1 cm long; cataphylls thin, ca. 19 cm long, ca. 1 cm wide. LEAVES with **petioles** to 43 cm long, narrowly sheathed to within 5 cm of apex, margins of sheath to 1 cm high, markedly broadened within 6 cm of base, acute and free-ending at apex (free part ca. 1.5 cm long, unsheathed part of petiole ca. 3 mm diam. (dried); **blades** entire, moderately thin, narrowly ovate, 26–36 cm long, 14–23 cm wide, acute or bluntly acuminate at apex, narrowed and cordate at base, , posterior lobes narrowly rounded; **primary lateral veins** 9–15 per side, arising at ca. 45–50º, straight or weakly curved to collective vein, with prominent branches (especially in lower half of blade) these curved and closely paralleling primary lateral veins; tertiary veins obscure (at least on drying), close, markedly parallel; collective veins 3, obscure, first ca. 5 mm from margin; basal veins 4 or 5 pairs, lowermost 3 or 4 basal veins coalesced ca. 5 mm before base. INFLORESCENCES 1–3 per axil; **peduncle** 9–11 cm long, to 14 cm long in fruit; flowering **spathe** 13–16 cm long; spathe tube 6–7 cm long, 1.7– 2.0 cm wide uniformly green on both surfaces, the blade 10–11 cm long, greenish white outside, whitish inside; **spadix** 13.5 cm long in front, 12.5 cm long in rear, stipitate 1.6 cm; staminate portion 10.8 cm, 1.3 cm diam. midway, 7 mm diam. on constricted portion; sterile staminate portion 1.8 cm long, 1.2 cm diam.; pistillate portion pale yellow, 2.8 cm long, 1 cm diam. at base, 6 mm diam. at apex. INFRUCTESCENCES with peduncles to 11 cm long, 6 mm diam. (dried) midway, smooth, fruiting spathe tube narrowly elliptic, green, 8 cm long, 4 cm diam.; **syncarp** oblong-elliptic,4.5– 5.5 cm long, 2.5–4.0 cm diam., tan. Flowers seen March, June, July; Fruits January, February, April. **Figures 49–55**.

Distribution — *Syngonium chocoanum* ranges from southern Panama to Colombia (Chocó, Valle del Cauca & Nariño) and Ecuador (Esmeraldas) from sea level to 800 m in *Tropical wet*, *Premontane wet* and *Tropical rain forest* life zones.

Figure 49: *Syngonium chocoanum*. Habit, Ecuador. Photo, B. Bauman

Figure 50: *Syngonium chocoanum*. Closeup of leaves, Ecuador. Photo, B. Bauman

Figure 51: *Syngonium chocoanum*. Flowering plant, Cabo Corientes, Colombia

Figure 52: *Syngonium chocoanum*. Habit, Cabo Corientes, Colombia,

Figure 53: *Syngonium chocoanum*. *Ortiz 2969*, Panama

Figure 54: *Syngonium chocoanum*. *Grayum 7661*, Colombia

Figure 55: *Syngonium chocoanum*. *Grayum 7661*, Colombia

Comments — The species is a member of section *Cordata* and is characterized by its short internodes, long thin cataphylls, petioles narrowly sheathed to within 5 cm of apex with the sheath margins to 1 cm high and free-ending at apex, entire, simple, moderately thin, narrowly ovate-cordate blades with narrowly rounded posterior lobes, 9–15 primary lateral veins per side, 4 or 5 pairs of basal veins with the lowermost 3 or 4 basal veins coalesced ca. 5 mm before base as well as a moderately long pedunculate infructescences with a narrowly elliptic, green spathe.

Sygonium chocoanum is most easily confused with *S. sagittatum* from Mexico (northern Oaxaca) which differs by having a well-developed posterior rib usually more than 1 cm long, by having the posterior rib naked for some distance from the apex of the sinus and by having a longer spathe tube (usually 6.5–15.0 cm long at anthesis).

Additional specimens seen —PANAMA. Darién: Serrania de Pirre, above Cana gold mine between Río Cana and Río Escucha Ruido, 600–1000 m, 29 July, 1976, *Croat 37719* (MO); Parque Nacional del Darién, slopes of Cerro Mali, headwaters of S branch of Río Pucuro, ca. 22 km E of Pucuro, 08°04'30»N, 77°14'00»W, 700–1400 m, 21 October 1987, *Barry E. Hammel, Greg C. de Nevers, Hermes Cuadros V. & Heraclio Herrera 16370* (MO); Area de Manejo Especial de Bahía Pinas, 07°35›11»N, 78°12'38"W, 0 m, 2 June 2018, *Orlando Ortiz 2969* (MO).

Syngonium churchillii Croat & O.Ortiz, Novon 27: 56–58, fig. 21. 2019. — Type: PANAMA. Chiriquí: along Pan American Hwy, E of turnoff to Gualaca, 08°309N, 82°179W, 100 m, 17 September 1984, *H.W. Churchill 6033* (holotype, MO, 3 sheets: barcodes MO-3202025 , MO-3202026 , MO-3285926).

Nomadic vine; stem scandent, climbing; internodes (0.5)1.0–2.0 cm, less than 1 cm diam., usually longer than broad, drying acutely several-ribbed, epidermis drying yellowish brown. LEAVES with **petioles** 22–27 cm, sub-flattened adaxially with raised margins and medial rib, drying finely ribbed, sheathed to 14.3 cm, 3/5th its length, sheath acute at apex, margin persisting intact; **blades** 3-parted, 20–25 cm long, 20.5–23.5 cm wide, about as broad as long, subcoriaceous, dark green above, slightly paler below, drying medium brown, matte above, yellowish green and weakly glossy below; all lobes narrowly long-acuminate at apex; medial lobe 15.5–19.3 cm long, 3.6–7.8 cm wide, moderately inequilateral, one side 1.1–1.7 cm wider, attenuated at base; lateral lobes 14.5–15.0 cm long, 3.3–5.5 cm wide, markedly inequilateral, (one side 1.2–2.1 cm wider), narrowly acute at apex, markedly auriculate on outer margin at base, inner margin gradually attenuated; auricles narrow and elongated, directed parallel to petiole, 3.5–7.0 cm long, 1.0–2.5 cm wide, sometimes elliptic; sinus sub-quadrangular to parabolic, more or less truncate at apex, 3–5 cm deep, 2.0–2.5 cm wide midway; midrib weakly raised and concolorous above, drying darker, 5-ribbed below; **primary lateral veins** 6 to 10 per side, departing midrib at 50°–55°; primary collective vein 3–6 mm from margin; tertiary veins moderately inconspicuous below. INFLORESCENCES 2 or 3 per axil, pendent post-anthesis; **peduncle** 9.0–9.5 cm, 3–5 mm diam., drying blackened; **spathe** blade absent, tube 5–6 cm; 2.3–3.2 cm diam., green outside, maroon inside, drying dark blackened, matte;

spadix with sterile staminate portion ca. 1.5 cm, mostly eaten away. INFRUCTESCENCE to 6 cm, 2.5 cm diam.; seeds 1.5–2.0 mm, 1.6–1.5 mm diam. Fruits are known in September. **Figure 56**.

Distribution — *Syngonium churchillii* is endemic to Panama, known only from the type locality, at 100 m elevation in a *Premontane wet forest* life zone.

Comments — The species is a member of sect. *Syngonium* and is characterized by its sub-flattened petioles with raised margins and medial rib, sheathed to about 2/3rd its length with the sheath acute at apex and with an intact margin, 3-parted leaf blades drying medium brown, matte above, yellowish green and weakly glossy below with narrowly long-acuminate lobes, the medial lobe moderately inequilateral, lateral lobes markedly inequilateral, markedly hastate on outer margin at base, inner margin gradually attenuated, the auricles narrow and elongated, directed parallel to petiole, 6 to 10 primary lateral veins per side, 2 or 3 inflorescences per axil with the spathe tube green outside and maroon inside.

Syngonium churchillii differs from *S. mauroanum* by having the lower outer margin of the lateral leaf blade lobes prominently narrowed (nearly pinched off) (vs. subtriangular or rounded).

Syngonium mauroanum and *S. neglectum* are both seemingly easily confused with *S. churchillii.* The former differs by having the lower outer margin of the lateral lobes subtriangular or rounded, not prominently narrowed. *Syngonium neglectum*, while sometimes having small leaves that are similar to those of *S. churchillii*, differs by being restricted to Mexico and by having much larger inflorescences with the spathe blade alone 9–15 cm long and persisting intact and reflexed after anthesis. In contrast, the spathe of *Syngonium churchillii* is at most 6 cm long and deciduous, not persisting after anthesis.

Sygonium erythrophyllum Birdsey ex G.S.Bunting, *Baileya* 14: 17, fig. 1, 2. 1966. — Type: PANAMA. Canal Zone: near Fort Randolph near the Atlantic coast, 26 May 1923, *W.R. Maxon & A.D.Harvey 6536* (holotype, US, barcode 00088051).

Nomadic vine; juvenile plants often solitary; stems with short internodes, later scandent, branching, slender, leafy; juvenile blades ovate, 3–9 cm long, ± cordate at base, lobes rounded, sinus ± arcuate with decurrent petiole, upper surface blackish green, lower surface at first green, soon becoming deep violet- purple; juvenile blades on climbing stems larger, simple, sagittate, dark green above, deep violet-purple below, 9–17 cm long, becoming indistinctly 3-lobed; petioles 11–20 cm long, sheathed to near apex. Adult plants with stems sometimes branching; internodes green, not glaucous, usually less than 1 cm wide, periderm thin, minutely papillate, flaking and pale reddish brown at maturity. LEAVES with **petioles** 9–20 cm long, sheathed 4/5 or nearly throughout their length; blades trisect, subcoriaceous, surface dark green and shiny above, paler beneath, usually green, sometimes violet-purple; leaflets usually completely free, spreading or slightly overlapping, acuminate to rounded at the apex, ending abruptly with a minute apiculum; median leaflet elliptic to lanceolate-elliptic or narrowly ovate, 10–22 cm long, 4.5–10.0 cm wide, obtuse to attenuate at base; lateral leaflets 4.5–10.0 cm long, 1.2–4.3 cm wide, elliptic to lanceolate or oblong, obtusely and narrowly rounded at apex, base inequilateral but not auricled. INFLORESCENCES usually 2 or 3 per axil; **peduncle** 3–11

Figure 56: *Syngonium churchillii*. Type, *H.W.Churchill 6033*, Panama

cm long, green, not glaucous, erect at anthesis, pendent in fruit; **spathe** equal to or longer than spadix; spathe tube green, 2–4 cm long, 1.0–1.5 cm diam., ovoid to ellipsoid; spathe blade white, ovoid to ellipsoid (when flattened), 8–11 cm long, 5–6 cm wide, weakly reflexed away from spadix at anthesis; **spadix** 9.0–13.5 cm long; pistillate portion of spadix to 1.5–1.8 cm long, pistils ca. 1.4 mm diam., stigmas discoid, ca. 0.9 mm diam.; staminate portion of inflorescence 6.5–10.0 cm long, (fertile part 6–9 cm long), flowers 4-androus, truncate or slightly retuse at apex, pollen white in arachnoid clusters. INFRUCTESCENCES ovoid, yellowish green outside, maroon inside, 3–5 cm long, tube opening at maturity; seeds white, ± oblong, rounded on one end, apiculate and angled on other end, 6–7 mm long. Flowers have been found mostly March-June and fruits in August-September. **Figures 57–62.**

Distribution — *Syngonium erythrophyllum* is known only from Panama at elevations from sea level to 350 m in *Tropical moist forest* and *Premontane wet forest* life zones.

Comments — The species is a member of sect. *Syngonium* and is not confused with any other species but is recognized by its dried stems with a conspicuous, flaky, reddish brown periderm, by its thick, trisect, slightly auriculate leaf blade (with violet-purple lower surfaces, at least on juvenile blades) with apex of the lobes frequently rounded and apiculate-tipped On Barro Colorado Island (Croat, 1978) this species produces abundant juvenile plants but few adult plants were seen during more than three years of fieldwork there.

Additional specimens seen — **PANAMA**. Canal Area: Madden Forest Preserve (Madden Road Timber Preserve), 09°06'N 79°37'W, 100 m, *Monroe R. Birdsey 351* (UC); On Zetek Trail, Barro Colorado Island, 09°09›17»N, 79°50'53"W, 100 m, 10 September 1953, *Monroe R. Birdsey 349* (MO, UC); Snyder-Molino Trail, 09°09'30"N, 79°50'20"W, 10–150 m, 30 September 1931, *Otis E. Shattuck 31* (MO), Allison Armour Trail, 09°09'10"N, 79°51'30»W, 10–100 m, 11 May 1968, *Thomas B. Croat 5496* (MO); William Morton Wheeler Trail, 09°09'20"N, 079°51'10"W, 10 –170 m, 7 August1970, *Thomas B. Croat 11778* (MO); James Zetek Trail, 09°09'31»N, 79°52›05»W, 10–100 m, 12 June 1971, *Thomas B. Croat 14955* (MO); **Barro Colorado Island**; Conrad Trail, 09°08'55»N 79°51'29»W, 80–120 m, 13 March 1969, *Thomas B. Croat 8637* (MO); Forest across stream from Smith house, 09°09'45»N, 79°50›30»W, 20 m, 26 March 1970, *Thomas B. Croat 9124* (MO); William Morton Wheeler Trail, 09°09'20"N, 79°51'10»W, 10–170 m, 19 September 1968, *Thomas B. Croat 6208* (MO); Snyder Molina trail, 3 August 1970, *Croat 11709* (MO); **Colón**: Santa Rita Ridge, southeast of Colón, along ridge road, 9–10 miles from Transisthmian Highway. [Coordinates on original label: ca. 09º20'N, 79º45'W], 09°22'N, 79°42'W, 550 m, 22 May 1986, *Gordon McPherson 9221* (MO); 9–12 mi E of Transisthmian Highway on Santa Rita ridge. [Coordinates on original label: 09º2 'N,, 079º45›W], 09°22›00»N, 79°39'30»W–09°23'30"N, 79°41'30»W, 500–550 m, 17–18 April 1988, *Sue A. Thompson 4838* (MO); 6 April 1993, *Thomas B. Croat 82908* (MO); **Panam**á: Panama to San Blas Trail from end of road past Los Altos de Pacora region of Cerro Jefé, onto Cerro Brewster, 09°17'N, 79°17'W, 600–800 m, 20– 25 April 1985, *Barry E. Hammel & Greg C. de Nevers 13629* (MO); Chepo, El Llano to Cartí road, 7.5 km N of Panamerican Highway, 09°15'22"N, 78°57'20"W, 13 April 1977, *James P. Folsom 2558* (MO); El Llano-Cartí Road, 11 km from Interamerican Highway, 09°16'02»N, 78°55'53"W, 350 m, 13 April 1975, *Scott A. Mori & Jacquelyn A. Kallunki 5592* (MO); El Llano-Cartí Road, 5-6 miles N of Interamerican Highway at El Llano, 09°15›30»N, 78°55'50"W, 350–375 m, 7 May 1976, *Thomas B. Croat 34801* (MO); 10 miles from Interamerican Highway

Figure 57: *Syngonium erythrophyllum*. Habit of fruiting plant, *Croat 11778*, Panama

Figure 58: *Syngonium erythrophyllum*. Habit, Panama

Figure 59: *Syngonium erythrophyllum*. Abaxial surface of leaves, Panama. Photo, J. Harrison

Figure 60: *Syngonium erythrophyllum*. Flowering and fruiting plant, *Croat 14955*, Panama

Figure 61: *Syngonium erythrophyllum*. *Croat 8637*, Panama

Figure 62: *Syngonium erythrophyllum*. Juvenile plant, *Croat 11709*, Panama

near El Llano, 09°17'45»N, 78°56›15»W, 330 m, 28 March 1976, *Thomas B. Croat 33800* (MO); Panamá, Goofy Lake, SW facing slope, 09°10›00»N, 79°24'59"W, 500 m, 5 July 1976, *Gene A. Sullivan 47* (MO); San Blas, El Llano-Cartí Road, vicinity of Nusagandí, Sendero Nusgandí, down to the Atlantic coast. [Coordinates on original label: 09º15›N, 79º00›W], 09°20›N, 78°58'W, 300 –350 m, 12 July 1988, *Thomas B. Croat 69280* (MO).

Syngonium glaucopetiolatum Croat, Ann. Missouri Bot. Gard. 68(4): 613. 1982. — Type: PANAMA. Chiriquí: E of Boquete along steep forested slopes on Cerro Azul near Quebrada Jaramillo, 1620–1700 m, 11 August 1974*, T.B. Croat 26821* (holotype, MO-2272459).

Nomadic vine; juvenile plants with stems ca. 5 mm diam., epidermis drying brown, peeling; petioles 9–13 cm long, D-shaped above sheath, becoming sharply angular on pre-adult and adult plants; blades ovate-triangular, narrowly acute at apex, mucronate, sagittate at base, 13 cm long, ca. 5 cm wide at middle, posterior lobes 5.0–5.5 cm long, posterior lobes soon pinched off and directed outward at 45°, noticeably auriculate at the base; intermediate blades with lateral segments confluent with medial lobes. Adult plants with stems to 2.5 cm diam. (fresh), shrinking to 1.5 cm diam., epidermis green, shiny, drying yellowish brown with sharp longitudinal wrinkles; internodes 2–4 cm long. LEAVES moderately thin, clustered in upper 30 cm of stem; **petioles** 25–30 cm long, sheathed ca. 2/3 their length, sheath 4.0–5.5 cm wide when flattened, free-ending and bluntly acute at apex, the upper part of the petiole subterete with a blunt medial rib; **blades** trisect, at least sometimes confluent to almost free; median leaflet elliptic, 15–25 cm long, 11–15 cm wide, acuminate at apex, briefly attenuate at base; lateral leaflets strongly inequilateral, 16–24 cm long, 10–12 cm wide, base prominently hastate on outer margin (the lobe usually moderately pointed), cuneate on inner margin, midrib bluntly depressed above, prominently raised beneath, primary lateral veins and the principle collective vein weakly sunken above, raised beneath, tertiary veins clearly visible (on dried specimens); **primary lateral veins** 6–8 per side, mostly departing midrib at ca. 40°; collective vein ca. 12–18 mm from the margin (midway to the apex). INFLORESCENCES 2 per axil; not seen in flower. INFRUCTESCENCES pendent; **peduncle** to 15 cm long; peduncle and spathe tube pruinose; **spathe** tube ovoid-ellipsoid, 6–7 cm long, ca. 5 cm diam. (fresh); spathe blade (dried) brown, subcoriaceous, ca. 10 cm long, acuminate at the apex, sometimes persisting in its dried condition. The species presumably flowers early in the rainy season, perhaps in June, because immature fruits have been seen in August and fruits of mature size have been seen in February. **Figures 63–66**.

Distribution — *Syngonium glaucopetiolatum* is endemic to Panama in *Lower montane wet forest* at elevations of 1300–1800 m.

Comments — The species is a member of sect. *Syngonium* and is distinguished by its large 3-lobed blades with markedly hastate lateral lobes, broad petiole sheath and by its glaucous young petioles, peduncles, and spathe tubes.

Syngonium glaucophyllum has been confused with *S. hoffmannii*. Grayum (2003) synonymized it with *S. hoffmannii* in his treatment of the Araceae of Costa Rica but *S. glaucopetiolatum* differs from *S. hoffmannii* by having larger leaf blades (31–43 cm wide) which have prominent

Figure 63: *Syngonium glaucopetiolatum*. Habit, Panama

Figure 64: *Syngonium glaucopetiolatum*. Type, *Croat 26821* Sheet 1, Panama

Figure 65: *Syngonium glaucopetiolatum*. *Croat 26821* Sheet 2. Panama

Figure 66: *Syngonium glaucopetiolatum*. *Croat 26821* Sheet 3. Panama

hastate and mostly pointed lobes with the medial and lateral lobes clearly confluent, the lateral lobes are proportionally shorter with the length to width ratio (tip of petiolule to tip of lobe divided but the lobe width midway) of 1.1–2.2 whereas for *S. hoffmannii* the same ratio is usually 3.3–4.2 times longer than broad. In contrast to *S. glaucopetiolatum* the leaf blades of *S. hoffmannii* are smaller, rarely to 30 cm wide and have the lateral lobes with narrow, often pinched off auricales. In addition, the petioles of *S. glaucopetiolatum* are very broad in the lower ½ and prominently glaucous whereas the petioles of *S. hoffmannii* have narrow sheaths and are not glaucous.

The blade shape of *Syngonium glaucopetiolatum* approaches that of *S. mauroanum* but that species has been found to range no higher than 450 m and is apparently restricted to *Premontane moist forest* life zones.

Additional specimens seen — **COSTA RICA**. **Puntarenas:** along road to Monte Verde, in vicinity of Santa Elena, 10°19'32»N, 084°49›35»W, 1300 m, 7 February 1979, *Thomas B. Croat 47094A.* **PANAMA**. **Chiriquí**: Vicinity of Planes de Hornito beyond Gualaca, ca. 2.5 km W of Finca Linares, high hills, 08°40'N, 082°11'W–08°41'N,082°13›W, 1400–1900 m, 28 November 1979, *Thomas B. Croat 48849* (MO); **San Blas:** Cerro Habu. Cultivated at Missouri Botanical Garden, 20 April 1981, *Thomas B. Croat 53544* (MO).

Syngonium hastiferum (Standl. & L.O.Williams) Croat, Ann. Missouri Bot. Gard. 68(4): 595. 1982. — *Philodendron hastiferum* Stanley & L.O.Williams, Ceiba 1: 232. 1951. — Type: Costa Rica, Puntarenas: sides of large trees between Río Esquinas and Palmar Sur de Osa, forested hills above Esquinas, alt. 60 m, 14 June 1950, *P.H. Allen 5563* (holotype, US, barcode 00088008; specimen transferred from EAP).

Nomadic vine; juvenile plants climbing; stems green, not glaucous, scandent; internodes to 25 cm or more long, ca. 1 cm diam., drying brown with thin flaking epidermis; smallest leaves with the petioles sheathed almost to the apex; blades broadly ovate. Intermediate stages with petioles 20–30 cm long, sheathed to beyond the middle, the unsheathed part of the petiole terete, becoming weakly flattened laterally toward the apex; blades becoming elliptic and weakly cordate, finally with hastate lobes like the adults, then increasing only in size. Adult plants appressed-climbing; internodes ca. 2.5 cm long, 1.5–2.5 cm diam. LEAVES with **petioles** to 37–50 cm long, sheathed ca. 5/6 their length; sheath free-ending and emarginate at apex; **blades** elliptic-hastate or rarely 3-lobed with large confluent lateral lobes, gradually short-acuminate to narrowly acute at apex, deeply lobed at base, 20–48 cm long, 9.0–22.5 cm wide; anterior lobe 22–36 cm long, gradually constricted at base, sides broadly rounded; posterior lobes directed downward or slightly outward, narrowly triangular, somewhat unequal, longer lobe 2.5–12.0 cm long (from apex of petiole to tip of lobe), narrowly rounded at apex, shorter lobe 2–8 cm long; lateral lobes of 3-lobed leaves directed outward and upward, 16.5–20.0 cm long, 6.5–11.0 cm wide; sinus usually triangular at least in apical 2.5–3.5 cm, then broadly opening (when flattened), drying thin, upper surface brown, lower surface greenish brown; midrib flat or weakly sunken, 4 mm wide at base; **primary lateral veins** 7–15 per side, weakly raised, secondary and tertiary veins clearly visible; principal collective vein 8–12 mm from margin, weakly raised on lower surface; basal veins 3– 5 pairs, basal rib not naked or only naked up to 1 cm. INFLORESCENCES erect at anthesis, 5–9 per axil; **peduncle** 13–20

cm long, 5–8 mm diam. (dried); **spathe** tube green on both surfaces, 4–7 cm long, 1.3–1.6 cm diam.; spathe blade greenish white, ca. 7 cm long, 2.2 cm diam. (unopened), acuminate at apex, gradually constricted near base; **spadix** sessile, white, 7.5–8.5 cm long; staminate portion of spadix more or less ellipsoid, 5.5 cm long, 13–15 mm diam., staminate flowers with synandrium truncate and obscurely 4-lobed at apex, lobes often obscurely emarginate at apex. INFRUCTESCENCES pendent, yellowish; not seen with mature fruit. Flowers July & November; Fruits seen March, September & November. **Figures 67–80**.

Distribution — *Syngonium hastiferum* is endemic to Costa Rica (Puntarenas & San José) in *Premontane wet forest, Tropical wet forest, and Premontane rain forest life zones* at 20–680 m.

Comments — The species is a member of section *Cordata* and is characterized by its leaf blades being usually longer than broad, petioles sheathed much of the length of the petiole with the sheath free-ending and emarginate at apex, elliptic-hastate deeply basally lobed brownish drying blades which are triangular-acuminate at apex and gradually constricted at the base of the anterior lobe and with the narrowly triangular posterior lobes directed downward or slightly outward, with the sinus very narrow at the apex, 3 or 4 pairs of basal veins with the posterior rib naked only about 1 cm as well as by its up to 5 inflorescences, moderately long-pedunculate spathes with a green tube and greenish white blade and yellowish infructescences. Grayum (2003) reported that this is the only Costa Rican species with simple leaves that has the spathe tube green internally.

Syngonium hastiferum is probably closest to *S. brewsterense* from central Panama which differs by having the blade narrowly triangular sagittate-hastate and moderately constricted at the base of the anterior lobe with the sinus broadly spreading at apex, then turned inward to form a constriction as well as by having only 5 or 6 primary lateral veins per side. In contrast *S. hastiferum* has narrowly ovate-elliptic blade which are scarcely or not at all constricted at the base of the anterior lobe and has the sinus very narrow at apex then flaring out with about 13 primary lateral veins per side.

Croat & Grayum 59798 is unusual in being the only 3-lobed specimen of *S. hastiferum*. In addition to having 3-lobed leaf blades it has a sinus that is sub-reniform rather than narrow. Despite these differences is seems to differ in no other way from simple-blades collections of the species.

Additional specimens seen — **COSTA RICA**. Eastern Osa pennisula, understory vegetation >500 meters from forest edge on the east coast of the Osa pennisula, 08°42'22"N, 83°35'29"W, 25 January 2003, *Margaret M. Mayfield 556-20-3156* (MO); Eastern Osa penninsula, 08°23›47»N, 83°18'53"W, 17 July 2001, *Margaret M. Mayfield 556-837-726* (MO); Eastern Osa penninusula, 08°42›24»N, 083°35›29»W, 25 July 2001, *Margaret M. Mayfield 566-1573-1110* (MO); vic. Sirena, 50 m, *RAY 34* (GH); vic. Sirena, 50 m, *RAY 1* (GH); vic. Sirena, 50 m, *RAY 36* (GH); *S. Troyo 29;* **Puntarenas:** Cantón de Osa 5 Km N de Rincón, Bahía de Chal, 08°43›48»N, 83°25'48"W, 10–100 m, 20 August 1990, *Abelardo Chac*ón *978* (MO); Northeastern slopes of Fila de Cal, between San Vito de Coto Brus and Ciudad Neily, 08°41'00»N, 82°56'30»W, 500–620 m, 12 July 1985, *Michael H. Grayum & Barry E. Hammel 5650* (MO); Ridge between Río Convento and Quebrada Segundo, ca. 1.5 km S of Carretera Interamericana, Valle de El General, 09º14›N, 83º30.5›W, ca. 600 m, 09°13›48»N,

Figure 67: *Syngonium hastiferum*. Plant with inflorescences & young infructescences, *Croat & D. Hannon 79195*, Costa Rica

83°30›00»W, 600 m, 10 July 1985, *Michael H. Grayum & Barry E. Hammel 5587* (MO); Rincón de Osa; along ridge between Quebrada Aparicio and Quebrada Aguabuena, 08°42'N, 083°31'W, 200–400 m, 7 October 1984, *Michael H. Grayum, Gerardo Herrera Ch, George E. Schatz & Felipe Chavarría D. 4012* (CR, MO); Hills above Palmar Norte, 08°57'36»N, 083°26›24»W, 100–200 m, 20 May 1976, *Thomas B. Croat 35112* (MO); Between Palmar Sur and Piedras Blancas, along Interamerican Highway, 08°52'12"N, 83°20'24"W, 20 m, 28 Feb 1976, *Thomas B. Croat 32911* (MO); Along road between Palmar Norte and Panamerican Border, 3 km N of turn-off to Rincón, 08°48'39»N, 83°16›18»W, 110 m, 10 September 1996, *Thomas B. Croat & Dylan P. Hannon 79195* (F, INB, K, MO, NY, WU); Vicinity of Boscosa, at Quebrada Aguabuena, 08°42'01"N, 83°30'48"W, 50 m, 11 September 1996, *Thomas B. Croat & Dylan P. Hannon 79246* (B, INB, K, MO, NY, TEX, WU); Along road between Chacarita and Rincón de Osa, ca. 6 km W of Interamerican Highway at Chacarita, 08°45'N, 83°18'W, 160 m, 2 March 1985, *Thomas B. Croat & Michael H. Grayum 59734* (MO); Eastern base of Fila Barriganes, ca. 1 km S and 2 km W of Cañasas, (ca. 12 km S of Rincón de Osa), 08°34›N, 83°25›W, 60 m, 4 March 1985, *Thomas B. Croat & Michael H. Grayum 59798* (CAS, CR, ENCB, HNMN, MO, PMA, SAR, VDB); Golfito, P.N. Corcovado, Península de Osa, Estación Los Patos, Cerro de Oro, 08°33'36»N, 083°30›36»W, 200 m, 21 December 1993, *Reinaldo Aguilar & V. Guzmán 2814* (CR); 08°41'N, 83°13'W, 70 m, 5 May 2001, *Werner Huber & Anton Weissenhofer 2537* (MO, WU); Osa, Sierpe, San Juan, cuenca media del Rio San Juan, aguas arriba, 08°43›48»N, 83°31'48"W, 200 m, 7 November 1990, *Gerardo Herrera Ch. 4584* (CR, MO); Collecting originally as a sterile cutting (Croat # 32911) in Costa Rica: Between Palmar Sur and Piedras Blancas along Interamerican Highway, February 8, 1976,

Figure 68: *Syngonium hastiferum*. Adaxial surface of leaf blade, *Croat 79195*, Costa Rica

Figure 69: *Syngonium hastiferum*. Adult on ground with unattached juvenile plants, Costa Rica. Photo, T. Ray

flowered in cultivation September-Oct, 1984, 08°52'46"N, 83°22'15"W, 20 m, *Thomas B. Croat 59153* (MO); Forested area near the airfield about 4 miles west of Rincon de Osa, Osa Peninsula, 08°42'00"N, 83°30'36»W, 30 m, 4–7 June 1968, *William C. Burger & Robert G. Stolze 5532* (MO); **San José:** Dota,. Along Interamerican Highway, 10 miles west of San Isidro, 09°28'12"N, 83°41'24"W, 28 February 1976, *Thomas B. Croat 32919* (MO); Pérez Zeledón. Along road between San Isidro del General and Dominical, 9 miles southwest of Río Pacuare, disturbed remnants of primary forest, 09°17'42"N, 83°47'17"W, 680 m, 23 May 1976, *Thomas B. Croat 35345* (MO).

Syngonium hoffmannii Schott, Oesterr. Bot. Z. 8: 178. 1858. — *Porphyrospatha hoffmannii* (Schott) Engl. in A.DC. & C.DC, Monogr. Phan. 2: 291. 1879. — Type: COSTA RICA. Alajuela: Candelaria, Alto de Sta. Cruz [presumably the modern day Candelaria, southeast of San Ramon and Palmares] at ca. 1000 m, July 1857, *C. Hoffmann 616* (holotype, B†, photo F, photo 12294, IRN 238626). — Schott drawing no. 3212, W, inventory no. NHMW-AFW-Schott Icones 3212, neotype, designated here).

Nomadic vine; juvenile plants with glaucous stems; internodes 1–4 cm long, 3–6 mm diam.; petioles sheathed 1/2–2/3 their length; blades sagittate, 4–13 cm long, medium green or with grayish white midrib and primary lateral veins (fide Birdsey, 1955), all the major veins sunken above, raised beneath, the anterior lobe 4–18 cm long, ovate-deltoid, slightly or not at all constricted at the base, acute to acuminate and apiculate at the apex, the posterior lobes

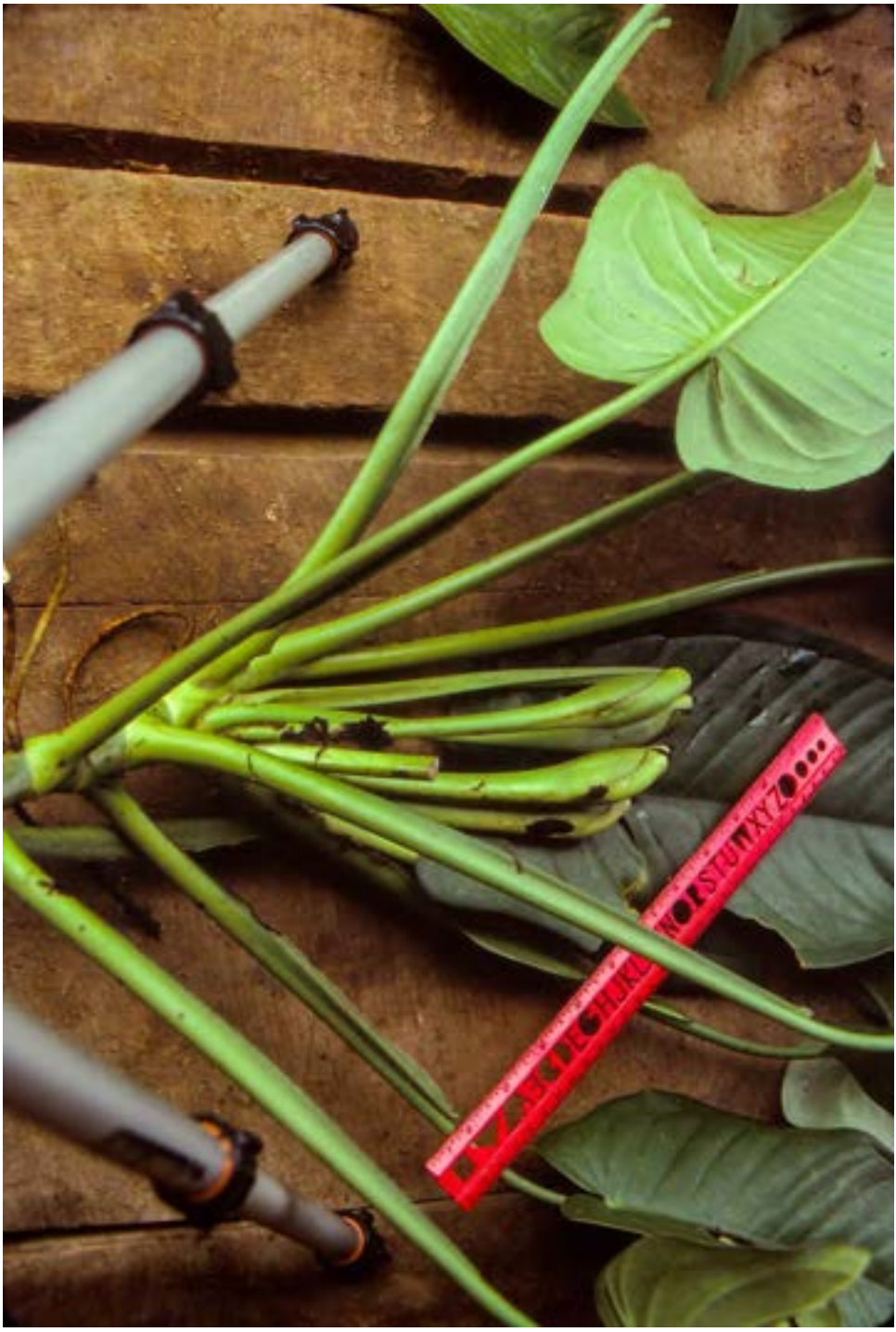

Figure 70: *Syngonium hastiferum*. Infructescence, Costa Rica. Photo, T. Ray

Figure 71: *Syngonium hastiferum*. plant with inflorescences, Costa Rica. Photo, T. Ray

Figure 72: *Syngonium hastiferum*. Adult stem, Costa Rica. Photo, T. Ray

Figure 73: *Syngonium hastiferum*. Habit with flowers and inflorescences, *Croat 79246*, Costa Rica

Figure 74: *Syngonium hastiferum*. Infructescences, *Croat 79195*, Costa Rica

2.5–9.0 cm long, acute to acuminate at the apex; intermediate leaves with the lateral lobes only slightly inequilateral or very inequilateral but lacking a conspicuous, protruded auricle. Adult plants with stems sometimes glaucous, usually 1–2 cm diam.; internodes weakly sulcate above the petioles, 1.5–10.0 cm long on flowering branches, olive-green, drying brown, flaky, often weakly and rather sparsely muricate. LEAVES with **petioles** sometimes glaucous, paler than the stems, 12–33 cm long, sheathed 2/3–4/5 their length, subterete above the sheath, somewhat flattened laterally, sharply to bluntly 1-ribbed adaxially; **blades** trisect (or rarely sub-5-sect); leaflets free to confluent, 9–28 cm long, 3.5–11.0 cm wide, the upper surface medium green, semiglossy, the lower surface only slightly paler; median leaflet oblong-elliptic to ovate-oblong or lanceolate, equal or more frequently unequal, acuminate at the apex, obtuse to acute or attenuate at the base; lateral leaflets 6–24 cm long, 2–8 cm wide, very unequal, acute on the inner margin at the base, usually prominently auriculate on the outer margin at the base, the auricles directed downward and in line with the leaflet or directed somewhat outward, usually ± parallel with the petiole, strongly to not at all pinched off from the leaflet (rarely appearing as another leaflet); primary lateral veins 5–10 per side, sunken on the upper surface, raised beneath, the minor veins obscure on the upper surface. INFLORESCENCES usually 1–3 (less frequently to 4 in Panama) per axil; **peduncle** sometimes glaucous (commonly glaucous at higher elevations), 3–9 cm long and erect at anthesis, 6–13 cm long and pendent in fruit; **spathe** tube broadly ovoid to ovoid-ellipsoid, dark green outside, becoming tinged with purple in age, red to violet-purple within, 4.0–4.5 cm long, 2.0–2.5 cm diam.; spathe blade broadly

Figure 75: *Syngonium hastiferum*. Leaf blade, adaxial surface, Costa Rica. Photo, T. Ray

Figure 76: *Syngonium hastiferum. Croat 79195* Costa Rica

Figure 77: *Syngonium hastiferum*. *Grayum & Hammel 5587*, Costa Rica

Figure 78: *Syngonium hastiferum*. Type with infructescence, *Croat 59153*, Costa Rica

Figure 79: *Syngonium hastiferum. Croat 9195,* Costa Rica

Figure 80: *Syngonium hastiferum. Croat & Grayum 59798*, Costa Rica

ovate, greenish white to white, cuspidate at the apex, 5.5–8.0 cm long, 4.8–5.5 cm wide; pistillate portion of the **spadix** greenish, 2.0–2.5 cm long, tapered gradually toward the apex, 1.2–1.6 cm diam., the flowers 2-carpellate, the stigma 2-lobed, circular, the syncarp 3–4 mm diam. at the apex; staminate portion of the spadix white, 5.5–9.0 cm long, 1.4–1.7 cm diam., broadest at about the middle, only slightly constricted at the point of merger with the sterile staminate flowers, then slightly broader toward the base, the fertile staminate flowers regularly to irregularly 4-lobed, the sterile staminate flowers slightly larger, irregular, closely compacted. INFRUCTESCENCES usually oblong-ellipsoid (sometimes ellipsoid), green heavily tinged with purple or sometimes yellowish (fide herbarium labels), 6–10 cm long, 3.0–4.5 cm wide; **syncarp** white, to 5.5 cm long and 3.5 cm diam. Flowers have been found in March, May, and December. Fruits are most common from July to September but have been seen immature

Figure 81: *Syngonium hoffmannii*. Habit of flowering plant, *Ortiz 8619*, Panama

Figure 82: *Syngonium hoffmannii*. Climbing habit, *Croat 47094A*, Panama

Figure 83: *Syngonium hoffmannii*, Habit, *Croat 47094A*, Costa Rica

Figure 84: *Syngonium hoffmannii*. Habit, *Croat 106230*, Panama

from December to August. **Figures 81–94.**

Distribution — *Syngonium hoffmannii* ranges from northern Costa Rica to Cerro Pirre in eastern Panama. It occurs in *Lower montane rain forest, Premontane rain forest* and *Tropical wet forest* life zones. It has also been collected, though much less frequently, in *Premontane wet forest* life zones.

Comments — The species is a member of section *Syngonium* and is characterized by its frequently glaucous stems, petioles sheathed 2/3–4/5 their length, trisect (or rarely sub-5-sect) blades with leaflets free to confluent, the lateral leaflets usually prominently auriculate on the outer margin at the base, the auricles directed downward, 5–10 primary lateral veins per side, usually 1–3 inflorescences per axil with the spathe tube red to violet-purple within.

The species is an extremely variable one and might eventually prove to consist of more than one element. Altitudinal range is particularly great ranging from 300 m to 1800 m. The greatest differences are exhibited in the degree of lobing of the lateral leaflets, in the shape and coloration of the infructescences, and in the degree to which petioles and inflorescences are glaucous. More Costa Rican and Panamanian collections at higher elevations were reported to have glaucous parts.

The species might be confused in Costa Rica with *Syngonium wendlandii* which has similar leaves. See that species for a discussion of the differences.

Figure 85: *Syngonium hoffmannii*. Abaxial leaf and infructescence, *Croat 47094A*, Costa Rica

Figure 86: *Syngonium hoffmannii*. Adaxial leaf blade, *Croat 61224*, Costa Rica

Figure 87: *Syngonium hoffmannii*. Adaxial leaf blade surface, *Croat 106230*, Costa Rica

Additional specimens seen — COSTA RICA. **Alajuela:** Candelaria, 1854–1859, *C. Hoffmann s.n.* (MO); La Concepcion, Llanuras de Santa Clara, 10°22›48»N, 84°18'36"W, 250 m, February 1896, *John Donnell Smith 6807* (MO, US); Candelaria, Alto de Santa Cruz, 10°01'53»N, 84°25›27»W, July 1857, *C. Hoffmann s.n.* (MO); Vicinity of Finca Peñas Blancas, E slope of Cerros Centinelas, Monte Verde Reserve, Cordillera de Tilarán, 10°18'00»N, 84°46›48»W, 1300–1450 m, 9 June 1985, *Michael H. Grayum 5365* (MO); Along Highway 15 between Naranjo and Quesada, 3.2 mi N of Zapote, 10°10'48»N, 84°23›24»W, 1560 m, 3 February 1979, *Thomas B. Croat 46917* (MO); Along road between Cañas and Upala, 4 km NNE of Bijagua on slopes leading into Río Zapote, 10°44'24»N, 85°04›12»W, 400 m, 24 June 1976, *Thomas B. Croat 36270* (MO); **Cartago:** Cartago. La Carpintera, 09°53›06»N, 83°58›59»W, 30 August 1953, *Monroe R. Birdsey 342* (MO); Paraíso. 1.5 miles E of Cachi, 10.2 miles NE of junction at Paraiso, 09°49'12"N, 83°45'36"W, 1200 m, 5 February 1979, *Thomas B. Croat 47084* (MO); Turrialba, along camino Raíz de Hule, SE of Platanillo (Tsipirí), 09°49›12»N, 83°24'00"W, 1200– 1400 m, 1 July 1976, *Thomas B. Croat 36731* (MO); **Guanacaste:** Parque Nacional Guanacaste Estación Pitilla, al noroeste de la estación; bosque primario y secundario, 11°01'48»N, 85°25›12»W, 550 m, 16 June 1989, *Barry E. Hammel 17493* (MO); Parque Nacional Guanacaste La Cruz–9 Km al sur de Santa Cecília Estación Pitilla, 10°59'24"N, 85°25'12"W, 700 m, 24 October 1990, *Carlos Ch*ávez *312* (CR, MO); P. Nac. Rincón de la Vieja Sector Las Pailas, Río Colorado, 10°46'12»N, 85°20›24»W, 820 m, 28 September 1990, *Gerardo Rivera 648* (CR, MO); 10°56'24»N, 85°30›36»W, 1000 m, 30 July 1987, *James F. Smith & E. Frost 420* (CR); Parque Nacional Guanacaste, Estación Cacao, 10°55'12"N, 85°28'12"W, 1100 m, 21 November 1990, *Roberto Espinoza 40* (INB); **Heredia:**

Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 10°25›53»N, 84°00'13"W, 100 m, 3 May 1980, *Michael H. Grayum 2786* (DUKE, MO); Between Río Peje and Río Sardinalito, Atlantic slope of Volcán Barva, 10°17'30»N, 84°04›30»W, 700–800 m, 3 April 1986, *Michael H. Grayum 6703* (MO); Pastures between Río Peje and Río Sardinalito, Atlantic slope of Volcán Barva, 10°18'36»N, 84°03'36"W, 550 m, 6 April 1986, *Michael H. Grayum 6829* (MO); 24 July 1980, *Michael H. Grayum 3020* (DUKE); Northern slopes of Volcan Barba, between Rio Peje and Rio Guacimo, along trail from main road across Quebrada Cantarana to Rio Guacimo, 10°21'00"N, 84°03'00"W, 300 m, 20 January 1983, *Michael H. Grayum & George E. Schatz 3213* (DUKE); 10°26›N, 84°01'W, 100 m, 15 April 1986, *Thomas B. Croat 61224* (MO); 4 miles north of Vara Blanca, 10°12'36"N, 084°09'36"W, 1350 m, 26 May 1976, *Thomas B. Croat 35594* (MO); *35619* (MO); **Limón:** Refugio Barra de Colorado, forests and pastures between Río Chirripocito and Río Sardina ("Sardinal" on Chirripó Atlántico quadrangle), 10°38›N, 83°45'W, 10 m, 12 November 1988, *Michael H. Grayum, F. G. Stiles, Isidro A. Chac*ón *G, E. Hernández, Reinaldo Aguilar & F. Bola*ños *9006* (MO); Bratsi, Alto Lari, Entre Surayo y Dapari 50 m N de la desembocadura del Río Dapari (Pare), junto al Río Lari, 09°24›36»N, 83°03'00"W, 300 m, 25 February 1992, *Reinaldo Aguilar & Heidi H. Schmidt 971* (MO); Talamanca, R. I. Talamanca, Cordillera de Talamanca, Amubri, Cacaotal, 09°30'36»N, 82°57'00"W, 70 m, 10 April 1995, Á*ngela Mora 109* (INB, MO); **Puntarenas:** Monte Verde; along Río Guacimal below Lechería, 10°17'N, 084°48›W, 1500 m, 11–14 June 1985, *Barry E. Hammel & Jill Trainer 13847* (MO); Foothills of the Cordillera de Talamanca, forested valley of the Río

Figure 88: *Syngonium hoffmannii*. Adaxial leaf blade surface, *Ortiz 8614*, Panama

Figure 89: *Syngonium hoffmannii*. Habit with adaxial leaf, Panama. Photo, J. Harrison

Cotón between Sitio Cotón (Cotonsito), and Sitio Tablas, 08°57'N, 82°46'W, 1500–1600 m, 2 September 1983, *Gerrit Davidse 24484* (MO); Foothills of the Cordillera de Talamanca, just north of Santa Elena on Fila Cotón, south of Agua Caliente, 08°57'N, 82°56›W, 1100 m, 4 September 1984, *Gerrit Davidse, Gerardo Herrera Ch. & Michael H. Grayum 28256* (MO); Cordillera de Talamanca, area around Río Canasta, 9.5 airline km NW of Agua Caliente, between Cerro Frantzius and Cerro Pittier, 09°02'N, 82°59'W, 1500–1600 m, 6 September 1984, *Gerrit Davidse, Gerardo Herrera Ch. & Michael H. Grayum 28485* (MO); Parque I., La Amistad Quijada del Diablo, 08°54'36»N, 82°46›48»W, 1200 m, 25 September 1990, *Marvin Ramírez & Curso II de Parataxónomos 127* (CR, MO); **San José:** Z. P. Cerros de Escazú, 09°49›12»N, 84°06'00"W, 1700–1800 m, 15 July 1991, *J. F. Morales 33* (MO); Leon Cortes Castro, S of Escazu on side of mountain, 09°49'57»N, 84°08›31»W, 1800 m, 27 August 1953, *Monroe R. Birdsey 340* (MO); Pérez Zeledón, W slopes of the General Valley along the Interamerican Hwy, 09°27'00"N, 83°42'36"W, 1400–1500 m, 7 February 1982, *William C. Burger & Kerry Barringer 11593* (MO); Puriscal, Z.P. La Cangreja, Cerros de Puriscal, San Martín de Puriscal, 09°43'48»N, 84°23›24»W, 800 m, 20 November 1993, *J. F. Morales 2017* (CR, MO); Z.P. La Cangreja, Cerros de Puriscal, Santa Rosa de Puriscal, tacotales y charrales camino al Río Negro, 09°42'36»N, 84°23›24»W, 400 m, 19 December 1994, *J. F. Morales & Quírico Jim*énez *3316* (CR, MO). **HONDURAS. Santa Bárbara:** Punta Gorda, Lago Yojoa, 14°53'N, 88°00›W, 680 m, 2 June 1993, *Randall J. Evans 1787* (MO); **Yoro:** Bank of Río Guán Guán, Cordillera Nombre de Dios, ca. 3 straight line km S of San José de Texíguat,

Figure 90: *Syngonium hoffmannii*. Flowering plant. Photo, J. Harrison

Figure 91: *Syngonium hoffmannii*, *Correa 10951*, Panama

Figure 92: *Syngonium hoffmannii*. *Birdsey 3410*, Costa Rica

Figure 93: *Syngonium hoffmannii*. *Carlsen et al. 3675* from *Croat 69809*, cult from D. Gould

Figure 94: *Syngonium hoffmannii*. *Churchill 6206*, Panama

15°30›N, 87°27'W, 380 m, 5 March 1993, *Randall J. Evans 1321* (MO). **MEXICO. Chiapas:** 1200 m, 19 July 1941, *Eizi Matuda 4859* (LL); La Trinitaria, at km 21–23 along road from Lago Tzicao to Santa Elena, 16°05'12"N, 91°33'33"W, 1230 m, 7 November 1988, *Dennis E. Breedlove & Thomas F. Daniel 71212* (CAS). **NICARAGUA. Atlántico Norte:** Municipio de Siuna, Waní, 13°41'30»N, 84°50›15»W, 100 m, 27 August 1982, *F. Ortiz 43* (MO); Reserva Bosawas, Municipio de Siuna, en la base del Cerro La Garrapata, 13°43'N, 85°01›W, 450 m, 14 April 1996, *R. M. Rueda, Alfredo Grijalva P, R. Dolmus, M. Castrillo & N. Tercero 4277* (MO); **Atlántico Sur:** Caño Monte Cristo, 1 km antes del campamento German Pomares, 11°35›N, 83°51'W, 10 m, 5 February 1982, *P. P. Moreno 14842* (MO); **Boaco:** Cerro Mombachito, 12°24›N, 085°32›W, 700 m, 29 November 1983, *M. Aranda, Alfredo Grijalva P. & S. Vega 41* (MO); Cerro Mombachito, al SE de la ciudad de Boaco, 12°24›N, 85°33'W, 900–1000 m, 30 September 1980, *P. P. Moreno 3171* (MO); **Estel**í: Municipio de Esteli, ásentamiento Puertas Azules, 13°16'N, 86°16›W, 1300 m, 17 April 1999, *R. M. Rueda & W. Velásquez 10952* (MO); **Granada:** Lado noroeste de Volcán Mombacho, Finca San Joaquín, 11°50'N, 85°59›W, 800–1000 m, 15 May 1981, *P. P. Moreno & James E. Henrich 8527* (MO); **Matagalpa:** Summit of El Tuma Road, 12°57'N, 85°51'W, 1000–1100 m, 16 March 1977, *David A. Neill 1573* (MO); Al noroeste del Cerro Musún, sobre el filo del cerro, a partir de la trocha de Paiwás, 12°59'N, 85°15'W, 800–1200 m, 14 May 1980, *M. Araquistain & P. P. Moreno 2498* (MO); Summit of Matagalpa-Tuma Road, 9.0 km NE of Hwy. 3 intersection, 12°57'N, 85°51›W, 1000 m, 24 May 1981, *W. D. Stevens & James E. Henrich 20319* (MO); **Rivas:** Isla Ometepe, Volcán Maderas, "Balgüe", cafetal de la Hacienda Magdalena, 11°27'45»N, 085°30›06»W, 500–700 m, 15 September 1983, *W. Robleto T. 29* (MO). **PANAMA. Bocas del Toro:** La Fortuna area to Chiriquí Grande and the oil pipeline; along dirt road 10 mi from Continental Divide, just past 2nd large bridge, 1 mi N from highway, 08°46›N, 82°11'W, 130 m, 5 March 1986, *Barry E. Hammel, Gordon McPherson & L. Sanders 14597* (MO); Fortuna Dam region, along trails leaving pipeline road. [Coordinates on orginal label: ca. 08º45'N, 82º15'W], 08°46'35»N, 82°11›42»W, 1000 m, 8 December 1985, *Gordon McPherson 7861* (MO); Road from Fortuna Dam to Chiriquí Grande, 3 mi from Continental Divide, 08°47'N, 82°11'W, 650 m, 22 September 1984, *H. W. Churchill & A. Churchill 6206* (MO); 1.2 mi N of Continental Divide, 5.3 mi N of bridge over Fortuna Dam 4. [Coordinates on original label: 08º44'N, 82º17›W], 08°46›06»N, 82°12'30"W, 910 m, 12 March 1985, *Thomas B. Croat & Michael H. Grayum 60457* (MO); **Chiriqu**í: Unimproved road to Cerro Punta, Boquete, 1300 m, 3 September1953, *Monroe R. Birdsey 345* (MO); Hartman finca, near Cerro Pando, 08°52'59»N, 82°43›24»W, 2000–2200 m, 22 August 1982, *Clem W. Hamilton, Henry Stockwell & Annette Aiello 844* (MO); Fortuna Field Station, 08°43'00»N, 82°16›00»W, 15 September 1993, *David W. Roubik, S. Bard & Liduvina Quiroz 1242*, Las Lagunas near Volcán, near the airstrip. [Elevation on original label: 1200 m], 08°45'54"N, 82°40'42"W, 1350 m, 21 October 1977, *James P. Folsom & Richard Page 5979* (MO); Fortuna Dam Project Area, slope NW of confluence of Rio Hornito and Rio Chiriqui, 08°44'N, 82°13'W, 1050–1100 m, 10 November 1980, *Kenneth J. Sytsma & W. D. Stevens 2217* (MO); *2251* (MO); Along Río Caldera (Boquete region), and on slope to the east, ca. 3.5 km NW of Bajo Mono, 08°50'N, 82°28'W, 1600 m, 8 February 1986, *Michael H. Grayum 6465* (MO); Headwaters of the Río Chevo, Finca Ojo de Agua, 08°52›N, 82°44'W, 1650 m, 9 October 1981, *Sandy Knapp 1474* (MO); "Ojo de Agua", property of Ratidon Hartmann, vicinity of Santa Clara (between Volcán and Río Sereno), 08°51'N, 82°45›W, 1520 m, 17 June 1987, *Thomas B. Croat 66289* (MO); **Cocl**é: La Mesa, above El Valle de Antón, ca. 2 km W of Cerro Pilón on slopes of steep hill, 08°37'30»N, 80°07›30»W, 860–900 m, 21 July 1976, *Thomas B.*

Croat 37341A (MO); La Pintada, Alto Calvario, above saw mill, on Continental Divide, 5.2 mi above El Copé, 08°40'16»N, 80°36›44»W, 930 m, 6 December 1979, *Thomas B. Croat 49201* (MO); **Colón:** Santa Rita ridge road, ca. 22 km from transisthmian highway, 09°25'N, 79°40'W, 500 m, 17–18 February 1986, *Barry E. Hammel, Gordon McPherson & David W. Roubik 14491* (MO); Santa Rita Ridge, 09°19›N, 79°39'W–09°24'N, 079°48'W, 1 March 1971, *Thomas B. Croat 13893* (MO); Along trail at end of road which goes to Río Indio, beginning 10.6 km from Iransisthmiam Hwy, 3 km beyond hydrographic station, 09°22'30"N, 79°41'30"W, 380 m, 13 April 1976, *Thomas B. Croat 34351* (MO); Donoso, Minera Panamá copper-mining concession, headwaters of Ríos Petaquilla and Molejón, 08°49'25»N, 80°39'57»W–08°49'26"N, 080°40'00"W, 234–245 m, 29 August 2014, *Michael H. Grayum, Gordon McPherson, Christel Ramos, Irving Vergara-Pérez & Luis Rojas 13231* (PMA); **Darién:** Summit of Cerro Pirre, 07°55'21"N, 077°42'57»W– 07°55'40"N, 77°42'12"W, 1000–1400 m, 29 December 1972, *Alwyn H. Gentry & Andre F. Clewell 7027* (MO); Parque Nacional del Darién, ridge between Río Topalisa and Río Pucuro, ca. 13 km E of Pucuro, Quebrada Pobre to Mi Casita, 08°03'N, 77°20'W, 450–600 m, 14 October 1987, *Barry E. Hammel, Greg C. de Nevers, Hermes Cuadros V. & Heraclio Herrera 16203* (MO); Cerro Chucanti, Sender al filo, E0779572, N097265, 1000 m, 21 December 2009, *Fermín Hernández, Alicia Ibáñez & Hortensio Sarco 1587* (MO, PMA); Serrania de Majé, Reserva Privada Chucanti, 08°47'45»N, 78°27›47»W, 1325 m, 4 April 2018, *Orlando Ortiz & et al. 3157* (MO, PMA); 08°47'31»N, 78°26›51»W, 699 m, 24 March 2017, *Orlando Ortiz, Rodolfo Flores, E. Campos & Slamová, G. 2775* (MO, PMA); Parque Nacional Darién, Cerro Pirre, 07°59›43»N, 77°42'39"W, 708 m, 3 December 2016, *Orlando Ortiz, Roberto Vergara, Roberto & Tilson Contreras 2710* (MO); **Herrera:** Between Las Minas and El Toro, near village of Chepo, trail along ridge of Montosa de Chepo, 07°42'04"N, 80°51'04"W, 900–950 m, 24 January 1987, *Gordon McPherson 10303* (MO); Las Minas, 18 km W of Las Minas, N slope of Cerro Alto Higo, 07°43'48»N, 80°52'25»W–07°43'24»N, 80°51›47»W, 2400–3000 ft, 6 August 1978, *Barry E. Hammel 4267* (MO); Hill above Chepo de las Minas, 07°43'22"N, 80°49'41"W, 700 m, 19 December 1977, *James P. Folsom, Robert B. Channell & Gordon Small 7009* (MO); **Panam**á: W of Interamerican Highway near Capira (c. 60 km W of Panamá City) on road to Cerro Campana, 08°40'N, 79°50'W, 800 m, 21 March 1985, *Gordon McPherson 6896* (MO); Cerro Jefe, along road short of summit, 09°15'04"N, 79°30'04"W, 550–800 m, 12 December 1986, *Gordon McPherson 10031* (MO); Vicinity of Cerro Jefe, Altos de Cerro Azul subdivision, Municipio Chilibré, 09°12›13»N 79°24'47"W, 3 March 2015, *Croat 106230* (MO); Parque Nacional Altos de Campana, Finca Thompson después de las torres del Intel, 100 m del sendero, 08°40›N, 79°55'W, 800–900 m, 2 February 1995, *Mireya D. Correa A. & Eduardo Montenegro 10951* (MO, PMA); Cerro Campana at end of road beyond Su Lin Hotel, 08°43'N, 79°54'W, 9 April 1971, *Thomas B. Croat 14226* (MO); Cerro Campana, 6.1 miles above Pan-American Hwy, 3.2 miles beyond park entrance and Guarda Bosque Station, 08°41'N, 79°56'W, 800 m, 23 March 1993, *Thomas B. Croat 74773* (CM, MO); **San Blas:** El Llano-Cartí Road, km 19.1, 09°20›N, 78°58'W, 350 m, 2 November 1985, *Greg C. de Nevers, Heraclio Herrera & Susan Charnley 6145* (MO); (Comarca de Kunayala): Nusigandí, El Llano-Cartí Road, 10.1 mi N of Interamerican Hwy, then ca. 0.5 mi N, Paseo Mariska near road, 09°20›N, 78°59'W, 300 m, 20 July 1994, *Thomas B. Croat & Guang Hua Zhu 77027* (MO); 1–2 mi N of Nusigandí on road to Cartí, 09°20›N, 79°00'W, 250–275 m, 2 July 1994, *Thomas B. Croat & Guang Hua Zhu 76587* (MO); **Veraguas:** Santa Fe, on Caribbean slope above Río Primero Brazo 5 miles NW of Santa Fé, 08°31'26»N, 81°07›46»W, 700–1200 m, 18–19 March 1973, *Ronald L.*

Liesner 827 (MO); Valley of Río Dos Bocas on road between Alto Piedra (above Santa Fé) and Calovebora, along road, 08°33'03»N, 81°10'17»W, 350–400 m, 29 August 1974, *Thomas B. Croat 27391* (MO); Beyond Tres Brazos River along steep descent, 11 km beyond Santa Fé, 08°31'52»N, 81°09›11»W, 650 m, 24 July 1974, *Thomas B. Croat 25647* (MO); Along Río Primero Braso, 08°31'26»N, 81°07›46»W, 700–800 m, 26 July 1974, *Thomas B. Croat 25970* (MO); Above Santa Fe beyond Escuela Agrícola Interamericana, 1.8 miles beyond fork in road on Pacific slope, above rocky ravine on side of Cerro Tute, 08°30'49»N, 81°02›11»W, 700–1000 m, 5 April 1976, *Thomas B. Croat 34231* (MO).

Syngonium laterinervium Croat, Ann. Missouri Bot. Gard. 68(4): 620, fig. 16. 1982. — Type: COSTA RICA. Puntarenas: Osa Peninsula, Corcovado National Park within 2 km of park headquarters at Sirena, below 200 m, 08°29'N, 83°36'W, 05 July 1977, *R.L. Liesner 2951* (holotype, MO, barcode MO-150708, acc. 2588405).

Nomadic vine; juvenile stages not seen. Adult plants with scandent stems, much branched; internodes 2–8 cm long, 5–10 mm wide, green, drying light brown, the periderm often flaky in small patches. LEAVES with **petioles** 10–22 cm long, sheathed 75–95% their length; sheath free-ending and narrowly acute at apex, often glaucous in lower half, those petioles subtending inflorescences much broader in lower half; free portion between petiole and blade flattened adaxially; **blades trisect**, leaflets overlapping or not distinctly free from one another; median leaflet oblong-elliptic, somewhat inequilateral, (5.5)8.0–22.0 cm long, 2.3–7.6 cm wide, acute and cuspidate to narrowly acuminate at apex, obtusely cuneate to attenuate at the base; lateral leaflets oblong-elliptic, very inequilateral, narrowly acute to attenuate on inner margins at base, conspicuously auriculate on outer margins at base, usually joining petiolule at ca. 90°, the petiolules 4–10 mm long, sulcate adaxially, margin continuous with margin of both median and lateral leaflets, the auricles about as long as or longer than broad, 12–28 cm long, oblong to triangular, rounded at the apex; midrib weakly sunken on upper surface, raised beneath; **primary lateral veins** 4–6 per side, slightly more conspicuous than the smaller lateral veins, all the veins below clearly visible, departing the midrib at ca. 70°, spreading almost straight to the collective vein; collective veins 2 or 3, the principal one 2–5 mm from the margin. INFLORESCENCES solitary; **peduncle** 2.5–4.5(4.8) cm long, ca. 3 mm diam., erect at anthesis, glaucous; **spathe** ca. 8.5 cm long, the tube narrowly ellipsoid, ca. 3.5 cm long, 1.2 cm diam., outside pale green, greenish yellow or pinkish red outside, dark red or purple inside; spathe blade elliptic, ca. 5 cm long, acuminate at the apex, white; **spadix** 6.7–9.0 cm long; pistillate portion of the spadix 1.8 cm long, ca. 9 mm diam., the flowers irregularly hexagonal, stigmas flat at the apex, 1.5–2.0 mm diam.; staminate portion of the spadix ca. 5 cm long, clavate, ca. 1.5 cm diam. at the broadest point in the upper 1/3, fertile staminate flowers mostly rhombic to sometimes irregularly hexagonal at apex, surface minutely rugose, margins weakly crenate. INFRUCTESCENCES with **syncarp** creamy yellow. Flowers have been found in Mar, May–July, October Fruits December. **Figures 95–107**.

Distribution — *Syngonium laterinervium* is known from southwestern Costa Rica and northwestern Panama in *Tropical wet forest* life zones in the region surrounding Golfo Dulce, at elevations ranging from near sea level (50 m) to 600 m.

Figure 95: *Syngonium laterinervium*. Habit of flowering plant, *Croat 59805*, Costa Rica

Figure 96: *Syngoniium laternervium*, habit of adult palnt, photo, T. Ray , Costa Rica_

Figure 97: *Syngonium laterinervium*. Adult plant laid out flat, Costa Rica. Photo, T, Ray

Figure 98: *Syngonium laterinervium*. Closeup of adult vegetation, Costa Rica. Photo, T. Ray

Figure 99: *Syngonium laterinervium*. Closeup of adult leaves, Costa Rica. Photo, T. Ray

Figure 100: *Syngonium laterinervium*. Juvenile plant on tree, Costa Rica. Photo, T. Ray

Figure 101: *Syngonium laterinervium*. Juvenile plants terrestrial, Costa Rica. Photo, T. Ray

Figure 102: *Syngonium laterinervium*. Juvenile leaves abaxial leaf surface. Photo, T. Ray

Figure 103: *Syngonium laterinervium*. Adaxial leaf and infructescence. Photo, T. Ray

Figure 104: *Syngonium laterinervium. Croat 59805*, Costa Rica

Figure 105: *Syngonium laterinervium*. *Grayum 4110*, Costa Rica

Figure 106: *Syngonium laterinervium*. Birdsey, Costa Rica

Figure 107: *Syngonium laterinervium*. *Aguilar 440*, Costa Rica

Comments — The species is a member of sect. *Syngonium* and is characterized by its scandent, much branched adult stems, elongate, light brown-drying internodes with flaky periderm, petioles sheathed to near apex, the sheath free-ending and narrowly acute at apex, free portion flattened adaxially, by its trisect and petiolulate blades, the oblong-elliptic leaflets with the outer margins conspicuously auriculate, 4–6 primary lateral veins per side, a solitary short-pedunculate inflorescence, spathe tube narrowly ellipsoid, pale green and the clavate spadix.

It is most easily confused with *Syngonium hoffmannii* but differs in having the lateral veins departing the midrib at no less than ca. 70° and in having the primary lateral veins only slightly more prominent than the lesser lateral venation. *Syngonium hoffmannii* has at least the lower primary lateral veins departing the midrib at a much sharper angle (ca. 50°), and much more conspicuous than the minor lateral veins (drying much darker than the surface).

Additional specimens seen — COSTA RICA. Eastern Osa Penninsula, 08°31'00»N, 083°24›25»W, 24 July 2001, *Margaret M. Mayfield 959-1501-1518* (MO); Illustration from Manual de Plantas de Costa Rica, *S. Troyo 30arac*; **Puntarenas:** Reserva Forestal Golfo Dulce Osa Península, Rancho Quemado, in forest on trail to Drake on ridge at N end of valley; on slope leading down to Guerra, 08°43'48"N, 83°36'00"W, 200–300 m, 2 May 1988, *Barry E. Hammel 16789* (MO); Parque Nacional Corcovado Sirena Skyway, 08°27›00»N, 83°33'00»W–08°30'N, 83°38›W, 100 m, 26 June 1988, *Christopher Kernan 620* (MO); Dos Brazos de Río Tigre, Jiménez, cuenca superior del Río Madrigal, margen derecha, 08°29›24»N, 83°28'48"W, 600 m, 6 December 1990, *Gerardo Herrera Ch. 4719* (CR, MO); Reserva Forestal Golfo Dulce Fila al oeste de Rancho Quemado, 08°43›48»N, 83°36'00»W, 0–300 m, 30 March 1991, *Juan C. Saborío, Barry E. Hammel & Reinaldo Aguilar 134* (AAU, CR, IBE, INB, MO); Eastern base of Fila Barriganes. Ca. 1 km S and 2 km W of Cañasas, (ca. 12 km S of Rincón de Osa) 08°34'N 83°25'W, 4 March, 1985, *Croat 59805*(MO). **PANAMA**. **Chiriquí**: San Bartolo Limité, 18 km W of Puerto Armuelles, 08°17'24»N 82°58›36»W, 450 m, 24 February 1973, *Phil Busey 605* (MO).

Syngonium llanoense Croat, Ann. Missouri Bot. Gard. 68(4): 585–587. 1982. — Type: PANAMA. Canal area: Summit Garden, 09°03'52»N 79°38›58»W; 22 June 1972. *T.B. Croat 17148* (holotype, MO, 2 sheets, barcodes MO-150698, MO-150699, acc. 2159002, 2164896 respectively).

Nomadic vine; juvenile plants with trailing stems, leaves much like those of adult but smaller; stems medium green when young, becoming dark olive-green to purplish; internodes 3–6 cm long, to 6 mm wide, weakly sulcate above petioles in lower part of internode; petioles 6 cm or longer, sheathed nearly throughout; sheath 1.0–1.3 cm wide when flattened. Adult plants with stems closely appressed to trees, dark olive-green, shiny, to ca. 2 cm diam., becoming brown in age, drying with longitudinal wrinkles; internodes to 5 cm or more long on lower parts of stem, 1–3 cm near apex; sap pale tan. LEAVES persisting on upper 1 m or more of stem; **petioles** 9–33 cm long, broadly sheathed almost throughout, broadly canaliculate from end of sheath to blade, sheath 2–3 cm wide when flattened (to 5 cm wide when subtending an inflorescence), margins of sheath erect at base, broadly spreading toward apex, free-ending and emarginate at apex (with apical lobes sometimes extending beyond bottom of blade); **blades** simple, oblong-

elliptic to ovate-elliptic, 13–34 cm long, 6–13 cm wide, gradually acuminate and turned down at apex (acumen apiculate), narrowly rounded to subcordate at base, posterior lobes 1–2 cm long, held almost erect, rounded at apex, upper surface medium green, matte to semiglossy, lower surface much paler, matte; midrib prominently sunken; **primary lateral veins** 10–18 per side, sunken above, raised beneath; interprimary veins few; tertiary veins distinctly visible; principal collective vein weakly sunken, 4–8 mm from margin, weakly loop-connected between primary veins. INFLORESCENCES usually 2 per axil, erect at anthesis; prophylls ca. 20 cm long; **peduncle** 6–8 cm long, epidermis in part becoming inflated on drying; **spathe** 15–16 cm long; spathe tube green, ovoid-ellipsoid, 5–6 cm long, ca. 3 cm diam.; spathe blade greenish white, ca. 10 cm long, acuminate at apex; **spadix** 11.5 cm long (on dried specimens); pistillate portion of spadix green, ca. 2 cm long, ca. 9 mm diam. at base, ca. 6 mm diam. at apex; staminate and sterile portions of spadix 9.5 cm long, white, sterile staminate portion ca. 12 mm diam., staminate flowers mostly ca. 2 mm diam., sterile flowers mostly 4–5 mm diam. INFRUCTESCENCES pendent; peduncles green, weakly flattened, to 10 cm long, fruiting spathe oblong-elliptic, 8–10 cm long, 3.0–4.5 cm diam., **syncarp** subglobose, ca. 5 cm long, 4 cm diam., tan-cream; seeds subglobose, ca. 8 mm diam. Flowering inflorescences have been seen in June and fruits have been found in June, July and October. **Figures 108–113.**

Distribution — *Syngonium llanoense* is endemic to Panama and occurs naturally only in *Tropical wet forest* life zones, ca. 50–550 m.

Comments — The species is a member of section *Cordata,* It is unique among known members of the genus in having oblong-elliptic leaves and a fully sheathed petiole. In the key the species may track to *Syngonium castroi* from Costa Rica which differs by having a narrower sheath, less than 1 cm wide in contrast to having a sheath 2–3 cm wide.

Additional specimens seen — PANAMA. **Canal Area:** Summit Garden, 09°03'52»N 79°38›58»W, 75 m, 18 June 1976, *Thomas B. Croat 35999* (MO); 10 June 1970, *Thomas B. Croat 10831* (MO); **Colón:** Santa Rita Ridge, southeast of Colon, along ridge road, 10–12 miles from Transisthmian Highway. [Coordinates on original label: ca. 09º20'N, 79º45'W], 9°24'N, 079°39'W, 550 m, 21 May 1986, *Gordon McPherson 9194* (MO); Río Guanché above bridge on Portobelo Road, ca. 3 to 5 km above bridge, 09°30'N, 79°37'W–09°31'N, 079°39'W, 50–200 m, 8 July 1976, *Thomas B. Croat 36946* (MO); Vicinity of Río Indio on road from Portobelo to Nombre de Dios, 09°33'30»N, 79°33›00»W, 50 m, 23 March 1976, *Thomas B. Croat 33636A* (MO); Vicinity of Río Indio on road from Portobelo to Nombre de Dios, 09°33'30»N, 79°33›00»W, 50 m, 23 March 1976, *Thomas B. Croat 33636* (MO); Río Guanché, between Puerto Pilón and Portobello, ca. 1.5 miles S of road, 09°30'N, 79°39'W, 100 m, 19 June 1994, *Thomas B. Croat & Guang Hua Zhu 76232*; **Panam**á: Chepo. 6 km above Pan-American Highway on road from El Llano to Carti-Tupile, 09°15'32"N, 78°57'36"W, 200 m, 18 October 1972, *Helen Kennedy 1785* (MO); El Llano-Cartí Road, 7-12 km from Interamerican Highway, 09°17'45»N, 78°56'15»W, 360–400 m, 18 July 1974, *Thomas B. Croat 25148* (MO); El Llano-Cartí Road, 5–6 miles N of Interamerican Highway at El Llano, 09°15'30"N, 78°55'50"W, 350–375 m, 7 May 1976, *Thomas B. Croat 34764* (MO); **San Blas:** El Llano-Cartí Road, Km 26.5. [Coordinates on original label: 09º19'N, 78º55›W], 09°22'N, 78°58›W, 200 m, 17 June 1986, *Greg C. de Nevers, Heraclio Herrera, Gordon McPherson, William G. D'Arcy & Bruce Allen 7844* (MO); El Llano-Carti Road, vic. Nusagandí, Sendero Nusgandí, down to the Atlantic coast, 09°15›N, 79°00'W, 300–350 m,

Figure 108: *Syngonium llanoense*. Habit of flowering plant, *Croat 36946*, Panama

Figure 109: *Syngonium llanoense*. Habit of adult plant laying on ground *Croat 75176*

Figure 110: *Syngonium llanoense*. Adult plant, stem and leaves on ground, Panama 12 July 1988, *Thomas B. Croat 69277* (MO).

Syngonium macrophyllum Engl., Pflanzenr. 71 (IV. 23E): 128. 1920. — Type: ?Cult. Berlin Botanic Garden, "Provinz des tropischen Zentralamerika. Genauerer Fundort und Sammler nicht bekannt", [no date], [unspecified collector] *215* (holotype, B, two sheets, barcodes B 10 0247011 & B 10 0247012).

Nomadic vine, juvenile plants with glaucous stems (at least in northern extreme of its range); petioles 7–25 cm long, sheathed ca. ½ their length; blades subcoriaceous, broadly ovate, 8–16 cm long, 6–10 cm wide, the posterior lobes at first rounded, becoming sagittate, rounded at the apex; intermediate leaves with the apical lobe elliptic, acuminate at apex, much constricted at the base, the posterior lobes becoming nearly pinched off, narrowly rounded to acute at the apex. Adult plants with stems glaucous (or possibly not in Panama) 3–4 cm diam., usually not branched and appressed to trees; internodes 1–4 cm long near the apex. LEAVES with **petioles** often glaucous, 25–60 cm long, sheathed 1/2–3/4 their length with a weak to prominent rib between sheath and blade; sheath free-ending and acute at apex; **blades** subcoriaceous, pedatisect; leaflets 7-9, mostly free or the outer ones confluent, the lowermost usually variously auriculate, the auricle soon pinched off to form a leaflet, dark to medium green on the upper surface, smooth, the lower surface light green; rachis sharply margined; median leaflet oblanceolate, elliptic, broadly elliptic or ovate-elliptic, acuminate to acute and downturned at the apex, cuneate to abruptly attenuate at the base, 17–47 cm long, 5–18 cm wide; primary lateral veins 3 or 4 per side in the median leaflet, weakly sunken above, raised below. INFLORESCENCES 4–8 per axil; **peduncle** almost terete, glaucous in northern part of

range, erect, 10–13 cm long at anthesis, 14–20 cm diam. and pendent in fruit; **spathe** 10–16.5 cm long; tube ovate, green and glaucous outside, green to greenish tan inside, 3.0–5.5 cm long, 3–5 cm diam.; spathe blade 7.0–11.5 cm long, at first green, becoming cream, mucronate at apex; pistillate portion of **spadix** 1.5–3.0 cm long, ca. 2 cm diam. at base, tapered to apex, to 1.5 cm diam. at apex, pale green, flowers irregularly 5- or 6–sided, stigma subsessile, discoid, yellowish at anthesis; staminate portion of spadix oblong-ellipsoid, abruptly constricted just above sterile staminate flowers, fertile staminate flowers with 4 stamens, synandrium with line of fusion scarcely visible, apex truncate or with a conspicuous central depression, sterile staminate flowers somewhat larger. lNFRUCTESCENCES often rather massive, 8–14 cm long, 5–8 cm wide, yellow and pruinose in northern part of range; **syncarp** narrowly ovoid to sub-globular, 6–10 cm long, 3.5–6.0 cm wide, brown; mesocarp sweet smelling, fleshy; seeds obovoid, white before maturity, becoming dark gray, 1.4–1.8 cm long, ca. 1.5 cm wide. Flowers and fruits are found throughout the year but principally from June to August. **Figures 114–131.**

Distribution — *Syngonium macrophyllum* ranges from Mexico to Ecuador (Pacific slope only). Collections from Río Palenque Field Station reported by Dodson & Gentry (1978) as *S. podophyllum* are also this species. I believe the latter species is restricted to the other side of the Andes. The species is known from wetter parts of *Tropical moist forest*, *Premontane wet forest* and *Tropical wet forest* life zones and ranges from sea level to 1100 m. It is most common below 700 m. In Panama, the species is always found in good forest or along roads recently opened. While this is usually the case also in the remainder of its range, to the north one finds the plants frequently in more disturbed areas. However, in most cases, it is possible that plants could have persisted in the areas where they were collected from earlier forest disturbances.

Comments — The species is a member of sect. *Syngonium* and is characterized by its lack

Figure 111: *Syngonium llanoense*. Infructescence, *Croat 36946*, Panama

Figure 112: *Syngonium llanoense*. *McPherson 9194*, Panama

Figure 113: *Syngonium llanoense*. *Croat 10831*, Summit Gardens, Panama

Figure 114: *Syngonium macrophyllum*. Habit (left) and Fruiting plant (right), Panama. Photo, L. Harrison

Figure 115: *Syngonium macrophyllum*. Preadult leaves. *O. Ortiz 2705*. Panama. Photo, O. Ortiz

Figure 116: *Syngonium macrophyllum*. Adult flowering plant held by Cathy Andrews. Costa Rica. Photo, T. Ray

of glaucous stems, its moderately short internodes, frequently glaucous petioles which are sheathed ½-¾ their length and the sheath free–ending and acute at apex, pedatisect blades with 7–9 leaflets, mostly free or with the outer ones confluent and the lowermost usually variously auriculate, by 3 or 4 primary lateral veins per side as well by having 4–8 inflorescences per axil, an ovate, green, glaucous spathe tube as well as with often rather massive infructescences often yellow and pruinose. According to natives in Guatemala near Puerto Barrios, spathe tube of mature infructescence turns yellow, whereas in Panama immature fruits have been seen turning a pale brick red (Croat, 1982).

It is possible that the plants from central Panama chiefly west of the Isthmus on Santa Rita Ridge, the Pipeline Road, El Llano-Carti Road, etc.) represent a distinct species. These collections (e.g., *Croat 13952*) differ in having only a few primary lateral veins, mostly restricted to the basal half of the blade.

Panamanian plants do not have glaucous parts and tend to have somewhat smaller leaves with narrower segments than do collections made from the northern part of the range.

Syngonium macrophyllum is not usually confused with any other species and is distinguished by its large parts, smooth, subcoriaceous, 7–9-pedatisect leaves and by its ovate-cordate juvenile blades. It may be confused with *Syngonium podophyllum* in some parts of Panama and Costa Rica where they both occur in wetter parts of *Tropical moist* or *Premontane wet forest* life zones.

Additional specimens seen — BELIZE. **Cayo:** Forest along highway at mile 28.5 on Hummingbird Hwy, S of Belmopan, 17°04'N, 088°36'W, 200– 300 ft, 14–21 June 1973, *Thomas B. Croat 24585* (MO); Vicinity of old lumber camp at Grano de Oro, 16°40'22"N, 089°01'35"W, 1700 ft, 2 June 1973, *Thomas B. Croat 23358* (MO); **Toledo:** Southwestern Maya Mountains, Columbia River Forest Reserve, 3–4 km E of Union Camp, 16°23'N, 89°09'W, 700–750 m, 7 April 1992, *Bruce K. Holst 4201* (MO); Southern Maya Mountains, Bladen Nature Reserve, limestone ridge and valley bottom along dry stream bed from Cave Creek to "AC Camp", 16°29'44»N, 088°55›07»W, 260– 360 m, 15 May 1997, *Gerrit Davidse, Douglas L. Holland & H.B. Buchanan 36468* (MO); Upper reach of Golden Stream, 16°21'N, 088°47'W–16°20'N, 88°48'W, 8 May 1944, *Percy H. Gentle 4591* (LL); 1.5 miles S of Mayan village of San Jose, ca. 5 miles W of Columbia Forest Station., 16°15'N, 89°04'W, 12 June 1973, *Thomas B. Croat 24318* (MO); Along trail to Esperanza beginning 1 mile north of Columbia Forest Station, 16°18'N, 89°02'W, 500–1000 ft, 12 June 1973, *Thomas B. Croat 24276* (MO). **COSTA RICA**. **Alajuela:** Peñas Blancas river valley NE of San Carlos, in woods on slopes along river, 10°21'36»N, 84°37›48»W, 350 m, 29 June 1985, *Barry E. Hammel, Erick Bello C. & William A. Haber 14061* (MO); Along road between Cañas and Upala, 4 km NNE of Bijagua on slopes leading into Río Zapote, 10°44'24»N, 85°04›12»W, 400 m, 24 June 1976, *Thomas B. Croat 36332* (MO); Along road between Cañas (Guanacaste) and Upala, near Río Zapote, 1.8–2.7 km south of Río Canalete, 100 m, 25 June 1976, *Thomas B. Croat 36400* (MO); Along road between Cañas and Upala, 10 km north of Bijagua, 10°47'24»N,

Figure 117: *Syngonium macrophyllum*. Closeup of abaxial leaf. *O. Ortiz 2705*, Panama

Figure 118: *Syngonium macrophyllum*. Habit of adult plant. O. Ortiz 2705, Panama

85°03›36»W, 260 m, 26 June 1976, *Thomas B. Croat 36479* (MO); Along road between Cañas and Upala, 8 km north of Bijagua, 10°48'00»N, 85°03›00»W, 300 m, 26 June 1976, *Thomas B. Croat 36491* (MO); Along road between Cañas and Upala, near Río Zapote, 6.1 km south of Río Canalete, disturbed area along road with a few remnant epiphyte populations on persisting large trees, 10°45'00"N, 85°04'12"W, 200 m, 25 June 1976, *Thomas B. Croat 36339* (CR, F, MO); Transition zone about 3 km NNE of Bijagua along the new road to Upala, 10°45'00"N, 85°03'00»W, 450 m, 7–8 November1975, *William C. Burger & Richard A. Baker 9883* (MO); Grecia, along the road to and around the edge of Laguna Hule, NE of Cerro Congo, and ca. 8 km NW of the village of Cariblanco, 20 km N of Vara Blanca, 10°16'48»N, 84°11'24»W, 740–900 m, 24 June 1972, *James L. Luteyn 3228* (DUKE, MO); **Guanacaste:** Estación Pitilla Area de Conservación, 11°02'00"N, 85°24'30"W, 700 m, 16 September 1990, *Petrona Ríos Castro & Curso II de Parataxónomos 48* (CR, MO); **Heredia:** Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 10°25›53»N, 84°00'13"W, 100 m, 24 September 1980, *Barry E. Hammel 9835* (DUKE, MO); Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 10°25›53»N, 84°00'13"W, 100 m, 13 July 1982, *Barry E. Hammel & Jill Trainer 13139* (DUKE); La Tirimbina, 220 m, 22 November 1990, *J. R. Hunter 819* (WIS); Finca La Selva, Puerto Viejo de Sarapiquí, 10°25›12»N, 84°00'36"W, 100 m, 5 January 1978, *Thomas B. Croat 44301A* (MO); Sarapiqui. North of Puerto Viejo, 10 km down road, then 7–8 km W, 10°31'12»N, 084°05›24»W, 2 February 1983, *Nancy C. Garwood, Mary Gibby,*

Rachel J. Hampshire & Christopher J. Humphries 906 (BM, CR); La Selva Biological Station, Jardines del comedor, 10°25›53»N, 84°00'13"W, 100 m, 5/7/2003, *Reinaldo Aguilar RA007800*; Near Puerto Viejo along road near the Río Sucio, 10°27›36»N, 83°59'24"W, 20 m, 27 May 1976, *Thomas B. Croat 35721* (MO); Near Puerto Viejo along road near the Río Sucio, 10°27›36»N, 83°59'24"W, 20 m, 27 May 1976, *Thomas B. Croat 35687* (MO); La Selva Field Station, Puerte Viejo de Sarapiquí, 10°25›12»N, 84°00'36"W, 100 m, 3 January 1978, *Thomas B. Croat 44223* (MO); Finca La Selva, Puerto Viejo de Sarapiquí, along El Sura Trail, 10°25›12»N, 84°00'36"W, 100–150 m, 6 January1978, *Thomas B. Croat 44308* (MO); **Limón:** Río Peje, Asunción [Fila Asunción], 09°53›24»N, 83°13'12"W, 500– 600 m, 27 April 1985, *Luis Diego Gómez P. & Gerardo Herrera Ch. 23516* (MO); Forest between Punta Manzanillo and Punta Mona, E of Manzanillo de Talamanca. [coordinates on original label: 09º38'N, 82º38›W], 09°37'48»N, 82°37'48»W, 8–12 m, 2 May 1985, *Michael H. Grayum & George E. Schatz 5248* (MO); 2 km W of Río Toro Amarillo on road heading W from Guápiles, 10°12›36»N, 83°49'48"W, 275 m, 9 January 1984, *Sue A. Thompson & John E. Rawlins 1206* (CM); Tortuguero National Park: on trees near park headquarters [coordinates on original labels 134'N, 831'W], 10°34'N, 83°31'W, 0 m, 13 April 1986, *Thomas B. Croat 61208* (MO); Along Hwy. 32 from Turrialba to Limón, ca. 11 miles south of Siquirres, 10°00'00"N,

Figure 119: *Syngonium macrophyllum*. Adult leaf blade adaxial. O. Ortiz 2705, Panama

Figure 120: *Syngonium macrophyllum*. Stem with inflorescence and infructescences. Costa Rica. Photo T. Ray

Figure 121: *Syngonium macrophyllum*. Leaf blade adaxial surface, Colombia, Cabo Corrientes

Figure 122: *Syngonium macrophyllum*. Stem and leaves, Costa Rica. Photo, T. Ray

Figure 123: *Syngonium macrophyllum*. Open inflorescence, Costa Rica. Photo, T. Ray

Figure 124: *Syngonium macrophyllum*. Open inflorescence

Figure 125: *Syngonium macrophyllum*. Spathe free from spadix. Photo, T. Ray

Figure 126: *Syngonium macrophyllum*. Infructescence, Costa Rica. Photo, T. Ray

Figure 127: *Syngonium macrophyllum*. Open infructescence, Costa Rica. Photo, T. Ray

Figure 128: *Syngonium macrophylllum*. Unopened infructescence. Photo, T. Ray

Figure 129: *Syngonium macrophyllum*. *Blackmore & Heath 1806*, Honduras

Figure 130: *Syngonium macrophyllum*. Preadult blade, *Croat 78584*, Mexico

Figure 131: *Syngonium macrophyllum. Croat & D. Hannon 64639*, Honduras

83°34'12"W, 650 m, 13 August 1977, *Thomas B. Croat 43327* (MO); **Puntarenas:** Valley of Laguna Chocuaco, ca. 9 km W of Rincón de Osa, ca. 200 m, 08º41-43›N, 083º34›W. Collected with Gerardo Herrera, George Schatz, Carlos Valerín & Felipe Chavarría, 08°42›00»N, 83°33'36"W–08°43'N, 083°34'W, 200 m, 8 October 1984, *Michael H. Grayum 4079* (MO); **San José:** Vazquez de Coronado, Braulio Carrillo National Park, along Hwy San José to Siquerres Hwy, along trail to Río Sucio, site of the Old Carillo Station, 10°09'50"N, 83°57'10»W, 600–700 m, 30 August 1996, *Thomas B. Croat 78763* (INB, MO). GUATEMALA. **Alta Verapaz:** 4 miles up road to Oxec, along road which turns north off Hwy 7E (to El Estor), ca. 6 km NE of Panzos, 15°29'03"N, 89°39'20"W, 500 m, 20 July 1977, *Thomas B. Croat 41609* (MO); 7 miles up road to Oxec along road which turns off Hwy 7E between Tucurú and El Estor, ca. 6 km NE of Panzós, 15°30'21"N, 89°40'23"W, 700 m, 20 July 1977, *Thomas B. Croat 41654* (MO); 7 miles up road to Oxec along road which turns off Highway 7E between Tucurú and El Estor, ca. 6 km NE of Panzós, 15°30'21"N, 89°40'23"W, 700 m, 20 July 1977, *Thomas B. Croat 41635* (MO); **Izabal:** Collected 2.5 mi. N of Río Dulce on gravel road to Petén, 15°40'39"N, 89°02'20"W, 100 ft, 8 August 1975, *David B. Dunn & Douglas G. LeDoux 22028a* (MO, UMO); **HONDURAS. Atlántida:** Along trail to dam for municipal water supply of Tela, Lancetilla Botanical Gardens, on road ca. 2 mi WSW of Tela and S of main hwy. Printed label for specimens 64586-64646 reads 9/2/1987, but fieldbook states 10/2/1987., 15°44'N, 087°27'W, 70–90 m, 10 February 1987, *Thomas B. Croat & Dylan P. Hannon 64639* (MO); Tela, Lancetilla Valley south of Tela, 50 m, 18 July1953, *Monroe R. Birdsey 316* (MO); Lancetilla Valley ca. 10 miles SE of Tela; in forest preserve along Río Lancetilla, on trail to water reservoir, 15°44'N, 87°27'W, 10–150 m, 3 August 1977, *Thomas B. Croat 42674* (MO); **Comayagua:** Taulabé. Lago de Yojoa, 14°48›N 087°59›W, *Ramón Zúñiga 505* (TEFH); **Copán:** Santa Rita. 13 miles east of Copán along gravel road to La Entrada. disturbed roadsides, 14°52'N 089°04'W, 750 m, 1 August 1977, *Thomas B. Croat 42528* (MO); **Cortés:** Camino entre Tapiquilar y Las Crucitas, 20 km S de San Antonio de Cortés, al pie de la montaña La Nieve, 15°05›48»N, 88°04'29"W, 900–1000 m, 24 February 1982, *Cirilo H. Nelson, J.A. Escobar N. & Roberto Andino U. 8112* (MO, TEFH); Santa Cruz de Yojoa. North of Lago de Yojoa, along gravel road (old Hwy 1) ca. 2–6 miles from junction with new Hwy 1, SW of Santa Cruz de Yojoa, 14°55'25"N, 87°58'39"W, 600 m, 4 August 1977, *Thomas B. Croat 42741* (MO); **Olancho:** Along Río Olancho, on road between San Esteban and Bonito Oriental, 14.8 miles NE of San Esteban, 15°25'N, 085°47'W, 635 m, 7 February 1987, *Thomas B. Croat & Dylan P. Hannon 64403* (MO); Along Río Olancho, on road between San Estéban and Bonito Oriental; 3.3 miles SW of border with Colon Dept., along Río Grande, 20.8 miles SW of junction in highway to La Ceiba and Trujillo (vicinity of Bonito Oriental), 15°31'N, 85°42'W, 350– 400 m, 8 February 1987, *Thomas B. Croat & Dylan P. Hannon 64521* (MO); Along Río Olancho, on road between San Francisco de la Paz and Gualaco, 13.6 miles SW of Gualaco, on steep slope ca 0.5 miles E of main road, along gravel road into private property, 15°00'N, 86°07'W, 1300 m, 6 February 1987, *Thomas B. Croat & Dylan P. Hannon 64296* (MO); Rio Chiquito, 15°33'20»N 85°42›55»W, 14 February 1982, *Blackmore & Heath 1806* (BM.MO); **Yoro:** Foothills of the Cordillera Nombre de Dios, S of San José de Texíguat and on the western side of the canyon of the Río Texíguat, 15°30›N, 87°26'W, 250–350 m, 15 May 1991, *Gerrit Davidse, Ramón Zúñiga & Paul R. House 34394* (MO); Cerro between Río Guán Guán and Río Texíguat, E of Cerro Guán Guán, S of San José in the Río León Valley, western end of the Cordillera de Nombre de Dios, 15°29'30"N, 87°27'00"W, 700–870 m, 6 November 1988, *John M. MacDougal, Paul R. House & Ramón*

Zúñiga 3260 (MO); Río Pijol Valley, 7 km SE of Nueva Esperanza, along forested Quebrada that flows into Río Pijol, and adjacent slopes, 15°12'N, 087°35'W, 1300–1500 m, 29 May 1993, *Ronald L. Liesner 26666* (MO, TEFH); **MEXICO**. **Chiapas:** Cintalapa. Oaxaca-Chiapas border near La Cienega de Leon, 16°40'48»N, 94°01›48»W, 1080–1230 m, 1 December 1980, *Dennis E. Breedlove & Frank Almeda 48223* (CAS); Ixhuatán, along road between Bochil and Pichucalco, near shrine along road at 430 m, 1.7 km S of Ixhuatán, 3.5 miles N of Ignacio Zaragosa, 17°16'54»N, 93°00›47»W, 430 m, 24 August 1996, *Thomas B. Croat 78584* (MO); La Trinitaria. 10 km ENE of Dos Lagos above Santa Elena, 16°06'36»N, 91°34›18»W, 1170 m, 19 January 1982, *Dennis E. Breedlove & Frank Almeda 57630* (CAS); Las Margaritas, 12 km E of Tziscao, along carretera fronteriza, 16°06›28»N, 91°34'37"W, 1200–1300 m, 16 November 1984, *Gerrit Davidse, Mario Sousa S., Oswaldo Téllez V., E. Martínez L. & Jeany Davidse 29868* (MO); Ocosingo, A 200 metros de Nuevo Jerusalem camino a Nuevo Francisco León, 17°01'42»N, 91°14'41»W, 295–298 m, 4 May 2002, *Gabriel Águilar M., Esteban M. Martínez S., Demetrio Álvarez M., J. Calónico Soto & S. Aguilar 688* (MEXU, MO); Ocozocoautla de Espinosa. 6 miles N of Ocozocoautla, along gravel road to Apitpac,16°49'12"N, 93°25'12"W, 1000 m, 9 July 1977, *Thomas B. Croat 40585* (MO. **Oaxaca:** Juchitán. m, *E. Torres 721* (MEXU); Tehuantepec. 28.9 km al NW de La Chiviza, carr. a Santiago Lachiguiri, Veg. Bosque mesófilo, 1170 m, 24 August 1984, *Rafael Torres C. & Cipriano Martínez R. 5923* (MO); **Tabasco:** east of Teapa, 17°32'24»N, 92°57›00»W, 50 m, 31 August 1952, *Monroe R. Birdsey 257a* (UC); E of Teapa, 17°32'24»N, 92°57'00»W, 30 m, *Monroe R. Birdsey 250* (UC); Teapa, 3 km E of Teapa, along road to Jalapa, 17°32'24»N, 92°55›48»W, 40 m, 4 July 1977, *Thomas B. Croat 40128* (MO); 3 km E of Teapa, along road to Jalapa, 17°32'24»N, 92°55›48»W, 40 m, 4 July 1977, *Thomas B. Croat 40132* (MO). NICARAGUA. **Atlántico Norte:** Cerro Livico, 7 km NE of Siuna; forest on slope, 13°46'30»N, 84°43'00"W, 500 m, 28 April 1978, *David A. Neill 3631* (MO); Vecindades de Waní, 13°42'N, 84°51'W, 100 m, 1–31 March 1983, *F. Ortiz 952* (MO); Municipio de Siuna, Waspado, 13°41'N, 84°54'W, 100–200 m, 6 October 1982, *F. Ortiz 299* (MO); Mt. Livico, Madregava, 13°47'N, 084°43›W, 100– 800 m, 6–7 January 1970, *Frank C. Seymour 3096* (MO); Cerro Waylawás, W slope of central range, limestone cliffs, 13°38'N, 84°49›W–13°39'N, 84°49›W, 100–200 m, 12 March 1979, *John James Pipoly III 4559* (MO); Cerro Baká, 6.5 km E of Río Coperna; lower mountain slopes and secondary areas, 13°40'N, 84°30'W, 200–320 m, 19 March 1979, *John James Pipoly, III 4914* (MO); *4925* (MO); *4240* (MO); Cerro Waylawás, east slope of northern range, 13°39'N 84°49›W, 11 Mar 1979, *John James Pipoly, III 4357* (MO); *4358* (MO); *4549* (MO); Caño Hormiguero, SE of Cerro La Pimienta No. 1., 13°46'N, 84°59›W, 750 m, 10 April 1979, *John James Pipoly, III 5087* (MO); Cerro Waylawás, E slope of central range, 13°38'N, 84°48'W–13°39'N, 84°49›W, 100–200 m, 10 March 1979, *John James Pipoly, III 4291* (MO); 1 km al W de El Naranjo, 13°34'N 85°11›W, 200-210 m, 24 February 1983, *P. P. Moreno & W. Robleto T. 20626* (MO); **Atlántico Sur:** Noroeste del poblado de Nueva Atlanta, 11°36'N, 84°02'W, 30–35 m, 17 February 1994, *R. M. Rueda, B. Hernández & I. Coronado G. 3152* (MO); Caño Costa Riquita, ca. 1.8 km SW of Colonia Naciones Unidas, above (S of) road between Colonia Nuevo Léon and Colonia Naciones Unidas, 11°43'N, 84°18'W, 150–180 m, 6–7 November 1977, *W. D. Stevens 4985* (MO); Along road to Colonia Yolaina, Colonia La Esperanza, etc., ca. 1.3 km SE of intersection with road between Nueva Guinea and Colonia Verdún, immediately upriver from bridge over Caño Sardina, 11°40'N, 84°26'W, 180–200 m, 11–12 February 1978, *W. D. Stevens 6372* (MO); **Chontales:** Ca. 2.8 km above (N of) Cuapa, 12°17'N, 085°23›W, 400–500 m, 4 September 1977, *W. D. Stevens 3665* (MO); 7.5 km NNE of Cuapa along road toward El Zancudo, near

Matayagual, 12°19'13»N, 85°21›12»W, 560 m, 31 December 2010, *W. D. Stevens & O. M. Montiel J. 30877* (HULE, MO); 7.5 km NNE of Cuapa along road toward Muy Muy, just before Matayagual, then W along new road, 12°19'41»N, 85°20›55»W, 535 m, 19 June 2009, *W. D. Stevens, O. M. Montiel J. & E. Duarte M. 28514* (HULE, MO); **Jinotega:** Municipio de Wiwilí, zona de amortiguamiento de Bosawas, comunidad Inipuas, 14°24'36»N, 85°10'54"W, 186 m, 19 April 2005, *I. Coronado G., M. Barrios & F. Rojas 1706* (HULE, MO); Municipio de Wiwilí, Reserva de Bosawas, comunidad de San Andrés, Caño Pilawas, 14°19'N, 85°07›W, 162 m, 5 April 2005, *I. Coronado G., M. Barrios, F. Rojas & G. P*érez *1354* (HULE, MO); Al noreste de Wiwilí, camino entre El Carmen y Wamblán, a lo largo del Río Coco, 13°43'N, 85°46'W, 250– 400 m, 13 March 1980, *M. Araquistain & D. Castro C. 1790* (MO); Municipio de Wiwili, Reserva Natural, Cerro Kilambé, Comunidad de Aguas Frias, 13°35›N, 85°44'W, 750– 800 m, 21–22 May 2001, *R. M. Rueda, L. D. Paguaga, J. Masís, M. Garmendia & N. Toval 16186* (HULE, MO); Reserva Natural Kilambé, Muncipio de Bocay, Comunidad San Miguel de Kilambé, 13°31'N, 85°37'W, 700–900 m, 6 January 2001, *R. M. Rueda, M. Garmendia, N. Toval, A. Rivera, H. Mendoza & L. D. Paguaga 15243* Caño Litutus, Río Bocay, 13°58'N, 085°21›W, 175 m, 9 March 1980, *W. D. Stevens, James H. Beach, J. Schal & O. M. Montiel J. 16613* (MO); **Nueva Segovia:** Along Río Solonlí (or Río Arriba de Jalapa), ca. 5 km N of Jalapa; gallery forest and riverine vegetation, 13°57'N, 86°08'W, 700 –950 m, 5 April 1977, *David A. Neill 1654* (MO); 4.6 km E of Murra (bridge), mostly converted to coffee, 13°46'27»N, 085°59›33»W, 1187 m, 29 December 2014, *W. D. Stevens & O. M. Montiel J. 35210* (HULE, MO); **Río San Juan:** La Lupe, ca. 25 km ENE of Boca de Sabalo, 11°08'N, 84°21'W, 80–120 m, 28 June– 2 July 1997, *Jan Salick & Eirik Stijfhoorn 8188* (MO); Municipio del Castillo. Estación Biológica La Lupe, 11°08›N, 084°21'W, 50–60 m, 1 December 1999, *R. M. Rueda, I. Coronado G., W. Velásquez & F. Flores 12324* (HULE, MO).

PANAMA. **Bocas del Toro:** Peninsula Valiente, on east side of Lagoon of Chiriquí, south side of peninsula, 09°05'N, 81°50'W, 25 m, 10 August 1987, *Gordon McPherson 11444* (MO); Along road to Chiriquí Grande, ca. 10 road-miles from Continental Divide and about 2 miles along road east of highway, 08°54'18"N, 82°09'54"W, 300 m, 15 April 1987, *Gordon McPherson 10829* (MO); Vicinity of Fortuna Dam, along road to Chiriqui Grande. [Coordinates on original label: 08°50'N, 82°15›W], 08°49›36»N, 82°12'54"W, 470 m, 6 September 1987, *Gordon McPherson 11652* (MO); Along road between Almirante and Ojo de Agua 3–6 km W of Almirante, 09°18'24"N, 82°26'48"W, 30–300 m, 4 August 1976, *Thomas B. Croat 38217* (MO); Above railroad stop at Milla 7.5. [some labels erroneously dated 27 July 1971], 09°21'30"N, 82°27'00"W, 26 July 1971, *Thomas B. Croat & Duncan M. Porter 16242* (MO); Valle del Silencio, along Río Changuinola, ca. 1 km above mouth of Río Teribe, vicinity Teribe Indian population, 09°21'40"N, 82°31'40»W, 0–100 m, 25 June 1994, *Thomas B. Croat & Guang Hua Zhu 76425* (F, MO, SEL); **Canal Area:** Roadside along "abandoned" road C29 just N of Las Cruces Trail, 6 km E of Gamboa, 09°07'06"N, 79°38'29"W, 150 m, 27 December 1973, *Michael H. Nee 7745* (MO); Pipeline Rd. 6.5 miles NW of gate, 09°10'15"N, 79°45'14"W, 100 m, 6 December 1970, *Thomas B. Croat 12763* (MO); Pipeline Road 4 miles from Gamboa gate, 09°09'07"N, 79°44'11"W, 50 m, 5 March 1971, *Thomas B. Croat 13952* (MO); Pipeline Road 10 miles from Gamboa gate, 09°11'08"N, 79°46'04"W, 100 m, 14 August1971, *Thomas B. Croat 16699* (MO); **Cocl**é: Road from La Pintada to Coclito, 08°41'06»N, 80°27›15»W, 600 m,7 February 1983, *Clem W. Hamilton & Gerrit Davidse 2839* (MO); Vicinity El Valle de Antón, La Mesa, 4 mi E of El Valle at base of Cerro Gaital, along trail which goes to the edge leading to the summit, 08°36'N, 80°07›W, 830–900 m, 25 March 1993, *Thomas B. Croat 74813* (CAY, CM, K, MO); **Colón:** Santa Rita Ridge, ca. 12 road-

miles east of transisthmian highway. [Coordinates on original label: 09º20'N, 79º45'W], 09°23'N, 79°40'W, 500 m, 26 May 1987, *Gordon McPherson 10996* (MO); 10 miles SW of Puertobelo, 2–4 miles from coast, 09°26'N, 79°43'W– 09°26'N, 79°44'W, 10– 200 m, 24 March 1973, *Ronald L. Liesner 1080* (MO); Santa Rita Ridge Road, 4–6 km from Transisthmian Highway, 09°20'N, 79°46'W, 150–200 m, 13 April 1976, *Thomas B. Croat 34289* (MO); Santa Rita Ridge Road, along trail at end of road which goes to Río Indio, beginning 10.6 km from Iransisthmiam Hwy, 3 km beyond hydrographic station, 09°22'30"N, 79°41'30"W, 380 m, 13 April 1976, *Thomas B. Croat 34335* (MO); Between Nuevo Tonosí and Río Indio on road from Portobelo and Nombre de Dios, n near sea level, 09°33'N, 79°33'W–09°34'N, 79°37'W, 0–5 m, 22 March 1976, *Thomas B. Croat 33534* (MO); **Darién:** Isla Cartagena, a steep dry island in Golfo de San Miguel, near La Palma, 08°26'N, 78°08'W, 1 February 1972, *Alwyn H. Gentry 3941* (MO); Parque Nacional Darién, trocha entre la Estación Pirre y el Cerro Pirre, 08°00›N, 77°45'W, 100–300 m, 11 February 1991, *Heraclio Herrera 939* (MO); Santa Fe, University of Georgia, Cuipo Forest site no. 2 (RL #6), 08°03'09»N, 78°09›W, 15 m, 18–20 September 1967, *James A. Duke 14259* (MO); **Panam**á: Road to Cartí [San Blas], 19 km north of El Llano [Panamá], 09°23›N, 78°58'W, 500 m, 13 March 1973, *Phil Busey 881* (MO); Kunayala (formerly San Blas) Nusigandi, along El Llano-Carti Road, 0.7 miles beyond Cuna Headquarters, located 10.9 miles N of Pan-American Highway, 11.6 miles N of Pan-American Highway, 09°18'N, 78°59›W, 450 m, 3 April 1993, *Thomas B. Croat 75119* (MO); Cerro Campana, 6.1 miles above Pan-American Hwy., 3.2 miles beyond park entrance and Guarda Bosque Station, 08°41'N, 079°56'W, 800 m, 23 March 1993, *Thomas B. Croat 74774* (CDBI, KUN, MO); Along road to Cartí Suitupo from El Llano; 11 km north of Pan American Highway, 370 m, 09º16'N, 78º57'W– 09°16'N, 78°57›W, 370 m, 11 February 1986, *W. Scott Hoover 1315* (MO); *1316* (MO); Capira, Middle slopes of Cerro Campana, ca. 1 mile from Interamerican Highway, 08°43'09"N, 79°53'25"W, 150 m, 15 June 1976, *Thomas B. Croat 35964* (MO); (MO); **San Blas:** Aila Terrain (Rio Acla), 08°48'30»N, 77°40'30»W, 25–100 m, 29 March 1979, *Andrew M. Sugden 625* (MO); Cangandí Hills near village, 09°27'N 79°06'W, 30 m, 27 March 1986, *Greg C. de Nevers, Heraclio Herrera & Susan Charnley 7494* (MO); Cangandí. Hills near village, 09°27'N, 79°06'W, 30 m, 27 March 1986, *Greg C. de Nevers, Heraclio Herrera & Susan Charnley 7568* (MO); El Llano-Cartí road, Km 26.5. [Coordinates on original label: 09º19'N, 78º55›W], 09°22›N, 78°58'W, 200 m, 17 June 1986, *Greg C. de Nevers, Heraclio Herrera, Gordon McPherson, William G. D'Arcy & Bruce Allen 7843* (MO); (Comarca de Kunayala): Nusigandí, El Llano-Cartí Road, 10.1 mi N of Interamerican Hwy., then ca. 0.5 mi N, Paseo Mariska near road, 09°20›N, 78°59'W, 300 m, 20 July 1994, *Thomas B. Croat & Guang Hua Zhu 77028* (MO).

Syngonium mauroanum Birdsey ex G.S.Bunting, Baileya 14: 18. 1966. — Type: Cult. Amazon Gardens, Miami, Florida ex PANAMA (exact locality unknown), April 11, 1962) *G.S. Bunting 1441* (holotype, BH).

Nomadic vine to ca. 3 m; juvenile plants with stems at first short, forming rosettes, becoming elongate, green; petioles 6–13 cm long, sheathed to the middle or somewhat above the middle, sharply 1–ribbed from the sheath to the blade; blades sagittate, the primary lateral veins and many secondary veins sunken above and beneath, the upper surface marked along the midrib and sometimes along the larger lateral veins with a discolorous band of gray or yellowish green,

the anterior lobe ovate, acuminate, 5–16 cm long, the posterior lobes triangular to ovate, acute to rounded at the apex, 2–10 cm long. Adult plants with stems not glaucous, scandent, appressed to trees; internodes 1–12 cm long, 1.0–1.5 cm wide. LEAVES with **petioles** 6-33 cm long, sheathed 0.5–0.75 their length, free part with a medial rib; **blades** thin, sub-trisect to usually trisect, rarely 5-segmented, medium green, matte above, slightly paler and matte beneath; leaflets free or sometimes confluent; median leaflet elliptic to ovate-elliptic, (7)12–21(30) cm long, 3.5–10.0(12.0) cm wide, acuminate at the apex, obtuse to acute and attenuate at the base, the margin minutely undulate and sometimes appearing toothed on drying; lateral leaflets inequilateral, sometimes auriculate, the auricle usually conspicuously hastate, narrowly rounded at the apex; **primary lateral veins** 6–11 per side, distributed throughout the blade (but thicker in the lower half of the blade), conspicuously sunken above, raised beneath; principal, secondary, tertiary and some quaternary veins sunken above, raised beneath, the reticulate veins clearly visible beneath. INFLORESCENCES 1 or 2 per axil; **peduncle** 3.5–9.0 cm long and erect at anthesis, 8–14 cm long and pendent in fruit; **spathe** tube ellipsoid to narrowly ovoid, 3.5–5.0 cm long, 1.5–2.5 cm diam., green outside, dark violet-purple inside; spathe blade ovate-elliptic, 6–8 cm long, 4–5 cm wide, acuminate, white; **spadix** 6.5–12.0 cm long, narrowly clavate; pistillate portion of the spadix ca. 1 cm long on the back side, ca. 1.5 cm long on the front side; flowers irregularly rhombic at the apex, 2.3–3.0 mm diam., the stigma ca. 1.2 mm diam.; staminate portion of the spadix white, the sterile part ca. 1.5 cm long, the fertile part 5–6 cm long, the synandrium irregularly rounded to rhombic at the apex, the margin irregular, the apex not drying smooth, irregularly undulate. INFRUCTESCENCES 4.5–7.5 cm diam., red on the outside, violet- purple within; **syncarp** brown, 4.5–6.0 cm long, 2.5–4.0 cm diam.; mesocarp white; seeds ovoid, 5–6 mm long, 4–5 mm diam., dark brown. Flowers are known from April to June and immature fruits in November and January. **Figures 132–139.**

Distribution — *Syngonium mauroanum* is known from Costa Rica and western Panama in seasonally dry parts of *Tropical moist forest* and especially from *Premontane moist forest* life zones. It is an interesting testimony to the apparent accuracy of the Holdridge Life Zone Maps that the only collection from Costa Rica was also found in a narrow band of *Premontane moist forest* life zone in Guanacaste and that the species has been collected in the small isolated patch of *Premontane moist forest* life zone around Santa Fe in Veraguas. The species ranges from sea level to about 500 m elevation.

Comments — The species is a member of Section *Syngonium* and can be recognized by its usually trifoliolate leaves, hastate-lobed blades with distinctive prominent venation and variegated juvenile leaves. It is not easily confused with any other species because of its relative isolation and narrow ecological range, but the species is closest to *Syngonium standleyanum,* a species from *Premontane wet forest* life zone in Guanacaste Province, Costa Rica. That species often shows no sign of auricles on the lateral leaflets (a feature rarely exhibited by *S. mauroanum*) and has a densely papillate stem. *Syngonium standleyanum* may ultimately prove to be merely an ecological variant of this species.

It may also be confused with *S. wendlandii* Schott with which it may occur (Grayum, 2003) but that species differs by having finely asperous-striate stems most evident on younger plants, velvety, moderately bicolorous blades with the medial lobe with 3–9 primary lateral veins per side as well as a smaller spadix in contrast to smooth stems, smooth, nearly concolorous leaf

blades with 7–11 veins per side.

Additional specimens seen— COSTA RICA. **Puntarenas:** Buenos Aires. No protegida. Cuenca Térraba-Sierpe. Pilas de Buenos Aires. Punto 47., 09°05›04»N 83°26'32"W, 260 m, 25 Apr 2000, *Evelio Alfaro 3042* (MO); No protegida. Cuenca Térraba-Sierpe. Bomba Cedro. Punto 29., 09°02›10»N 83°10'57"W, 170 m, 4 Mar 2000, *Evelio Alfaro 2903* (MO); Along the Río Ceibo, Ujarrás., 09°13›48»N 083°18›00»W, 500 m, 9 March 1993, *Michael H. Grayum 10230* (CR); Along the Río Ceibo, Ujarrás., 09°13›48»N 83°18'00"W, 500 m, 9 March 1993, *Michael H. Grayum 10230* (MO); PANAMA. Exact locality unknown, cultivated at Amazon Gardens, Miami, Florida, *Croat 34249* (MO); **Canal Area:** Vicinity of Curundu Housing area of Albrook Air Force base, Parque Metroplitano., 08°58'00»N 79°32›55»W, 17 June 1994, *Thomas B. Croat & Guang Hua Zhu 76200* (CM,MO); **Chiriquí**: About 1 mi. E of David, 08°36'N 082°24'W, 100 m, 4 Sep 1953, *Monroe R. Birdsey 347* (MO); About 1 mi. E of David, 08°36'N 82°24'W, 100 m, 4 Sep 1953, *Monroe R. Birdsey 347* (UC); Río Chiriquí to Remedios., 15–50 m, 11 July 1938, *R. E. Woodson, Jr., Paul H. Allen & Russell J. Seibert 1189* (MO); **Colón:** 16 July 1994, *Thomas B. Croat 82907* (MO); **Herrera:** Ocu. 12.5 miles S of Ocú., 07°54'46»N 80°41›39»W, 1200 ft, 26 May 1967, *Walter H. Lewis, Bruce MacBryde, Royce L. Oliver & J.E. Ridgway 1637* (MO); **Los Santos:** Pedasi. Ca. 3 miles south of Pedasí, 07°29'20»N 80°01›51»W, 07 Aug 1969, *Andre F. Clewell & Kurt E. Blum 2911* (IBE); Between Limón and Punta Mala, 07°30'23»N 80°02›19»W–07°28'17»N 080°00›00»W, 14 Apr 1970, *Thomas B. Croat 9763* (MO); Tonosi. 10 miles N of Tonosí, 07°30'49»N 80°23›02»W, 1237 f, 23 Jan 1966, *Edwin L. Tyson, John D. Dwyer & Kurt E. Blum 2954* (MO); Río Tonosí, vicinity of Tonosí. Gravel river bed and forest edge., 07°24'N 080°27'W, 25 May 1967, *Walter H. Lewis, Bruce MacBryde, Royce L. Oliver & J.E. Ridgway 1561* (MO); Loma Prieta, Cerro

Figure 132: *Syngonium mauroanum*. Juvenile plant, *Croat 76200*, Panama

Figure 133: *Syngonium mauroanum*. Closeup of leaf, juvenile plant, D. Gould cultivated at MO, Panama

Figure 134: *Syngonium mauroanum*. Inflorescence. Photo, M. Birdsey

Figure 135: *Syngonium mauroanum*. Cultivated plant from Veraguas Province, Panama*, Croat 34249*

Grande., 07°33'41»N 80°30›48»W, 2400–2800 ft, 08 June 1967, *Walter H. Lewis, Richard K. Baker, Bruce MacBryde & Royce L. Oliver 2193* (MO); **Panam**á: Panamá. Vicinity of Panama City., 08°59›N 079°31›W, 15 m, 5 Aug 1940, *Harley H. Bartlett & Tobías Lasser 16708* (MO); **Veraguas:** Puerto Mutis, 12 mi S of Santiago, 07°55›30»N 81°03'25"W, 1 m, 27 Dec 1968, *Edwin L. Tyson 6045* Along Río Angulo (or Angulón), between Tebario and (Llano de) Mariato, Península de Azuero., 07°41'05»N 80°58'05"W, 10 m, 21 Jul 1990, *Michael H. Grayum & Randall J. Evans 9912* (MO); Atalaya. 2 km NW of Atalaya., 08°02'52»N 80°56›41»W, 100 m, 19 November 1973, *Michael H. Nee 8231* (MO); Montijo. Isla Coiba. Ensenada de Santa Cruz., 07°37'N 081°45›W, 2 May 1995, *Carmen Galdames, Jorge E. Aranda B., Carlos Guerra & Blanca Ara*úz *2355* (MO); Isla Coiba. Cerro de La Torre., 07°30'N 81°49›W, 200 m, 1 May 1995, *Carmen Galdames, Jorge E. Aranda B., Carlos Guerra, Narciso Bastidas & Blanca Ara*úz *2327* (MO); Isla Coiba. Cerro de La Torre., 07°30'N 081°49›W, 200 m, 1 May 1995, *Carmen Galdames, Jorge E. Aranda B., Carlos Guerra, Narciso Bastidas & Blanca Ara*úz *2327* (CAY); Santa Fe. Along stream near Santa Fé, 08°30'30»N 81°04›20»W, 1700 f, 8 Jun 1973, *James L. Luteyn 4048* (MO); Forest remnant along quebrada just S of Santa Fé., 08°30'30»N 81°04›20»W, 450 m, 17 November 1973, *Michael H. Nee 8038* (MO); Forest remnant along quebrada just S of Santa Fé., 08°30'30»N 81°04›20»W, 450 m, 17 November 1973, *Michael H. Nee 8038* (UMO); Along stream between Santa Fé and Escuela Agricola Alto Piedra, 08°30'30»N 81°04›20»W–08°30'47»N 81°06›54»W, 300–800 m, 29 Aug 1974, *Thomas B. Croat 27345* (MO); Along 1st river, on road from Santa Fe to Rio Calovebora, 1.8 miles from fork in road at Escuela Agricola Alto Piedra, 08°31'28»N 81°07›50»W, 500 m, 5 Apr 1976,

Figure 136: *Syngonium mauroanum. Lewis et al. 1637*, Panama

Figure 137: *Syngonium mauroanum*. *Birdsey 347*, Panama

Figure 138: *Syngonium mauroanum*. *Grayum 9912*, Panama

Figure 139: *Syngonium mauroanum. Croat 33981*, Panama

Thomas B. Croat 34249 (MO); In forest along road near east edge of Escuela Agricola Alto Piedra, 08°30'47»N 81°06›54»W, 800 m, 3 Apr 1976, *Thomas B. Croat & James P. Folsom 33981* (MO); **COSTA RICA. Puntarenas:** Buenos Aires. No protegida. Cuenca Térraba-Sierpe. Pilas de Buenos Aires. Punto 47., 09°05›04»N 83°26'32"W, 260 m, 25 Apr 2000, *Evelio Alfaro 3042* (MO); No protegida. Cuenca Térraba-Sierpe. Bomba Cedro. Punto 29., 09°02›10»N 83°10'57"W, 170 m, 4 Mar 2000, *Evelio Alfaro 2903* (MO); Along the Río Ceibo, Ujarrás., 09°13›48»N 83°18'00"W, 500 m, 9 March 1993, *Michael H. Grayum 10230* (CR); Along the Río Ceibo, Ujarrás., 09°13›48»N 083°18›00»W, 500 m, 9 March 1993, *Michael H. Grayum 10230* (MO); **PANAMA. Canal Area:** Vicinity of Curundu Housing area of Albrook Air Force base, Parque Metroplitano., 08°58'00»N 79°32›55»W, 17 June 1994, *Thomas B. Croat & Guang Hua Zhu 76200* (CM); Vicinity of Curundu Housing area of Albrook Air Force base, Parque Metroplitano., 08°58'00»N 79°32›55»W, 17 June 1994, *Thomas B. Croat & Guang Hua Zhu 76200* (MO); **Chiriquí**: About 1 mi. E of David, 08°36'N 82°24'W, 100 m, 4 Sep 1953, *Monroe R. Birdsey 347* (MO); About 1 mi. E of David, 08°36'N 82°24'W, 100 m, 4 Sep 1953, *Monroe R. Birdsey 347* (UC); Río Chiriquí to Remedios., 15–50 m, 11 July 1938, *R. E. Woodson, Jr., Paul H. Allen & Russell J. Seibert 1189* (MO); **Colón:** 16 July 1994, *Thomas B. Croat 82907* (MO); **Herrera:** Ocu. 12.5 miles S of Ocú., 07°54'46»N 80°41›39»W, 1200 ft, 26 May 1967, *Walter H. Lewis, Bruce MacBryde, Royce L. Oliver & J.E. Ridgway 1637* (MO); **Los Santos:** Pedasi. Ca. 3 miles south of Pedasí, 07°29'20»N 80°01›51»W, 07 Aug 1969, *Andre F. Clewell & Kurt E. Blum 2911* (IBE); Between Limón and Punta Mala, 07°30'23»N 080°02›19»W–07°28'17»N 080°00›00»W, 14 Apr 1970, *Thomas B. Croat 9763* (MO); Tonosi. 10 miles N of Tonosí, 07°30'49»N 80°23›02»W, 1237 f, 23 Jan 1966, *Edwin L. Tyson, John D. Dwyer & Kurt E. Blum 2954* (MO); Río Tonosí, vicinity of Tonosí. Gravel river bed and forest edge., 07°24'N 80°27'W, 25 May 1967, *Walter H. Lewis, Bruce MacBryde, Royce L. Oliver & J.E. Ridgway 1561* (MO); Loma Prieta, Cerro Grande., 07°33'41»N 080°30›48»W, 2400–2800 ft, 08 June 1967, *Walter H. Lewis, Richard K. Baker, Bruce MacBryde & Royce L. Oliver 2193* (MO); **Panam**á: Panamá. Vicinity of Panama City., 08°59›N 79°31'W, 15 m. 5 Aug 1940, *Harley H. Bartlett & Tobías Lasser 16708* (MO); **Veraguas:** Puerto Mutis, 12 mi S of Santiago, 07°55›30»N 81°03'25"W, 1 m, 27 Dec 1968, *Edwin L. Tyson 6045* Along Río Angulo (or Angulón), between Tebario and (Llano de) Mariato, Península de Azuero., 07°41'05»N 80°58'05"W, 10 m, 21 Jul 1990, *Michael H. Grayum & Randall J. Evans 9912* (MO); Atalaya. 2 km NW of Atalaya., 08°02'52»N 80°56›41»W, 100 m, 19 November 1973, *Michael H. Nee 8231* (MO); Montijo. Isla Coiba. Ensenada de Santa Cruz., 07°37'N 81°45›W, 2 May 1995, *Carmen Galdames, Jorge E. Aranda B., Carlos Guerra & Blanca Araúz 2355* (MO); Isla Coiba. Cerro de La Torre., 07°30'N 81°49›W, 200 m, 1 May 1995, *Carmen Galdames, Jorge E. Aranda B., Carlos Guerra, Narciso Bastidas & Blanca Araúz 2327* (MO); Isla Coiba. Cerro de La Torre., 07°30'N 81°49›W, 200 m, 1 May 1995, *Carmen Galdames, Jorge E. Aranda B., Carlos Guerra, Narciso Bastidas & Blanca Araúz 2327* (CAY); Santa Fe. Along stream near Santa Fé, 08°30'30»N 81°04›20»W, 1700 f, 8 Jun 1973, *James L. Luteyn 4048* (MO); Forest remnant along quebrada just S of Santa Fé., 08°30'30»N 81°04›20»W, 450 m, 17 November 1973, *Michael H. Nee 8038* (MO); Forest remnant along quebrada just S of Santa Fé., 08°30'30»N 81°04›20»W, 450 m, 17 November 1973, *Michael H. Nee 8038* (UMO); Along stream between Santa Fé and Escuela Agricola Alto Piedra, 08°30'30»N 81°04›20»W–08°30'47»N 81°06›54»W, 300–800 m, 29 Aug 1974, *Thomas B. Croat 27345* (MO); Along 1st river, on road from Santa Fe to Rio Calovebora, 1.8 miles from fork in road at Escuela Agricola Alto Piedra, 08°31'28»N 81°07›50»W, 500 m, 5 Apr 1976, *Thomas B. Croat 34249* (MO); In forest along road near east edge of Escuela Agricola Alto Piedra, 08°30'47»N

81°06›54»W, 800 m, 3 Apr 1976, *Thomas B. Croat & James P. Folsom 33981* (MO).

Syngonium neglectum Schott, *Bonplandia* 7: 163. 1859. — *Syngonium auritum* (L.) Schott var. *neglectum* (Schott) Engl. in A.DC & CDC., Monogr. Phan. 2: 294. 1879. — Type: MEXICO. Veracruz: near El Mirador [at Km 45 on road from Puente Nacional to Huatusco, 21 Km E of Huatusco], *F. Liebmann s. n.* (holotype, C?, not found). — Schott drawing 3213 (W, inventory no. NHMW-AFW-Schott Icones 3213; neotype, designated here).

Syngonium morelosense Matuda, Anales Inst. Biol. Univ. Nac. Mexico 22: 369. 1952 ('1951'). — Type: MEXICO. Morelos: Río Pollo near Cuernavaca, ca. 1500 m, 17 February 1952, *E. Matuda 25933* (holotype, MEXU; isotype MEXU).
Syngonium occidentale G.S.Bunting, Gentes Herb. 9: 370. 1965. — Type: MEXICO. Nayarit: at km 15 on road from Tepic to Jalcocotán, 900 m, 6 September 1961, *H.E.Moore Jr. & G.S. Bunting 8708* (holotype, BH; isotypes, MEXU, US).

Nomadic vine; juvenile plants with stems not glaucous; petioles sheathed 2/3–4/5 their length, 8–30 cm long; blades subsagittate to hastate, anterior lobe ovate, acuminate at apex, 9–14 cm long, 6–9 cm wide, posterior lobes very unequal, to 10 cm long and 4 cm wide; intermediate blades with the posterior lobes increasingly pinched off, 3-lobed with conspicuous, broad auricles. Adult plants with stems not glaucous, 1.5–2.5 cm diam., shiny, olive-green, becoming tan, short or elongated-creeping and firmly attached to trees; sap pale tan, copious; internodes 1.5–10.0 cm long on flowering parts, longer below, green when fresh, drying pale brown with many longitudinal folds. LEAVES with **petioles** 17–55 cm long, semiglossy, sometimes glaucous, slightly paler than stem, sheathed 1/2–4/5 their length, sheath free ending at apex (free ending portion sometimes to 2.5 cm long), the portion between sheath and blade subterete, obtusely angled adaxially; **blades** firm, semiglossy, weakly coriaceous, sometimes semi-glaucous on the upper surface, usually pedatisect with 3–7 leaflets, occasionally 9, rarely 11; leaflets usually free or sometimes (especially outer leaflets) confluent; median leaflet ovate to elliptic, rarely suborbicular, 14–38 cm long, 5–25 cm wide, acuminate at apex with a small apiculum, obtuse to rounded and attenuate at base, somewhat inequilateral; outermost leaflets often with slender, almost oblong auricles (these eventually pinching off and becoming widely separated as distinct leaflets); **primary lateral veins** 5–13 per side, sunken above, prominently raised beneath; tertiary veins clearly visible on lower surface. INFLORESCENCES 1–3, usually 1; **peduncle** 7–15 cm long and erect at anthesis, 12–18 cm long and pendent in fruit; **spathe** tube suborbicular to ellipsoid, 4.5–6.5(8.0) cm long, 4–6 cm diam., green outside, dark dull waxy red or sometimes violet-purple inside; spathe blade orbicular to elliptic, acuminate at apex, green becoming yellowish cream within (sometimes reddish at base), sometimes creamy white on both sides, reflexed from spadix at maturity, 9–15 cm long, 7–14 cm wide (when flattened); spadix sometimes curved sharply outward somewhat above the pistillate portion; pistillate portion of **spadix** 1.4–3.9 cm long, 1.5–2.9 cm diam., yellowish green, the flowers 2(or 3)-carpellate, the stigma bilobed; staminate portion of spadix white, curved forward, 8–16 cm long, 1.5–3 cm diam., flowers usually 4-androus (rarely more), synandrium usually flat at apex, usually irregularly 6-sided, ca. 5 mm long, 3 mm wide, margins weakly sinuate. INFRUCTESCENCES orange to red, 6–9 cm long, 5–7 cm diam.; **syncarp** 5–7 cm long, 3–5 cm diam.; mesocarp fleshy, white; seeds grayish black to dark black, 6–10 mm long, 5–7 mm wide (Birdsey reports

them as 10–13 mm long by 6–9 mm wide). *Syngonium neglectum* apparently flowers during the first half of the rainy season (June to September) and also at the beginning of the dry season. **Figures 140–155**.

Distribution — *Syngonium neglectum* is known only from Mexico but is widespread in that country, ranging from Tamaulipas to Chiapas on the Atlantic slope and from Nayarit to Chiapas on the Pacific slope. The range of life zones is uncertain, but the species is obviously quite variable ecologically and has been collected in both relatively dry and relatively wet areas. The species is most common at higher elevations in relatively dry situations. It occurs from near sea level (in the north of its range) or from near 350 m (in the south of its range) to 1700 m elevation.

Comments — The species is a member of section *Syngonium* and is characterized by having non-glaucous stems, moderately long internodes, petioles sheathed 1/2–4/5 their length with the sheath free ending at apex, usually pedatisect blades with 3–7(11) leaflets, the outermost leaflets often with slender, almost oblong auricles, 5–13 primary lateral veins per side, with 1–3 moderately long-pedunculate inflorescences, the spathe tube suborbicular to ellipsoid, green outside, reddish to purplish inside as well as the orange to red spathe tube.

The species was considered a variety of *Syngonium auritum* (a strictly West Indian species) by Engler & Krause (1920). *Syngonium auritum* is distinguished by a spathe blade twice as long as the staminate portion of the spadix, whereas in *S. neglectum* the spathe blade and staminate portion of the spadix are of nearly equal length. Other characters which help to distinguish *Syngonium neglectum* are the usually solitary inflorescences, and especially the size of the spathe and the staminate portion of the spadix, both of which are larger than for any other species.

Syngonium neglectum can be confused vegetatively with *S. podophyllum* where they occur together, although the latter species does not occur on the Pacific slope in Mexico and usually occurs at lower elevations, whereas *S. neglectum* frequently ranges above 1000 m. *Syngonium neglectum* also lacks the glaucous stems usually present on Mexican plants of *S. podophyllum.*

Additional specimens seen—BELIZE. **Cayo:** Ceibo Grande to Ceibo Chico track, canopy to 35 m, dbh 50–70 cm, 16°31'25"N, 89°05'36"W, 930 m, 9 March 2000, *M. Peña-Chocarro & et al. 1071* (MO). **EL SALVADOR**. **Ahuachapán:** San Benito, al E of Cerro León, al centro cafetal El Anono, 13°49›N, 89°56'W, 1050 m, 25 November 1993, *Eliberto A. Sandoval & Raul Villacorta 1522* (B, LAGU, MO); **MEXICO**. 1865–1866, *Eugène Bourgeau 2268* (P); Mozoñongo, February 1892, *Jared G. Smith 468* (MO); *L. H. Quarles van Ufford 108* (U); 1865–1866, *Ludwig Hahn 27* (P); 4 km W of "Y Griega" of Xilitla, 270 m, *Pedro Tenorio L. 582* (AAU); **Chiapas:** 1 km W of San Fernando, 16°52'12»N, 93°12›36»W, 1000 m, *Monroe R. Birdsey 267* (UC); NE of Tuxtla Gutierrez, 16°45›00»N, 93°06'36"W, 900 m, *Monroe R. Birdsey 264* (UC); 51 mi NE of Chiapas/Oaxaca border on Highway 190 to Tuxtla Gutierrez, 16°47'N, 93°18›W, 660 m, 31 May 1980, *Sue A. Thompson, Mick Richardson & David S. Seigler 431* (MO); Acacoyagua, Ejida Las Golondrinas, lower slopes of Cerro Ovando, along road between Golandrinas and Los Cacaos, 15°27'N, 92°37'W, 800–900 m, 22 August 1996, *Thomas B. Croat 78521* (CM, F, K, MO); Arriaga, Reserva de la Biosfera La Sepultura, Loc. Ejido López Mateos, Cerro El Carrizalillo, 16°21'58»N, 93°56›22»W, 1130 m, 17 January

Figure 140: *Syngonium neglectum*. Habit, Mexico, Guerrero, Croat 107166

Figure 141: *Syngonium neglectum*. Habit, *Holst 9826*, Belize, Photo Ella Baron

Figure 142: *Syngonium neglectum*. Adaxial leaf blade surface, *Holst 9804*, Belize

Figure 143: *Syngonium neglectum*. Abaxial surface of adult leaf, Cult at MO, *Croat 45243*

Figure 144: *Syngonium neglectum*. Adaxial surface of adult leaf, Cult at MO, *Croat 45243*

Figure 145: *Syngonium neglectum*. Juvenile leaf, *Holst* 9805, Belize, Photo B. Holst

2004, *Leonardo O. Alvarado-Cárdenas, Alberto Reyes-García, Daniel Gómez C, José A. Figueroa & Horacio Oca*ña *943* (MEXU, MO); Escuintla, along road from Escuintla to El Triunfo, ca. 1 mile N of Escuintla, 15°19'12»N, 92°38›24»W, 100 m, 21 August 1977, *Thomas B. Croat 43815* (MO); About 10 miles NE of Escuintla just above El Triunfo, 15°20'39»N, 92°32›09»W, 300 m, 21 August 1977, *Thomas B. Croat 43864* (MO); Ocosingo, A 4 km al W de Crucero Corozal, camino Palenque-Boca Lacantum, Veg. Selva alta subperennifolia, 180 m, 19 September 1984, *Esteban M. Martínez S. 7556* (MEXU, MO); Ocozocoautla de Espinosa, 18–20 km N of Ocozocoautla along road to Mal Paso, 16°53'47»N, 93°26›07»W, 800 m, 17 May 1972, *Dennis E. Breedlove 25214* (MO); 3 km N of Ocozocoautla along road to Mal Paso, 16°47'34»N, 93°23›14»W, 900 m, 1 February 1973, *Dennis E. Breedlove 32866* (MO); 6 miles N of Ocozocoautla, along gravel road to Apitpac, in and at edge of disturbed forest, 16°49'12"N, 93°25'12"W, 1000 m, 9 July 1977, *Thomas B. Croat 40586* (MO); **Guerrero:** San Luis Acatlán, Vicinity of Yoloxochitl, 1.2 km west of town, along trail toward Cerro San Marcos, 16°49'16»N 098°40›37»W, 640 m,26 Oct., 2017, *Croat 107166* (MO) San Luis Acatlán, Yoloxóchitl, 16°49'12»N, 98°39›27»W, 713 m, 31 May 2017, *K. Velasco G. 40458* (MO): **Pueblo**: Vicinity of Yoloxóchitl, 4.46 (airline km) E of town Paraje near source of towns water supply, 16°49'11»N, 98°38'38»W, 806–806 m, 25 October 2017, *Thomas B. Croat 107122* (MEXU); 1.2 km west of town, along trail toward Cerro San Marcos, 16°49'16»N, 98°40›37»W, 640 m, 26 October 2017, *Thomas B. Croat 107166* (MO); **Jalisco:** Arroyo La Calera, ca 9 km distancia área al N de Casimiro Castillo en el camino entre Autlán y la costa, Sierra Manantlán Occidental, 19°40'26"N, 104°25'48"W, 740–780 m, 7 January 1985, *Emmet J. Judziewicz,*

Figure 146: *Syngonium neglectum*. Juvenile leaf, *Croat 107166*, Mexico

Figure 147: *Syngonium neglectum*. Inflorescences at anthesis, Mexico, Photo: A. Acebey

Figure 148: *Syngonium neglectum*. Open inflorescence, Cult by Doug Aitken. Photo, D. Aitken

Figure 149: *Syngonium neglectum*. Juvenile infructescence; Mexico. Photo, J. Amith

Theodore S. Cochrane & Rafael Guzmán M. 5116 (MO); 14.8 miles from Autlán on road to Barra de Navidad, 19°41›21»N, 104°25›56»W, 700 m, 8 September 1961, *Harold E. Moore & George S. Bunting 8735* (MO); Upper end of Arroyo Ayotitlán, on lower SE slopes of Sierra Perote , 2.1 km by rd. (1.5 km by air) NNE of Ayotitlan, ca. 29 km by rd. E of Cuautitlan, 19°28'48"N, 104°10'48"W, 940 m, 28 March 1989, *Theodore S. Cochrane, Mark A. Wetter & M. Rosales C. 11797* (MO); Along Highway 200 between Puerto Vallarta and Tuito at vicinity of large bridge ca. 19 km S of Puerto Vallarta, 20°27'26"N, 105°17'25"W, 150 m, 9 January 1979, *Thomas B. Croat 45427* (MO); Quimixto, 20°29›50»N, 105°22›05»W, 60 m, 1 Dec, 1926, *Ynés Mexia 1200* (G, MO); **México:** Temascaltepec. Naranjo, 18°49'00"N, 100°19'59"W, 860 m, 21 April 1933, *George B. Hinton 3808* (GBH); Ixtapan, 18°50'24»N, 99°40›12»W, 1000 m, 27 May 1933, *George B. Hinton 3984* (GBH); **Michoacán:** Ca. 19 miles from Arteaga on road to Playa Azul, near km 155, 18°10'45"N, 102°16'24"W, 470 m, 12 September 1961, *Harold E. Moore & George S. Bunting 8786* (MO); **Nayarit:** Rocks by small waterfall near km 20 on road from Tepic to Jalcocotán, 21°31'N, 105°04'W, 700–800 m, 6 September 1961, *Harold E. Moore & George S. Bunting 8700* (MO); Along Route 28, between Tepic and Jalcocotán, 21°32'N, 105°02'W, 1000 m, 7 January 1979, *Thomas B. Croat 45243* (MO); Jalisco, 12 km al E del poblado El Cora camino a Palapita, 21°25›N, 105°03›W, 500 m, 8 October1993, *Gabriel Flores F. 3081* (MEXU, MO); Tepic, along Highway 28 between Tepic and Jalcocotán, at km 15.5, 21°32›N, 105°02›W, 1000 m, 8 January 1979, *Thomas B. Croat 45336* (MO); **Oaxaca:** Along the dirt road to Chayuco 12 km from Mex. Hwy 200, 220 m, 29 January 1983, *James S. Miller & Pedro Tenorio L. 523* (MO); El Manguito, entrando por la desv. a Buenos Aires camino a Rancho "Limón", 17.2 km al NW de Tehuantepec, 770 m, 25

Figure 150: *Syngonium neglectum*. Cut open infructescence, Croat sn. Mexico

Figure 151: *Syngonium neglectum*. Habit of fruiting plant, Holst 9804. Belize. Photo, B. Holst

Figure 152: *Syngonium neglectum*. Cut open infructescence. *Croat 74199*

Figure 153: *Syngonium neglectum. Cochrane 11797*, Mexico

Figure 154: *Syngonium neglectum*. *Croat 107166,* Mexico

Figure 155: *Syngonium neglectum. C. Onofre 7169*, **Mexico**

July 1984, *Rafael Torres C. & Cipriano Martínez R. 5620* (MO); Along Hwy 175 between Tuxtepec and Oaxaca, 10 km S of bridge over Río San Juan Bautista at Valle Nacional, 17°43›26»N, 096°19›18»W, 666 m, 4 March 2008, *Thomas B. Croat & Pedro Díaz Jiménez 100230* (MO); Juchitán, to the W of the secondary school in Santa Maria Chimalapa, 16°54'24»N, 94°41›30»W, 266 m, 26 June 2014, *Matthias S. Geck MSG177* (MEXU, MO); Putla, Distrito de Putla. ca. 1 Km al E del poblado de San Pedro, 800 m, 13 July1988, *Eloy Solano C. 443* (CHAPA); Along Highway 125 between Pinotepa and Tlaxiaco, ca. 11.4 mi S of Putla de Guerrero, 17°03'36»N, 97°51›36»W, 850 m, 16 January 1979, *Thomas B. Croat 45803* (MO); Along Highway 125 between Pinotepa and Tlaxiaco, 4.4 km S of Putla de Guerrero, 16°59'24"N, 097°54'00"W, 850 m, 17 January 1979, *Thomas B. Croat 45815* (MO); Tlaxiaco, Camino Santiago,Yosondúa-Cuajilotes, 1.5 km al sur del pueblo de Vergel, 16°48'N, 97°34›W, 1146 m, 4 January 2013, *Daniel Sandoval Gutiérrez, Jesus Olivares Chávez & Ilarino L*ópez *Mendoza 772* (MEXU, MO); **Puebla:** Road Cuetzalan to San Antonio Rayon, 20°03'42»N, 97°28›14»W, 565 m, 10 November 2014, *Pedro Acevedo-Rodr*íguez*, J.D. Amith, E. Salazar, CASTANEDA & DOMINGUES 16054* (MO, US); Ayotoxco de Guerrero, Cuauhtémoc, 20°03'29»N, 97°25›39»W, 232 m, 21 April 2016, *Miriam Jim*énez *C. & Mariano Gorostiza S. 31289* (MO); Hermenegildo Galeana, *L. Caamaño Onofre 7159* (HUAP); Hueyapan, 19°56'02"N, 97°23'20"W, 1248 m, 8 March 2016, *J. D. Amith & et al. 82021* (MO); Hueytamalco, Campo Experimental "Las Margaritas", (INIFAP), 20°01'41»N, 97°19'20"W, 520 m, 21 April 2008, *Guadalupe Cornejo Tenorio, Guillermo Ibarra Manr*íquez*, Nah*ú *González Casta*ñeda *& Braulio Gómez Chagala 2704a* (MEXU, MO); Jonotla, *L. Caamaño Onofre 5228* (HUAP); Jopala, Patla, 20°14'51»N, 97°49›31»W, 482 m, 10 June 2015, *J. D. Amith 70038* (MO); Juan Galindo, *José L. Contreras J. 8631* (HUAP); San Sebastián Tlacotepec, *L. Caamaño Onofre 6594* (HUAP); Tlatlauquitepec, *José L. Contreras J. 4970* (HUAP); *6864* (HUAP); Xicotepec, *A. B. Cerón Carpio 520* (HUAP); *L. Caamaño Onofre 2483* (HUAP); *2454* (HUAP); Zacapoaxtla, San Juan Tahitic Village, trail to Zapotepic, 19°57'01»N, 97°31›52»W, 1165 m, 2 November 2017, *Thomas B. Croat 107307* (MO); Zihuateutla. m, *José L. Contreras J. 9621* (HUAP); *José L. Contreras J. 5154* (HUAP); Zongozotla, camino real a Zapotitlán de Méndez, en la localidad Mote, 19°59›25»N, 97°43'11"W, 980 m, 7 July 2016, *Osbel López F. 74199* (MO); **Quer**é**taro:** 3–4 km al Oriente de La Parada, 1300 m, 29 December 1990, *Benito Servín O. 754* (IEB, MO); 2 km al S de El Rincón, cerca de Tilaco, municipio de Landa, 900 m, 2 April 1987, *Jerzy Rzedowski 42932* (IEB); Jalpan, 8–10 km al Norte del Carrizal, La Isla del Río, ladera de cerro, 3000 m, 1 August 1990, *Benito Servín O. 396* (IEB, MO); 2–3 km al E de La Boquilla, S. L. P junto al Río Santa María, 21°39'36»N, 99°11›24»W, 270–320 m, 10 March 1993, *Carranza, José* Maria *4548A* (IEB); Al SE de El Saucito, 890 m, 29 August 1992, *E. Carranza G. 4155* (MO); Landa de Matamoros, 2 km al S de El Rincón de Piedra Blanca, 25 September 1989, *E. Gonz*ález *M. 1070* (IEB); 1.5 km al Sur de San Juan Bautista, 1100 m, 4 February 1988, *H. Rubio 271* (MO); 2 km al NE de San Onofre, 700 m, 21 February 1989, *H. Rubio 479* (IEB); 2 km al W de Neblinas, sobre el camino a Agua Zarca, 950 m, 16 January 1989, *Jerzy Rzedowski 48170* (IEB); 11 km al W de Tilaco, 900 m, 9 June 1986, *Rafael Fern*ández *Nava & Jerzy Rzedowski 3449* (IEB); **San Luis Potos**í: Along Hwy. 85, 39 mi. N of Tamagunchale, 21°38'24»N, 98°58›48»W, 200–300 ft, 13 August 1978, *David B. Dunn & et al. 23099* (MO, UMO); Hills above Highway 85, 6 miles NW of Tamazunchale, 250 m, 25 June 1977, *Thomas B. Croat 39282A* (MO); Tamasopo, 12 September1978, *William G. D'Arcy 11890* (MO); **Sinaloa:** Rosario, Transecto de Zamora a El Calaboz, Ejido Palos Blancos, 23°16›22»N,

105°51'00»W–23°17'12"N, 105°50'15»W, 385–608 m, 8 February 2010, *Marcela Ruiz Guerrero, Albert van der Heiden & Prisciliano Mejía 2010-053* (MO); **Tabasco:** Balancán, Finca la Esperanza, 17°48'00»N, 91°31›48»W, 50 m, 2 October 1976, *Juan Ismael Calzada & et al. 2653* (MO); Tacotalpa. Ca. 3 km. a pie al E. del ejido Lázaro Cárdenas, 17°31'37»N, 92°46›38»W, 50 m, 10 May 1979, *Clark P. Cowan & O. Solano V. 2067* (MO); **Tamaulipas:** 55 mi south Ciudad Victoria, 115 m, 1 August 1948, *Fred G. Meyer & David J. Rogers 2870* (MO); Gomez Farias, Vicinity of Gómez Fárias, 23°03'00»N, 99°09›00»W, 350 m, 13–21 April 1907, *Edward Palmer 309* (MO); **Veracruz:** Along road from Xalapa to Huatusco via Coatepec, Tuzamapan and Tlaltetela, 12 km N of Tlaltetela, 19°21'54»N, 96°49›54»W, 520 m, 1 March 2008, *Thomas B. Croat 100066* (MO); Acayucan, along dirt road near Hwy 180, 2-3 miles NW of Acayucan, 18°00'36"N, 94°55'12"W, 20 February 1976, *Thomas B. Croat 32740* (MO); Camerino Z. Mendoza. Sierra San Cristobal, between Ciudad Mendoza and Orizaba, along highway 150D (autopista), ca. 3 km SW of Orizaba, S of autopista ca. 0.5 km, 18°49'48»N, 97°08›24»W, 1260–1400 m, 27 June 1977, *Thomas B. Croat 39550* (MO); Coahuitlán. Carretera Coahuitlan–Coyutla, en el predio del C. Alberto Reyes Castiilo, 20°16'12»N, 97°43›24»W, 360 m, 20 June 2017, *Osbel López F. 76164* (MO); Coatepec, Faldas del Cerro de Achichuca, entre Tuzamapan y Jalcomulco, 19°22'48»N, 96°48›00»W, 700 m, 29 September 1979, *G. Castillo 677* (MO); Córdoba.5 mi. S of Cordoba, 18°49'12»N, 96°55›12»W, 927 m, 20 August 1952, *Monroe R. Birdsey 225* (MO, UC); Jalapa. 3 mi. W of Jalapa, 19°33'00»N, 96°57'36»W, 1400 m, *Monroe R. Birdsey 227* (UC); Jilotepec, 3 km después de la Concepcion a San Ablo, Malpais,19°36'36»N, 96°54›36»W, 950 m, 22 July 1976, *R.V. Ortega O. 336* (MO); Las Minas, hacia Molinillo, 19°42'N, 97°08›W, 1300 m, 25 May 1989, *Carlos M. Durán-Espinosa & J. Becerra 809* (IEB, MO); Misantla, 2.4 miles on road to Martinez de la Torre, 20°07'12"N, 96°59'24"W, 320 m, 28 September 1961, *Harold E. Moore & George S. Bunting 8945* (MO); San Andrés Tuxtla, 18°34'48»N, 95°03›36»W, 180 m, 6 May 1970, *Guadalupe Martínez Calderón 2286* (MO); Ejido Barrio Lerdo, Falda del Volcán San Martin,18°33'N, 95°11›W, 700 m, 14 May 2005, *Thorsten Krömer & Amparo Acebey 2218* (MO); Tepetzintla. 2.7 km SE of Tepetzintla along Hwy Mex. 105, 21°09'00»N, 97°49›48»W, 300 m, 25 October 1981, *Michael H. Nee 22403* (MO); Tihuatlán, 1 km NE of Tihuatlan along Mex. Hwy 180, 20°43'12"N, 097°31'12"W, 150 m, 10 June 1973, *Bruce F. Hansen, JoAnn Hansen & Michael H. Nee 1766* (MO); Tlapacoyan, 6.5 km al Oeste de Tlapacoyan, camino a Teziutlan, 19°55›12»N, 97°14'24"W, 900 m, 20 June 1970, *Lorin I. Nevling & Arturo Gómez Pompa 1125* (MO).

Syngonium oduberi T.Ray, *Aroideana* 3: 128. 1980. — Type: COSTA RICA. Puntarenas: Corcovado National Park, Osa Peninsula, hills above Llorana, 83°42'W 8°35›N, 13 July 1977, *T. Ray 4* (holotype, GH; isotype MO).

Nomadic vine; juvenile plants with trailing stems; internodes 4–7 mm long, 3 mm wide; leaves much like those of adults but smaller and narrower; petioles 4.5–5.5 cm long; blades 13–15 cm long, 3.5–4.5 cm wide. Adult plants with stems closely appressed to trees; internodes 1–2 cm long, ca. 6 mm wide. LEAVES with **petioles** 6–10 cm long, sheathed throughout except for apical 0.5–1.0 cm, sheath free-ending and apiculate at apex, not extending beyond base of blade, apical part flattened adaxially with a medial rib, margins acute; **blades** simple, oblong-elliptic, gradually acuminate at apex (acumen 1.0–1.5 cm long), slightly constricted

above posterior lobes (less so on juvenile blades), 14–23 cm long, (4)6–9 cm wide, drying olive-green to yellow-brown, semiglossy above, gray-green and weakly glossy below; posterior lobes rounded to bluntly acute, 0.8–1.3(2.5) cm long; sinus arcuate to parabolic, (0.5)1.0– 2.1 cm deep, 0.5–1.8 cm wide (sometimes completely closed); primary lateral veins (9)12–14 on each side, sunken above, raised beneath, drying narrowly and weakly raised on both surfaces sometime undulate; tertiary veins prominent, scarcely apparent on drying; latex not milky though slightly orange in mature stems. INFLORESCENCES pendent; **peduncle** 3.5 cm long; flowering **spadix** not seen. INFRUCTESCENCES with **spathe** green outside, burgundy inside; **syncarp** 4 cm long, 2.5 cm diam.; berries cream. Flowering July; fruiting October–December. **Figures 156–161.**

Distribution — *Syngonium oduberi* is endemic to Costa Rica, known only from the Osa Peninsula in Corcovado National Park at 50–900 m elevation in a *Tropical wet forest* life zone.

Comments — The species is a member of sect. *Cordata* and is characterized by moderately elongate, narrow internodes, non-milky sap that eventually turns orangish, petioles sheathed nearly throughout, the sheath free-ending and apiculate at apex, free part flattened with a medial rib, simple, oblong-elliptic, gradually acuminate blades which are slightly constricted above posterior lobes, rounded to bluntly acute posterior lobes, an arcuate to parabolic sinus and infructescences with the spathe burgundy inside with berries cream.

The species is close to both *Syngonium llanoense* and *S. castroi* but differing from both by having a much narrower petiole that is also much shorter, only 6–10 cm long and with the sheath ending well below the apex. The other two species have much longer petioles with a sheath 2–3 cm wide and usually extending the full length of the petiole.

Syngonium oduberi can also be confused with *S. rayi* a more widespread species known mostly from the Atlantic slope of Costa Rica in Guanacaste, Heredia, Alejuela and Limón and ranging south to Panama. That species differs by having decidedly hastate spreading posterior lobes.

Additional specimens seen — **PANAMA**. **Darién:** Parque Nacional del Darién, slopes of Cerro Mali, head waters of S branch of Río Pucuro, ca. 22 km E of Pucuro, 08°04'30»N, 177°14'00»W, 700–1400 m, 21 October 1987, *Barry E. Hammel, Greg C. de Nevers, Hermes Cuadros V. & Heraclio Herrera 16370* (MO); Area de Manejo Especial de Bahía Pinas, 07°35›11»N, 78°12'38"W, 0 m, 2 June 2018, *Orlando Ortiz 2969* (MO). **COSTA RICA**. **Puntarenas:** Parque Corcovado, near Llorana, 100 m, *T. Ray 14* (GH); Parque Nacional Corcovado, Estación Sirena, S of Río Sirena along Río Camaronal, 08°28'N, 83°35'W, 22 November 1981, *S. Knapp 2190* (MO).

Syngonium peliocladum Schott, Prodr. Syst. Aroid. 202. 1860. — *S. podophyllum* Schott var. *peliocladum* (Schott) Croat, Ann. Missouri Bot. Gard. 68(4): 636–637, figs 66, 70. 1982. — Type: none designated in the protologue, and none found; described from juvenile living material originally collected by Wendland in Costa Rica. — Schott drawings nos. 3215, 3216 (W, inventory nos NHMW-AFW-Schott Icones 3215, NHMW-AFW-Schott Icones 3216, neotype, designated here).

Figure 156: *Syngonium oduberi*. Detached flowering plant, Costa Rica, Osa. Photo, T. Ray

Figure 157: *Syngonium oduberi*. Closeup of abaxial leaf and infructescence, Costa Rica, Photo, T. Ray

Figure 158: *Syngonium oduberi*. Closeup of abaxial leaf and infructescence, Costa Rica, Photo, T. Ray

Figure 159: *Syngonium oduberi*. *Ray 4*, Costa Rica

Figure 160: *Syngonium oduberi. Knapp 2190*, Costa Rica

Figure 161: *Syngonium oduberi*. Mature syncarp, *Knapp 2190*, Costs Rica

Nomadic vine; juvenile plants with stems not glaucous, usually dark violet-purple; petioles sheathed from 1/2 to nearly entire length; blades hastate to sagittate, anterior lobe ovate, acuminate, the posterior lobes ovate to lanceolate, acute at the apex; adult plants with stems not glaucous; internodes 0.4–1.5 cm diam., 1–20 cm long, usually densely covered with brownish projections. LEAVES with **petioles** 11–33 cm long, usually sheathed 1/2–4/5 or more of their length, obtusely I-ribbed adaxially; **blades** trisect to almost 5-lobed, mostly 16–33 cm long, often drying yellowish green; lateral leaflets free or confluent, usually conspicuously auriculate and usually nearly pinched-off to form a small lobe, auricle directed at right angles to axis of lateral leaflets; median leaflet 14–20 cm long, ovate to elliptic, acuminate at apex, acute to cuneate at base; **primary lateral veins** 3–8 per side, sunken above, raised beneath; collective veins 2 or 3; tertiary veins all clearly visible. INFLORESCENCES usually 6–8 per axil; **peduncle** not glaucous, 3.5–11.0 cm long and erect at anthesis, 7–14 cm long and pendent in fruit; **spathe** orange, 4–5 cm long, 3.0–3.5 cm diam., tube ovoid to ellipsoid, usually not glaucous, 2–3 cm long, green inside and out; spathe blade greenish white to cream, 4.0–5.5 cm long; **spadix** 5-7 cm long; pistillate portion of spadix 1–2 cm long; staminate portion of spadix 4–6 cm long, flower similar to those of *Syngonium podophyllum*. INFRUCTESCENCES whitish to yellow. Flowering inflorescences January (June–December). Immature fruits are found more or less throughout the year. **Figures 162–178.**

Distribution — *Syngonium peliocladum* is known from Costa Rica and western Panama, principally on the Atlantic slope from sea level to ca. 1000 m. In Costa Rica it occurs in the Cordillera Central ranging from Tortuguero to Talamaca. In Panama, it occurs only in Bocas del Toro Province. It occurs in *Tropical wet forest, Premontane wet forest* and wetter parts of *Tropical moist forest* life zones.

Comments — The species is a member of sect. *Syngonium* and is characterized by its lack of glaucous stems, its moderately short internodes, frequently glaucous petioles which are sheathed 1/2–3/4 their length and the sheath free–ending and acute at apex, pedatisect blades with 7-9 leaflets, mostly free or with the outer ones confluent and the lowermost usually variously auriculate, by 3 or 4 primary lateral veins per side as well by having 4–8 inflorescences per axil, an ovate, green, glaucous spathe tube as well as with often rather massive infructescences often yellow and pruinose.

The species has been confused with *S. podophyllum* and was earlier treated as a variety of that species (Croat, 1982). The latter is distinquished by having glaucous stems, a smooth epidermis and bright orange to red infructescences.

Additional specimens seen — **COSTA RICA**. Costa Rica [No further locality], *H. Wendland s.n.* (MO); **Heredia:** Finca La Selva, the OTS field station on the Río Pu **Cartago**: Vicinity Chitaria, *Solis 241* (F); Las Vueltas, Tucurrique, *Tondu: 12891* (US). Puerto Viejo just E of its junction with the Río Sarapiquí, 10°25›53»N, 84°00'13"W, 100 m, 29 November 1980, *Barry E. Hammel 10593* (DUKE); *12597* (DUKE); 10 July 1982, *Barry E. Hammel & Jill Trainer 13134* (DUKE); 100 m, 8 June 1982, *12787* (DUKE, MO); 5 July 1984, *Brian Jacobs 2690* (DUKE, MO); 19 February 1981, *James P. Folsom 9046* (DUKE); 13 February 1981, *8924* (DUKE); 19 August 1979, *Michael H. Grayum 2470* (DUKE, MO); 16 July

Figure 162: *Syngonium peliocladum*. Habit of flowering plant, Costa Rica. Photo, R. Aguilar

Figure 163: *Syngonium peliocladum*. Adaxial leaf, *Aguilar 1163*, Costa Rica. Photo, R. Aguilar

Figure 164: *Syngonium peliocladum*. Preadult leaf, *Aguilar 1163*, Costa Rica. Photo, R. Aguilar

Figure 165: *Syngonium peliocladum*. Juvenile leaf; *Aguilar 1163*, Costa Rica. Photo, R. Aguilar

Figure 166: *Syngonium peliocladum*. Cluster of inflorescences, *Aguilar 1163*, Costa Rica. Photo, R. Aguilar

Figure 167: *Syngonium peliocladium*. Habit of flowering plant, La Selva, Costa Rica. Photo, T. Ray

Figure 168: *Syngonium peliocladum*. Potted juvenile plant, Costa Rica. Photo, T. Ray

1979, *Michael H. Grayum 1836* (MO); 22 February 1986, *Robert L. Wilbur 39130* (DUKE); 14 May 1984, *Robert L. Wilbur & Brian Jacobs 34456* (DUKE); 11 March 1997, *Robert L. Wilbur & Kyle J. Williams 66683* (DUKE); 30 September 1982, *Tim McDowell 284* (DUKE, MO); 2 October 1982, *308* (DUKE); 20 October 1982, *531* (DUKE); 22 October 1982, *579* (DUKE); 30 July 2004, *Daniel Solano DS 1260;* 27 June 2003, *Reinaldo Aguilar RA007933*; Near Puerto Viejo along road near the Río Sucio, 10°27›36»N, 83°59'24"W, 20 m, 27 May 1976, *Thomas B. Croat 35677* (MO); Along El Sura Trail, 10°25'12"N, 84°00'36"W, 100–150 m, 6 January 1978, *Thomas B. Croat 44306* (MO); **Limon**: N of Bribri, *Burger & Antonio 10943* (F); Vicinity of Cairo, *Standley & Valerio s,n.* (US); La Colombiana Farm, *Standley 36975* (US); Vicinity Llanuras de Santa Clara, *Smith 4980* (US). Lago Dabagri, W coast, toward Río Llei, 09°37›30»N, 83°17'00"W, 1000 m, 4 November 1984, *Luis Diego Gómez P, Gerardo Herrera Ch,* Ángel *Solís, José Berrocal, J. Rodríguez & Manuel Solís 23162* (CM, MO); Parque Tortuguero Estación Cuatro Esquinas, siguiendo Sendero al Este, rumbo a la playa,10°30›36»N, 83°30'00"W, 4 m, 23 November 1987, *Rafael Robles 1310* (MO); 3 km al suroeste del pueblo, a orillas del Río Tortuguero, 10°30›36»N, 083°30›36»W, 2 m, 15 February 1989, *Rafael Robles 2847* (CM, CR, MO); 20 mi SE of Limón on road to Punta Cahuita, near sea level, 09°45'36"N, 82°54'00"W, 0 m, 11 August 1977, *Thomas B. Croat 43172* (MO); Banana and cacao plantation on level areas between Siquirres and the Río Pacuare, and remnant forest on steep hills south of the railroad bridge over the Río Pacuare, 10°05›N, 83°29'W, 50–100 m, 20–22 December 1969, *William C. Burger & Ronald L. Liesner 6931* (MO). **PANAMA**. **Bocas del Toro:** Hillside above Almirante, 09°18'N, 82°24'W, 28 November 1971, *Alwyn H. Gentry 2745* (MO); Johns Creek, vicinity of Chiriquí Lagoon, 26 September1941, *H. von Wedel 2765* (MO); Darkland, vicinity of Chiriquí Lagoon, 09°12'N, 082°17'W, 5 September 1941, *H. von Wedel 2616* (MO), 09°03'00»N, 82°00›00»W, 2 October 1940, *1025* (MO); Water Valley,

Figure 169: *Syngonium peliocladum*. Stem showing trichomes, *R. Aguilar 1163*, Costa Rica. Photo, R. Aguilar

Figure 170: *Syngonium peliocladum*. Petiole cross-section showing milky sap, *Aguilar 1163*, Costa Rica. Photo, R. Aguilar

09°14'42»N, 82°23›00»W, 8 November 1940, *1545* (MO); Río Teribe, between Quebrada Treglo and Puerto Palenque, 09°22'24"N, 82°42'30»W–09°22'42"N, 082°45'00"W, 300–350 ft, 12 April 1968, *Joseph H. Kirkbride, Jr. & James A. Duke 533* (MO); Río Cricamola, between Finca St. Louis and Konkintoë, 08°51'N, 81°49›W–08°54'N, 81°52'W, 10–50 m, 12–16 August 1938, *R. E. Woodson, Jr, Paul H. Allen & Russell J. Seibert 1915* (MO); Along road between Almirante and Ojo de Agua 3–6 km W of Almirante, 09°18'24"N, 82°26'48"W, 30–300 m, 4 August 1976, *Thomas B. Croat 38225* (MO); Station Milla 7.5 on Changuinola-Almirante Railroad, along a slender ridge to World War II communications facility, ca. 2 km NW of ruins of U.S. Army military barracks, 09°21'54"N, 82°27'12"W, 0–100 m, 3 August 1976, *Thomas B. Croat 38088* (MO); Station Milla 7.5 on Changuinola-Almirante Railroad, along a slender ridge to World War II communications facility, ca. 2 km NW of ruins of U.S. Army military barracks, 09°21'54"N, 82°27'12"W, 0–100 m, 3 August 1976, *Thomas B. Croat 38115* (MO); Above railroad stop at Milla 7.5. [some labels erroneously dated 27 July

Figure 171: *Syngonium peliocladum*. Inflorescence at anthesis, *Aguilar 1163*, Costa Rica. Photo, R. Aguilar

Figure 172: *Syngonium peliocladium*. Insects on staminate spadix. Photo, T. Ray

Figure 173: *Syngonium peliocladum*. Cut open spathe, *Aguilar 1163*, Costa Rica. Photo, R. Aguilar

Figure 174: *Syngonium peliocladum.* Infructescence with spathe removed, Costa Rica. Photo, T. Ray

Figure 175: *Syngonium peliocladum*. *Wilbur & Jacobs 34456*, Costa Rica

Figure 176: *Syngonium peliocladum*. *Croat 38225*, Panama

Figure 177: *Syngonium peliocladum*. *Grayum 2470*, Costa Rica

Figure 178: *Syngonium peliocladum. Croat 38082*, Panama

1971], 09°21'30"N, 82°27'00"W, 26 July 1971, *Thomas B. Croat & Duncan M. Porter 16305* (MO); Changuinola to 5 miles S at junction of Ríos Changuinola & Terebe, edge of river and railway, and adjacent rain forest, 09°22'18"N, 82°31'48"W, 100–200 ft, 17–19 December 1966, *Walter H. Lewis, John D. Dwyer, Thomas S. Elias & Kenneth R. Robertson 954* (MO, US); Chiriquicito to 5 miles S along Río Guarumo, 08°55›N, 82°10'W–09°00'N, 82°11'W, 5–7 June 1967, *Walter H. Lewis, Novencido Escobar A., Bruce MacBryde, Royce L. Oliver & J. E. Ridgway 2022* (MO); Changuinola, Vicinity of Changuinola, 09°23'30"N, 82°29'30»W, 0–25 m, 3 August 1976, *Thomas B. Croat 38082* (MO).

Syngonium podophyllum Schott, Bot. Zeitung (Berlin) 85: 1851. — Type: no candidate cited in the protologue, described from a living plant from Mexico. — Schott drawings 3222, 3223 and 3224 (W, inventory nos NHMW-AFW-Schott Icones 3222, NHMW-AFW-Schott Icones 3223 and NHMW-AFW-Schott Icones 3224, neotype, designated here).

Syngonium willdenowii Schott, Syn. Aroid.: 68. 1856. — *Pothos auritus* ('*aurita*') Willd. ex Schult., Mant. 3: 301. 1827. — Type: COLOMBIA. Santander: San Bartolomé, May 1801 ('1805'), *A. von Humboldt & A. Bonpland 1622* (holotype, B-W, barcode B-W 03104-010; isotype P, barcode P00669327; both examined on-line).

Xanthosoma gracile Miq., Delect. Sem. Hort. Amstelodam. 1853. — *Syngonium gracile* (Miq.) Schott, Syn. Aroid. 70. 1856. — Type: none designated, none found; named from a cultivated plant said to be from Caracas, Venezuela.

Syngonium vellozianum Schott, Österr. Bot. Wochenbl. 4: 418. 1854. — [*Arum auritum* Vell., Fl. Flumin. ed. 2: 387. 1881 (nom. illeg., non *A. auritum* L.)]. — Type: Vellozo, Fl. Flumin. Icon. 9, tab. 113. 1827, (lectotype, designated by Engler, 1878: 129).

Syngonium ruizii Schott, Österr. Bot. Wochenbl. 4: 148. 1854. — Type: PERU. Pasco: Pozuzo, *H. Ruíz* (B†, holotype); — Schott drawing no. 3229 (W, inventory no. NHMW-AFW-Schott Icones 3229, neotype, designated here) [NYBG photo 4333].

Syngonium riedelianum Schott, Syn. Aroid. 70. 1856. — *Syngonium vellozianum* var. *riedelianum* (Schott) Engl., Fl. Bras. 3(2): 130. 1878.— Type: Schott drawings 3228, 3710 and 3711 (neotype, W, inventory nos NHMW-AFW-Schott Icones 3228, NHMW-AFW-Schott Icones 3710 and NHMW-AFW-Schott Icones 3711, designated here).

Syngonium decipiens Schott, Syn. Aroid. 69. 1856. — *Syngonium vellozianum* var. *decipiens* (Schott) Engl., Fl. Bras. 3(2): 130. 1878. — Type: no candidate cited in the protologue. — Schott drawing no. 3200 (W, inventory no. NHMW-AFW-Schott Icones 3200, neotype, designated here) [NYBG Photo 4320].

Syngonium poeppigii Schott, Syn. Aroid. 68. 1856. — [*Syngonium auritum sensu* Poeppig, Nov. Gen. Sp. Pl. 3: 89. 1845; non (L.) Schott]. — *Syngonium vellozianum* var. *poeppigii* (Schott) Engl., Fl. Bras. 3(2): 130. 1878. — Type: PERU. Loreto: Yurimaguas, *E.F. Poeppig* (holotype ?W†). — Schott drawing no. 3226 (W, inventory no. NHMW-AFW-Schott Icones 3226, neotype, designated here) [NYBG Photo 4321].

Syngonium affine Schott, Syn. Aroid. 67. 1856. — Type: SURINAM. Paramaribo, *H.R. Wullschlägel 504* (M?, not found). — Schott drawing no. 3192 (W, inventory no. NHMW-AFW-Schott Icones 3192, neotype, designated here) [NYBG Photo 4323].

Syngonium xanthophilum Schott, Prodr. Syst. Aroid. 214. 1860. — Type: none cited in the protologue, based on a cultivated plant from Mexico. — Schott drawing no. 3249 (W, inventory no. NHMW-AFW-Schott Icones3249, neotype, designated here) [NYBG Photo 4335].

Syngonium vellozianum Schott var. *latilobum* Engl., Fl. Bras. 3(2): 130. 1878. — Type: BRAZIL. Rio de Janeiro: Troxal, 1832?, *J. Lhotzky* [*s.n.*?] (holotype, G-DC *fide* Engler, 1879: 297, not located).

Syngonium amazonicum Engl., Pflanzenr. 71 (IV.23E): 128. 1920. — Type: BRAZIL. Amazonas: Rio Juruá, *E.H.G. Ule, 5614* (B†, holotype; photo F, photo no. 12292, IRN 238621).

Syngonium podophyllum var. *multisectum* Engl., Pflanzenr. 71 (IV.23E): 129. 1920. — Syntypes: INDONESIA. Jawa: Bogor Botanic Garden, *A. Engler?* (B†?); FRANCE. Martinique, *A. Duss '519'* (not located).

Syngonium ternatum Gleason, Bull. Torrey Bot. Club 56: 13. 1929. — Type: GUYANA. Northwest District, Waini River, Marabo Shortcut, 6 February 1922, *J.S. de la Cruz 1288* (holotype, NY, barcode 00246698).

Nomadic vine to 6 m; juvenile plant with stems slightly glaucous; petioles sheathed 0.5–0.9 their lengthd; blades simple, cordate, 7–14 cm long, becoming sagittate or hastate, acuminate at apex, anterior lobe somewhat constricted at the base, posterior lobes usually more or less triangular, directed downward or prominently outward; blades on climbing plants 12–27 cm long. Adult plants with stems sometimes glaucous; sap milky; internodes 2.8–14.5 cm long, 0.5–3.5 cm wide (dry). LEAVES with **petioles** 15–60 cm long, sometimes glaucous, sheathed about 2/3 their length (sheath free-ending), rounded to obtusely angular above sheath; **blades** pedatisect, the surface dark green above, pale below (sometimes glaucescent in South America); leaflets 3–11, united to free; lowermost leaflet variously auriculate at the base, auricles oblong to oblong-elliptic to broadly elliptic; median leaflet obovate to broadly elliptic, abruptly acuminate at apex, broadly or narrowly decurrent at base, 16–38 cm long, 6–17 cm wide; rachis usually angular on blades with more than 3 segments; **primary lateral veins** 3–4(7) per side on the median leaflet, sunken above, prominently raised beneath; collective veins 2 or 3; tertiary veins all distinct. INFLORESCENCES 4–11 per axil; **peduncle** sometimes glaucous, somewhat compressed laterally, erect and usually less than 9 cm long at anthesis, pendent, to 13 cm long in fruit; **spathe** 9–11 cm long; spathe tube sometimes glaucous, narrowly ovoid to ellipsoid, 3–4 cm long, 1.8–2.0 cm diam., green inside and out; spathe blade greenish white to creamy white or sometimes yellow (in South America) (sometimes green outside and creamy white inside), 6.0–7.5 cm long, 3–5 cm wide, long-cuspidate at the apex; **spadix** 5–7 cm; pistillate portion 1–2 cm long, 6–9 mm diam., greenish cream, the flowers irregularly 5- or 6(7)-sided, adherent, the stigma discoid-capitate, sometimes 2- or 3-lobed;

staminate portion 4–7 cm long, 7–15 mm diam., cream, the synandrium with anthers usually 4, cross-shaped, 3.5–4.0 mm wide, partially or completely fused. INFRUCTESCENCES red to reddish orange or yellow (rarely brown) at maturity; **syncarp** ovoid, brownish, scruffy with darker brown flecks, 3.0–5.5(7.0) cm long, 1.5–3.5 cm wide; seeds many, ovoid, 7–11 mm long, 5–7 mm wide, black or brown, enveloped in a soft, grayish, sweet, pulpy mesocarp. It has been collected in flower and fruit throughout the year. **Figures 179–192.**

Distribution—*Syngonium podophyllum* is the most widespread and variable species in the genus, ranging from Mexico (states of San Luis Potosi and Veracruz) to the Guianas, Brazil, and Bolivia. It is found principally on the Atlantic slopes in Mexico but commonly extends to the Pacific slope in Guatemala, Costa Rica, and Panama. It ranges from sea level to usually less than 1100 m and is more abundant below 750 m, especially between 100 and 500 m.

In Central America, it is most frequent in regions of *Tropical moist forest* but also occurs in *Premontane wet forest* and *Tropical wet forest* life zones. It is mostly replaced by *S. macrophyllum* in *Tropical wet forest* life zones.

Comments—*Syngonium podophyllum* is a member of section *Syngonium.* It and *S. macrophyllum* are often difficult to separate where they occur together in wetter parts of *Tropical moist forest* and in *Premontane wet forest* life zones, but *S. macrophyllum* is usually distinguishable by its much larger vegetative and fertile parts, its smoother, thicker blades, which tend to dry brown rather than greenish as in *S. podophyllum,* and by its ovate-cordate juvenile blades.

The morphological variation in the species is great. Mexican plants may have up to 11 leaflets (usually 9), have leaflets often more widely separated and have stems, peduncles and spathe tubes glaucous, whereas Panamanian populations generally have mostly 3-5 (sometimes 7) leaflets with the lowermost leaflet often conspicuously auriculate.

Unusual variation is also represented in collections from Darién Province, Panama. Here the auricles of the lateral leaflets are frequently obovate and scarcely pinched-off rather than more or less oblong and usually conspicuously pinched-off as is typical of most Central American populations. These Darién populations most closely resemble typical material of what was previously considered *S. vellozianum.*

Infructescences in Mexico are commonly bright red whereas those in Panama and in South America are generally yellow to orange or red-orange.

In Central America, *Syngonium podophyllum* is most closely related to and confused with *S. angustatum.* The two species occur together in similar habitats throughout much of their range in Central America, and according to Birdsey (1955) they may hybridize. (See the Key for characters used in separating the two species.) *Syngonium podophyllum* may also be confused with *S. neglectum* in its vegetative condition. In the field, *Syngonium podophyllum* can be distinguished from *S. neglectum* by its glaucous stems. Although the species tends not to have glaucous stems in the southern part of its range, there is no confusion with *S. neglectum*, which is restricted to Mexico.

Figure 179: *Syngonium podophyllum*. Adaxial leaf surface, *Croat 107407*, Panama,

Additional specimens seen —BELIZE. **Belize:** Collected in area about 1 km N of Bermudian Landing Village, along Belize River., 17°34'N 88°32›W, 20 m, 4 February 1987, *Jonathan Lyon 6* (MO); Gracie Rock 1.5-4 miles S of Mile 22 Western Highway; limestone outcrops prevalent., 17°24'N 088°28'W, 100 m, 21 January 1974, *Ronald L. Liesner & John D. Dwyer 1468* (MO); **Cayo:** Caves Branch, 17°08'53»N 88°42›39»W, 80 m, 23 July1976, *Caroline Whitefoord 1080* (MO); San Antonio, ca. 15 km SW of San Ignacio. Secondary forest along trail. Common., 17°05'N 89°00'W, 9 June 1988, *Michael J. Balick, Rosita Arvigo, Gregory Shropshire & Antonio Cuc 1881* (MO); Cayo District, 23 May 1988, *Rosita Arvigo, Michael J. Balick & Gregory Shropshire 119* (MO); Chiquibul National Park, Caracol Archaeological Reserve, 16°45›N 089°07›W, 550 m, 18 October1993, *Stephen W. Ingram & Karen Ferrell-Ingram 1937* (MO); Along Sibun River, just W of Hummingbird Highway., 17°06'N 88°40'W, 200–300 ft, 21 June 1973, *Thomas B. Croat 24866* (MO); **Toledo:** 1.5 miles from San José on road to Columbia Forestry Station., 16°16'N 089°07'W, 12 June 1973, *Alwyn H. Gentry 8133* (MO); Southwestern Maya Mountains, Columbia River Forest Reserve, Union Camp, 16°23'N 89°09'W, 700–750 m, 06 April 1992, *Bruce K. Holst 4057* (MO); Along Río Grande, ca. 1.5 km NE of Big Fall, near Don Owens-Lewis property., 16°16'N 088°52›W, 20 m, 06 May 1996, *Bruce K. Holst, Gerrit Davidse & Alan T. Whittemore 5131* (BRH,MO, SEL Southern Maya Mountains, Bladen Nature Reserve, large sinkhole just S of the upper Bladen Branch and 1.3 airline km SE of "AC Camp"., 16°28'17»N 088°55›04»W, 210–330 m, 13

Figure 180: *Syngonium podophylium*. Abaxial leaf surface, Panama, *H. Hentrich SL 190*. Photo, H. Hentrich

Figure 181: *Syngonium podophyllum*. Flowering plant, Panama. *H. Hentrich SL 190*. Photo, H. Hentrich

May 1996, *Gerrit Davidse, Martin Meadows & Alan T. Whittemore 35907* (BRH,MO); Southern Maya Mountains: Bladen Nature Reserve, area around "AC Camp" helicopter landing site, along the upper part of the Bladen Branch., 16°29'21»N 088°52›12»W, 250 m, 09 May 1996, *Gerrit Davidse, Sharon Matola & Gregorio Sho 35731* (MO); **CARIBBEAN**. **Bahamas:** Eleuthera, Northeast edge of North Palmetto., 16 August 1977, *Donovan S. Correll 49000* (MO); **Cuba:** Soledad, 22°30'00»N 80°00›00»W, August1940, *Hugo Gunckel s.n.* (MU); **Dominican Republic:** Distrito Nacional. City of Santo Domingo: Cementerio Nacional at Avenida Maximo Gomez and Ave. Americo Lugo., 17 June 1981, *Milcíades M. Mejía 14929* (MO); El Seibo. Los Cuatro Caminos, por km. 5 de ela carretera de Miches a higuey., 18°58'N 69°01›W, 10–20 m, 18 December 1980, *Milcíades M. Mejía 9905* (MO); San Cristóbal. Arroyo El Molino; at populated village of El Molino, at NW base of Loma Siete Picos, due N of Villa Altagracia., 18°44'30»N 70°11›00»W, 280–300 m, 01 December 1980, *Milcíades M. Mejía 9521* (MO); **Leeward Islands:** Dominica. S side of main road 400 m before bridge crossing Layou River, 15°24'N 61°24'W, 48 m, 12 May 1992, *Eirik Stijfhoorn 780* (MO); **Puerto Rico:** Mpo. Caguas. Emergency escape ramp off route 172, 1.3 miles west of intersection with route 7784. NW facing slope near summit of step ridge., 18°12'25"N 066°04'21"W, 285 m, 03 March 2006, *Andrew Townesmith & Greg Gust 369* (MO,UPRRP); S of Yabucoa, ca. km 99.5 on Highway 3, 70 m, 27 October 1985, *Sue A. Thompson & Ione K. Thompson 3245* (MO); Cayey. Municipio of Cayey. Just W of the interø section of routes 184 and 179. Private road along ridge leading to Barrio Farrallón., 18°07'N 66°03'W, 9 February 1991, *James S. Miller & Charlotte M. Taylor 6005* (MO); Naguabo. Along hwy 191, 2.4 mi. N of Rio Blanco (jct. Hwy 31)., 26 November 1981, *Bruce F. Hansen 9428* (MO); **Virgin Islands:** St. John. Susannaberg, 100 m, 27 January 1991, *Pedro Acevedo-Rodríguez & Bobbi*

Figure 182: *Syngonium podophyllum*. Closeup of inflorescence, Panama, *H. Hentrich SL 190*. Photo, H. Hentrich

Figure 183: *Syngonium podophyllum*. *Baron 204*, Belize. Photo, E. Baron

Figure 184: *Syngonium podophyllum*. Inflorescence. *Baron 204.* Belize. Photo, E. Baron

Figure 185: *Syngonium podophyllum*. Cluster of infructescences. *Baron 204.* Belize. Photo, E. Baron

Angell 4061 (MO). **COSTA RICA**. 10°13'48»N 84°31›48»W, 17 April 1935, *Alberto M. Brenes 18181* (CR); Eastern Osa pennisula. *08°31'18"N 083°24'01"W, 27 January2003,* Margaret M. Mayfield s.n. *(MO);* **Alajuela**: Finca Los Ensayos, ca. 11 mi NW of Zarcero. Roadside and fencerows, 10°15'36"N 84°27'00"W, 900 m, 15 August1977, *Thomas B. Croat 43532* **Cartago:** Paraíso. Valley of Jicotea, between town of Jicotea and Río Pacuare, disturbed vegetation near road, 09°49'12"N 083°31'12"W, 500–700 m, 30 June1976*, Thomas B. Croat 36538* (MO); **Guanacaste***:* Parque Nac. Rincón de la Vieja. Sendero Laguna Santa Maria, finca Las Moras, sendero Las Pailas., 10°36'00»N 85°15›36»W, 800 m, 12 October1990*, Gerardo Rivera 785* (MO); **Heredia:** Forest between Río Peje and Río Sardinalito, Atlantic slope of Volcán Barva. 10°17'N 84°04.5'W 800-1000 m, 10°16'48»N 84°04'12"W, 800–1000 m, 7 April 1986*, Michael H. Grayum & Robin L. Chazdon 6865.* **Limón:** Hitoy Cerere reserve, SW of Valle La Estrella. Along Río Cerere to ca. 1 km upstream from Quebrada Barrera., 09°40'30"N 83°02'00"W, 90–200 m, 31 July 1985, *Michael H. Grayum & Barry E. Hammel 5780* (MO); **Puntarenas:** Forests on main ridge and NE slopes of Fila de Cal, between San Vito and Ciudad Neily. 8°41'N, 82°56.5'W. Elev. ca. 500-620 m., 08°40'48»N 82°56›24»W, 500–620 m, 13 September 1985, *Michael H. Grayum 6047*(MO)*;* Between Palmar Sur and Piedras Blancas, along Interamerican Highway, 08°52'12"N 83°20'24"W, 20 m, 28 Feb 1976, *Thomas B. Croat 32918* (MO); **Carchi:** Tulcán. Parroquia Tobar Donoso. Sector Sabalera. Reserva Indígena Awá. Bosque primario Noreste Casa Comunal., 01°00›N 78°24'W, 650–100 m, 19 junio 1992–28 junio 1992, *Galo A. Tipaz, Jorge Zuleta & N. Guanga*

Figure 186: *Syngonium podophyllum*. Inflorescence with spathe cut away, *Baron 204.* Belize. Photo, E. Baron

Figure 187: *Syngonium podophyllum*. Closeup of cut open infructescence. Photo, R. Hernandez

Figure 188: *Syngonium podophyllum. Cowan 3930*, Mexico

Figure 189: *Syngonium podophyllum. Croat 42934*, Mexico

Figure 190: *Syngonium podophyllum. Croat 100282*, Mexico

Figure 191: *Syngonium podophyllum. Croat 11426*, Panama

Figure 192: *Syngonium podophyllum. Gentry 428*, Panama

1269 (MO); **Cotopaxi:** Latacunga. Tenefuerste, Río Pilalo, Km 52-53, Quevedo-Latacunga., 00°52‘42“S 79°05›16»W, 750–900 m, 19 July1982, *Calaway H. Dodson & Alvin Embree 13376* (SEL); Tenefuerste, Río Pilalo, Km 52-53, Quevedo-Latacunga., 00°52‘42“S 79°05›16»W, 750–900 m, 19 July1982, *Calaway H. Dodson & Alvin Embree 13376* (MO); **Esmeraldas:** Along road between main Lita-San Lorenzo highway and Mataje; 1.1 km N of main Lita-San Lorenzo highway., 01°04’31»N 78°45›29»W, 46 m, 15 October2007, *Thomas B. Croat, Mónica Carlsen & Dan Levin 99868* (MO); **Galapagos:** San Lorenzo, km 369., *Carlos Játiva & Carl C. Epling 738* (AAU); **Guayas:** Cerro Pancho Díablo, parte media de frente a la gasolinera. Cuenca de quebrada, 00°24›S 079°35›W, 220–250 m, 01 October 1992, *Carlos E. Cer*ón *20552* (MO); Inland road from Puerto Lopez to S of Rio Ayompe. Province Guayas., 01°40’S 80°45›W, 152 m, 16 January1980, *Sue A. Thompson 386* (CM, MO); **Los Ríos:** Centinela Ridge area, 12.5 km E of Patricia Pilar. Lightly disturbed forest on hills., 00°37’00»S 79°18›00»W, 427 m, 28 July1980, *Bertel Hansen & et al. 7825* (SEL); 0–500 m, *Calaway H. Dodson & et al. 7958* (GUAY,SEL); Hacienda Clementina, Cerro Samana, near Puerta Negra, 01°39’S 79°20›W, 200–250 m, 23 May 2002, *Stahl 5860* (GUAY); Vinces. Jauneche Forest, Jauneche, km 70 Quevedo-Palenque via Mocachi., 01°16›00»S 79°42’00”W, 100 m, 14 July1979, *Calaway H. Dodson & et al. 7985* (MO); **Manabí:** Pedernales. 43 km north of Pedernales along new coastal highway, 4 km south of Río Cojimíes crossing. Tropical wet forest on hills., 00°17’N 79°53’W, 100 m, 19 December 1998, *David A. Neill & QCNE Botany Interns 11729* (CM.MO,QCNE,SEL); Cerro Pata de Pajaro, 10 km east of Pedernales, 00°01›N 79°58’W, 400–700 m, September 1998, *Tom Delinks & Carlos Robles 84* (MO); **Morona-Santiago:** Parroquia Bomboiza, Misión Salesiana Shuar Bosque Húmedo Premontano Camino al Monte de Purushamnait y Bosque primario., 03°25›S 78°35’W, 800 m, 7/Nov/1986, *Carlos E. Cer*ón*, Marc A. Baker & David A. Neill 475* (MO); Along road between Zamora and Gualaquiza, 48 km N of Yangzatza, 7 km N of El Pangui. Premontane wet forest., 03°28’S 078°40’W, 850 m, 19 October 1981, *Thomas B. Croat 50788* (MO); Along route E-40 from Santiago to Puerto Morona and San José de Morona. Just E of Río Morona near Km marker 139.5, 48.0 km E of Santiago flat area of forest near Río Morona., 02°55›22»S 077°43›31»W, 201 m, 18 January 2015, *Thomas B. Croat et al. 105744* (MO); Morona. Cordillera de Cutucú, en la vertiente occidental de la Cordillera, al este del Río Upano. Parroquia Sevilla Don Bosco. Centro Shuar Angel Rubí. 02°20›03»S 78°03’30”W–02°19’34»S 78°02›59»W, 990–1330 m, 02 July 2009, *Abel Wisum 1534* (ECUAMZ, MO,QCNE); **Napo:** Vicinity of oil company Auca base camp, ca. 40 km S of Coca., 00°48’00»S 76°59›00»W, 300 m, 6 November 1974, *Alwyn H. Gentry 12526* (MO); Reserva Biológica Jatun Sacha. 8 km de Puerto Misahuallí, margen derecha del Río Napo. b.m.h.T., 01°04›S 77°36’W, 450 m, 08 noviembre 1987, *Carlos E. Cer*ón *2604* (MO); Estación Biológica Jatun Sacha. Río Napo, 8 Km al E de Misahuallí. Bosque muy húmedo tropical. Potrero a 200 m al sur de la reserva., 01°04›S 077°36›W, 450 m, 23 June1987–27 June1987, *Carlos E. Cer*ón *1680* (MO); **Orellana:** Tiputini Biodiversity Station. Epiphyte. Evergreen lowland rainforest., 00°38’S 76°09›W, 200 m, 7 Feb 2002, *N. Koester 112* (MO); Vicinity of San José Payamino, Estación Cientifica Timburi Cocha, along banks of Río Payamino., 00°28’29»S 77°17›05»W, 310–330 m, 11 February 2015, *Thomas B. Croat, Geneviève Ferry & David Scherberich 106133* (ECUAMZ,MO). **Pastaza:** Along road to Río Anzu, 17.1 Km N of Mera, 3.5 Km N of Río Anzu, trail W into mountains., 01°23’26”S 078°03’19”W, 1238–1400 m, 6 May 2003, *Thomas B. Croat, Lynn P. Hannon & Mark Menke 88737* (MO); Comunidad Consuelo. 1 km arriba del cruce del Río Pastaza (vía Puyo-Macas)., 01°53’S 077°48›W, 700 m, July 1999, *Walter A. Palacios 14844*

(MO). **Pichincha:** Reserva Guaycuyacu, near border with Imbabura Province, along Río Guaycuyacu, on road from Cielo Verde to Santo Rosa, near junction of Río Guaycuyacu and Río Guayabamba., 00°13'N 78°55›W, 500 m, 28 February 2005, *Thomas B. Croat, Christopher Davidson & Sharon R. Christoph 95306* (MO); Vicinity of El Centinela, 0.2 km past Escuela Mixta El Centinela, along trail to left of road, exactly 13 km E from main Santo Domingo-Quevedo Highway in Patricia Pilar., 00°32'S 79°11'W, 1000 m, 14 March 1992, *Thomas B. Croat 73043* (MO); **Sucumbíos:** Reserva de Prodducion Faunistica Cuyabeno. One-hectare plot ca. 1 km north of Laguna Grande and surroundings. Tropical rainforest on terra firme., 00°00'S 76°12'W, 265 m, 4/11/1988–6/10/1988, *A. D. Poulsen 78663* (AAU); **Zamora-Chinchipe:** Vicinity of Ecuacorrientes mining company, Valley of Río Quime, trail along Río Waiwaime near its mouth at Río Quime., 03°33'45»S 78°27›47»W, 1000 m, 23 Sept 2007, *Thomas B. Croat & Geneviève Ferry 99080* (MO); **EL SALVADOR. La Libertad:**

Alta Verapaz: Along road to El Estor (Lago Izabal) from Tucurú, 10-15 miles west of Tucurú, 15°17'39»N 90°04›50»W, 100-300 m, 18 July1977, *Thomas B. Croat 41523* (MO); Panzos. Finca Mercedes, Telemán., 15°17'59"N 89°42'14"W, 50 m, 12 julio 1988, *Pedro Tenorio L., et al. 14475* (MO); **Chimaltenango:** Volcán Acatenanago, Aldea Quisache., 14°31'05»N 90°17›04»W, 1500 m, 19/V/2004, *Mario Véliz MV15266* (MO); **Huehuetenango:** Barillas. Río Espiritu (orilla). Aldea Nuevo Amanecer., 15°54'09»N 91°11'28"W, 283 m, 23 September 2006, *Daniel Santamaría & Rafael* Ávila *5049* (MO,USCG); **Izabal:** At Shell Oil Station and vicinity just south of Río Dulce., 15°39'04»N 88°59›34»W, 75 ft, 08 August 1975, *Douglas G. LeDoux, David B. Dunn & Kenneth J. Torke 2103* (MO,UMO); Along dirt road which turns E into piña plantations from Highway CA-14, ca. 7 miles S of Puerto Barrios, 15°36'46»N 088°34›01»W, 50 m, 22 July1977, *Thomas B. Croat 41785* (MO); **Jutiapa:** 8 miles SW of San Cristóbal along Hwy. CA-2, near a picnic area, deep canyon, Monjoy. Large Ceiba trees and clear stream with jungle undergrowth, Aristolochia and many lianas, 14°08'00"N 89°45'51"W, 1600 f, 3 August1979, *David B. Dunn, Pan Case, Shelly Trott, Diane Thurm & Chester T. Dziekanowski 23277* (MO,UMO); **Petén:** Río Pasion, Ceibal, above Sayaxche, 16°30'48»N 90°03›44»W, 3 Feb 1964, *Cyrus L. Lundell 17658* (LL); Río Pasion, bordering Laguna San Juan Acul, 16°32'55»N 90°17'55"W, 19 Mar 1964, *Cyrus L. Lundell 18216* (LL); Forest between Finca Yalpemech along Río San Diego and San Diego on Río Cancuen, 16°01'40»N 90°04'31"W, 50–150 m, 25 Mar 1942, *Julian A. Steyermark 45329* (MO); **Quetzaltenango:** Along Highway Cito N of jct. with CA2, toward Quezaltenango, in watershed reserve INDE (Inst. Nac. de Electrificación, Guatemala) "Santa María" (Central Hidroeléctrica), Km 199. Loose gray soil, steep slopes W of highway, 14°43'35»N 91°42›31»W, 1200–1300 m, 22 January 1987, *Thomas B. Croat & Dylan P. Hannon 63431* (MO); **San Marcos:** La Trinidad, ca. 2 km from Finca Armenia above San Rafael., 14°56'02»N 91°53›55»W, 1100–1250 m, 12 July 1977, *Thomas B. Croat 40843* (MO); Finca Armenia near La Trinidad above San Rafael, 14°54'36»N 091°53›43»W, 1100–1250 m, 12 July1977, *Thomas B. Croat 40825* (MO); **Sololá**: Bordering Río Bravo, vicinity of Finca Mocá, south-facing slopes of Volcán Atitlán. Pine woods, 14°32'03»N 91°13›38»W, 1000–1100, 21 June1942, *Julian A. Steyermark 48017* (MO); **Zacapa:** Along old road to Finca Agua Fría, 2 miles N from Route CA-9, 41 miles S of turnoff to Petén (near Morales), 15°15'02"N 89°16'24"W, 150 m, 23 July1977, *Thomas B. Croat 41876* (MO); **HONDURAS**. **Atlántida:** San José de Texiguat, SE of Tela, 15°31›38»N 087°27›07»W, *Cirilo H. Nelson 10699* (TEFH); Along road between Tocoa and La Ceiba at Río Sambo, 11.3 miles from Río Cangreja Bridge at La Ceiba., 15°47'N 086°30›W, 30 m, 09 February 1987, *Thomas B. Croat & Dylan P. Hannon 64582* (MO); La Ceiba. On the mountain

slopes and coastal plains, vicinity of La Ceiba., 29 July1938, *Truman G. Yuncker et al. 8678* (MO); Tela. Lancetilla Valley south of Tela, 50 m, 17 July1953, *Monroe R. Birdsey 315* (MO); Along dirt road adjacent to railroad tracks on way to Jardín Botaníco Lancetilla, ca. 2 km north of Jardín Botaníco Lancetilla., 15°45›00»N 087°27›04»W, 50 m, 03 August 1977, *Thomas B. Croat 42578* (MO); **Colón:** Trujillo. Mountain directly south of Trujillo., 15°54'09»N 85°57›03»W, 9 May 1980, *Janice G. Saunders 232* (MO); **Copán:** Copán Ruinas. Quebrada just north of Copán. Limestone with clay soil. Mixed tropical vegetation, 14°51'N 89°09'W, 13 June1977, *Jackie M. Poole 1036* (LL); Along Copán Ruinas-Agua Caliente road, 4.4 km N of Copán Ruinas., 14°53›N 89°10'W, 650 m, 29 April 1996, *Randall J. Evans 2568* (CM,K,MO,NY); **Cortés:** Omoa. Tulián, 10 km O de Puerto Cortés, bosque húmedo tropical, nivel del mar., 15°47'51»N 87°58'07"W, 0–5 m, 22 Mar 1985, *Cirilo H. Nelson & Guadalupe Cruz R. 9138* (TEFH); 2-3 miles southwest of Omoa on road from Puerto Cortes to Guatamalan border; sea level; pastures with few trees., 15°45'09"N 88°04'00"W, 0 m, 2 August1977, *Thomas B. Croat 42567* (MO); **Gracias a Dios:** Puerto Lempira. Arroyada del río Dursuna, 70 km al [sur]oeste de Puerto Lempira. Clima lluvioso tropical húmedo; llanos de *Pinus caribaea* Morelet, 15°00'N 84°13'W, 40–80 m, 7 April1972, *Cirilo H. Nelson 758* (INPA); **Olancho:** Arroyadas del río Wampú. Orillas. Dulce Nombre de Culmí, río Wampusito., 15°15›N 85°25'W, 500–700 m, 12 Mar 1972–17 Mar 1972, *Cirilo H. Nelson & Andre F. Clewell 438* (MO); Along Río Olancho, W of main Tegucigalpa-Catacamas Highway, ca. 1 km up stream from and NW of Puente Boquerón, 8.6 miles SW of Catacamas, 6 miles SW of Santa María del Real., 14°45›N 86°00'W, 400 m, 04 February 1987, *Thomas B. Croat & Dylan P. Hannon 64108* (MO); **MEXICO Campeche:** Península de Yucatán. Municipio Escárcega, 18°37'50»N 90°16›20»W, 21 September1999, *Germán Carnevali et al. 5776* (MO); **Chiapas:** Col. Triumfo Agrarista, Parque Nacional Cañón del Sumidero., 16°50'49»N 93°04'35"W, 667 m, 23 agosto 2007, *Josefa Anahí Espinosa Jiménez 667* (HEM,MO); Municipio of Cintalapa, 10 km N of Cintalapa., 16°45›00»N 93°45'00"W, 1150 m, 30 January1990, *Peter J. Stafford & et al. 97* (MO); **Guerrero:** Acapulco. Acapulco and vicinity., 16°52'12»N 99°53›24»W, October1894–Mar 1895, *Edward Palmer 346* (MO); San Luis Acatlán. Vicinity of Yoloxochitl, 4.46 (airline km) E of town Paraje Itutane KWA, near source of towns water supply., 16°49'11»N 98°38›38»W, 806 m, 25 October 2017, *Thomas B. Croat 107122* (MO); **Hidalgo:** 10.5 mi SW of Hidalgo/San Luis Potosí border on Highway 85 from Ixmiquilpan to Tamazunchale., 21°07'48"N 99°01'48"W, 1050 m, 9 June1980, *Sue A. Thompson & et al. 442* (MO,SEL); Along Highway 105 between Pachuca and Tampico, 27.2 miles S of Huejutla, 1.2 miles S of Quebradora, 0.9 miles N of Santa Maria., 20°57'36»N 098°33›36»W, 1315 m, 28 February 1987, *Thomas B. Croat & Dylan P. Hannon 65977* (MO); **Morelos:** Fraccionamiento San Antonio, W. of Colonia Carolina (suburb of Cuernavaca, NW of the center of Cuernavaca). Canyon walls along the Río Pollo below Salto San Antonio (at site of newly finished condominium project), 18°57'00»N 099°15›00»W, 1500 m, 24 Feb 1987, *Thomas B. Croat & Dylan P. Hannon 65776* (MO); **Nayarit:** San Blas. Along Route 28; 1.8 miles WSW [west] of Jalcocotlán [Jalcacatán], between Tepic and Santa Cruz., 21°28'12"N 105°06'36"W, 500 m, 08 January 1979, *Thomas B. Croat 45306* (MO); **Oaxaca:** 6 miles N of Pochutla by road, just S of Chacalapa. Second growth tropical deciduous forest., 28 May 1973, *Bruce F. Hansen, JoAnn Hansen & Michael H. Nee 1543* (MO); Tropical jungle on steep bluff and roadside 8.5 miles ne of valle nacional, old Roadbed turnout. Too juvenile to be certain, 17°50'24»N 96°12›36»W, 300 ft, 10 August1979, *Diane Thurm et al. 236* (UMO); Tehuantepec. "El Manguito" al Sur de El Limón, el cual está a 11.1 km al SW de la entrada a Buenos Aires. Veg. Bosque deciduo templado=Selva baja caducifolia., 800 m, 25 November1983,

Rafael Torres C. 4161 (MEXU); "El Manguito" al Sur de El Limón, el cual está a 11.1 km al SW de la entrada a Buenos Aires. Veg. Bosque deciduo templado=Selva baja caducifolia., 800 m, 25 November1983, *Rafael Torres C. 4161* (MO); Tuxtepec. Mpio. de Soyaltepec. Lado Norte de la cortina de la Presa Temascal., 18°14'03»N 96°24'43"W, 50 m, 12 junio 1987, *Luis Cortés A et al. 914* (MO); Ejido Benito Juárez., 45 m, 08 January 1981, *Luz María Garcí*a *R. 7T* (CHAPA); **Puebla:** Cuetzalan del Progreso. Vicinityy: Camino de Cuetzalan a San Miguel Tzinacapan y después hacia Ayotzinapan y Xaltipan, pasando Xaltipan hacia Tecoltepec como 100 a 150 metros sntesde Ilegar al centro de Tecoltepec., 20°05›36»N 97°31'32»W, 234 m, *Pilar Mendoza 1443* (MO); Ca. 6 km from center of town on road to Santa Elena., 19°58'05"N 097°44'04"W–19°58'44»N 097°44›11»W, 1090–1079 m, 05 November 2017, *Thomas B. Croat 107407* (PMA); **Querétaro:** Jalpan. Tanchanaquito. Bosque tropical subperennifolio., 21°38'24»N 99°13'12"W, 300 m, 07 Mar 1990, *Sergio Zamudio R. & E. Carranza G. 7798* (IBE,MO); Landa de Matamoros. 2 km al S de El Rincón, cerca de Tilaco. Ladera caliza con vegetación de encinar húmedo perturbado., 900 m, 2 April1987, *Jerzy Rzedowski 12932* **San Luis Potosí**: 2 miles N of Tamazunchale, tropical vegetation, many lianas & ferns & epiphytes. Steep slopes., 21°16'12»N 98°46›12»W, 09 January1972, *David B. Dunn & Don Dunn 19152* (MO,UMO); Huehuetlán. 1 km NW of Huichihuayan on highway 85 between Ciudad Valles and Tamazunchale. 21°28'48»N 098°58›12»W, 150 m, 24 June 1977, *Thomas B. Croat 39247* (MO); Tamazunchale. Hills above Highway 85, 6 mi NW of Tamazunchale., 21°17'24»N 098°47›24»W, 250 m, 25 June 1977, *Thomas B. Croat 39282* (MO); **Tabasco:** 3 km antes del rancho "La Adelita" (Proquivemex). Sobre el Camino Tacotalpa-Tapijulapa. Vegetación ruderal, 17°28'48»N 92°48›36»W, 50 m, 28 April1984, *A. Espejo S.et al. 950* (MO); Parrilla, 11 km S of Villa Hermosa, 17°54'36»N 92°54'36»W, *Monroe R. Birdsey 243* (UC); Scandent on live fences near railroad tracks. E of Teapa., 17°32'24»N 92°57'00"W, 3 m, 26 August1952, Parrilla, 11 km S of Villa Hermosa, 17°54'36»N 092°54'36»W, *Monroe R. Birdsey 245* (UC); Km 2 (1.2 miles) de la carretera Jalapa-Tacotalpa. Km 33.9 (21.2 miles) de la desviación de la carretera hacia Lomas Alegres y Castaña, 17°34'12»N 92°36›36»W, 16 June 1983, *Cowan 3930* (MO); **Tamaulipas:** Gomez Frias area, Rancho del Cielo, 23°02›24»N 99°09'00»W, *Alfred T. Richardson 93* (TEX); **Veracruz:** 1867, *François Marie Gabriel Go*üin *s.n.* (P); 2.8 km E of jct with Sontecomapan-Montepio Rd on the way to Playa Escondida (jct 11 km by road NE of Sontecomapan)., 18°31'48»N 95°01›48»W, 0–200 m, 2 July1976, *Gary J. Breckon & Mary E. Breckon 2043* (MO); Vera Cruz-Coatzacoalcos Road; Forest remnant and coffee plantation on ridge above road at km 156.5., 13 July 1974, *Seymour H. Sohmer 9427* (WIS); Along secondary road between Hidalgotitlán and Jaltipan, along Río Coatzacoalcos, vicinity Buena Vista, 4 km S of Buena Vista., 17°49'17»N 96°38›17»W, 150 m, 5 Mar 2008, *Thomas B. Croat & Pedro Díaz Jiménez 100282* (MO); **NICARAGUA**. **Atlántico Norte:** Puerto Cabezas, 14°02›N 83°23'W, 0–20 m, 28 July 1991, *Bruce Barrett 313* (WIS); Cerro Baka, Coperna, 30 km E of Siuna, 13°40'N 84°32›W, 250 m, 17 June 1978, *David A. Neill 4511* (MO); Vicinity of plantel of Neptune Mining Company in NE part of Bonanza; steep disturbed slopes, metamorphic rocks., 14°01'N 084°35›W, 200-350 m, 25 February 1979, *W. D. Stevens 13030* (MO); Vicinity of plantel of Neptune Mining Company in NE part of Bonanza; steep disturbed slopes, metamorphic rocks., 14°01'N 84°35›W, 200-350 m, 25 February 1979, *W. D. Stevens 13036* (MO); **Atlántico Sur:** Orinoco, Justa Point, 12°33›N 83°44'W, 0–5 m, 9 July 1991, *Bruce Barrett 219* (MO); Orinoco, Justa Point, 12°33'N 083°44'W, 0–5 m, 9 July 1991, *Bruce Barrett 219* (WIS); Corn Island, various points including Brocker Inlet and Waula Point [Seymour series], 12°10'N 83°04'W, 0–2 m, 6 March 1971, *Henry K. Svenson 4319* (MO); O-1 km N of San Martín; pasture with scattered trees, 11°53'N

84°21›W, 120 m, 6 September1983, *Michael H. Nee 27836* (MO); Caño Monte Cristo, 1 km antes del campamento German Pomares, 11°35›N 83°51'W, 10 m, 5 febrero 1982, *P. P. Moreno 14856* (MO); **Boaco:** Cerro Mombachito, 8.5 km noroeste de Camoapa., 12°24›N 85°33'W, 900–1020 m, 24 January 1980, *M. Araquistain & P. P. Moreno 924* (MO); N slope of Cerro Mombachito and adjacent plain, between Cerro and main road (Boaco-Camoapa)., 12°24'30»N 85°32›30»W, 500–900 m, 08 October 1979, *W. D. Stevens & Alfredo Grijalva P. 14748* (MO); **Chontales:** 2 km al N de Santo Tomás, carretera a Santo Domingo, 12°04›N 085°06'W, 340-380 m, 30 April 1982, *P. P. Moreno 16209* (MO); Ca 3.1 km S of Hwy 7 (from ca 3.6 km E of La Gateada) on road to Nueva Guinea; roadside and pasture, 11°58'N 084°45›W, 180 m, 9 November 1977, *W. D. Stevens 5123* (MO); **Granada:** Mun. de Nandaime, comarca Aguas Agrias, finca Las Plazuelas, alrededor de la Laguna blanca, Reserva de Mecatepe y río Manares, 11°43'N 086°00'W, 100 m, 11 April 2011, *I. Coronado G. & P. A. Almanza 5951* (MO); 3.1 km NW of Río Ochomogo bridge along Hwy. 1; level Crescentia savanna., 11°40'N 85°59›W, 60 m, 20 August 1981, *W. D. Stevens & O. M. Montiel J. 20607* (MO); **Jinotega:** Municipio de Wiwilí, zona de amortiguamiento de Bosawas, comunidad Inipuas, 14°24›N 85°10'W, 185 m, 20 April 2005, *I. Coronado G., M. Barrios & F. Rojas 1726* (HULE, MO); Municipio de Wiwilí, Reserva de Bosawas, comunidad de Tuburus; Transecto 1 ubicado en la zona agrícola, Parcela 20 a la 29, 14°15›N 85°10'W, 200 m, 2 Febrero 2005, *I. Coronado G., M. Barrios & F. Rojas 945* (HULE,MO); Along rock road 3.8 miles SE of Yalí, between Condega on Route 1 and Jinotega on Route 3, 13°15'N 86°09'W, 1350 m, 6 Aug 1977, *Croat 42934* (MO); **Matagalpa:** Behind La Selva Negra Hotel, slopes of Cerro Picacho, near the border with Dept. Jinotega., 13°00'N 85°55'W, 1200–1540 m, 23 May 1985, *Gerrit Davidse, Alfredo Grijalva P. & Mario Sousa S. 30518* (MO); Municipio de El Tuma, La Dalia, base del Macizo de Peñas Blancas, Hacienda Monte Cristo, 13°13'44»N 85°38'16"W, 713 m, 18 December 2004, *I. Coronado G., M. Fletes, R.M. Reyes & L. Reyes 778* (MO); **Nueva Segovia:** Municipio de Jalapa, subiendo y bajando la cima del cerro de Jesús. Sobre la linea fronteriza, 13°59›02»N 086°11'17"W, 1255–1720 m, 19 Julio 2006, *L. D. Paguaga & N. Toval 204* (HULE,MO El Jícaro, El Cinchado., 13°46'N 86°05'W, 650–700 m, 24 December 1981, *P. P. Moreno 13596* (MO); **Río San Juan:** Municipio El Castillo, Comunidad Las Maravillas, El Puentón, 3 km al oeste de la comunidad, 11°07›15»N 84°21'04"W, 100 m, 8 April 2005, *C. Guadamuz 3642* (HULE,MO); Municipio El Castillo, Communidad Las Maravillas, 6 km al este, 11°07›15»N 84°21'04"W, 100 m, 10 November 2004, *D. Urbina 100* (HULE); 1.8 km NE of border between La Venada and San José along road to Los Chiles; remnant moist forest along stream, 11°11'52»N 84°36›10»W, 115 m, 24 October 2011, *W. D. Stevens & O. M. Montiel J. 31989* (HULE,MO); **Rivas:** Isla de Ometepe, lado norte del Volcán Concepción, entrada a Los Angeles, 11°33'N 85°37'W, 400–460 m, 12 marzo 1981, *J. C. Sandino 514* (MO); Isla Ometepe, Balgüe, 11°29'N 85°30'W, 50-100 m, 28 noviembre 1982, *P. P. Moreno 18903* (MO); **PANAMA. Bocas del Toro:** Chiriquí Lagoon, on Cayo Agua., 09°08'59»N 82°01›59»W, 5 m, 11 August 1987, *Gordon McPherson 11477* (MO); Isla San Cristobal. Cerro de Bocatorito. Moist tropical forest with Luehea seemannii, Ficus insipida and planted Theobroma cacao., 09°13'48»N 82°16›24»W, 60 m, 11 Feb 1989, *Paul M. Peterson & Carol R. Annable 6771* (MO); Isla San Cristóbal, 2 km NE of Bocatorito. Moist tropical forest, 30–60 m, 10 February 1989, *Paul M. Peterson & Carol R. Annable 6757* (US); **Canal Area:** Barro Colorado Island. Near Thomas Barbour Trail, 09°09'30»N 79°49›20»W, 10–100 m, 11 Feb 1969, *Alwyn H. Gentry 428* (MO); Río Providencia 3 km SE of Achiote near W border of Canal Zone., 09°12'54"N 79°58'14"W, 5–100 m, 04 December 1973, *Alwyn H. Gentry & Michael H. Nee 8663* (MO); Barro Colorado Island, Allison Armour Trail, 09°09›10»N

79°51'30"W, 10–100 m, 26 August1970, *Thomas B. Croat 11921* (MO); Barro Colorado Island, 09°09'45»N 79°50›30»W, 5–15 m, 20 July1970, *Thomas B. Croat 11426* (MO); Barro Colorado Island. Allison Armour Trail, 09°09›10»N 79°51'30"W, 10–100 m, 24 July1971, *Thomas B. Croat 16218* (MO); **Cocl**é: Cerro Moreno, between Molejon and Coclecito, ca. 13 km NW of Cascajal. Steep hill., 08°46'44»N 80°31›54»W, 130–250 m, 07 February 1983, *Gerrit Davidse & Clem W. Hamilton 23712* (MO); **Colón:** Road to Mosquera from Palmas Bellas (nearer Mosquera). On the edge of cleared pasture and in adjacent forest., 09°09'N 80°04'W–09°11›N 080°04›W, 17 September1974, *Scott A. Mori & Jacquelyn A. Kallunki 1971* (MO); Along Río Cascajal at road between Portobelo and Nombre de Dios., 09°33'N 79°38'W, 50 m, 5 April1980, *Thomas B. Croat 49784* (MO); **Darién:** Río Pirre near town of Pirre, 08°07'N 077°44'W–08°08'N 77°44›W, 27 December 1972, *Alwyn H. Gentry & Andre F. Clewell 6917* (MO); East slope of Cerro Sapo, along ridge from campsite., 07°58'N 78°22›W, 1500 ft, 02 February 1978, *Barry E. Hammel 1257* (MO); Parque Nacional del Darién, along S branch of Río Pucuro; on ridge in forest E of old village of Tacarcuna; ca. 18 km E of Pucuro, 08°04'N 77°16›W, 600-900 m, 23 October1987, *Barry E. Hammel, Greg C. de Nevers, Hermes Cuadros V. & Heraclio Herrera 16453* (MO); **Panam**á: Chepo. El Llano-Cartí Road 10 miles from Interamerican Highway near El Llano., 09°17'45»N 78°56›15»W, 330 m, 28 March 1976, *Thomas B. Croat 33776* (MO); Along trail between Río Majé and Quebrada Brava, 09°06›21»N 78°45'36"W, 60 m, 4 May 1976, *Thomas B. Croat 34658* (MO).

Syngonium purpureospathum Croat & Raz, Novon 27: 32–63, figs 62 & 63. 2019. — Type: JAMAICA. Saint James Parish: Johnson District, Cockpit Country, 1 mi S of Sweet Water, White Rock Hill, ca. 100 m N of main road, 18°26'N, 77°50›W, 640 m, 14 August 2007, *L. Raz, K. Wendelberger, H. Jacobsen, C. Jones*, *G. Proctor & S. Palmer 718* (holotype, IJ; isotypes FTG, MO-5996108, UCWI).

Growing on east facing ledges and cliffs, on lower parts in shade; epiphytic to epipetric; internodes short, to ca. 1 cm diam., thicker than broad toward apex, drying closely and sharply ribbed, yellow-brown, the uppermost nodes minutely and irregularly ridged. LEAVES with **petioles** 14–24 cm long, sheathed to within 1.5–3.5 cm from base of blade; sheath spreading, 1.8–2.0 cm wide midway, free-ending at apex, weakly undulate along the margins, the free portion subterete, drying closely and minute acute-ridged; **blades** trisect; medial segment ovate, 14.3–20.3 cm long, 6.9–11.7 cm wide, 1.6–2.1 times longer than wide, slightly inequilateral, one side 6–10 mm wider, acute to narrowly rounded and short-apiculate at apex, rounded to rounded-truncate at base, scarcely to not at all confluent onto lateral segments; lateral segments much smaller, directed at 115–155° angle from midrib, oblong to oblong-elliptic, slightly inequilateral, one side 2–8 mm wider, rounded at apex, the inner margin acute and weakly confluent onto medial lobes (confluent portion 1–2 mm wide), the outer margin acute to weakly auriculate (but not forming a lobe), 7.4-12.5 × 2.5–4.5 cm; **primary lateral veins** 6 or 7 per side. INFLORESCENCES one per axil, up to 3 borne in uppermost leaf axils; prophylls 9.0–13.2 cm long, 2-ribbed; **peduncle** 4.0–6.5 cm long, drying dark brown, 3–6 mm wide; **spathe** stiffly erect, 13.0–14.5 cm long, 6 cm wide when flattened, the tube oblong-elliptic, medium green, 4 cm long, drying 1 cm wide, dark brown, finely ridged and weakly pustular, the blade naviculiforme at anthesis with the lateral margins curled backward, violet-purple and semiglossy adaxially, green abaxially, drying medium yellow-brown on both

surfaces; **spadix** to 10 cm long, the staminate portion extending about 2/3 up the length of the spathe; staminate spadix 6.5–7.0 cm long, drying 9 mm diam., pale green pre-anthesis, turning yellow at anthesis, drying dark brown, 7–9 wide, shedding copious yellow pollen; sterile staminate portion 1 cm long, 3 mm diam., slightly broadened at apex with a few staminodia, these 0.6–2.0 mm long, 0.9–1.2 mm wide, the pistillate portion 3.3 cm long, 4–5 mm wide; pistils widely scattered, 3–4 across the width of the spadix; style rounded, drying blackened, 2 mm diam.; Fruits not seen. Flowering seen in August. **Figures 193 & 194.**

Distribution — *Syngonium purpureospathum* is endemic to Jamaica, known principally from the Cockpit country of St. James Parish in Johnson District on craggy limestone cliffs in *Jamaican moist forest* at 640 m elevation.

Comments — The species is a member of section *Syngonium* and is characterized by its non-glaucous stems which are usually densely covered with brownish projections, petioles sheathed 1/2–4/5 or more of their length and obtusely 1-ribbed adaxially, the trisect to almost 5-lobed, yellowish green-drying leaf blades with the lateral leaflets usually conspicuously auriculate and usually nearly pinched-off, as well as having usually 6–8 inflorescences per axil, a non-glaucous peduncle and a spathe that has the tube green on both surfaces.

Syngonium purpureospathum is most closely related to *S. auritum*, a species which also occurs in Jamaica. It differs from *S. auritum* in having a violet-purple spathe and 3-lobed blades which lack auricles on the lateral lobes of the leaf blades. In contrast *S. auritum* has prominent auricles on the lateral lobes and a creamy white spathe, more typical of other species in the genus.

Additional specimens seen — **CARIBBEAN**. **Jamaica:** Vicinity of Auchtembeddie, shaded limestone cliff, 1750 ft, 1 December 1962, *George R. Proctor 22976* (IJ); Along the Ipswich road, 1 mile north of Redgate, wooded limestone hillside, 500 ft, 5 August 1962, *George R. Proctor 22562* (IJ); Vicinity of Auchtembeddie, shaded base of limestone cliff, 1250 ft, 9 August 2003, *George R. Proctor 52183* (IJ); St. Elizabeth Parish, Black River Morass, near junction of the Y.S. and Black Rivers, 25 January 1964, *George R. Proctor 24515* (IJ); St. Elizabeth Parish, near the Styx River, Slipe District, 20–40 ft, 15 January 1963, *George R. Proctor 23144* (IJ); Hanover Parish, Bulls Bay, 5–10 ft, 24 August 1963, *George R. Proctor 23976* (IJ); Manchester Parish, Smithfield, 1.75 miles east of Cross Keys, 1750 ft, 8 November 1962, *George R. Proctor 22889* (IJ); Westmoreland Parish, Brighton district, Negril Hills, 200 ft, 18 November1955, *George R. Proctor 11155* (IJ); Geneva Mountain area, Dolphin Head Forest Reserve, 50–500 ft, 13–14 February 2001, *George R. Proctor & Rohan Estry 51812* (IJ); Trelawny, Crown Lands, ca. 10 km NW of Troy, NW of unpaved road, about 1 km before road terminates, 580 m, 13 August 2006, *Lauren Raz 700* (FTG, IJ, MO, UCWI); Hanover Parrish, Dolphin Head Mountain, E side (base) of mountain, 544 m, 8 September 2001, *Pedro Acevedo-Rodríguez & K. Campbell 12009* (IJ); Hanover. Bulls Bay, 5–10 ft, 24 August 1963, *George R. Proctor 23976* (IJ); Manchester, Smithfield, 1.75 miles east of Cross Keys, 8 November1962, *George R. Proctor 22889* (IJ); Vicinity of Auchtembeddie, 1250 ft, 9 August 2003, *George R. Proctor 52183* (IJ); 1750 ft, 1 December 1962, *George R. Proctor 22976* (IJ); St. Elizabeth, along Ipswich road, 1 mi north of Redgate, 500 ft, 5 August 1962, *George R. Proctor 22562* (IJ); Black River Morass, near junction of the Y. S. and Black Rivers, 25 January 1964, *George R. Proctor 24515* (IJ); Near Styx River, Slipe district, 20–40 ft, 15 January 1963,

Figure 193: *Syngonium purpureospathum*. Flowering plant, *Raz et al. 718*, Jamaica

Figure 194: *Syngonium purpureospathum. Raz et.al. 718*, Jamaica

George R. Proctor 23144 (IJ); St. James, Johnson District, 1 mi. S of Sweet Water, White Rock Hill, ca. 100 m N of main road, 18°26'N, 77°50›W, 2100 ft, 14 August 2007, *Lauren Raz et al. 718* (FTG, IJ, MO, UCWI); Geneva Mountain area, Dolphin Head Forest Reserve, 50–500 ft, 13–14 February 2001, *George R. Proctor & Rohan Esty 51812* (IJ).

Syngonium rayi Croat & Grayum, Phytologia 82(10): 553–55. 1997. — Type: Cultivated, Marie Selby Botanical Gardens [originally collected at La Selva Biological Station, Prov. Heredia, Costa Rica, in early October, 1985, *J.T. Atwood s.n.*], 30 May 1990. *H. Luther s.n.* (holotype, INB; isotypes, MO, PMA, SEL).

Nomadic vine to 2–3 m; scandent climber, fertile ca. 2–3 m above the ground; internodes moderately elongated, drying 1–4 cm long, 3–7 mm diam., yellowish brown to grayish brown, moderately ridged, semiglossy; **petioles** (3.6)8.4–22.5 cm long, sheathed for ca. 58–94% their total length, matte, finely ribbed; sheath involute, weakly free-ending at apex, free part drying sharply and deeply sulcate; **blades** simple, (5)10–25 cm long, (2.5)3.5–13.0 cm wide, 1.7–2.0(3.6) times longer than broad, ovate, oblong-ovate or oblong-deltate to narrowly ovate-sagittate, elliptical, lanceolate-oblong or lanceolate, cordate or hastate at base, dark green to purplish and matte to velvety above, moderately paler and weakly glossy below, margin minutely undulate; anterior lobe broadest in middle, often inequilateral with one side more broadly rounded (the other side more nearly straight), weakly constricted at petiolar plexus; posterior lobes (2)3-4(7) cm long, (1.5)2.6–2.8(4.0) cm wide; sinus narrow, broadened only at apex owing to the prominently in-turned posterior lobes; basal veins 5 or 6 pairs, 1st & 2nd pairs free to base; 3rd pair fused 2-4 mm; 5th pair fused 7-17 mm; **primary lateral veins** (3)4–11 per side; tertiary and collective veins prominulous below. INFLORESCENCE 1–4 per axil; **peduncle** ca. 2.2–5.2 cm long, oval in cross-section, 6-7 x 5-6 mm wide; **spathe** 10.5-14 cm long; tube 4.5-6 cm long, 2-2.7 cm wide, dark green, matte outside, dark purple-violet, glossy inside; spathe blade 6.5-7.5 cm long, opening to 3 cm wide, creamy yellow outside, creamy white to wine-red inside; **spadix** (6.0)8.1-9.5 cm long; 0.4–0.7 cm diam.; staminate portion creamy white, 7.5-8.0 cm, 1.1 x 1.25 cm diam., constricted area 1 cm long, 6 mm diam.; sterile male section 2.3 cm long, the basal portion 1.5 cm long, 1 cm diam.; pistillate portion pale green, 9 mm long in rear, 1.6 cm long in front. INFRUCTESCENCES to 6 cm long, 3 cm diam., the spathe green outside, red inside. Flowering May-July (December), mature fruits May & December. An indication of bimodal flowering. **Figures 195–201**.

Distribution — *Syngonium rayi* is endemic to Costa Rica (Fila Costeña, Cordillera de Guanacaste, Atlantic slope of Cordillera de Tilarán and Central, Barra del Colorado region) to eastern Panama (Cerro Jefe, Kunayala); 0–1000 (1500 m), occurring in *Tropical wet forest* life zone in Costa Rica and a *Premontane rain forest* life zone in Panama.

Comment — The species is a member of section *Cordata* and is characterized by its long slender internodes, petioles sheathed for ca. 50–95% their total length, the sheath weakly free-ending at apex, free part sharply and deeply sulcate, by its simple gradually acuminate blades with convex margins and short spreading, moderately acute posterior lobes, the anterior lobe

Figure 195: *Syngonium rayi*. Adaxial leaf blade, cult. at Missouri Botanical Garden, *Croat 78434*

Figure 196: *Syngonium rayi*. Juvenile potted plant, Cultivated at KBCC, Taiwan

broadest in middle and often inequilateral, a narrow sinus, 5 or 6 pairs of basal veins, (3)4–11 primary lateral veins per side as well as 1–4 inflorescences per axil with the spathe tube oblong-elliptic and green outside, dark purple-violet inside, the spadix with the pistillate portion pale green and the infructescence with the spathe tube red inside. *Syngonium rayi* can be confused with *S. oduberi* from the Osa Peninsula but that species differs by having only small, narrowly rounded posterior lobes which are not at all directed outward.

Grayum (1997) reports that the species is rare in the wild and that at the type locality in the La Selva Biological Station fruiting specimens were never observed despite the presence of many juvenile specimens in the region.

Additional specimens seen — **COSTA RICA**. Cultivated at Selby Display House, 15 May 1991, *John T. Atwood & Uguccioni s.n.* (MO, SEL); Received from Selby, Costa Rica: La Silva, September 1996, *Thomas B. Croat 78434* (K, MO, US); **Alajuela:** Reserva Forestal de San Ramón, ca. 10 km west of Lagitos, along Río San Lorencito. [Original Label Coordinates 10°18'N, 84°34›W], 10°18'00»N, 84°33'36»W, 850–1100 m, 30 May–June 1986, *Barry E. Hammel et al. 15263* (MO); **Guanacaste:** Parque Nacional Rincón de la Vieja, the SE slopes of Volcán Santa María, above Estación Hacienda Santa María, 10°47'N, 85°18'W, 900–1200 m, 27–28 January 1983, *Gerrit Davidse, et al. 23405* (MO); La Cruz, along divide between upper Río Mena and basin of Río Colón (Las Haciendas), NE of Cerro Orosilito, Cordillera de Guanacaste, 10°58'N, 085°27'W, 1140–1200 m, 8 April 2008, *Michael H. Grayum 13025* (MO); Liberia,W (Pacific) slope of Cerro Cacao, ridges and creeks in headwaters of Quebrada Florcita, 10°57'N, 85°28›W, 1150–1300 m, 13 August 2007, *Michael H. Grayum & Daniel*

Figure 197: *Syngonium rayi*. Inflorescences on cultivated plant, Missouri Botanical Garden, *Croat 78434*

Figure 198: *Syngonium rayi*. Closeup of inflorescence. Cultivated at KBCC, Taiwan.

Figure 199: *Syngonium rayi*. Inflorescence with open spathe, *Croat 78434.* Photo, E. Colleti

Figure 200: *Syngonium rayi. Grayum 13025*, Costa Rica

Figure 201: *Syngonium rayi.* Type, *Luther s.n.*, Costa Rica

García 12695 (INB, MO); **Heredia:** Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 10°25›12»N, 084°00›36»W, 100 m, 24 May 1982, *Barry E. Hammel 12462* (DUKE); Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 10°25›53»N, 84°00'13"W, 100 m, 31 May 1981, *Barry E. Hammel & Jill Trainer 10779* (DUKE); La Selva Reserve, collected along trails in dense forest, 10°25'12"N, 84°01'12"W, 100 m, 4 August 1984, *David Lee s.n.* (MO); 10°25›53»N, 084°00›13»W, 100 m, 30 May 1990, *Harry E. Luther s.n.* (MO); Cerro Las Nubes, Macizo Mixavalles, creciendo en el interior del bosque sobre un arbusto de 2 m, 10°44'24»N, 85°07›48»W, 1500 m, 9 April 1982, *Isidro A. Chacón G. 85* (CR); OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 10°25›53»N, 084°00›13»W, 100 m, 7 July 1980, *Michael H. Grayum 2959* (DUKE); 15 June 1980, *Michael H. Grayum 2895* (DUKE); 10°25›53»N, 84°00'13"W, 100 m, 18 August 1979, *Michael H. Grayum 2435* (DUKE); 11 August 1979, *2281* (DUKE); **Limón:** Refugio Barra del Colorado, forests and pastures between Río Chirripocito and Río Sardina ("Sardinal" on Chirripó Atlántico quadrangle), 10°37'48»N, 083°45'00"W, 12 m, 19 April 1990, *Michael H. Grayum 9747* (MO); Pococí, Parque Nacional Tortuguero, Northern terminus of Lomas de Sierpe, S from Río Tortuguero, 10°28›48»N, 83°31'12»W, 8– 25 m, 22 January1997, *Michael H. Grayum, Barry E. Hammel & Jan Schipper 11164* (INB, MO); **San José:** Tarrazu, Nápoles, Ladera Oeste de Cerro Pito, 09°36'30»N, 84°03›58»W, 1500 m, 1 December 1995, *Gerardo Herrera Ch, Alfredo Cascante & Joaquín Sánchez González 8805* (CR); Z.P. Cerro Nara; Faja Costeña del Valle de Parrita, 09°28'48»N, 84°00›36»W, 400–500 m, 19 July 1995, *J. F. Morales & José Á. González R. 4564* (CR, MO). **PANAMA. Panam**á: Cerro Jefe, NE of Panama City, 09°15'N, 079°30'W, 850–900 m, 12 July 1986, *Gordon McPherson 9740* (MO); **San Blas:** Cerro Obu, 09°23›N, 78°48'W, 400–500 m, 25 June 1986, *Greg C. de Nevers, Heraclio Herrera & Ernesto Gernado 8040* (MO).

Syngonium sagittatum G.S.Bunting, Gentes Herb. 9: 372. 1965. — Type: MEXICO. Oaxaca: Sierra de Juarez, at Vista Hermosa, 17.9 mi from bridge at Valle Nacional on road to Oaxaca, *H.E. Moore Jr. & G.S. Bunting 8920* (holotype, BH; isotypes, MEXU, US 2 sheets, US barcodes 00088052, 00088053).

Nomadic vine; juvenile plants with stems ca. 1 cm diam., drying weakly verrucose with many slender longitudinal ridges; petioles broadly sheathed ca. 2/3 of their length; blades triangular-elliptic, 19–23 cm long, 7–9 cm wide, anterior lobe acuminate at apex, weakly constricted at base, posterior lobes narrowly triangular, rounded at apex. Adult plants with stems to ca. 2 m long, short-creeping, closely appressed to trees; internodes green, 3.0–5.5 cm long, longer toward base of stem, 2.5–4.0 cm wide. LEAVES with **petiole** 37–43 cm long, sheathed 2/3 to 3/4 its length, subterete, weakly flattened laterally above sheath, sheath open, thin along its margin; **blades** simple, subcoriaceous, ovate and conspicuously sagittate at base, acuminate at apex, 30–50 cm long, 23–31 cm wide; upper surface semiglossy, light green, sub-bullate; lower surface slightly paler, semiglossy, margins revolute; posterior lobes directed somewhat upward at an angle to midrib, usually unequal, rhomboid-triangular, obtusely angular at apex, 12–18 cm long, usually longer than wide, frequently overlapping; sinus spatulate to rhombic or obovate (clavate to hippocrepiform when pressed flat); **primary lateral veins** 9–11 per side, prominently sunken; some interprimary veins prominently sunken; collective veins weakly sunken above, prominently to weakly raised beneath; basal veins 3–7 pairs, coalescing 1.5–7.0

cm from petiole; basal rib naked 1–5 cm. INFLORESCENCES 2 or 3 per axil, erect; **peduncle** ca. 15 cm long; **spathe** thick and fleshy, 15–26 cm long; spathe tube ellipsoid, 8–11 cm long, 4.5–5.0 cm diam., greenish outside, tinged with violet-purple inside, constriction usually at a point about midway on staminate portion of spadix; spathe blade 14 cm long, long-acuminate and convolute at apex, greenish white; **spadix** 12.5–17.0 cm long; pistillate portion of spadix 2–4 cm long, 1.5–2.2 cm diam., slightly narrower at apex, pale green, synandrium irregularly 4–6–sided, smooth to bumpy at apex, densely and minutely papillate, 6 mm long, 2–3 mm diam.; staminate portion of spadix 10.5–13 cm long, 2.0–2.5 cm diam., broadest at about middle. INFRUCTESCENCES green, pendent, weakly flattened, ca. 7 cm diam. in broadest view. Collected in flower in February and September and in mature fruit in February. **Figures 202–208**.

Distribution — *Syngonium sagittatum* is known for certain only from the Sierra de Juárez in eastern Oaxaca at elevations of 1200–1400 m. The area appears to be in a *Tropical wet forest* life zone.

Comments — The species is a member of section *Cordata* and is characterized by its moderately short internodes, petiole sheathed 2/3 to 3/4 its length and subterete above the sheath, the simple, subcoriaceous, ovate and conspicuously sagittate, acuminate blades with the upper surface semiglossy, light green and sub-bullate, by the rhomboid-triangular posterior lobes directed somewhat upward at an angle to midrib, the clavate to hippocrepiform sinus when pressed flat, the primary lateral veins 9–11 per side, basal veins 3–7 pairs with the posterior rib 1.5–7.0 cm long and naked 1–5 cm as well as by 2 or 3 inflorescences per axil, moderately long-pedunculate spathes with tube ellipsoid, greenish outside, tinged with violet-purple inside.

The species is apparently most closely related to *Syngonium crassifolium* (Engl.) Croat of Colombia and Ecuador and has nearly identical leaves. It differs from that species in having a long-acuminate spathe. *Syngonium crassifolium* has a spathe which is acute or merely short-acuminate at the apex. Despite their similarities, it is doubtful that these two species are the same because of their very disjunct ranges and the fact that no other closely related plants have ever been collected between Mexico and Colombia-Ecuador.

Syngonium sagittatum is also related to *S. schottianum* and *S. hastiferum*, but of these two species, it is most similar to the former, with which it shares a similar leaf shape and inflorescence. It differs from *Syngonium schottianum* principally in having a thinner blade which dries green rather than typically whitish as in *S. schottianum*. The species is probably the same as *Syngonium xanthosomaphyllum*, which was proposed as a new species (but never published) by Birdsey (1955). However, the collection (*Birdsey 300*) from near Jalapa, Veracruz, has never been located. *Syngonium sagittatum* would certainly be expected to occur there.

Additional specimens seen — MEXICO. **Oaxaca:** Mpio. Santiago Comaltepec, alrededores de la carretera federal Tuxtepec-Oaxaca, 2.8 km en línea recta al SO de La Esperanza, 17°36'32»N, 096°24›14»W, 1580 m, 9 January 1995, *Guillermo Ibarra Manríquez, A. Rincón G, Claudia Gallardo Hern*ández*, Jorge A. Meave, Trudy Kavanagh & C. López H. 3903* (MO); Mpio. Santa Maria Chimalapa, 8–10 km from Santa Maria, N of Río Verde and S of Arroyo Hamaca, 17°00'00"N, 94°40'48"W, 350 m, 11 June 1985, *Heriberto Hernández G. 1215* (CHAPA, MO); Along Hwy 175 between Tuxtepec and Oaxaca, 29–32 km above (S of) bridge over Río

Figure 202: *Syngonium sagittatum*. Habit of flowering plant, Mexico, *Croat 48080*

Figure 203: *Syngonium sagittatum*. Inflorescence with tube cut open, Mexico, *Croat 48080*

Figure 204: *Syngonium sagittatum. Hernandez 1215*, Mexico

Figure 205: *Syngonium sagittatum. Croat 48080*, Mexico

Figure 206: *Syngonium sagittatum. Croat 48080*, Mexico

Figure 207: *Syngonium sagittatum. Croat 48080*, Mexico

Figure 208: *Syngonium sagittatum. Croat 48080*, Mexico

San Juan Bautista at Valle Nacional, 17°38'02»N, 96°20'33»W–17°37'44»N, 096°21›37»W, 1420–1600 m, 3 March 2008, *Thomas B. Croat & Pedro Díaz Jiménez 100226* (MO); Mun. San Jose Tenango, Zona boscosa al SW de San Martín Caballero, accesible por veredas que parten de San Martín, 18°05'51"N, 96°38'29"W, 1600 m, 19 January 2002, *Xochitl Munn-Estrada, A. García, D. García & F. Mendoza 1750* (MO); Ixtlan. Municipio de Comaltepec, Cerro Redondo, above town of La Esperanza (on the Oaxaca-Tuxtepec road, Highway 175), Caribbean slope, (Treeplot 1750-1), 17°37'12»N, 096°21›36»W, 1750 m, 27 October 1991, *Brad Boyle & Alice Boyle 622* (MO); Juchitán, Municipo Santa Maria Chimalapa, San Antonio Nuevo Paraisos a 500 m en linea recta a W,por al camino al Pial de la Ceiba en el panteón, 17°09'13"N, 94°21'12"W, 350 m, 25 August 1999, *Jaime Rivera H, E. Martínez & C. Perret 1317* (MEXU); Tuxtepec Mun, San Juan Bautista Valle Nacional, along Highway 175 through Sierra de Juárez between Tuxtepec and Oaxaca, 18.4 mi S of bridge at Valle Nacional at ca. km 140, 17°37'48»N, 96°20›24»W, 1500 m, 19 February 1979, *Thomas B. Croat 48080* (MO); 1.49 miles S of bridge at Valle Nacional, 17°39'36»N, 096°19›48»W, 1400 m, 19 Feb/ 1979, *Thomas B. Croat 48004* (MO); **Veracruz:** Banderilla, Planta del Mpio, Proyecto Flora de Veracruz, La Martinica, 19°35›N, 95°56'W, 1520 m, 11 March 2008, *Thorsten Kr*ömer *et al. 3179* (M)); Huatusco, C. Cercano al Río Seco, Carretera Huatusco-Coscomatepec, 19°07›48»N, 96°58'48"W, 1300 m, 7 February 1979, *Sergio Avendaño R. 563* (F); Jalapa. ca. 0.5 km W of San Antonio Hidalgo (4–5 km W of Jalapa), 19°32'24»N, 97°00›36»W, 1300 m, 14 June 1953, *Monroe R. Birdsey 300* (MO, UC); Jesús Carranza, Lomas al S de Poblado 2 (3 Km al S del entronque de la terracería La Laguna-Sarabia con el camino que va al N al Pob. 2), 250 m, 6 July 1987, *Thomas L. Wendt 5806* (CHAPA); San Andrés Tuxtla, Estacion Biologia Tropical Los Tuxtlas, 18°34'48»N, 95°03›36»W, 150 m, 8 June 1981, *David H. Lorence 3460* (MEXU); 200 m, 14 July 1983, *Guillermo Ibarra Manríquez 726* (MEXU); Zongolica, Reserva Ecológica, La Quinta, Amatitla, 18°38'57»N, 096°59›49»W, 1330 m, 27 April 2008, *Thorsten Krömer, H. Flores-Méndez & J. Viccon-Esquivel 3264 (MO).*

Syngonium salvadorense Schott, Oesterr. Bot. Z. 8: 178. 1858. Type: EL SALVADOR. Santa Ana, 9 February 1857, *H. Wendland 408* (holotype, GOET).

Syngonium donnell-smithii Engl, Bot. Jahrb. Syst. 37: 141. 1905. — Type: GUATEMALA. Escuintla: Escuintla, 1100 ft., 1 March 1892, *J. Donnell Smith 2782* (lectotype, B; isolectotype, GH, M, MO, P, designated by Croat, 1982).

Nomadic vine; juvenile plants with stems glaucous; internodes 5–20 cm long, less than 1 cm thick; petioles 12–25 cm long, glaucous, sheathed beyond the middle (sometimes more than 4/5 their length); blades usually hastate, sometimes sagittate, 9–19 cm long, 5.5–11.0 cm wide, anterior lobe equilateral or inequilateral, often constricted at base, posterior lobes inequilateral, usually longer than broad; intermediate blades becoming larger, more conspicuously hastate-lobed, mostly 20–30 cm long, lobes ovate to broadly ovate, directed markedly outward, eventually becoming pinched off. Adult plants with stems glaucous, frequently scandent; internodes 3–14 cm long, 1–2 cm diam., olive-green when young, the periderm tan, thin and cracking. LEAVES with **petioles** slightly paler than stems, 18–42 cm long, sheathed 1/2–4/5 their length, obtusely ribbed above sheath, sheath free-ending and acute at apex; **blades** trisect to sub-5-sect, lobes usually confluent to almost free, median lobe broadly ovate to ovate-elliptic, 14–28 cm long, 8–18 cm wide, acuminate at apex, rounded at base, lateral lobes ovate,

unequal, usually not auriculate, sometimes with hastate auricles, rarely auricles nearly pinching off to form a nearly 5-lobed blade; primary lateral veins 2–5 per side, mostly arising in lower half of blade, slightly sunken on upper surface, raised beneath; tertiary veins clearly visible on the lower surface. INFLORESCENCES 1 or 2 per axil; **peduncle** 9–18 cm long and more or less erect in flower, 9–25 cm long and pendent in fruit; **spathe** tube ellipsoid, 4–5 cm long, 3-4 cm diam., green outside, the inside reddish at the base, greenish near apex; spathe blade broadly ovate, 7–10 cm long, 4–5 cm wide, greenish outside, inside white, abruptly cuspidate at apex; pistillate portion of the **spadix** 1.5–2.5 cm long, 1.0–1.5 cm diam., greenish, flowers with stigmas bilabiate; staminate portion of spadix white, clavate, 5–7 cm long, 1.0–1.5 cm diam., synandrium irregularly 6-sided, flat at apex with no sign of fusion, margins weakly scalloped. lNFRUCTESCENCES red-orange to red, often massive, 9–12 cm long, 6–8 cm diam.; **syncarp** brown, to 8 cm long and 5 cm diam.; mesocarp sweet, fleshy, white; seeds black, ovoid-ellipsoid, 8–12 mm long, 4–6 mm diam. Flowering inflorescences have been found in February and August. Fruits mature mostly in July and August. **Figures 209–223.**

Distribution — *Syngonium salvadorense* ranges from southwestern Mexico (Chiapas) along the western coast of Guatemala to El Salvador, Honduras, and Costa Rica with a single collection from Costa Rica in the Cordillera de Guanacaste (*R. Villalobos 56*). It occurs principally in *Tropical moist forest* life zones from sea level to 700 m. The species is a conspicuous plant in disturbed areas and often grows in great profusion, to the exclusion of most other epiphytic plant species, on the shade trees in coffee plantations in Guatemala.

Comments — *Syngonium salvadorense* is a member of sect. *Syngonium* characterized by its glaucous stems, elongate internodes with tan, thin and cracking periderm, petioles sheathed 1/2–4/5 their length, sheath free-ending and acute at apex, trisect to sub-5-sect blades with the lobes usually confluent to almost free, the lateral lobes usually not auriculate, 1 or 2 inflorescences per axil, the spathe tube reddish at the base, greenish near apex and red-orange to red, often massive infructescences.

The species is not confused with any other but resembles *Syngonium neglectum* in having large and often solitary inflorescences.

Note that the holotype of this species, once believed to have been lost has been found and is now housed at the herbarium at the University of Göttingen, Germany.

A presumably related plant was seen at the Patricia Koons Botanical Garden in Taiwan (KBCC) which perhaps was collected in El Salvador at is seemingly related to *S. salvadorense* but differs in substantial ways (see Figs. 220-223). This species needs to be confirmed as to origin and studies further before any judgement can be made.

Additional specimens seen — COSTA RICA. **Guanacaste:** Liberia. P.N., Guanacaste, cord. de Guanacaste, Estación Cacao, Cerro Cacao, 10°55'12"N, 85°27'36"W, 1100 m, 8 February 1995, *Ronald Villalobos 56* (MO). **EL SALVADOR**. **Ahuachapán:** San Francisco Menéndez, Montaña Sexta, El Corozo, 13°49›N, 89°56'W, 2 March1994, *D. Martí*nez *s.n.* (MO); A.P. Santa Rita, ruta 2, 13°48'N, 90°04›W, 20 m, 13 April 2004, *J. M. Rosales 2354* (MO); San Francisco Menéndez, al pie de la quebrada Acosta, 13°49›N, 089°56›W, 450 m,

Figure 209: *Syngonium salvadorense*. Adult plant on ground with infructescences, *Croat 32785*

Figure 210: *Syngonium salvadorense.* Stem with leaves and young inflorescences, *Croat 43867*, Mexico

Figure 211: *Syngonium salvadorense*. Leaves and Infructescence, *Croat 32789*, Mexico

13 December1995, *Max Sandoval & Eliberto A. Sandoval 267* (MO); Along road from San Francisco Menéndez to Tacuba, 0–2 miles NE of San Francisco Menéndez, 13°50'35»N, 90°00›57»W, 200–450 m, 28 July 1977, *Thomas B. Croat 42074* (MO); Ahuachapán, *J. M. Rosales 2354* (LAGU); **Cabañas:** 2.6 Km east of Illobasco, coffee plantation owned by Malcolm Chisholm, 13°52'04"N, 88°51'04"W, 870 m, 21 January 1998, *Gerrit Davidse, Karen J. Sidwell & Alex K. Monro 37127* (MEXU, MO); **La Libertad:** Antiguo Cuscatlán, Jardín Botánico La Laguna, Laderas de la laguna, 13°40›N, 89°15'W, 830 m, 24 October 1989, *Raul Villacorta & J. E. Vicente 490* (MO); Parque del Jardín Botanico La Laguna, 13°40›N, 089°15›W, 805 m, 15 June 1989, *Raul Villacorta & S. Martínez 287* (MO); **San Vicente:** Las Galeras, western edge of the floodplain of the Río Lempa, along the side of the Panamerican Highway, between San Vicente and San Miguel, 13°36'09»N, 88°38›40»W, 30 m, 9 February 1998, *Gerrit Davidse, Alex K. Monro, Karen J. Sidwell & Raul Villacorta 37489* (MO); Ca. 50 miles NW of San Miguel, along highway CA-1. [Originally reported from Depto. San Miguel], 13°41'N, 88°51›W, 23 February 1976, *Thomas B. Croat 32789* (MO); **Santa Ana:** *H. Wendland s.n.* (MO); **Sonsonate:** Santa Isabel Ishuatán, El Ecuador, calleque conduce a Acachapa, 13°41›N, 089°33›W, 430 m, 17 June2006, *Dagoberto Rodríguez 233* (B, LAGU, MO); *Dagoberto Rodríguez & H. Trejo DR-00233* (B, LAGU, MO); Mun. San Julián, Ctón. Los Lagartos, A.N.P. Complejo Los Farallones, Sector Los Lagartos, La Conacastera, 13°42'58»N, 089°35›38»W, 595 m, 17 May 2012, *P. Galán & B.J. Peña 1451* (B, LAGU, MO). **GUATEMALA. Escuintla:** Southeast of Escuintla near road to San José, 338 m, 1 July 1953, *Monroe R. Birdsey 311* (MO); Forest remnants along stream at Univ. of San Carlos field station, 14°20'40»N, 90°44›13»W, 600 m, 14 May 1990, *Juan José Castillo Mont & Donald R. Hodel 1084* (MO), 6 miles north of Escuintla on road to Alotenango. Roadside near small river, 14°23'05"N, 90°49'49"W, 650 m, 27 July1977, *Thomas B. Croat*

Figure 212: *Syngonium salvadorense*. Habit of adult cultivated plant; CECOM Bot. Garden, Guatemala

Figure 213: *Syngonium salvadorense*. Adaxial surface of young adult leaf, CECOM Bot. Garden, Guatemala

Figure 214: *Syngonium salvadorense*. Juvenile plant, CECOM Bot. Garden, Guatemala

Figure 215: *Syngonium salvadorense. Croat 43827*, Mexico

Figure 216: *Syngonium salvadorense. Breedlove 30921*, Mexico

Figure 217: *Syngonium salvadorense. Birdsey 311*, Guatemala

Figure 218: *Syngonium salvadorense*. *Croat 42074*, El Salvador

Figure 219: *Syngonium salvadorense*. Juvenile plant, *Croat 32762*, Mexico

Figure 220: *Syngonium cf. salvadorense*. Adaxial leaf surface, cultivated at Patricia Koons Botanical Garden in Taiwan

Figure 221: *Syngonium cf. salvadorense*. Cultivated plant, Patricia Koons Botanical Garden in Taiwan

Figure 222: *Syngonium cf. salvadorense*. Abaxial surface, Cultivated Patricia Koons Botanical Garden in Taiwan

42045 (MO); 2 km E of Santa Lucía. Swampy wooded depression along road, 14°20'06"N,, 091°00'16"W, 30 July1970, *William E. Harmon & John D. Dwyer 3371* (MO); Escuintla, 14°18'01»N, 90°47›14»W, 1100 ft, March 1890, *John Donnell Smith 2243* (MO); Escuintla, 14°18'01»N, 90°47›14»W, 1100 ft, 1892, *John Donnell Smith 2782* (MO); Palin, El Chilar (Finca), Caserio Agua Blanca, 15°08›09»N, 090°14›38»W, 1740 m, 27 February 2007, *Rafael* Ávila & A. *Quilo 3890* (MO, USCG); **Jutiapa:** 4 km south of San Jerónimo. Mesic shut-in between limestone ridges along Río Ostua, 14°13'45»N, 089°42›03»W, 22 July 1970, *William E. Harmon & John D. Dwyer 3325A* (MO); **Quetzaltenango:** Along Highway CA-2, 4 mi. NW of turnoff to Coloba, 14°41'56»N, 91°52›41»W, 400 m, 22 February 1976, *Thomas B. Croat 32768* (MO); Hwy. CA-2 between Coatepeque and turnoff to Colomba, 1.9 mi W of turnoff. Coffee plantantion, 14°41'44»N, 091°49›54»W, 580 m, 22 January1987, *Thomas B. Croat & Dylan P. Hannon 63395* (MO); **San Marcos:** Catarina. Near Catarina, 8 miles N, of the Interamerican Highway. Disturbed roadside, 14°50'36»N, 92°04›54»W, 300 m, 11 July1977, *Thomas B. Croat 40768* (MO); **Suchitepéquez:** Along route CA-2, 5 miles east of Mazatenango, 14°32'34»N,, 091°25›23»W, 22 Feb 1976, *Thomas B. Croat 32785* (MO); 1 mi E of Mazatenango, 14°32'13»N, 91°28›22»W, 300–500 m, 20 August1977, *Thomas B. Croat 43758* (MO). **HONDURAS:** (possibly cultivated), "Platanitos" climbing on Opuntia guatemaensis growing in my garden at EAP El Zamorano, alt. 800 m, Oct. 15, 1983, *A. Molina 33722* (MO). **MEXICO. Chiapas:** Acacoyagua. Ejida Las Golondrinas, lower slopes of Cerro Ovando, along road between Golandrinas and Los Cacaos, 15°27'N, 092°37'W, 800–900 m, 22 August 1996, *Thomas B. Croat 78533* (CM, F, MO, N,Y); Escuintla. About 8.5 miles N,E of Escuintla on gravel road to El Triunfo, 15°20'52"N, 92°34'05"W, 250 m, 21 August1977, *Thomas B. Croat 43827* (MO); About 12 miles N,E of Escuintla, ca. 2 miles N,E

Figure 223: *Syngonium cf. salvadorense*. Leaves, Cultivated Patricia Koons Botanical Garden in Taiwan

of El Triunfo, on gravel road to Permuta, 15°21'36"N, 092°31'48"W, 300 m, 21 August 1977, *Thomas B. Croat 43867* (MO); 5 km N, of Escuintla, along road between Ovando Turquia and Finca California, at the eastern base of Monte Ovando, 15°21'49"N, 092°37'27"W, 200 m, 13 Feb 1979, *Thomas B. Croat 47533* (MO), Huixtla, Cafetal along small streams 6–8 km N,E of Huixtla along road to Motozintla, 15°10'12»N, 92°25›12»W, 200 m, 27 December 1972, *Dennis E. Breedlove & Robert F. Thorne 30921* (MO); Along road from Huixtla to Motozintla de Mendoza, 4.8 km N, of Huixtla, 15°10'16»N, 92°25›17»W, 200 m, 13 Feb 1979, *Thomas B. Croat 47524* (MO); Pijijiapan,z Rancho Rafael Lamda, Cerro El Soldado, Polígono Zona de Amortiguamiento II, 15°48'46»N, 93°08›46»W, 436 m, 21 May 2005, *Marcos D. Reynoso S. 116* (MO); Ejido El Rosario, 26 km al N, del puente, margaritas que esta sobre la carret, Polígono Zona de amortiguamiento, 15°48'50»N, 93°01'50"W, 750 m, 20 April 2006, *Hayely Martínez Meléndez 1531* (MO); Tapachula. 2 miles SW of Guatemalan border along Highway 200 to Tapachula, 14°55'49"N, 092°09'39"W, 300 m, 20 August 1977, *Thomas B. Croat 43768* (MO); Along route #200 between Huixtla and Tapachula, ca. 12 km from Tapachula, 14°55'12"N, 92°21'00"W, 30 m, 20 February 1976, *Thomas B. Croat 32762* (MO); **Oaxaca:** Mpio. Santa Maria Chimalapa: Arroyo Chirimoyal, afluente del Rio Portamonedas a ca. 5 km en línea recta al NNE de Benito Juarez, ca. 43 km en linea recta al N de San Pedro Tapanatepec, 16°45›00»N, 94°07›48»W, 800 m, 28 May 1985, *Salomón Maya J. 1693* (MO.

Syngonium schottianum Wendl. ex Schott, Prodr. Syst. Aroid. 199. 1860. — *Porphyrospatha schottiana* (Wendl. ex Schott) Engl. in A.DC. & C.DC., Monogr. Phan. 2: 290. 1879. — Type: Cult.Vienna [from a plant introduced by H. Wendland from Costa Rica; no original specimen found]. — Schott drawing no. 3237 (W, inventory no. NHMW-AFW-Schott Icones 3237, neotype, designated here). — Schott drawings 3234, 3235 & 3236 (W, inventory nos NHMW-AFW-Schott Icones 3234, NHMW-AFW-Schott Icones 3235, NHMW-AFW-Schott Icones 3236, epitype, designated here).

Nomadic vine, to 6–10 m; juvenile plants with scandent stems; internodes 10–20 cm or more, to ca. 1 cm diam., petioles sheathed beyond middle, often to near apex; blades ovate, becoming ovate-elliptic, with small lobes at base, lobes rounded or angulate; venation conspicuous, primary lateral veins sunken above, tertiary veins clearly visible beneath. Adult plants appressed-climbing; stems to ca. 1 m long, ca. 4 cm wide; internodes very short. LEAVES with **petioles** 47–117 cm long, prominently sheathed 70–90% of their length, mostly to the distal 5–13 cm, subterete above sheath, weakly flattened near blade attachment; sheath firm, to 3 cm high near base, tapering to 1 cm at apex, with one margin shorter, apex free, round, boat-shaped; **blades** simple, mostly prominently lobed at base, 40–100 cm long, 19–48 cm wide, matte on both surfaces, medium green above, much paler and whitish beneath; posterior lobes directed slightly upwards and sometimes closing sinus, sometimes slightly unequal; sinus 6–14 cm deep, usually narrow, sometimes as broad as deep; basal portions of major lateral veins sunken, collective veins weakly visible, all other veins obscure on upper surface; lower surface with basal portions of major lateral veins raised, arcuate-ascending and loop-connected with major laterals forming weak collecting veins, innermost arising from middle or lower 1/3 of blade, successive collective veins closely paralleling first but becoming closer and more obscure toward margin, spaced at intervals of 0.5–3.0 mm, each arising from lower primary lateral veins and basal veins; **primary lateral veins** 9–17 per side; basal veins 2–4, coalescing up to 1–4 cm

from petiole, basal rib naked 1–6 cm. INFLORESCENCES 4 per axil, each subtended by a prophyll ca. 25 cm long, 4 cm wide, conspicuously 2–ribbed on outside surface, ribs thin, ca. 4 mm high; **peduncle** 15–25 cm long, obtusely 3-sided; **spathe** tube green or green tinged with purple mostly in longitudinal streaks, pale violet-purple inside, ca. 9–10 cm long at anthesis (to 17 cm long and 7.5 cm diam. in fruit); spathe blade whitish, ca. 10 cm long, constricted at base and articulating along an elevated ring which forms 4–5 cm above apex of pistillate part of spadix; **spadix** 10–20 cm long; staminate portion of spadix 19 cm long, 3 cm diam., white; pistillate portion of spadix pale orange, 3.5 cm long on open side, to 2.5 cm long on back side, stigmas bright yellow, irregularly rounded, 3.5 mm diam., ca. 1 mm high, with an irregular, often slit-like depression in center. INFRUCTESCENCES usually green, heavily tinged with purple, 14–16 cm long, 5–6 cm wide; **syncarp** 7.5–10.0 cm long on open side, 6–7 cm long on back side, 3.0–5.5 cm diam., surface pale brown; stigmas raised, ca. 2.8 mm wide, central core ca. 1 cm diam.; berries white; seeds irregularly oblong, white, ca. 7 mm long. Flowering inflorescences have been found from January through August. Mature fruits are known from August-September (March). **Figures 224–231.**

Distribution — *Syngonium schottianum* ranges from Honduras to Panama but is also likely to range into Colombia. The species has been collected in Costa Rica only on the Atlantic slope in Alajuela, Cartago, Guanacaste, Heredia, and Limón Provinces. It is restricted to the Atlantic slope except at middle elevations along the Continental Divide in central Panama. It ranges from near sea level to about 900 m in wetter parts of *Tropical moist forest, Premontane wet forest, and Tropical wet forest* life zones.

Comments — The species is a member of sect. *Cordata* and is characterized by its very short internodes, long petioles prominently sheathed most of their length with the free part subterete and the sheath free-ending, round and boat-shaped, the blades prominently lobed at base, matte on both surfaces, medium green above, much paler and whitish beneath, with the sinus usually narrow, the basal veins 4 or 5 per side, the posterior rib naked 1–6 cm as well as by having up to 4 moderately long-pedunculate inflorescences per axil, the spathe tube green or green tinged with purple mostly in longitudinal streaks outside and pale violet-purple inside and a pale orange pistillate spadix and white berries.

The species is closest to *Syngonium crassifolium* from Colombia and Ecuador, but it differs from that species by its pale lower blade surface and its generally larger inflorescences. *Syngonium sagittatum* is also similar to *S. schottianum* but that Mexican species differs principally in having a thinner blade which dries green rather than typically whitish as in *S. schottianum*.

Additional specimens seen —**COSTA RICA**. 1889, *H.G.A. Engler 167* (P); Los Angeles de Siquirres: 3 km W and 1.9 km S from Guayacan, highway to Limón; 1000 m, 6 May 1983, *Ronald L. Liesner & Emmet J. Judziewicz 20530* (MO); **Alajuela:** Along road from Cañas to Upala, 13.8 km north of Bijagua. Primary forest and roadside, 10°49'12"N 085°01'48"W, 100–150 m, 26 June1976, *Thomas B. Croat 36445* (MO); Along road between Cañas and Upala, 4 km NNE of Bijagua on slopes leading into Río Zapote; 10°44'24»N 85°04›12»W, 400 m, 24 June 1976, *Thomas B. Croat 36261* (MO); Along Highway 15 between Naranjo and Aguas Zarcas, 8 km NE of Quesada, 10°22'48»N 84°23›24»W, 600 m, 3 Feb 1979, *Thomas B. Croat 46950* (MO); Reserva Biológica Monteverde Río Peñas Blancas; 10°20›N 84°43'W, 900

Figure 224: *Syngonium schottianum*. Habit of fruiting plant, *Ortiz 1691*, Panama

m, 8 February 1987, *William A. Haber & Erick Bello C. 6957* (MO); San Carlos. 22 km northeast of Quesada by air, 4 km west of Muelle San Carlos; 10°27'36»N 84°30'00"W, 09 April 1983, *Ronald L. Liesner 14125* (MO); San Ramón. Along road from San Ramón northward through Balsa, ca. 13.8 km north of bridge over Quebrada Volio and ca. 4.6 km north of bridge over (apparently) Río Balsa, at small stream (?Río San Luis); 10°12›00»N 84°30'36"W, 900–1000 m, 29 August 1979, *W. D. Stevens 13753* (MO); **Cartago:** Turrialba. Along Highway 32 from Turrialba to Limón, ca. 9 miles northeast of Turrialba, along ravine and stream, 09°55'12"N 83°36'00"W, 800 m, 13 August1977, *Thomas B. Croat 43367* (MO); **Guanacaste:** Estación Pitilla Area de Conservación; 11°02'00»N 85°24›30»W, 700 m, 16 September 1990, *Petrona Ríos Castro & Curso II de Parataxónomos 49* (MO); **Heredia:** La Selva Biological Station; 10°25›53»N 084°00›13»W, 100 m, 15 February 1982, *Barry E. Hammel 11150* (DUKE); La Selva Biological Station; 10°25›53»N 84°00'13"W, 100 m, 27 February 1981, *James P. Folsom 9146* (DUKE); La Selva Biological Station; 10°25›53»N 84°00'13"W, 100 m, 4 March 1981, *James P. Folsom 9201* (DUKE); Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí; 10°25›53»N 84°00'13"W, 100 m, 12 August 1979, *Michael H. Grayum 2323* (MO); Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí; 10°25›53»N 84°00'13"W, 100 m, 8 May 1980, *Michael H. Grayum 2802* (DUKE); Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí; 10°25›53»N 84°00'13"W, 100 m, 25 June 1980, *Michael H. Grayum 2911* (DUKE); Estación Biológica La Selva At confluence of Río Sarapiquí and Río Puerto Viejo, Atlantic slope; 10°25›48»N 84°00'36"W,

Figure 225: *Syngonium schottianum*. Infructescence, *Ortiz 1691*, Panama

Figure 226: *Syngonium schottianum*. Leaves with inflorescences, Panama. SL-265. Photo, H. Hentrich

Figure 227: *Syngonium schottianum*. Closeup of leaves, infructescences, Panama

50 m, 1 May 1987, *Michael H. Grayum & María Marta Chavarría 8286* (MO); **Limón:** Hills 2 airline km SSE of Islas Buena Vista in the Río Colorado, 14 airline km SW of Barra del Colorado; 10°40'N 83°40'W, 10–120 m, 13 September 1986–14 September 1986, *Gerrit Davidse & Gerardo Herrera Ch. 31100* (MO); Río Segundo, Asunción [Fila Asunción], 09°55›07»N 83°10'55"W, 500–600 m, 27 Mar 1985, *Luis Diego Gómez P. & Gerardo Herrera Ch. 23476* (MO); Cerro Tortuguero Ladera Noroeste, pendientes pronunciadas 4 Km al Norte de Tortuguero, rumbo a la Barra del Colorado. Suelos bien drenados y pedregosos; 10°34›48»N 83°31'48"W, 6 m, 28 October 1988, *Rafael Robles 2130* (CR); Cerro Tortuguero Ladera Noroeste, pendientes pronunciadas 4 Km al Norte de Tortuguero, rumbo a la Barra del Colorado. Suelos bien drenados y pedregosos; 10°34'48»N 083°31›48»W, 6 m, 28 October 1988, *Rafael Robles 2130* (MO); Parque Nacional Tortuguero Lomas de Sierpe, 1.5 Km al O del puesto del P.N. en el Río Sierpe. Topografía quebrada con pendientes medianamente pronunciadas. Suelo bien drenado; 10°24›00»N 83°33'00"W, 100 m, 12 August1988, *Rafael Robles, Gerardo Herrera Ch. & Luis Flores 2022* (MO); 2 m W of Río Toro Amarillo on road heading W from Guápiles, 10°12›36»N 83°49'48"W, 275 m, 09 January1984, *Sue A. Thompson & John E. Rawlins 1195* (CM); Talmanca, Costado Este, Lago Dabagri 09°37›30»N 83°16'47"W, 1030 m, 9 November 1984, *Gómez P. 23325*(MO); Ca. 10 miles S of Punta Cahuita, ca. 3 miles S of turnoff to Bribri. Disturbed primary forest on very steep slopes above river, 09°36'00»N 82°48›36»W, 70 m, 11 August1977, *Thomas B. Croat 43196* (MO); Ca. 10 miles S of Punta Cahuita, ca. 3 miles S of turnoff to Bribri. Disturbed primary forest on very steep slopes above river, 09°36'00»N 82°48›36»W, 70 m, 11 August1977, *Thomas B. Croat 43190* (MO); Pococi, along Río Corinto near Barulio, Carrillo-Guapiles Hwy., 1 km S of turnoff to Puerto Viejo; 10°12'15"N 83°54'20"W, 250-270 m, 30 August 1996, *Thomas B. Croat 78749* (CR); Pococi, along Río Corinto near Barulio, Carrillo-Guapiles Hwy., 1 km S of

Figure 228: *Syngonium schottianum*. Old inflorescence, *Ortiz 1691*, Panama

Figure 229: *Syngonium schottianum*. *Araquistain & Moreno 2348*, Nicaragua

Figure 230: *Syngonium schottianum. Stevens 13753*, Costa Rica

Figure 231: *Syngonium schottianum. L.D.Gomez et al.23325*, Costa Rica

turnoff to Puerto Viejo; 10°12'15"N 83°54'20"W, 250-270 m, 30 August 1996, *Thomas B. Croat 78749* (MO); Cerro Coronel, E of Laguna Danto; 10°41›N 083°38›W, 20–170 m, 16 January 1986–23 January 1986, *W. D. Stevens 23727* (MO); Cerro Coronel, E of Laguna Danto; 10°41›N 83°38'W, 20–170 m, 15 September 1986–20 September 1986, *W. D. Stevens & O. M. Montiel J. 24365* (MO); **Puntarenas:** Forest along trail between Las Alturas and Cotonsito, along the Río Cotón; 08°56'30»N 82°48›00»W, 1400 m, 31 August 1983–01 September 1983, *Gerrit Davidse 24353A*. **MEXICO**. **Veracruz:** Estacion de Biologia Tropical Los Tuxtlas, 18°33'36»N 95°03›36»W–18°36'00»N 095°09›00»W, 200 m, 29 January 1984, *Guillermo Ibarra Manríquez 1225* (MEXU); **NICARAGUA**. **Atlántico Norte:** Along new road fron Siuna to Matagalpa, ca. 31.4 km beyond Río Ulí (near Waní), ca. 8.9 km beyond Rosa Grande La Balsama and near major highway construction camp; 13°36'N 85°05›W, 100–200 m, 18 March 1978, *W. D. Stevens 7516* (MO); **Atlántico Sur:** Ca. 6 km upriver from Barra de Punta Gorda, S side; low evergreen forest on river levee; 11°30'N 83°49'W, 8–10 m, 30 September 1981, *W. D. Stevens 20754* (MO); SW of Bluefields, from cemetery along road to new airstrip; 11°59'N 083°46'W–12°00›N 83°46'W, 10–40 m, 02 April 1981–03 April 1981, *W. D. Stevens 19740* (MO); **Matagalpa:** Faldas del Cerro Musún, 8 km de la Población Wanawás, área conocida como La Hacienda, Río Bilampí, en Palán Grande, 12°59›N 85°14'W–13°00›N 085°14'W, 500–800 m, 13 May 1980, *M. Araquistain & P. P. Moreno 2348* (MO); Quebrada Las Carpas, near El Limón; remnant evergreen forest; 13°15'N 85°34'W, 580 m, 11 March 1981, *W. D. Stevens & P. P. Moreno 19724* (MO); **Río San Juan:** Near Caño Chontaleño, 20 km NE of El Castillo; 11°08'N 84°12'W, 200 m, 18 April 1978–21 April 1978, *David A. Neill & Paul C. Vincelli 3617* (MO); La Lupe, ca. 25 km ENE of Boca de Sabalo; primary forest lightly logged with silvicultural treatment, clay soils, hilly, 11°08'N 84°21'W, 80–120 m, 28 June 1997, *Jan Salick & Eirik Stijfhoorn 8233* (MO); La Lupe, ca. 25 km ENE of Boca de Sabalo; primary forest lightly logged with silvicultural treatment, clay soils, hilly, 11°08'N 84°21'W, 80–120 m, 28 June 1997, *Jan Salick & Eirik Stijfhoorn 8204* (MO); La Lupe, ca. 25 km ENE of Boca de Sabalo; primary forest lightly logged with silvicultural treatment, clay soils, hilly, 11°08'N 84°21'W, 80–120 m, 28 June 1997, *Jan Salick & Eirik Stijfhoorn 8407* (MO); Reserva Indio-Maíz, Municipio de San Juan del norte, a lo largo de caño Negro ramal del río Indio y a lo largo del río Indio entre la desembocadura del caño negro y la casa de Narciso Orozco; 11°00›N 83°53'W–11°04'N 083°56'W, 5–20 m, 13 Febrero 1996, *R. M. Rueda, Alfredo Grijalva P., R. Dolmus & M. Castrillo 4132* (MO); **PANAMA**. **Bocas del Toro:** Road to Chiriquí Grande north of Fortuna Dam. [Coordinates on orginal label: 08º45'N, 82º15'W]; 08°47›06»N 82°10'54"W, 650–700 m, 29 June 1987, *Gordon McPherson 11138* (MO); Isla Colón, 1.5 km N of La Gruta. Edge of forest and within; 09°24'36"N 82°16'24"W, 100 m, 29 January1989, *Paul M. Peterson 6413* (US); Gualaca-Chiriquí Grande, 1.6 mi N of Continental Divide; 08°48›N 82°13'W, 850 m, 29 March 1993, *Thomas B. Croat 74929* (MO); Along road between Almirante and Ojo de Agua 3-6 km W of Almirante. Disturbed vegetation along road, 09°18'24"N 82°26'48"W, 30–300 m, 4 August1976, *Thomas B. Croat 38210* (MO); Station Milla 7.5 on Changuinola-Almirante Railroad, along a slender ridge to World War II communications facility, ca. 2 km NW of ruins of U.S. Army Military barracks; 09°21'54»N 82°27›12»W, 0–100 m, 03 August 1976, *Thomas B. Croat 38114* (MO); Along road between Fortuna and Chiriquí Grande, 8.5 miles N of bridge over the Fortuna Lake, 4.3 km N of the Continental Divide; 08°49'N 82°12'W, 590 m, 10 March 1985, *Thomas B. Croat & Michael H. Grayum 60157* (MO); **Chiriquí**: Fortuna Dam region, above northern edge of lake; 08°45'N 82°15'W, 1100 m, 27 April 1986, *Gordon*

McPherson 9082 (MO); Vicinity of Fortuna Dam site on Río Chiriqui beyond Gualaca 9.4 mi beyond Gate to Francisco Linare's house, 20.9 mi from bridge over Río Está, 10.8 mi beyond Los Planes de Hornito; 08°42'N 82°14›W, 1400 m, 27 November1979, *Thomas B. Croat 48710* (MO); Along road between Gualaca and the Fortuna dam site 10.1 mi NW of Los Planes de Hornito; 08°42'N 82°14›W, 1300 m, 8 April1980, *Thomas B. Croat 49822* (MO); **Coclé**: Cerro Pilón; 08°38'15»N 80°06›25»W, 2900 ft, March 1968, *B. R. Lallathin 5004* (MO); Along road from La Pindeda to El Copé by way of Piedras Gordas. Sawmill above el Copé; 08°40'06»N 80°35'42"W, 3000 ft, 20 April 1978, *Barry E. Hammel 2632* (MO); Road from La Pintada to Coclesito; 08°41'06»N 80°27›15»W, 600 m, 07 February 1983, *Clem W. Hamilton & Gerrit Davidse 2865* (MO); Caribbean side of divide at El Copé; 08°42'24»N 80°36›30»W–08°44'00»N 80°36›31»W, 200–400 m, 04 February 1983, *Clem W. Hamilton & Gerrit Davidse 2714* (MO); Area of El Valle, 2 km E of La Mesa, N slope of Cerro Gaital; 08°37'30»N 80°06›30»W, 800 m, 16 November 1983, *H. W. Churchill 3880* (MO); La Mesa, above El Valle de Antón, ca. 2 km W of Cerro Pilón on slopes of steep hill; 08°37'30»N 80°07›30»W, 860–900 m, 21 July 1976, *Thomas B. Croat 37406* (MO); El Valle de Antón Region, at La Mesa, 3.2 mi above El Valle. Small patch of cloud forest on flat area, 0.1 km E of Finca Macarenita; 08°36'N 80°07›W, 775 m, 25 March 1993, *Thomas B. Croat 74794* (CM,MO); **Colón:** Río Guanche area. Trail along S bank of river, 2 km from bridge, 09°30'15»N 79°40›13»W, 0 m, 28 August 1984, *H. W. Churchill, A. Liese & Héctor M. Hern*ández *M. 6004* (MO); La Macha, 08°59›04»N 80°32'35"W, 20 m, 18 August2001, *Jorge A. Mendieta M. 10-30* (MO); Along Río Boquerón near No. 1 (manganese mine) E of Salamanca. [Coordinates on original label: 09º35'N, 79º32'W], 09°22'30"N 79°34'00"W, 50 m, 03 July 1982, *Sandy Knapp, N. Holbrook & M.R. Vodicka 5833* (MO); Between Portobelo and Río Cacajal (vicinity of Nuevo Tonosí). Disturbed swamp forest, 09°33›N 79°37'W, 22 Mar 1976, *Thomas B. Croat 33660* (MO); Along Río Guanché, 3-5 km above bridge on Colón-Portobello Road. [Coordinates on original label: 09º30'N, 79º30›W], 09°30›N 79°39'W, 30–100 m, 22 September 1996, *Thomas B. Croat 79371* (MO); Near Guasimo, along river; 09°07'30"N 80°11'00"W, 22 April 1970, *Thomas B. Croat 9959* (MO); Near Guasimo, along river; 09°07'30"N 80°11'00"W, 22 April 1970, *Thomas B. Croat 9935* (SCZ); Near Guasimo, along river; 09°07'30"N 80°11'00"W, 22 April 1970, *Thomas B. Croat 9935* (MO); **Darién:** Cultivated at Garwood Botanical Garden. Origin: Panama: Darién: Jacque; 07°13'03»N 78°10'13»W, *Anonymous s.n.* (MO); Vicinity Cerro Pirre, 17 km S [N on original labels] of El Real, along trail from base camp, along Río Perisenico; 08°01'N 77°44›W, 100 m, 28 July 1994, *Thomas B. Croat & Guang Hua Zhu 77179* (CM); Vicinity Cerro Pirre, 17 km S [N on original labels] of El Real, along trail from base camp, along Río Perisenico; 08°01'N 77°44›W, 100 m, 28 July 1994, *Thomas B. Croat & Guang Hua Zhu 77179* (MO); **Panam**á: Capira. Cerro Campana, trocha desde el mirador a la cima. Bosque nebuloso; 08°41'N 79°55'W, 700–1000 m, 15 December 1994, *Carmen Galdames 1858* (MO); Middle slopes of Cerro Campana, ca. 1 mile from Interamerican Highway, 08°43'09"N 79°53'25"W, 150 m, 15 June 1976, *Thomas B. Croat 35984* (MO); Cerro Campana, along trail to summit; 08°41'27"N 79°55'02"W, 780–875 m, 20 July 1974, *Thomas B. Croat 25223* (MO); Cerro Campana along trail to summit; 08°41'24"N 079°55'01"W, 730 m, 22 June 1972, *Thomas B. Croat 17244* (MO); Panamá. 3 mi NE of Altos de Pacora. Campo Tres; 09°18'03»N 79°15›57»W, 500–800 m, 10 March 1973, *Thomas B. Croat 22730* (MO); **San Blas:** Studies of evergreen lowland seasonal rainforest on the Aila Terrain (Rio Acla); 08°48'30»N 77°40›30»W, 25–100 m, 10 February 1979, *Andrew M. Sugden 425* (MO); El Llano-Cartí

Road, Km 19.1; 09°20›N 78°58'W, 350 m, 12 March 1985, *Greg C. de Nevers & Heraclio Herrera 5138* (MO); **Veraguas:** Santa Fe. Valley of Río Tercero Braso beyond Escuela Agricola Alto Piedra above Santa Fé; 08°32'45»N 081°09›58»W, 500–700 m, 29 August 1974, *Thomas B. Croat 27339* (MO); Vicinity of Escuela Agricola Alto Piedra near Santa Fe, 0.3 mi beyond the fork in the road near the agricultural school toward Atlantic coast, along trail to top of Cerro Tute, 08°30'20»N 81°07›14»W, 1050–1150 m, 29 November 1979, *Thomas B. Croat 48889* (MO); Río Segundo Braso, 8 km beyond Escuela Agricola Alto Piedra beyond Santa Fé; 08°31'48»N 081°08›58»W, 750 m, 24 July 1974, *Thomas B. Croat 25542* (MO); Along road from Santa Fé to Río Calovebora. 0.6 miles beyond Escuela Agricola Alto Piedra, 08°30'53»N 81°06›59»W, 735 m, 4 April1976, *Thomas B. Croat & James P. Folsom 33997* (MO); Along road from Santa Fé to Río Calovebora. 0.6 miles beyond Escuela Agricola Alto Piedra, 08°30'53»N 81°06›59»W, 735 m, 4 April 1976, *Thomas B. Croat & James P. Folsom 33991A* (MO).

Syngonium standleyanum G.S.Bunting, *Baileya* 14: 21. 1966. — Type: COSTA RICA. Guanacaste: El Arenal, 485–800 m, *P.C. Standley & J. Valerio Rodríguez 45248* (holotype, US-1254001).

Nomadic vine to 5 m; juvenile plants with scandent stems, not glaucous; sap clear; internodes 2.3–6.5 cm long; petioles sheathed more than 4/5 their length, 4–12 cm long; blades elliptic, inequilaterally acuminate at apex, 4–10 cm long, 2–4 cm wide; intermediate leaves elliptic to oblong or lanceolate, sub-hastate or cordate at base. Adult plants appressed-climbing, stems green, not glaucous, densely and minutely papillate, drying pale brown with longitudinal wrinkles; internodes 3–12 cm long, less than 1 cm diam. LEAVES with **petioles** (15)25–35 cm long, sheathed 2/3 or nearly full length (l.5–9.0 cm from apex), portion above sheath acutely angled on upper side; **blades** trisect, leaflets free; median leaflet slightly to very inequilateral, elliptic to oblong, (13)18–28 cm long, 6.5–15.0 cm wide, acuminate and mucronate at apex, acute and attenuate at base; lateral leaflets elliptic-oblong, 11–24 cm long, generally less than 70% as long as the medial lobe, acute-cuneate on inner edge at base, obtuse to rounded or slightly auricled on outer edge at base; petiolule 5–15 mm long; **primary lateral veins** ca. 6 per side, sunken above, raised beneath; smaller veins clearly visible (at least on drying). INFLORESCENCES 1–4(5); **peduncle** 4.5–5.2 cm long, less than 4 cm diam. on drying; **spathe** 10.0–11.5 cm long; tube green, 4.5–5.0 cm long, ca. 3 cm diam., fusiform-cylindroid; spathe blade white, ovate-elliptic, 6.2–7.0 cm long, ca. 2.5 cm diam. (closed), ca. 3.5 cm wide (open), acuminate at apex, 2.8 cm longer than spadix; **spadix** 8.1–9.0 cm long; staminate portion of spadix clavate, creamy white, 6.0–7.5 cm long, 1.1 cm diam. on fertile section, 0.5 cm on constricted segment; sterile staminate portion 1 cm long, 0.7 cm diam.; pistillate portion 1.5 cm long. 0.5 cm diam. INFRUCTESCENCES with spathe blade bright red-orange inside, yellowish green outside except red-orange at very base; berries white (*Davidse 36582*). Flowers January, June-August Fruits June–August. **Figures 232–239.**

Distribution — *Syngonium standleyanum* ranges from Belize and Honduras to Costa Rica on the Caribbean slope. In Costa Rica, it occurs in *Tropical wet forest* and *Premontane wet forest* life zones, generally in secondary forests at elevations from near sea level (50 m) to 700 m.

Comments — The species is a member of sect. *Syngonium* and is characterized by its non-glaucous, densely and minutely papillate internodes, petioles sheathed 2/3 or nearly throughout,

trisect blades with the leaflets free and petiolulate, the lateral leaflets less than 70% as long as the medial lobe, about 6 primary lateral veins per side, up to 5 inflorescences, a fusiforme green tube and the infructescences with the spathe blade bright red-orange inside with white berries. Bunting (1966) reported that the species could be distinguished by the matte upper blade surfaces, deeply impressed primary lateral veins, and the shape of the leaf blade.

The species is close to *S. triphyllum* which differs by having white to yellow sap, blackish drying leaf blades and petioles which are sheathed more than 70% of their length in contrast to having clear sap, greenish drying leaf blades and petioles sheathed less than 70% their length.
The species is perhaps closest to *Syngonium. mauroanum* but that species lacks densely papillate stems, usually has more prominently hastate posterior lobes, and occurs in *Tropical moist forest* or *Premontane moist forest* life zones.

Additional specimens seen — **BELIZE**. **Toledo:** Southern Maya Mountains, Bladen Nature Reserve, central Snake Creek, 16°27'35»N, 088°58›52»W, 400 m, 19 May 1997, *Gerrit Davidse & Douglas L. Holland 36582* (BRH, CM, MO, NY). **COSTA RICA**. At La Lola, 10°05›24»N, 83°22'48"W, 50 m, 9 August 1953, *Monroe R. Birdsey 328* (MO, UC); **Alajuela:** Along road between Cañas and Upala, 8 km north of Bijagua, 10°48'00»N, 85°03›00»W, 300 m, 26 June 1976, *Thomas B. Croat 36515* (MO); **Heredia:** La Selva Biological Station, 10°25›53»N, 84°00'13"W, 100 m, 20 March 1980, *Barry E. Hammel 8203* (DUKE); Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río

Figure 232: *Syngonium standleyanum*. Plant in early fruit, *Croat 78727*, Costa Rica

Figure 233: *Syngonium standleyanum*. Leaves displayed on floor. Photo, T. Ray

Figure 234: *Syngonium standleyanum*. Adult and Juvenile leaves,. Photo, T. Ray

Figure 235: *Syngonium standleyanum*. Juvenile leaves. Photo, T. Ray

Figure 236: *Syngonium standleyanum*. Infructescence close up, Belize. Photo, G. Davidse

Figure 237: *Syngonium standleyanum. Hammel & Trainer 13206,* Costa Rica

Figure 238: *Syngonium standleyanum. Croat 78727*, Costa Rica

Figure 239: *Syngonium standleyanum. Croat 78750*, Costa Rica

Sarapiquí, 10°25›53»N, 84°00'13"W, 100 m, 6 August 1983, *Barry E. Hammel 13319* Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 10°25›53»N, 84°00'13"W, 100 m, 17 July 1982, *Barry E. Hammel & Jill Trainer 13206* (DUKE, MO); Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 10°25›53»N, 84°00'13"W, 100 m, 16 July 1979, *Michael H. Grayum 1841* (DUKE); 10°25›12»N, 84°00'36"W, 100 m, 30 June 1995, *M. K. Whitson 357* (DUKE); La Selva Biological Station, 10°26›00»N, 84°01'00"W, 50 m, 30 August 1996, *Thomas B. Croat 78727* (INB, MO); **Limón:** Along Río Guapiles at Los Diamantes (1 mile east of Guapiles), 10°12'36"N, 83°46'12"W, 300 m, *Monroe R. Birdsey 334* (MO, UC); Pococi, along Río Corinto near Barulio, Carrillo-Guapiles Hwy, 1 km S of turnoff to Puerto Viejo, 10°12'15"N, 83°54'20"W, 250–270 m, 30 August 1996, *Thomas B. Croat 78750* (CR, INB, MO). NICARAGUA. **Atlántico Sur:** Vicinity of Bluefields, just W of town along trail to The Pool, 12°00'45"N, 83°46'00»W, 0–50 m, 12 April 1961, *George S. Bunting & L. Licht 1250* (K, US). **Puntarenas**: Osa Peninsula, Parque Corcovado, *Ray 3, 17, 18, 19, 44* (GH).

Syngonium steyermarkii Croat, Ann. Missouri Bot. Gard. 68(4): 604–605. 1982. — Type: GUATEMALA. San Marcos: Vicinity of San Rafael, Finca Armenia at La Trinidad, ca. 2 km above main buildings of finca, 1100–1250 m, virgin forest along stream, 12 July 1977, *T.B. Croat 40842* (holotype, MO-2599645; isotypes, EAP, F, MEXU, PMA, US, USCG, VEN).

Nomadic vine; appressed-climbing,; sap milky; stems 1–3 cm diam., 1.3 m long; upper internodes 1.5–2.5 cm long, dark green, shiny, drying light brown, periderm drying wrinkled; leaves ca. 8, persisting only near apex, broadly spreading. LEAVES with **petioles** 25–60 cm long, subterete, sheathed to beyond middle to upper 2/3, sharply ribbed near apex of sheath, drying black; blades incised-lobate, ovate in outline, 20–43 cm long, 17–36 cm wide, firmly membranous, medium green above, paler beneath, drying black, anterior lobe with 5 or 6 segments, shallowly lobed to within 1–2 cm from midrib, segments 2–5 cm wide, narrowly rounded at apex, posterior lobes about half as long as anterior lobe, segments partly confluent; midrib and primary lateral veins sunken above, raised and U-shaped beneath; secondary veins and collective vein weakly sunken on upper surface, weakly raised on lower surface; tertiary veins distinctly visible. INFLORESCENCES 1–7 per axil; **peduncle** terete, erect in flower, 7–13 cm long, ca. 1 cm diam., straight to sigmoid; **spathe** 5.5– 7.0 cm long, somewhat fleshy, narrowly ovoid, acuminate, tightly inrolled and curved forward at apex, scarcely constricted near middle, opening from apex of spadix to base of spadix; spathe tube green, glaucous, grayish or whitish green, ca. 2.6 cm long, 2 cm diam.; spathe blade green, scarcely or not at all flared open; **spadix** 5.0–5.5 cm long; pistillate portion of spadix 2.6–3.0 cm long, 2 cm diam., broader than staminate portion, pistillate flowers pale green, 4–5 mm diam., stigma sessile, ca. 2 mm diam., orange-yellow; staminate portion of spadix 2.0–2.5 cm long, 0.6–1.3 cm diam., staminate flowers creamy white, synandrium truncate at apex with a medial depression, irregularly 4–6 sided, 2–3 mm diam. INFRUCTESCENCES with spathe tube 6–7 cm long, 3.5–4.0 cm diam., in part weakly glaucous, obtusely ribbed on closed side; **syncarp** 5–7 cm long, ca. 4 cm diam. The type collection had immature fruits in July. **Figures 240–249**.

Distribution — *Syngonium steyermarkii* is known only from the Pacific slope of Guatemala and southeastern Mexico at elevations above 1250 m.

Figure 240: *Syngonium steyermarkii*. Adult plant, held by Pedro Díaz Jiménez's assistant, Mexico, Photo, P. Díaz Jiménez

Figure 241: *Syngonium steyermarkii*. Adaxial leaf surface closeup, Type, *Croat 40842*, Guatemala

Comments — *Syngonium steyermarkii* is the only Central American species in Section *Pinnatiloba* and is unique in having incised-lobate leaves like those of *Philodendron radiatum* Schott. It also differs from other *Syngonium* species in having the inflorescences all mature at about the same time and having the pistillate part of the spadix appreciably larger than the staminate portion.

The species was named in honor of Julian A. Steyermark who made three collections of it between 1940 and 1942 in three different departments of Guatemala.

The data on the flowers in the 1982 revision of *Syngonium* was provided by Josef Bogner from a living collection of *Croat 47201* growing at Munich (**Figures 245–249**). However, Pedro Díaz Jiménez (Díaz et al., 2023) has collected what he believes is *Syngonium steyermarkii* in Oaxaca, Mexico (**Figures 240, 242–244**), but his plant has remarkably different inflorescences (**Figure 243**). On the other hand, the leaves are very similar. Nevertheless, these differences need to be pursued. Either the plant that Bogner flowered (from a cutting from the Croat type collection) had a radically deformed nature or the plant that Díaz collected is perhaps a different species. To my knowledge no other flowering plant of the original collection has been reported.,

Additional specimens seen — **GUATEMALA**. **Quezaltenango**: Between Finca Pirineos and Patzulin, *Standley 86886*; *86900* (F); Along Quebrada Geronimo, Finca Pirineos, S slope of

Figure 242: *Syngonium steyermarkii*. Juvenile plant. Photo, P. Díaz Jiménez

Figure 243: *Syngonium steyermarkii*. Habit of flowering plant. Photo, P. Díaz Jiménez

Figure 244: *Syngonium steyermarkii*. Stem with young infructescence. Photo, P. Díaz Jiménez

Figure 245: *Syngonium steyermarkii*. Preadult leaves on cultivated plant, *Croat 47201*. Photo, J. Bogner

Figure 246: *Syngonium steyermarkii*. Cluster of Inflorescences seemingly all at the same stage of development, *Croat 7201*. Photo, J. Bogner

Figure 247: *Syngonium steyermarkii*. Closeup of cluster of inflorescences, *Croat 47201*. Photo, J. Bogner

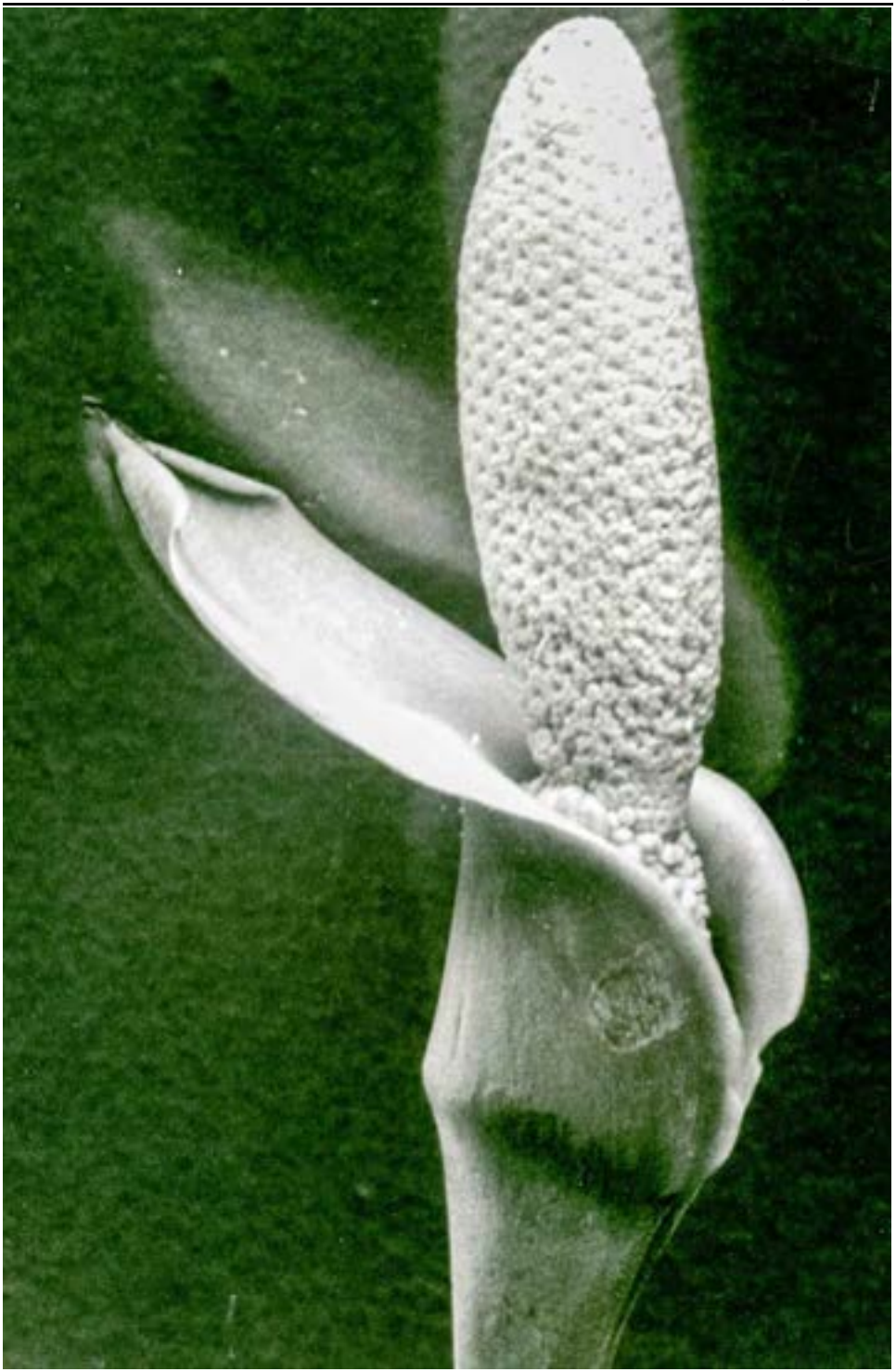

Figure 248: *Syngonium steyermarkii*. Closeup of open inflorescence. Photo, J. Bogner

Figure 249: *Syngonium steyermarkii*. Infructescence with syncarp, *Croat 47201*. Photo, J. Bogner

Volcan Santa Maria, 1300–2000 m, *Julian A. Steyermark 53437* (F). **San Marcos**. Finca El Porvenir along Río Chopal, S slope of Volcan Tajumulco, 1300–1500 m, *Julian A. Steyermark 37499* (F). **Suchitepéquez**: Volcan Santa Clara between Finca El Naranjo and upper slopes, 1250–2650 m, *Julian A. Steyermark 46621* (F). **MEXICO**: **Chiapas**: N of Puente Monte Perla, *Croat 47201* (MICH, MO).

Syngonium tacotalpense Díaz Jim. & Croat, Novon 27: 63, fig. 26, 28. 2019. — Type: MEXICO. Tabasco: Mpio. Tacotalpa, Buenos Aires, Selva alta perennifolia, 17°219N, 92°429W, 14 May 2005, *P. Díaz Jiménez & J. M. Ascencio Rivera 165* (holotype, MO-6355420, MO-6355671; isotypes, K, UJAT, US).

Nomadic vine; LEAVES with **petioles** 20–59 cm, sheathed 2/3–3/4 their length; **blades** trisect or 5- to 11-pedatisect, thin, upper surface dark green, lower surface paler; segments 5, usually free; posterior segments rarely auriculate at base; median segment oblong-elliptic to lanceolate, abruptly acuminate at apex, decurrent at base, 29–38 cm long, 6.2–7.3 cm wide; rachis usually cruciform; midrib deeply sunken and concolorous above, prominently rounded below; **primary lateral veins** 4-8 per side on median segment; collective veins 2. INFLORESCENCES ca. 8 (to 10) per axil; prophylls ca. 13.5 cm; **peduncle** dark olive-green, 6.5–7.5 cm, erect at anthesis, 13 cm and pendent in fruit; **spathe** 9.3 cm long; spathe blade 7.2 cm long, 4.5 cm wide at anthesis, cream; tube of spathe ovoid to ellipsoid, ca. 3.6 cm, green yellowish inside and green outside; **spadix** with pistillate portion ca. 2.2 cm, 10 mm diam., greenish cream and yellowish; staminate portion ca. 5 cm, 12 mm diam., cream. INFRUCTESCENCES pendent, peduncles green, weakly flattened, ca. 13 cm; fruits ovoid, 3.5–5.0 cm long, 1.5–3.0 cm diam., reddish; spathe persistent in fruit. The type specimen had fruits in May. **Figures 250–254.**

Distribution — *Syngonium tacotalpense* is endemic to Mexico, known only from the type locality at 450 m in a *Tropical moist forest* life zone.

Comments — *Syngonium tacotalpense* is a member of section *Syngonium* and is characterized by its hemiepiphytic habit, with leaf blades of adult plants trisect or 5- to 11-pedatisect and leaf blades of the pre-adult climbing phase simple, usually hastate or sagittate. The species is perhaps most easily confused with *Syngonium angustatum*, which differs in having stems not glaucous, usually sparsely muricate, and fewer primary lateral veins (three to five vs. four to eight) and inflorescences ca. seven versus ca. eight (to 10) per axil.

Additional specimen seen — **MEXICO: Tabasco:** cultivated at Universidad Juarez, *Diaz 1361* (UJAT).

Syngonium triphyllum Birdsey ex Croat, Ann. Missouri Bot. Gard.: 642–645, figs. 68, 73–75. 1982. — TYPE: COSTA RICA. Heredia: near Puerto Viejo along the Río Sucio, 20 m, 27 May 1976, *T.B. Croat 35675* (holotype, MO-2381577).

Nomadic vine; juvenile plants at first with short internodes (5 mm or less), becoming scandent, not glaucous, green to greenish brown, turning brown with age; internodes to 17 cm long; petioles sheathed 4/5 or nearly their entire length, less than I0 cm long, sheath with margin crisped; blades inequilateral, elliptic, acuminate at apex, acute to obtuse and often inequilateral at base, sometimes weakly cordate, 6–23 cm long, 3–9 cm wide. Intermediate plants with petioles 14–28 cm long; blades entire and elliptic to oblong-elliptic or ovate-elliptic or becoming auricle-lobed at base, auricles held parallel to petiole, in later stages becoming more trisect, lobes oblong-elliptic, directed at nearly right angles to midrib. Adult plants with stems not glaucous, sometimes branched; internodes to 9 cm long, to 2.5–3.5 cm long on flowering portions, 1.0–2.5 cm diam., brown, matte, sometimes drying flaky, sometimes with sharp longitudinal wrinkles. LEAVES with **petioles** 11–50 cm long, sheathed 2/3–4/5 their length or more, unsheathed portion sharply triangular with lateral margins sharply raised; **blades** usually trisect but frequently with a conspicuous spatulate auricle at base, auricle sometimes to 15 cm long, blade thus appearing almost 5-pedatisect; leaflets free, semiglossy above, dark green, drying dark, lower surface slightly paler; median leaflet ovate to elliptic or oblong-elliptic, equilateral or nearly so, 17–32 cm long, 6–14 cm wide, short-acuminate at apex, cuneate or obtuse at base; lateral leaflets of well-developed blades 15–28 cm long, 4–11 cm wide, ovate-elliptic to elliptic, nearly equilateral to very inequilateral and variously auriculate at base, auricles oblong to spatulate to oblong-elliptic, 6–16 cm long; primary lateral veins 10–16 per side, scarcely more prominent than the numerous interprimary veins; primary,

Figure 250: *Syngonium tacotalpense*. Full sized flowering plant, *Díaz Jim*énez *1361*, Mexico. Photo, P. Díaz Jiménez

Figure 251: *Syngonium tacotalpense*. Stem with inflorescences, *Díaz Jiménez 1361*, Mexico. Photo, P. Díaz Jiménez

Figure 252: *Syngonium tacotalpense*. Stem closeup, *Díaz Jim*énez *1361*, Mexico. Photo, P. Díaz Jiménez

Figure 253: *Syngonium tacotalpense*. Open Inflorescence at anthesis, *Díaz Jiménez 1361*, Mexico. Photo, P. Díaz Jiménez

Figure 254: *Syngonium tacotalpense*. *Díaz Jiménez 1361*, Mexico. Photo, P. Díaz Jiménez

major secondary veins and collective veins prominently sunken above, prominently raised on lower surface, smaller veins clearly visible when fresh; reticulate veins often very close and fine on drying, collective veins 3–12 cm from margin, moderately straight or broadly arching between primary lateral veins. INFLORESCENCES 1–5 per axil, usually 1–3, most frequently 1 or 2; **peduncle** erect, 5–7 cm long in flower, 8–13 cm long and pendent in fruit; **spathe** ca. 14 cm at anthesis; spathe tube narrowly ellipsoid, 4.5–6.0 cm long, 2.0–2.5 cm diam., pale green outside, red inside to near apex; spathe blade oblong-elliptic to oblong, white on both sides, short cuspidate and weakly cucullate at apex, 8–9 cm long, ca. 3.5 cm diam. (to 5 cm wide when flattened); **spadix** 7.9-12.5 cm long pistillate portion of spadix 1.9–2.5 cm long (fresh) (1.0–1.8 cm long dry), 7–13 mm diam., pale yellowish white, flowers irregularly 4-sided, stigma sessile, cup-shaped; staminate portion of spadix 6–10 cm long, 1.0–1.5 cm diam., clavate, gradually attenuate toward sterile flowers, fertile staminate flowers 4-staminate, anthers partially or completely fused, synandrium truncate or slightly rounded at apex, staminate sterile flowers slightly longer than adjacent fertile staminate flowers and much longer than pistillate flowers, 4–6-sided to ellipsoid or subglobose; spathe tube becomes rolled backward along its lateral margins and fleshy white spadix is prominently displayed against bright red interior of spathe tube. INFRUCTESCENCES oblong-elliptic, green tinged with purple, becoming violet purple on outside, inner surface bright red; syncarp oblong-ellipsoid, 6–8 cm long, 3.5–4.0 cm diam.; mesocarp white, fleshy, sweet; seeds black, irregularly ovoid to ellipsoid, 5–8 cm long, 4–6 cm wide. Inflorescences have been found from February through May and in October and November. Immature fruits are known from March to October with nearly mature fruits in May, June, and July. **Figures 255–266.**

Distribution — *Syngonium triphyllum* ranges from the northern Atlantic coast from Belize to Honduras, Nicaragua, Costa Rica, and Panama. It also occurs on the Pacific slope at Palmar Norte in Puntarenas Province, Costa Rica, and on the Burica Peninsula between Panama and Costa Rica as well as in Colombia (Chocó), generally in primary forest. It no doubt occurs as well on the Osa Peninsula in Costa Rica. It is probably restricted to *Premontane wet forest* and *Tropical wet forest* life zones below 1000 m.

Comments — Birdsey (1955) reported the species to be in virgin areas in Honduras but from disturbed areas in Costa Rica. I have always found it growing in virgin forest or in disturbed remnant virgin forest but never in a weedy situation.

The species is a member of sect. *Syngonium* and is characterized by having the petiole cross-sectional shape which has an acute medial rib and conspicuously raised lateral margins and blackish-drying leaf blades with numerous conspicuously sunken veins as well as by having juvenile blades with small, more or less spatulate lateral lobes that are directed laterally. Other distinguishing characters include having moderately few inflorescences, a sessile, cup-shaped stigma, a cucullate spathe blade, and a spathe tube that is reddish inside, bright red while in fruit.

According to Birdsey (1955) the pollen of *Syngonium triphyllum* is unique for *Syngonium* with the ''surface almost completely covered with more or less orbicular knobs."

Additional specimens seen — **BELIZE**. **Toledo:** Columbia Forest Reserve, near Crique Negro, 16°23'27"N, 89°03'27"W, 16 June 1981, *Caroline Whitefoord 3288* (BM); Maya

Figure 255: *Syngonium triphyllum*. Habit of adult plant, Costa Rica. Photo, T. Ray

Figure 256: *Syngonium triphyllum*. Habit of adult plant partly trailing on ground, Costa Rica. Photo, T. Ray

Figure 257: *Syngonium triphyllum*. Habit of adult plant on ground, Costa Rica. Photo, T. Ray

Figure 258: *Syngonium triphyllum*. Adaxial leaf surface, *Croat 60105*, Panama

Mountains, canyon along Bladen Branch from Richardson Creek to Quebrada de Oro, 16°31'N, 88°46'W–16°33'N, 088°49›W, 100–200 m, 11 March 1987, *Gerrit Davidse & Alan E. Brant 32317* (MO). **COSTA RICA**. **Alajuela:** Reserva Biológica Monteverde, Cordille de Tilarán, San Ramón, Río Peñas Blancas, Refugio Eladio's, Sendero Eston's, 10°18'36»N, 84°42›36»W, 800 m, 5 March 1992, *Erick Bello C, Eladio Cruz L. & M. Brenes 4532* (CR); Along Highway 15 between Naranjo and Aguas Zarcas, 8.5 km N,E of Villa Quesada, 10°14'24»N, 84°22›12»W, 600 m, 3 February 1979, *Thomas B. Croat 46972* (MO); Along road between Cañas and Upala, 4 km NNE of Bijagua on slopes leading into Río Zapote, 10°44'24»N, 85°04›12»W, 400 m, 24 June 1976, *Thomas B. Croat 36268* (MO); Along road between Cañas and Upala, 10 km north of Bijagua, 10°47'24»N, 85°03›36»W, 260 m, 26 June 1976, *Thomas B. Croat 36484* (MO); Reserva Biológica Monteverde Río Peñas Blancas, 10°19'N, 84°43›W, 700 m, 27 March 1988, *William A. Haber & Erick Bello C. 8349* (MO); Upala, San José, Alrededores de Laguna Las Camelias, 10°57'36»N, 85°07›48»W, 100 m, 19 November 1987, *Gerardo Herrera Ch. 1343* (MO); **Cartago:** Turrialba, along Highway 32 from Turrialba to Limón, ca. 9 miles NE of Turrialba, along ravine and stream, 09°55'12"N, 83°36'00"W, 800 m, 13 August 1977, *Thomas B. Croat 43376* (MO); **Heredia:** La Selva Biological Station, 10°25›53»N, 84°00'13"W, 100 m, 29 March 1980, *Barry E. Hammel 8343* (DUKE); Finca La Selva, the OTS field station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, 10°25›53»N, 84°00'13"W, 100 m, 26 March 1982, *Barry E. Hammel 11454A* (DUKE); 28 September 1980, *Barry E. Hammel 9906* (DUKE); 9 October 1980, *Barry E. Hammel 10093* (DUKE); 5 November 1980, *Barry E. Hammel 10389* (DUKE); 13 July 1982, *Barry E. Hammel & Jill Trainer 13141* (DUKE); 9 June 1984, *Brian Jacobs & Richard Stomberg 2234* (DUKE); 18 February 1981, *James P. Folsom 9012* (DUKE); 22 February 1981, *James P. Folsom 9098* (DUKE); Between Río Peje and Río Sardinalito, Atlantic

Figure 259: *Syngonium triphyllum*. Adult plant

Figure 260: *Syngonium triphyllum*,. uvenile Plant, Costa Rica. Photo, T. Ray

Figure 261: *Syngonium triphyllum*. Old fruiting spathe. Photo, T. Ray

Figure 262: *Syngonium triphyllum*. Mature syncarp showing red spathe, Costa Rica. Photo, T. Ray

Figure 263: *Syngonium triphyllum*. Old fruiting spathe and syncarp. Photo, T. Ray

Figure 264: *Syngonium triphyllum*. Type, *Croat 35675*, Costa Rica

Figure 265: *Syngonium triphyllum. Grayum 21836*, Costa Rica

Figure 266: *Syngonium triphyllum*. Showing narrow auricle, *Bass & Pittman 290*, Costa Rica

slope of Volcán Barva, 10°17'30»N, 84°04›30»W, 700–800 m, 3 April 1986, *Michael H. Grayum 6715* (MO); Area between Río Peje and Río Sardinalito, Atlantic slope of Volcán Barva, 10º17.5'N, 84º04.5'W 700–950 m, 10°17'24»N, 84°04›12»W, 700–950 m, 10 April 1986, *Michael H. Grayum 6980* (MO); Near Puerto Viejo along road near the Río Sucio, 10°27›36»N, 83°59'24"W, 50 m, 30 August 1996, *Thomas B. Croat 78727A* (MO). **HONDURAS**. **Atlántida:** Campamento Quebrada Grande ca. 10 km SW of La Ceiba, at base of north slope of Pico Bonito, 15°42'N, 86°51'W, 50–80 m, 12 May 1993, *Ronald L. Liesner & Darío Mejía 26240* (MO); Along trail to dam for municipal water supply of Tela, Lancetilla Botanical Gardens, on road ca. 2 mi WSW of Tela and S of main hwy. Printed label for specimens 64586-64646 reads 9/2/1987, but fieldbook states 10/2/1987, 15°44'N, 087°27'W, 70–90 m, 10 February 1987, *Thomas B. Croat & Dylan P. Hannon 64609* (MO); Tela. Lancetilla Valley, Valley above Experiment Station, along stream and slopes above stream but below the dam, 15°43'00"N, 87°27'30»W, 30– 60 m, 4 November 1988, *John M. MacDougal, Paul R. House & Ramón Zúñiga 3175* (MO); Lancetilla Valley south of Tela, 50 m, 19 July1953, *Monroe R. Birdsey 319* (MO, UC). **NICARAGUA. Atlántico Sur:** Monkey Point, Caño El Pato, 1.5 km sobre la ribera del Caño, 11°35'50"N, 83°42'20"W, 10 m, 25 October 1981, *P. P. Moreno 12370* (MO); Río Punta Gorda, Atlanta, desembocadura del Caño del Oro en el Río Chiquito, 11°36'N, 084°00›W, 10 m, 12 November 1981, *P. P. Moreno & J. C. Sandino 12953* (MO); Monkey Point, lado S del campo de aterrizaje abandonado, 11°36›10»N, 83°40'05"W, 10 m, 22 October 1981, *P. P. Moreno & J. C. Sandino 12104* (MO); Caño Monte Cristo, La Grupera, 11°33›N, 083°48›W, 10 m, 4 February 1982, *P. P. Moreno & J. C. Sandino 14701* (MO); Municipio de Nueva Guinea, Reserva Indio-Maiz, Río Pijibaye entre el Caño Bijagua y el Cerro Chiripa, 11°22›N, 84°01'W, 50–200 m, 14 January 1999, *R. M. Ruedaet et al. 10110* (MO); Ca. 6.3 km S of bridge at Colonia Yolaina and ca. 0.8 km S of ridge of Serranías de Yolaina on road to Colonia Manantiales (Colonia Somoza), 11°36'N, 84°22'W–11°37'N, 084°22'W, 200–300 m, 29–31 October 1977, *W. D. Stevens 4822* (MO); Ca. 6.3 km S of bridge at Colonia Yolaina and ca. 0.8 km S of ridge of Serranías de Yolaina on road to Colonia Manantiales (Colonia Somoza), 11°36'N, 084°22'W–11°37'N, 084°22'W, 200–300 m, 29–31 October 1977, *W. D. Stevens 4853* (MO); Caño Costa Riquita, ca. 1.8 km SW of Colonia Naciones Unidas, above (S of) road between Colonia Nuevo Léon and Colonia Naciones Unidas, 11°43'N, 84°18'W, 150–180 m, 6–7 November 1977, *W. D. Stevens 4986* (MO); Along road to Colonia Yolaina, Colonia La Esperanza, ca. 1.3 km SE of intersection with road between Nueva Guinea and Colonia Verdún, immediately upriver from bridge over Caño Sardina, 11°40'N, 84°26'W, 180–200 m, 8 November 1977, *W. D. Stevens 5091* (MO); **Río San Juan:** Boca de Sábalo, 11°02'30»N, 84°28'00»W, 70–100 m, 14 March 1987, *P. P. Moreno 26695* (MO); En las Cercanias del Poblado Nuevo de San Juan del Norte, 10°56›N, 83°46'W, 0–5 m, 1 July 1994, *R. M. Rueda, B. Hernández & E. Palma 1562* (MO); Municipio el Castillo, Reserva Indio-Maiz, Cerro Bolívar, 10°51'N, 84°10'W, 150–280 m, 28 November 1998, *R. M. Rueda, F. Flores, W. Velásquez & O. Caballero 9194* 29 November 1998, *9263* (MO); 30 November 1998, *92909* (MO); Municipio de el Castillo, a 8 km de la cabecera del Río Bartola, en dirección hacia el Cerro el Diablo, 11°01'N, 84°14›W, 120 m, 3 January 1997, *R. M. Rueda, I. Coronado G, O. Aráuz & F. Flores 5298* (MO); Reserva Indio-Maíz, Municipio de el Castillo, a lo largo del Caño Chontaleño, 11°09'N, 84°10'W, 150–200 m, 21 February 1997, *R. M. Rueda, I. Coronado G, O. Aráuz & F. Flores 6173* (MO). **PANAMA. Bocas del Toro:** Along road between Chiriquí Grande and Fortuna, 13.2 miles W of Chiriquí Grande, 08°50›12»N, 82°11'48"W, 310 m, 9 March 1985, *Thomas B. Croat & Michael H. Grayum*

60147 (MO); Along road between Fortuna and Chiriquí Grande, 8.5 miles N of bridge over the Fortuna Lake, 4.3 km N, of the Continental Divide, 0 8°49'N, 82°12'W, 590 m, 10 March 1985, *Thomas B. Croat & Michael H. Grayum 60172* (MO); Along road between Fortuna Dam and Chiriquí Grande, 7.3 mi N of bridge over Fortuna Dam, 3.2 mi N of Continental Divide [Coordinates on orginal label: 08º45'N, 82º15'W], 08°49'00"N, 82°12'36"W, 700 m, 10 March 1985, *Thomas B. Croat & Michael H. Grayum 60266* (MO); 1.2 mi N, of Continental Divide, 5.3 mi N, of bridge over Fortuna Dam 4. [Coordinates on orginal label: 08º44'N, 82º17›W], 08°46›06»N, 82°12'30"W, 910 m, 12 March 1985, *Thomas B. Croat & Michael H. Grayum 60455* (MO); Along road between Chiriquí Grande and Fortuna, 7.7 miles W of Chiriquí Grande, 1.5 miles W of Punta Peña, 08°53'36»N, 82°11›12»W, 80 m, 9 March 1985, *Thomas B. Croat & Michael H. Grayum 60105* (MO); Changuinolaj, ca. 1 mile S of Changuinola on the Changuinola River, 09°24'06"N, 82°30'00"W, 19 April 1969, *Robert L. Lazor & Edwin L. Tyson 2668* (FSU); **Chiriquí**: Along road from Puerto Armuelles to San Bartolo Limite, 7 miles west of Puerto Armuelles, 08°16'N, 082°56'W, 120 m, 19 May 1976, *Thomas B. Croat 35080* (MO); Burica Peninsula, 10–11 mi W of Puerto Armuelles in the vicinity of San Bartolo Limité, 08°19›N, 82°58'W–08°20'N, 082°59'W, 300–500 m, 19 February 1973, *Thomas B. Croat 22008* (MO); **Coclé**: Area around Rivera Sawmill, near top of Alto Calvario, 7 km north of El Copé, New Works, 08°41'N, 80°36'W, 700–850 m, 20 October 1977, *James P. Folsom & Richard Page 5973* (MO); Cerro Pilón, 08°37'30»N, 80°06›48»W–08°38'12»N, 80°08›15»W, 900–1173 m, 16 March 1973, *Ronald L. Liesner 778* (MO); La Mesa, above El Valle de Antón, ca. 2 km W of Cerro Pilón on slopes of steep hill, 08°37'30»N, 80°07›30»W, 860–900 m, 21 July 1976, *Thomas B. Croat 37341* (MO); La Mesa above El Valle, in forest on both sides of junction with road to Cerro Pilón, 08°38'00»N, 80°07›30»W, 800 m, 21 July 1974, *Thomas B. Croat 25358* (MO); El Valle de Antón Region, at La Mesa, 3.2 mi above El Valle, 0.1 km E of Finca Macarenita, 08°36'N, 80°07›W, 775 m, 25 Mar, 1993, *Thomas B. Croat 74801* (MG, MO, SCZ); Vicinity El Valle de Antón, La Mesa, base of Cerro Gatital, 5 mi N of turn-off to La Mesa in El Valle, 08°37'N, 80°08›W, 860 m, 7 July 1994, *Thomas B. Croat & Guang Hua Zhu 76727* (MO, TEX); El Copé, along gravel road to the right, before sawmill, 08°38'30»N, 80°35›30»W, 2400 ft, 18 October 1979, *Thomas M. Antonio 2172* (MO); La Pintada, along road between Llano Grande and Coclecito (N of La Pintada), 4.0 mi N of stream at Llano Grande, 08°40'02"N, 80°27'08"W, 330 m, 7 December 1979, *Thomas B. Croat 49228* (MO); Vicinity of El Copé at Parque Nacional El Copé, 5–6 mi N of El Copé, along trail which leads into the lowlands from Old Rivera saw works area, 08°39'42»N, 80°35›29»W–08°40'00»N, 80°35›29»W, 700–810 m, 8 July 1994, *Thomas B. Croat & Guang Hua Zhu 76752* (MO); **Colón:** Along Río Guanché, 3–5 km above bridge on Colón-Portobello Road [Coordinates on original label: 09º30'N, 79º30›W], 09°30›N, 79°39'W, 30–100 m, 22 September 1996, *Thomas B. Croat 79340* (MO); Near Guasimo along river, 09°07'30"N, 080°11'00"W, 22 April 1970, *Thomas B. Croat 9939* (MO, SCZ); Río Guanché above bridge on Portobelo Road, ca. 3 to 5 km above bridge, 09°30'N, 79°37'W–09°31'N, 079°39'W, 50–200 m, 8 July 1976, *Thomas B. Croat 36999* (MO); Walking upstream from bridge over the Río Guanche, 09°30›N, 79°39'W–09°30'N, 79°41'W, 0–100 m, 19 January 1980, *Thomas M. Antonio 3371* (MO); Donoso, Teck Cominco Mining Concession, Camp Colina, Main road to Camp Colina at crossing of Quebrada Molejon, 08°48'09»N, 80°39›14»W, 90 m, 29 February 2008, *Mary Merello, José Isabel González & Roberto Gomez 3142* (HUA, MO); **Veraguas:** Parque N,acional Sante Fe, cosque cercano a Alto de Piedra, 08°32'00»N, 81°09'03"W, 830 m, 12 April 2018,

Orlando Ortiz, J. S. Vergara, M. E. Spicer & J. Ortega 3206 (MO, PMA); Santa Fe, Valley of Río Dos Bocas along road between Escuela Agricola Alto Piedra and Calovebora, 15.6 km NW of Santa Fé; along trail to Santa Fé, 08°33'03»N, 081°10'17»W, 450–550 m, 31 August 1974, *Thomas B. Croat 27572* (MO); 5 miles W of Santa Fé on road past Escuela Agricola Alto Piedra on Pacific side of divide, 08°30'47»N, 81°06›54»W, 800–1200 m, 18 March 1973, *Thomas B. Croat 23118* (MO); Beyond Tres Brazos River along steep descent, 11 km beyond Santa Fé, 08°31'52»N, 81°09›11»W, 650 m, 24 July 1974, *Thomas B. Croat 25643* (MO); Along the Santa Fe to Calovebora road beyond Escuela Agricola Alto Piedra, along first major stream ca. 3 mi from fork in the road at the school, 08°31'28»N, 81°07›50»W, 700 m, 1 December 1979, *Thomas B. Croat 49006* Along road from Santa Fé to Río Calovebora, 0.6 miles beyond Escuela Agricola Alto Piedra, 08°30'53»N, 81°06'59"W, 735 m, 4 April 1976, *Thomas B. Croat & James P. Folsom 34142* (MO).

Syngonium wendlandii Schott, Oesterr. Bot. Z. 8: 178. 1858. — Type: COSTA RICA. [San José:] Santa Ana ('Santa Anna'), 9 April 1857, *H. Wendland 619* (lectotype, GOET, GOET000260, designated here, examined on-line).

Nomadic vine to 4–5 m; juvenile plants with stems not glaucous; internodes at first short, 2–4 cm long, becoming longer, to 10 cm long; petioles sheathed 1/3–3/4 their length (usually less than 1/2); blades cordate, to 10 cm long, anterior lobe ovate, acuminate, posterior lobes semi-orbicular; intermediate blades sagittate to hastate, posterior lobes triangular, upper surface velvety green, major veins streaked with silvery gray. Adult plants with stems green, not glaucous, becoming brownish, asperous-striate; internodes 1–5 cm long, 0.5–2.5 cm diam. LEAVES with **petioles** 10–37 cm long, sheathed ½ to nearly 90% of their length, free portion above sheath acutely angled medially, lateral margins acute; **blades** trisect, dark velvety green, sometimes with a streak of silver gray, epidermis of conspicuous papillate cells; median leaflet 8–22 cm long, 2–8 cm wide, elliptic to oblong-elliptic, acuminate at apex, truncate to acute, sagittate or hastate at base; **primary lateral veins** 6–10 per side; lateral leaflets 7–15 cm long, 3–6 cm wide, oblong-elliptic to narrowly ovate, acute to acuminate at apex, inequilateral, inner margin acute, outer margin rounded to auriculate, auricles sometimes pinched off, oblong-elliptic, to 3 cm long. INFLORESCENCES 1–4 per axil; **peduncle** (2.5)8–10 cm long, obtusely triangular; **spathe** 13.0–16.5 cm long; spathe tube 5–6 cm long, 2.0–2.5 cm diam., narrowly ovoid, pale green outside, dark red to dark purplish inside; spathe blade elliptic, 8.0–10.5 cm long, acuminate at apex, pale yellowish green outside, white to cream inside; **spadix** 7.0-10.5 cm long, weakly sigmoid, curved outward in pistillate and lower part of sterile staminate portions, then turned inward again in upper part of sterile staminate section; pistillate portion of spadix 1.5–2.0 cm long, to 1 cm diam., flowers irregularly 6-sided, stigma orbicular or 2-lobed; staminate portion of spadix white, 5.5–8.5 cm long, more or less cylindroid and markedly tapered onto sterile staminate part of spadix; staminate flowers 2–4-androus (usually 4), synandrium crenate near apex, area of fusion of stamens somewhat visible; sterile staminate flowers irregular, larger than fertile flowers and well-spaced for genus. INFRUCTESCENCES pendent, oblong; **syncarp** oblong, 2.6–5.8 cm long, 1.4–2.4 cm wide, interior red, berries white to brown (fide Birdsey, 1955); seeds not seen. Flowers March-May; Fruits August December-January. **Figures 267–280.**

Distribution — The species is endemic to Costa Rica, occurring from sea level to 1000 m elevation mostly on the Pacfic slope in Alejuela, San José and Puntarenas Provinces but also

Figure 267: *Syngonium wendlandii*. Adult leaf, *Hammel 27969*, Costa Rica. Photo, B. Hammel

Figure 268: *Syngonium wendlandii*. Closeup of adaxial leaf surface, *Hammel 27969*, Costa Rica. Photo, B. Hammel

Figure 269: *Syngonium wendlandii*. Habit of adult flowering plant, inflorescence in bud on new shoot, *Hammel 27969*, Costa Rica. Photo, B. Hammel

Figure 270: *Syngonium wendlandii*. Inflorescences with adult leaf, *Hammel 27969*, Costa Rica. Photo, B. Hammel

Figure 271: *Syngonium wendlandii*. Habit of adult flowering plant, *Hammel 27969*, Costa Rica. Photo, B. Hammel

Figure 272: *Syngonium wendlandii*. Inflorescence face view, *Hammel 27969*, Costa Rica. Photo, B. Hammel

Figure 273: *Syngonium wendlandii*. Closeup of sterile staminate section of spadix, *Hammel 27969*, Costa Rica. Photo, B. Hammel

Figure 274: *Syngonium wendlandii*. Closeup of old spadix, *Hammel 27969*, Costa Rica. Photo, B. Hammel

Figure 275: *Syngonium wendlandii*. Mature unopened infructescence, *Hammel 27969*, Costa Rica. Photo, B. Hammel

Figure 276: *Syngonium wendlandii*. Mature fruit with white berries, *Hammel 27969*, Costa Rica. Photo, B. Hammel

Figure 277: *Syngonium wendlandii*. Juvenile Plant, *Hammel 21828.* Photo, B. Hammel

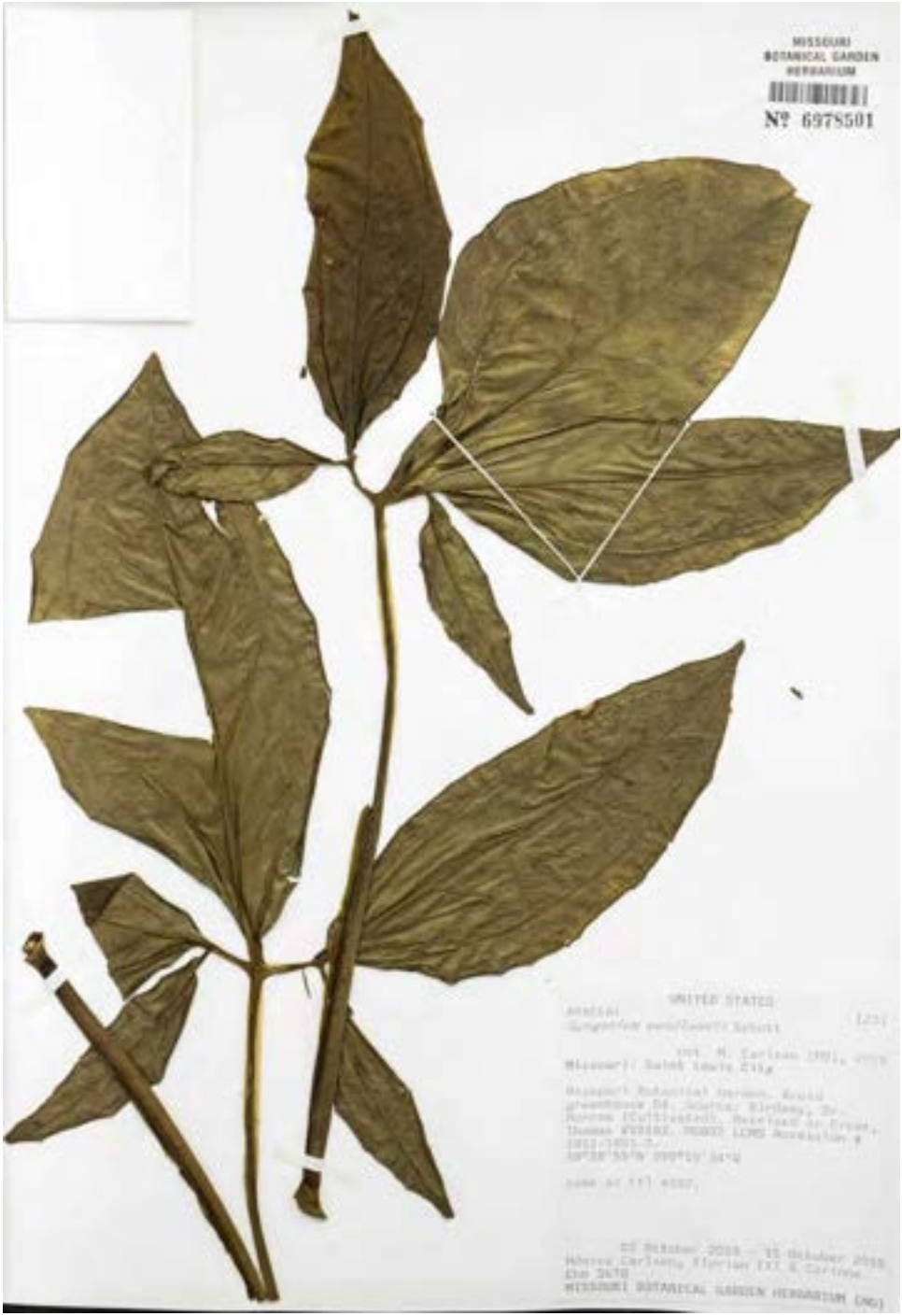

Figure 278: *Syngonium wendlandii*. *Carlsen et al. 3670,* Cult at Missouri Botanical Garden

Figure 279: *Syngonium wendlandii*. *Nagata 2409*, cultivated at Lyon Arboretum

Figure 280: *Syngonium wendlandii*. *Croat 45035*, cultivated at Lyon Arboretum

on the Eastern slope on Cerro Turrubares. It occurs in *Premontane moist forest*, *Premontane wet forest,* and *Tropical wet forest* life zones in the Meseta Central, west of the city of San Jose.

Comments — *Syngonium wendlandii* is a member of section *Syngonium* and can be recognized by its trisect leaves with a densely papillate upper epidermis and by its inflorescence with a frequently sigmoid spadix and widely spaced sterile staminate flowers.

The species is most easily confused with *Syngonium hoffmannii*, a species with similar leaves that occurs at higher elevations (1500–1800 m) on the slopes surrounding the Meseta Central. The latter species is distinguished by the lack of conspicuous papillate leaf epidermis and by having a stouter spadix that is scarcely constricted at the base with the sterile staminate flowers closely compacted. Under magnification, the papillae on the upper surface of the leaf blades of *Syngonium wendlandii* appear as minute reddish-brown glands (on dried specimens).

Additional specimens seen—**COSTA RICA**. Costa Rica [no further locality], *H. Wendland s.n.* (MO); Santa Ana, 9 April1857, *H. Wendland 619* (MO); **Alajuela:** Vicinity of Capulin, *Standley 40120* (VS). San Jose: Rio Marfa Aguillar, *Standley 38990* (VS); Wendland Photo #12299 (US); North of Alajuela, 10°02'02"N, 84°12'43"W, 985 m, 29 August 1953, *Monroe R. Birdsey 341* (MO); Atenas, banks of Río Cacao, 09°59'52"N, 084°25'46"W, 800 m, 2 January 1983, *Luis Diego Gómez P. 19564* (CR, MO); **Heredia**: Ca. 700 m al sur de San Francisco, de San Isidro, 09°59›53»N 84°04'03"W, 1200 m, 5 April 2023, *Hammel 27969* (CR); **Puntarenas:** Interamerican Highway km marker 122, patch of forest west of road, 10°03'00»N, 84°45›00»W, 100 m, 4 August 1985, *Barry E. Hammel & Jill Trainer 14370* (CR, MO); Reserva Biológica Carara Along S side of Río Grande de Tárcoles from Carretera Costanera E to beyond Paso Rieles (N base of Lomas Pizote), 09°48'00»N, 84°36›00»W, 20 m, 25 March 1987, *Michael H. Grayum, Richard H. Warner & Pamela J. Sleeper 8221* (MO); Reserva Biológica Carara, Sendero Quebrada Bonita a Bijagual, 09°59'53"N 84°04'03"W sitio Lomas Pizote, 09°46'48»N, 084°34›48»W, 300 m, 8 December 1989, *Rodolfo Zúñiga & Quírico Jiménez 11* (CR, MO); Garabito, Camino a Playa Agujas, por el Rio Agujas, 09°42'36»N, 084°35›24»W, 0–10 m, 5 April 1997, *Barry E. Hammel 20698* (INB, MO); Golfito, Distrito: Jiménez; Puerto Jiménez camino a playa Tamales, pequeño parche de bosque, al este del peunte sobre la Quebrada Tigre, 08°28›00»N, 83°16'50"W, 10 m, 18 April 2008, *Reinaldo Aguilar 11198*(MO,USJ); Puntarenas, Barranca Site, about 15 miles north of Puntarenas in the small patch of forest that crosses the highway, 09°59'24"N, 84°42'00"W, 10 December 1977, *Daniel H. Janzen 10731* (MO); **San José:** Mora, Ridge between Río Virilla and Quebrada Micos, along road between Finca Micos and Llano Limón (ca. 8.5 km by road west of Ciudad Colón), 09°55'48"N, 84°18'00»W, 550–650 m, 16 January 1986, *Michael H. Grayum et al. 6097* (MO); Entre Ciudad Colon y Hacienda El Rodeo, 09°55›00»N 84°16'00"W, 800 m, 24 December 1998, *Hammel 21828* (CR); Ciudad Colón, Finca El Rodeo, camino Universidad para la Paz, 09°54'36»N, 84°16'48»W, 500–800 m, 2 May 1994, *Vanda Nilsson 469* (MO); Santa Ana, Valle Central, Brazil de Santa Ana, en bosque remnantes y campos de cultivos, por el Río Virilla, 09°55'48"N, 84°13'48"W, 800 m, 29 December 1993, *Barry E. Hammel 19320* (CR, MO); Turrubares, Z. P. Turrubares, Cuenca del Río Grande de Tárcoles, NW flank of Cerro Turrubares, near and along Quebrada La Plata, 09°49'30»N, 84°29'30"W, 580 m, 4 April 1993, *Michael H. Grayum & Barry E. Hammel 10498* (CR, MO); Reserva Biológica Carara, along trail leading through abandoned fields northeast from guard post north of Bijagual de Turrubares, 09°45'00"N, 84°33'36"W, 460 m, 24 April 1988, *Michael H. Grayum*

& W. John Kress 8570 (CR, MO

Cultivated Plants: PANAMA: Canal Area: Balboa, 08°57›N, 79°34'W, 25–50 m, 22 August 1971, *Thomas B. Croat 17016* (MO); Barro Colorado Island, lab clearing, 09°09'45"N, 79°50'30"W, 20 m, 5 August 1970, *Thomas B. Croat 11747* (MO).

EXCLUDED SPECIES

Syngonium rothschuhianum Engl. & K.Krause, *Pflanzenr.* 71 (IV. 23E): 124. 1920. — Type: NICARAGUA. Matagalpa, 1000 m, 9 August 1893, *E. Rothschuh 229* (holotype, B, barcode B 10 0247034). = *Philodendron anisotomum* Schott.

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APPENDIX

Notes on typifications

***Syngonium affine* Schott.** No specimen or illustration was cited in the protologue, which described only a leaf, and gave the provenance vaguely as 'Guyana, Surinam'. Later, Schott (1860: 208) cited a specimen at M made by H.R. Wullschlägel (1805–1864) in Surinam, still later cited with the number *504* by Engler (1878: 131). The Wullschlägel specimen has not been located, but Schott had it drawn, and the drawing (no. 3192) is here designated the neotype. **Figure 281**.

***Syngonium albolineatum* W.Bull.** This name was lectotypified in Croat (1982) with an N.E. Brown specimen from Bull's nursery. However, the specimen was made some six years after the name was first validated, and, although it is likely from the original plant, the specimen itself cannot be considered part of the original material for the purpose of lectotypification. The

Figure 281: The neotype of *Syngonium affine* Schott. — Schott drawing No. 3192, of the presumed holotype specimen consisting of stem with leaves and inflorescences, including detailed insets [From the Archive for the History of Sciences, Natural History Museum Vienna (inventory no. NHMW-AFW-SchottIcones3192); reproduced with permission].

Figure 282: The neotype of *Syngonium decipiens* Schott. — Schott drawing No. 3200, of the presumed holotype specimen, consisting of flowering and fruiting stem with leaves. [From the Archive for the History of Sciences, Natural History Museum Vienna (inventory no. NHMW-AFW-SchottIcones3200); reproduced with permission].

Figure 283: The neotype of *Syngonium hoffmannii* Schott. — Schott drawing No. 3212, of the presumed holotype specimen with leaf and inflorescences as well as detailed inserts. [From the Archive for the History of Sciences, Natural History Museum Vienna (inventory no. NHMW-AFW-SchottIcones3212); reproduced with permission].

Figure 284: The neotype of *Syngonium neglectum* Schott. — Schott drawing No. 3213, of the presumed holotype specimen; leaf with petiole. This was based by Schott (loc. cit.) on a Liebmann specimen said to be at C. It has not been located. However, Schott had the specimen drawn (drawing no. 3213), and the drawing is here designated the neotype. [From the Archive for the History of Sciences, Natural History Museum Vienna (inventory no. NHMW-AFW-SchottIcones3213); reproduced with permission].

Figure 285: The neotype of *Syngonium oerstedianum* Schott. — Schott drawing No. 3214, of the presumed holotype specimen [From the Archive for the History of Sciences, Natural History Museum Vienna (inventory no. NHMW-AFW-SchottIcones3214); reproduced with permission].

specimen is consequently newly designated as the neotype here.

***Syngonium armigerum* Standl. & L.O.Williams.** The holotype was cited in the protologue as deposited at EAP [Escuela Agrícola Panamericana, in Honduras], but Williams' types there were transferred to US in 1956 (Dorr et al., 2009). The 'isotype' at US, cited by Croat (1982), is in fact the holotype.

***Syngonium decipiens* Schott.** The protologue (Schott, loc. cit.) was under a heading '*Species vix cognitae*' [species barely known] and consisted of a description of a juvenile vegetative plant. It included '*Caladium abor*[*e*]*um* Hort.' [i.e. not *C. arboreum* Kunth = *Montrichardia arborescens* (L.) Schott]. Schott (1860: 213 & 214) retained it under a heading '*Dubia*' , noted he had seen it living in cultivation, and suggested it was the same as *Syngonium willdenowii* Schott. Later, Schott had had drawn a fertile specimen (no. *719*) collected in 1860 by Archduke Ferdinand Maximilian of Austria at Ilheus, Bahia, Brazil, (now presumed lost). The drawing, no. 3200, is annotated by Schott as *Syngonium decipiens*, and is here designated the neotype, thereby preserving Schott's concept. **Figure 282**.

***Syngonium gracile* (Miq.) Schott.** No original material has been found. However, three sheets at L, collected by Gaudichaud at Rio de Janeiro, are annotated by Schott with this name. L-barcode 1423455 & 1423454 (Herb. Gaudichaud coll. at Rio [de] Janeiro, L-barcode 1423453 ('RJan Gaudich'). One of these might be suitable to designate as a neotype on further investigation.

***Syngonium hoffmannii* Schott**. The holotype is presumed destroyed at B, but a photograph of it is at F. Schott drawing no. 3212 is evidently of the holotype, and is designated neotype here, as it includes analytical details. **Figure 283**.

***Syngonium neglectum* Schott.** This was based by Schott (loc. cit.) on a Liebmann specimen said to be at C. It has not been located. However, Schott had the specimen drawn (drawing no. 3213), and the drawing is here designated the neotype. **Figure 284**.

***Syngonium oerstedianum* Schott**. The protologue cited no specimens, merely indicating where the plant had been collected. No specimen has been located. Schott drawing (no. 3214) of an Ørsted specimen from the type locality is therefore designated the neotype. **Figure 285**.

***Syngonium peliocladum* Schott.** This was described from juvenile living material collected by Wendland in Costa Rica (Schott, loc. cit.). Schott's two paintings (nos. 3215, 3216) of *S. peliocladium* are evidently prepared after the publication of the name, being from a mature living plant, and are complementary elements of a single entity for the purpose of typification, one being of the leaves, the other floral analysis. They are here designated the neotype. **Figures 286–287**.

***Syngonium plumieri* Schott.** Schott (loc. cit.) based this only on a drawing and description by Charles Plumier (1646–1704), but indicating neither Plumier's name for the plant nor the plate number, nor the work in which the description and drawing appeared, and merely stated the provenance as '*Ind. occ*' [West Indies]. Nevertheless, it must be that cited here (which was also cited in the protologue of *Arum auritum* L., but is not the lectotype of that name). The

Figure 286: Part 1 of the neotype of *Syngonium peliocladum* Schott. — Schott drawing No. 3215, with five inflorescences in different stages and detailed inserts. [From the Archive for the History of Sciences, Natural History Museum Vienna (inventory no. NHMW-AFW-SchottIcones3215); reproduced with permission].

Figure 287: Part 2 of the neotype of *Syngonium peliocladum* Schott. — Schott drawing No. 3216, two leaves without stem. [From the Archive for the History of Sciences, Natural History Museum Vienna (inventory no. NHMW-AFW-SchottIcones3216); reproduced with permission].

Figure 288: Part 1 of the neotype of *Syngonium podophyllum* Schott. — Schott drawing No. 3222, sterile plant in habit. [From the Archive for the History of Sciences, Natural History Museum Vienna (inventory no. NHMW-AFW-SchottIcones3222); reproduced with permission].

Figure 289: Part 2 of the neotype of *Syngonium podophyllum* Schott. — Schott drawing No. 3223, of three inflorescences, face view, side view and side view cut-away with detailed inserts. [From the Archive for the History of Sciences, Natural History Museum Vienna (inventory no. NHMW-AFW-SchottIcones3223); reproduced with permission].

Figure 290: Part 3 of the neotype of *Syngonium podophyllum* Schott. — Schott drawing No. 3224, showing stem with three inflorescence and fade out of entire leaf.. [From the Archive for the History of Sciences, Natural History Museum Vienna (inventory no. NHMW-AFWSchottIcones3224); reproduced with permission].

Figure 291: The neotype of *Syngonium poeppigii* Schott. — Schott drawing No. 3226, of the presumed holotype specimen, a single leaf. [From the Archive for the History of Sciences, Natural History Museum Vienna (inventory no. NHMW-AFW-SchottIcones3226); reproduced with permission].

plate is therefore here designated the lectotype of *Syngonium plumieri.* Schott later (Schott, 1860: 207) expressed doubt that this species was distinct from *Syngonium auritum* (L.) Schott, and indicated the plant was from 'S[anto] Domingo', where Plumier had observed it ('L'Isle S[aint] Domingue', the then French part of Hispaniola, in the area of what is now the Republic of Haiti) and made his characteristically detailed description (Plumier, 1693: 41–43).

***Syngonium podophyllum* Schott**. No specimens were cited in the protologue, which indicated the plant had come up in soil associated with orchids sent to Schott from Mexico. Schott drawings 3222, 3223 and 3224, evidently from the living plant, are here designated the neotype. They respectively depict the habit, floral analysis, and a flowering shoot, so comprising complementary elements of a single entity for the purpose of typification. **Figures 288–290**.

***Syngonium podophyllum* var. *multisectum* Engl.** This was said in the protologue (Engler, loc. cit.) to have been from Bogor Botanic Garden [Engler himself did collect Araceae specimens from Bogor, but nothing relevant among Berlin type photos at F], and to be similar to material from the botanic garden in Martinique under the number '*P.* [Père] *Duss 519*'. However, herbarium material of *Duss 519* at P is of *Charianthus* (Melatomataceae). In his *Flore Phanérogamique des Antilles Françaises* (Duss, 1897: 483), he records *Syngonium podophyllum* in the Jardin Botanique de Saint Pierre, Martinique, and cites his collection no. *2194* (with '519' then perhaps a transcription error?), though a Duss specimen with that number at MO is of *Ficus* (Moraceae). The typification of var. *multisectum* Engl. is unable to be resolved at present.

***Syngonium poeppigii* Schott.** This was a new name for a plant to which Poeppig (loc. cit.) had misapplied the name *Syngonium auritum* (L.) Schott. The holotype is presumed destroyed at W. Schott's drawing of it is here designated the neotype. **Figure 291**.

***Syngonium riedelianum* Schott.** The protologue (Schott, loc. cit.) appears under a heading '*Species vix cognitae*' and consists of a description of the leaf of a sterile juvenile plant. It included '*Philodendron riedelianum* Hortorum' [non *Philodendron riedelianum* Schott = *Philodendron* [subg. *Pteromischum*] *surinamense* (Miq.) Engl.], but no other material was cited. Later, Schott (1860: 202) provided a description of the adult, flowering plant, noting, among other things, the trisect leaves with very broad anterior lobes. Several Schott drawings were made of *Syngonium riedelianum*, including colour plates by W. Leipoldt with extremely detailed and beautifully executed flower, fruit, seed, and seedling studies, but no mature leaves (Schott drawings 3709, 3712, 3713 and 3713a, of which 3712 is the most complete but with juvenile, sagittate leaves). Three coloured plates by J. Oberer are also of this species, depicting the climbing adult plant (drawing 3711), a flowering shoot (drawing 3228), and floral analysis (drawing 3710) respectively. [Two of these illustrations were published under this name in Peyritch's *Aroideae Maximilianae* (Peyritch, 1879: 26 & 27; plates 17 & 18). Both were there attributed to Leipoldt, but actually there was only one of his (drawing 3712 — Plate 18) and the other was Oberer's (drawing 3711 — Plate 17)]. Oberer's three plates, here considered as three complementary elements of a single entity for the purpose of typification, are designated the neotype, as one of the most distinctive features Schott described, the unusually broad median (anterior) leaflets, are clearly depicted. **Figures 292–294**.

Figure 292: Part 1 of the neotype of *Syngonium riedelianum* Schott. — Schott drawing No. 3228, of stem with two leaves, two inflorescences [From the Archive for the History of Sciences, Natural History Museum Vienna (inventory no. NHMW-AFW-SchottIcones3228); reproduced with permission].

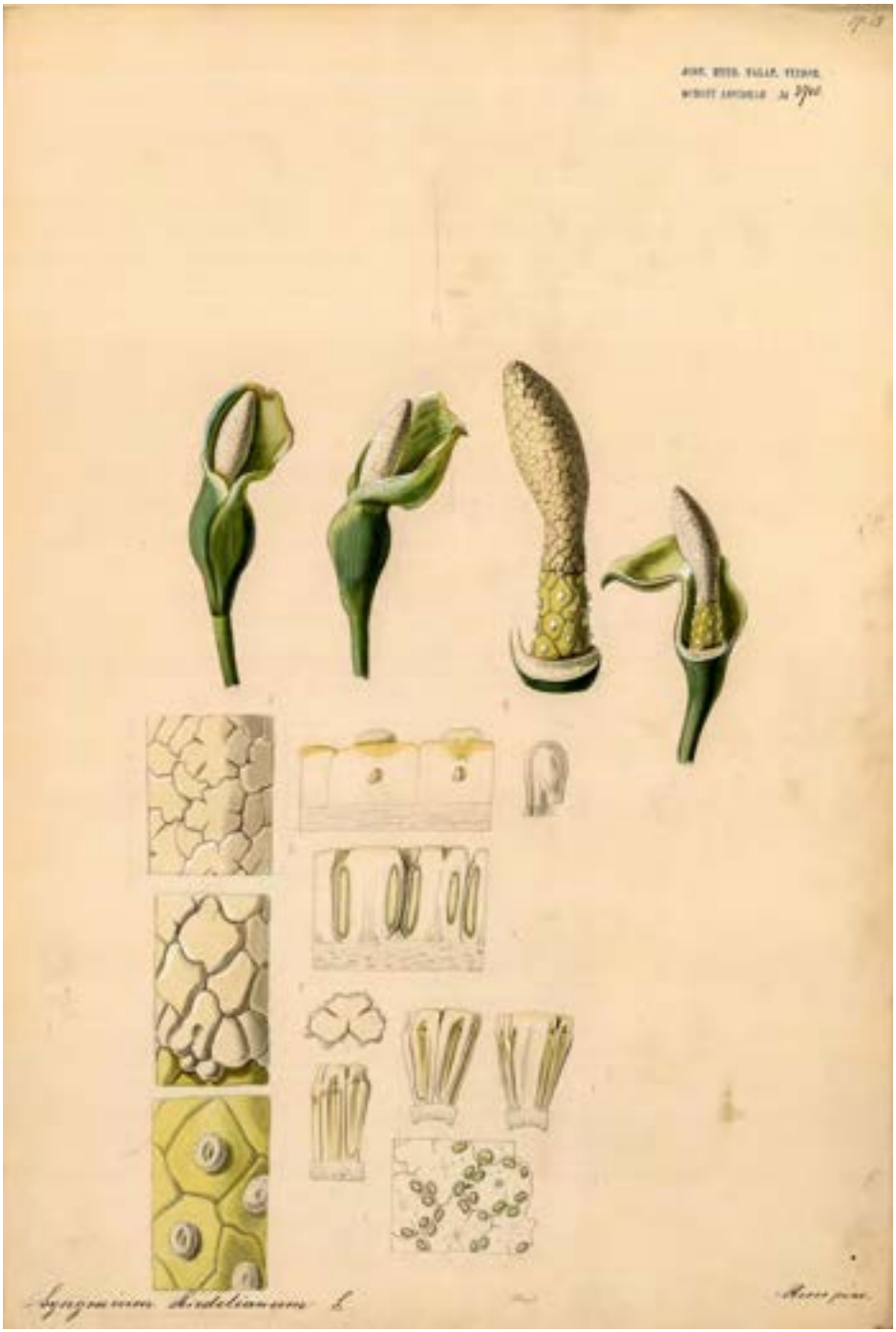

Figure 293: Part 2 of the neotype of *Syngonium riedelianum* Schott. — Schott drawing No. 3710 of four inflorescences of different stages with detailed inserts.[From the Archive for the History of Sciences, Natural History Museum Vienna (inventory no. NHMW-AFW-SchottIcones3710); reproduced with permission].

Figure 294: Part 3 of the neotype of *Syngonium riedelianum* Schott. — Schott drawing No. 3711 of flowering plant in habit. [From the Archive for the History of Sciences, Natural History Museum Vienna (inventory no. NHMW-AFW-SchottIcones3711); reproduced with permission].

Figure 295: The neotype of *Syngonium ruizii* Schott. — Schott drawing No. 3229, of the presumed holotype specimen, a single leaf. [From the Archive for the History of Sciences, Natural History Museum Vienna (inventory no. NHMW-AFW-SchottIcones3229); reproduced with permission].

Figure 296: The neotype of *Syngonium schottianum* Wendl. ex Schott. — Schott drawing No. 3237, of the living juvenile phase described in the protologue, consisting of a face view and cut-out side view of inflorescences. [From the Archive for the History of Sciences, Natural History Museum Vienna (inventory no. NHMW-AFW-SchottIcones3237); reproduced with permission].

Figure 297: Part 1 of the epitype of *Syngonium schottianum* Wendl. ex Schott. — Schott drawing No. 3234. [From the Archive for the History of Sciences, Natural History Museum Vienna (inventory no. NHMW-AFW-SchottIcones3234); reproduced with permission].

Figure 298: Part 2 of the epitype of *Syngonium schottianum* Wendl. ex Schott. — Schott drawing No. 3235 of leaf blade, adaxial surface. [From the Archive for the History of Sciences, Natural History Museum Vienna (inventory no. NHMW-AFW-SchottIcones3235); reproduced with permission].

Figure 299: Part 3 of the epitype of *Syngonium schottianum* Wendl. ex Schott. — Schott drawing No. 3236 of leaf blade, abaxial surface. [From the Archive for the History of Sciences, Natural History Museum Vienna (inventory no. NHMW-AFW-SchottIcones3236); reproduced with permission].

***Syngonium ruizii* Schott**. This was based on a specimen at B (evidently destroyed, and not among the type photos at F), collected by Hipólito Ruiz, presumably in Peru during the ten year expedition with Pavón (and Dombey) to Chile and Peru from 1778–1788. Schott had the specimen drawn and the drawing is here designated the neotype. **Figure 295**.

***Syngonium schottianum* Wendl. ex Schott.** The protologue indicates it was described from a juvenile living plant. The type was cited in Croat (1982) as a destroyed Wendland specimen, of which there is a photo at F (no. 12301, IRN 23114). However, that specimen is labelled 'ex Hort. Kew' and was accessioned at Berlin in 1904, and was not the type. Paintings were made in Vienna (by Wenzel Leipoldt, and one, Schott drawing no. 3237, of a juvenile vegetative shoot painted by Josef Unger). All are annotated by Schott "*Syngonium schottianum* Wendl.". Drawing no. 3237 corresponds virtually exactly to the description in the protologue. However, it is undated and it therefore cannot be said unequivocally to be part of the original material for the purpose of lectotypification; it is therefore here designated the neotype. Those by Leipoldt depict the adult abaxial leaf (3236), adult adaxial leaf (3235), the undissected inflorescence and leaf sheath (no. 3233), and dissected inflorescences (3232, 3234). No. 3232 gives an impression of representing a somewhat malformed inflorescence and the spathe:spadix length ratio is the same as that in drawing 3233, but clearly different from that in 3234 in which the floral details appear normal. This name is therefore epitypified with drawings 3234, 3235 and 3236, taken to be complementary elements of a single entity for the purpose of typification. While it is unusual not to designate a specimen as an epitype, the clarity of morphological detail in the superbly executed paintings is such that the drawings are as informative as a specimen. **Figures 296–299**.

***Syngonium vellozianum* Schott.** This was a new name for Vellozo's illegitimate *Arum auritum* which was not validated until the 1881 publication of the second edition of Vellozo's *Flora Fluminensis* (loc. cit). Schott based it on two elements, Vellozo's illustration, published much earlier (but without analysis and so the name not valid there), and a Gaudichaud specimen from Rio de Janeiro at B (apparently no longer extant). Engler (1878: 129) included under *Syngonium vellozoanum* the drawing but not the Gaudichaud specimen (despite citing other specimens under segregate varieties, and various Gaudichaud specimens under a range of other species in that work); this is here taken to constitute an implicit lectotypification with the drawing.

***Syngonium wendlandii* Schot**t. The type was cited in Croat (1982) as a Wendland specimen destroyed at B. The only photo bearing this name at F (photo number 12299, IRN 238631) is of a B specimen not annotated by Schott, and having attached a copy of the entry for this species in Pflanzenreich 71 (IV.23E) (1920) 124, together with an annotation 'Bearbeitet für das «Pflanzenreich"'. The specimen in the photo seems not to have been the type, but perhaps a voucher made for the Pflanzenreich account. However, there is at GOET an extant Wendland specimen annotated by Schott, here designated as the lectotype.

***Syngonium xanthophilum* Schott**. This species was described from a living plant from Mexico; no preserved element was cited in the protologue. A sterile specimen with juvenile and mature leaves was preserved at W, presumed destroyed during WWII, annotated with this name in Schott's hand, of which a photo remains at F (photo no 29870, IRN 238632). The painting of this species executed for Schott (no. 3249) is here designated the neotype. **Figure 300**.

Figure 300: The neotype of *Syngonium xanthophilum* Schott. — Schott drawing No. 3249, of the presumed holotype specimen habit of presumed adult plant. [From the Archive for the History of Sciences, Natural History Museum Vienna (inventory no. NHMW-AFW-SchottIcones3249); reproduced with permission].