
LANKESTERIANA

No. 1

MAYO 2001

Addenda Orchidaceis Quepoanis

FRANCO PUPULIN



LA REVISTA CIENTIFICA DEL JARDIN BOTANICO LANKESTER
UNIVERSIDAD DE COSTA RICA

LA PUBLICACIÓN DE ESTE FASCÍCULO
DE LANKESTERIANA
HA SIDO POSIBLE GRACIAS A LA COOPERACIÓN
Y A UNA GENEROSA DONACIÓN DE



CLEVELAND
BOTANICAL
GARDEN

LANKESTERIANA

No. 1

MAYO 2001

Addenda Orchidaceis Quepoanis

FRANCO PUPULIN



LA REVISTA CIENTIFICA DEL JARDIN BOTANICO LANKESTER
UNIVERSIDAD DE COSTA RICA

LANKESTERIANA

LA REVISTA CIENTIFICA DEL JARDIN BOTANICO LANKESTER
UNIVERSIDAD DE COSTA RICA

Copyright © 2001 Jardín Botánico Lankester, Universidad de Costa Rica

Fecha de publicación válida / Effective publication date: 15 de mayo del 2001

Diagramación: Jardín Botánico Lankester

Digitalización de las imágenes: Carlos Ossenbach y Asociados

Imprenta: Litografía Ediciones Sanabria S.A.

Tiraje: 500 copias

Impreso en Costa Rica / Printed in Costa Rica

R Lankesteriana / La revista científica del Jardín Botánico
Lankester, Universidad de Costa Rica. No. 1
(2001)-- . San José, Costa Rica: Editorial Universidad
de Costa Rica, 2001--

v.

ISSN 1409-3871

1. Botánica - Publicaciones periódicas, 2. Publicaciones
periódicas costarricenses



UN HOMENAJE AL ESTUDIO DE LAS EPIFITAS A HOMAGE TO THE STUDY OF EPIPHYTES

JORGE WARNER

Director, Jardín Botánico Lankester - Universidad de Costa Rica
P.O. Box 1031-7050 Cartago, Costa Rica, A.C. jwarner@cariari.ucr.ac.cr

Estimado lector:

En sus manos está el primer número de LANKESTERIANA, la publicación científica del Jardín Botánico Lankester de la Universidad de Costa Rica. Su nombre honra la memoria de Charles Lankester, gran naturalista inglés fundador de este Jardín que lleva su nombre desde 1973. En los últimos años el Jardín Botánico Lankester ha hecho, a través de sus investigadores, importantes contribuciones al conocimiento de la flora de Costa Rica, principalmente mediante exploraciones botánicas y estudios taxonómicos que han conducido al descubrimiento de numerosas especies nuevas para la ciencia. Sus programas de educación ambiental y de micropropagación de especies amenazadas de extinción han contribuido significativamente a disminuir la presión de recolecta sobre las poblaciones naturales.

LANKESTERIANA representa un gran hito en la historia del Jardín Botánico Lankester. Nace con el apoyo de la Universidad de Costa Rica como parte de una estrategia para enfrentar los retos del nuevo siglo con renovado entusiasmo y reafirmar el papel protagónico del Jardín Botánico Lankester en la investigación, la educación ambiental y la conservación de la flora epífita neotropical.

LANKESTERIANA publicará principalmente trabajos científicos originales sobre sistemática y ecología de plantas epífitas, además de estudios relacionados con morfología, genética, propagación y conservación. Se enfatizará en investigaciones que tengan como sujeto de estudio especies originarias de Mesoamérica, especialmente orquídeas. Esta región posee una variada flora, donde casi 20% de las familias de plantas incluyen epífitas.

Confiamos en que el esmerado trabajo de sus editores, el apoyo entusiasta de su Comité Científico y las contribuciones de la comunidad científica harán posible el éxito de esta nueva publicación.

Dear reader:

This is the first issue of LANKESTERIANA, the scientific journal of Jardín Botánico Lankester at Universidad de Costa Rica. Its name honors the memory of Charles Lankester, British naturalist and founder of the botanical garden entitled to him since 1973. Thanks to the botanical exploration and taxonomic studies carried out by its researchers, the Jardín Botánico Lankester has made important contributions to the knowledge of Costa Rican flora and revealed many species new to the science. Its programs of environmental education and micropropagation of threatened species consistently contributed to reduce the collecting pressure on natural populations.

LANKESTERIANA means a big step in Jardín Botánico Lankester history. It was born with the support of the Universidad de Costa Rica as part of a strategy to face the challenges of the new century with renewed enthusiasm and to confirm the leading role of Jardín Botánico Lankester in research, environmental education and conservation of neotropical epiphytes.

LANKESTERIANA is mainly devoted to the publication of original research on systematic and ecology of epiphytes, as well as morphology, genetic, propagation and conservation. The journal emphasizes research on Mesoamerican species, mainly orchids. This region has a rich flora where almost 20% of the plant families includes epiphytes.

We trust the conscientious work of its editors, the enthusiastic support of its scientific committee and the contribution of scientists around the world will promote the success of this new journal.

ADDENDA ORCHIDACEIS QUEPOANIS

FRANCO PUPULIN

Jardín Botánico Lankester - Universidad de Costa Rica
P.O. Box 1031-7050 Cartago, Costa Rica, A.C. fpupulin@cariari.ucr.ac.cr
Research Associate, Marie Selby Botanical Gardens, Sarasota, U.S.A.

ABSTRACT. Sixteen orchid species are first reported for the area of Quepos in addition to those recorded for Manuel Antonio National Park, Costa Rica. Generic descriptions are provided for the genera not previously recorded for the area, and each species is described and illustrated. Data on distribution and phenology are provided, together with keys to the genera including more than one species in the area. A new species, *Epidendrum montis-narae* Pupulin & L. Sánchez, is described and illustrated. Two previously recorded species, *Epidendrum isomerum* and *Oncidium polycladium*, are illustrated from material collected within the study area.

KEY WORDS: Orchidaceae, Taxonomy, Tropical Wet Forest, Costa Rica, Quepos

The epiphytic flora of Costa Rican Pacific lowlands failed to attract the interest of botanists. Species richness in epiphytes is greater in premontane and lower montane rain forests reflecting a correlation with moisture availability through cloud cover and mists, and with the notable exception of La Selva Biological Station (Atwood, 1987) most of the better sampled areas for epiphytic flora in Costa Rica are in mountainous regions. Also when the level of total rainfall is approximately the same, epiphytic abundance and diversity are influenced by the seasonal distribution of the rain, and species richness is usually greater in Caribbean lowlands than in Pacific forests, which experience several months of dry-season. However, in the last few years many new plant species and new records were reported from central Pacific Costa Rica, which proved to be a very rich and botanically underexplored area (Dressler & Pupulin, 1996; Hodel *et al.*, 1997; Estrada & Cascante, 1998; Pupulin, 1998b; Sánchez, 1998; Pupulin, 2000).

The present paper follows the work by Pupulin (1998b) intended to elucidate the orchid flora of the area of Quepos, and includes new records and taxa originating from field collections done in the region. The study area corresponds politically to the Cantón de Aguirre, province of Puntarenas, and it is representative of the tropical moist, transition to wet forests of the lowlands and firsts highs (usually under 200 m elevation) of Costa Rican Pacific drainage. It takes the name used in this paper from the ancient Quepo tribes settled along the coast of central Pacific Costa Rica before the arrival of the Spanish conquerors. After the destruction of their culture and the deportation of the last natives at the end

of the eighteenth century, the actual name of the village of Quepos is the only memory of the ancient masters of these lands. Generic descriptions are provided for all the genera not previously reported for the area, whereas accounts on the already recorded genera may be found in Pupulin (1998b). For each of the new records a detailed description, illustration, and notes on distribution and phenology are provided. Nomenclatural changes are given for the taxa of which recent systematic studies were done. All the drawings are based on specimens native to the study area.

SPECIES DESCRIPTIONS

1. *CAMPYLOCENTRUM* Benth.

1. *Campylocentrum tyrridion* Garay & Dunst.,
Venez. Orch. Ill. 2: 54. 1961. FIG. 1.

Plant epiphytic, acaulescent, a leafless cluster of roots. *Roots* conspicuous, flexuous, glabrous, produced from the cormlike body of the obsolescent stem, less than 1 mm in diameter. *Inflorescence* 1 to many patent racemes, usually produced in pairs, with filiform, glabrous peduncle, to 11 cm long; floral bracts inconspicuous, scarious, triangular, acute. *Flowers* small, distichous, white with yellowish spur. *Sepals* ovate to broadly ovate, obtuse, 1-nerved, 1.2 mm long, 0.5-1.0 mm wide. *Petals* oblique, elliptic-ovate, obtuse to acute, about 1 mm long, 0.5 mm wide. *Lip* simple, triangular, obtuse, extended at the base into a curved, saccate, conspicuous, bulbous spur, about 2 mm long including the spur, 0.6 mm wide. *Column* very short, with terminal anther, about

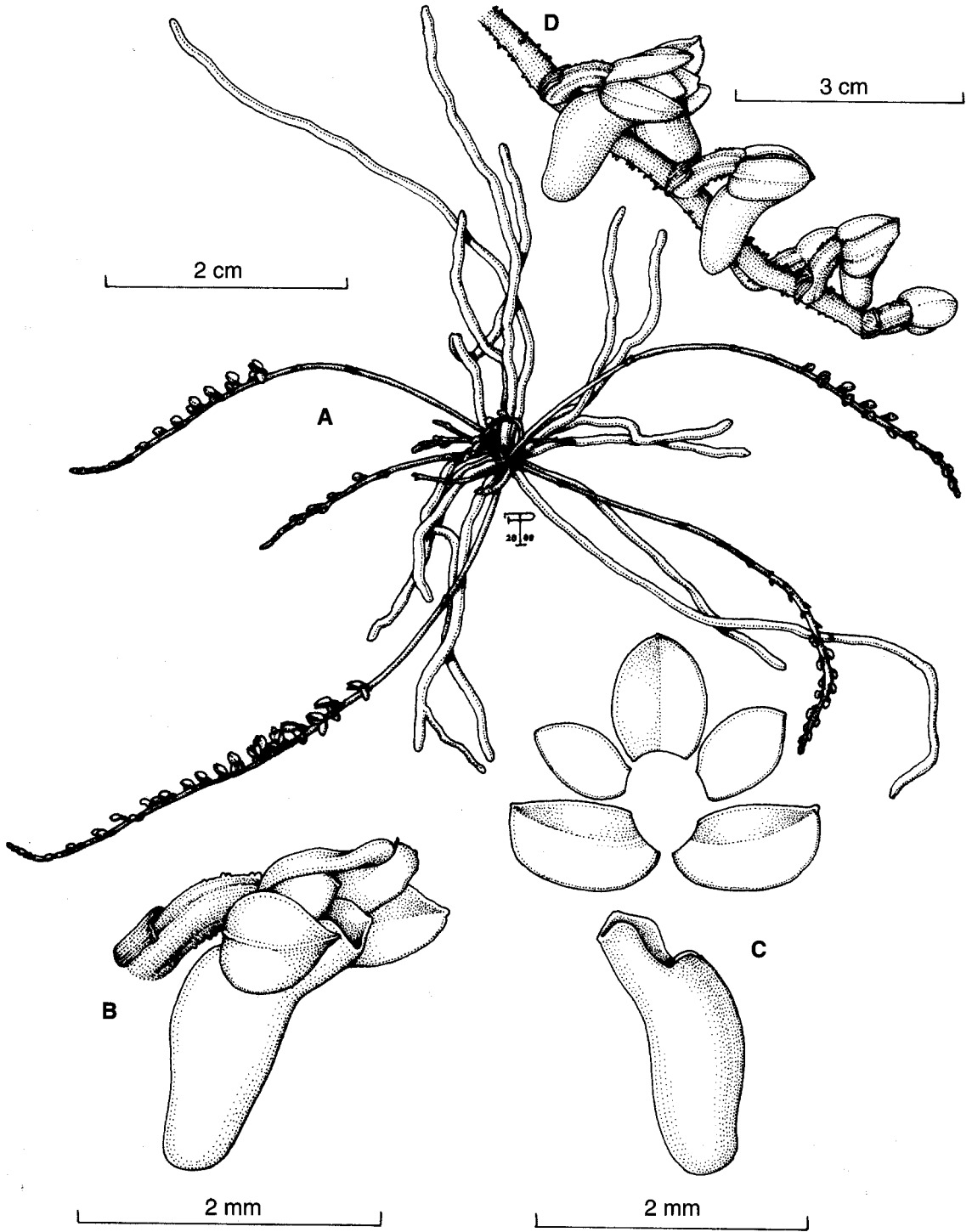


Figure 1. *Campylocentrum tyrridion* Garay & Dunsterville. A - Habit. B - Flower. C - Dissected perianth. D - Inflorescence. ILLUSTRATION VOUCHER: F. Pupulin 1029 (USJ).

0.5 mm long. *Pollinia* 2, on a short hyaline stipe; viscidium elliptic. *Anther cap* cucullate, ellipsoid, 1-celled.

DISTRIBUTION: Guatemala and Belize to Venezuela and Peru.

QUEPOS AREA: Near Naranjito, about 50 m, in *Citrus* orchard, 2 Jan. 1999, flowered in cultivation at Gaia Botanical Garden, 9 May 1999, *F. Pupulin*, *D. Castel-franco* & *L. Spadari* 1029 and 1030 (USJ!).

PHENOLOGY: flowering occurs from April to July.

Although populations of aphyllous *Campylocentrum* were usually accepted as *C. fasciola* (Lindl.) Cogniaux (Schweinfurth, 1961; Dodson & Dodson, 1980; Hamer, 1985; Brako & Zarucchi, 1993; McLeish *et al.* 1995), specimens of leafless, acaulescent *Campylocentrum* from Pacific Costa Rica (Puntarenas, *C. Todzia* 219, SEL, and *D.G. Cufodontis* 155, AMES) consistently differs from *C. fasciola* in the shape and size of lip and spur.

KEY TO THE *CAMPYLOCENTRUM* SPECIES OF QUEPOS AREA

1. Plant leafless, acaulescent *C. tyrridion*
1. Plants with conspicuous leaves on elongate stem.... 2
 2. Stem < 20 cm long; leaves < 5 cm long.....
..... *C. micranthum*
 2. Stem > 30 cm long; leaves > 7 cm long.....
..... *C. panamense*

2. *COELIOPSIS* Rchb.f.

Cespitose, epiphytic, herbs with sulcate pseudobulbs, 2-4-foliolate at apex. Leaves plicate, prominently veined, oblanceolate, persistent. Inflorescence a simple, short, pendent raceme from the bases of pseudobulbs, many-flowered. Flowers small. Sepals subequal, fleshy, the dorsal free, the lateral ones connivent at the base forming a mentum; petals smaller than sepals; lip 3-lobed, the lateral lobes erect, the midlobe rectangular-ovate, truncate, with ciliate margins. Column short, subclavate, winged, with terminal, operculate anther. *Pollinia* 2, waxy.

A probably monotypic genus restricted to the Neotropics, only known from Costa Rica and Panama.

1. *Coeliopsis hyacinthosma* Rchb.f., Gard. Chron. 9: 1872. FIG. 2.

Plant epiphytic, cespitose, forming large clumps. *Roots* fleshy, glabrous. *Pseudobulbs* ovoid to subcylindric, sulcate, to 8.5 cm long, about 3.5 cm wide, basally covered by 3-5 papyraceous sheaths, 2-4 foliolate at apex (rarely monophyllous). *Leaves* oblanceolate, acuminate, plicate, prominently veined, 30-50 cm long, 5-7 cm wide. *Inflorescence* basal, pendent, a

terete, subcapitate, many-flowered raceme to 8-12 (18) cm long, covered at the base by imbricating, brown, papyraceous sheaths. *Flowers* rather showy, white, the lip blotched with orange within the gorge. *Dorsal sepal* ovate, acute, concave, free, 1.8-2.0 cm long, 0.9-1.2 cm wide. *Lateral sepals* obliquely lanceolate, acute, 2.0-2.2 cm long, 1.0-1.2 cm wide, connate at the base to form a conspicuous mentum. *Petals* lanceolate, acute, about 1.5 cm long, 0.6 cm wide. *Lip* 3-lobed, strongly reflexed at apex, 1.6-1.8 cm long, 1.3-1.5 cm wide; lateral lobes erect with spreading, apically ciliate margins; the midlobe rectangular to ovate, obtuse to truncate, with ciliate margins. *Column* subclavate, winged, about 10 mm long, with a purple blotch at the base. *Pollinia* 2, elliptic, on a short stipe. *Anther cap* cucullate, white.

DISTRIBUTION: Costa Rica and Panama, rather frequent in wet forests to about 1000 m.

QUEPOS AREA: Villa Nueva, finca Walker, 200 m, collected by Mrs. Merli, flowered in cultivation at Gaia Botanical Garden, 27 Apr. 1999, *F. Pupulin* 1153 (USJ!).

PHENOLOGY: flowering occurs in March to May.

3. *EPIDENDRUM* L.

1. *Epidendrum congestoides* Ames & C. Schweinf., Sched. Orch. 10: 61. 1930. FIG. 3.

Plant epiphytic, cespitose, erect or pendent, with abbreviate, foliaceous stems to 6 cm tall. *Stems* simple, laterally flattened, to 5 cm long, about 0.7 cm in diameter, completely concealed by closely appressed leaf sheaths, 5-7-leaved. *Roots* filiform, flexuous, glabrous, produced at the base of the stem. *Leaves* distichous, lanceolate-elliptic to elliptic-ovate, retuse, irregularly bilobed at apex, fleshy, 1.8-2.7 cm long, 0.8-1.0 cm wide, not articulated to the sheaths, persistent. *Inflorescence* terminal from the upper leaf of mature growths, sessile, 2-flowered. *Ovary* triquetrous, sessile, glabrous, about 1 cm long. *Flowers* small, resupinate, greenish suffused with pale purple, the lip green. *Sepals* subsimilar, spreading, free, ovate-lanceolate, acute, apiculate, concave, dorsally carinate, 10-12 mm long, 4-5 mm wide. *Petals* drooping, triangular-subfalcate to subfalcate-ovate, acute, with entire margins, 8.0 mm long, 3.2 mm wide. *Lip* with a ligulate claw adnate to the column, the claw 6.8-7.0 mm long, the lamina widely reniform, obtuse, apiculate, obscurely cordate at the base, 3.0 mm long, 7.5 mm wide, the lateral lobes suberect. *Column* short, stout, incrassate at apex, provided with a pair of subrhombic, lateral teeth, the clinandrium erose-lacerate, arcuate, 4.5 mm long.

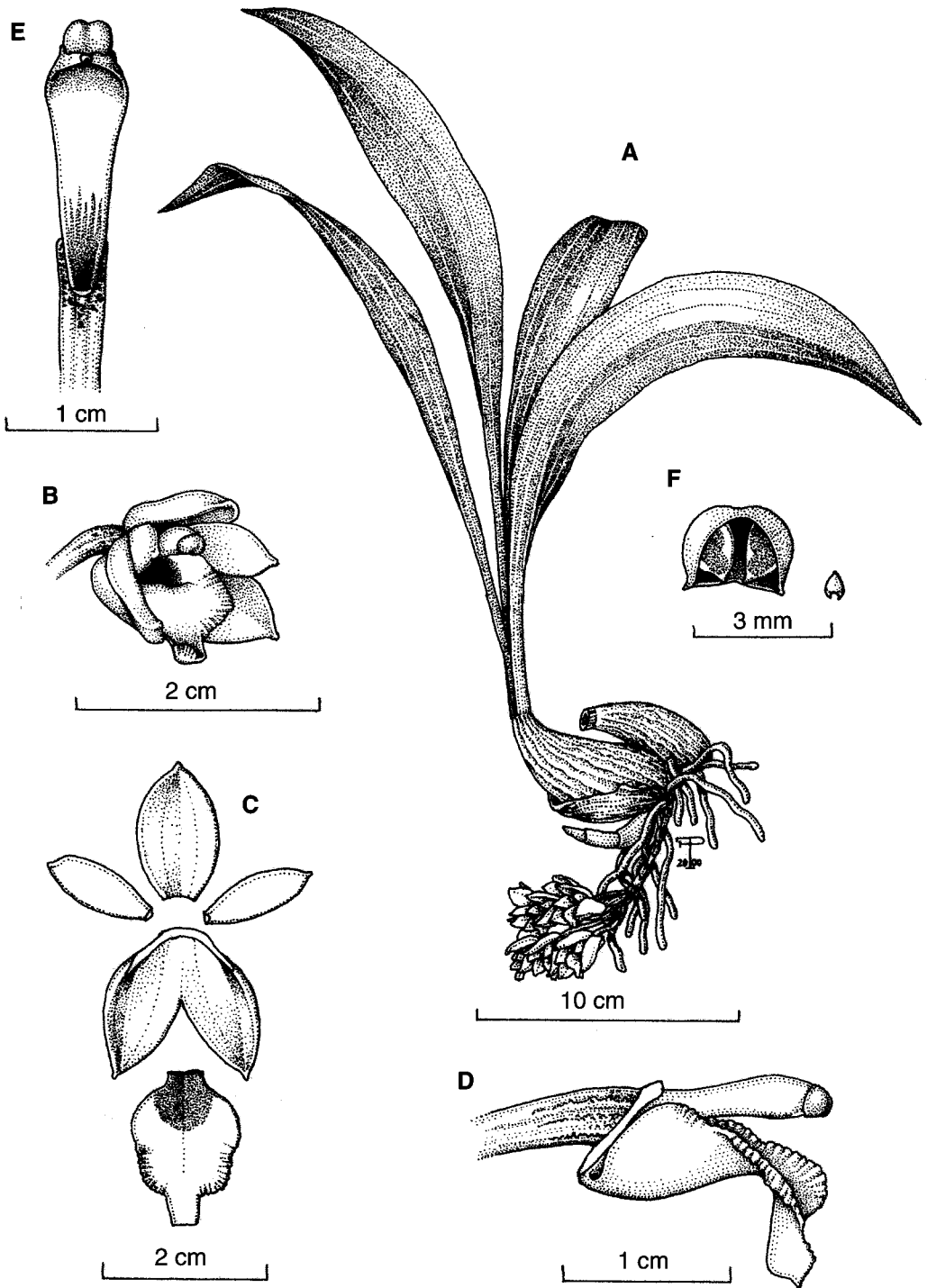


Figure 2. *Coeliopsis hyacinthosma* Rchb.f. A - Habit. B - Flower. C - Dissected perianth. D - Column and lip, lateral view. E - Column, ventral view. F - Operculum and caudicle. ILLUSTRATION VOUCHER: F. Pupulin 1153 (USJ).

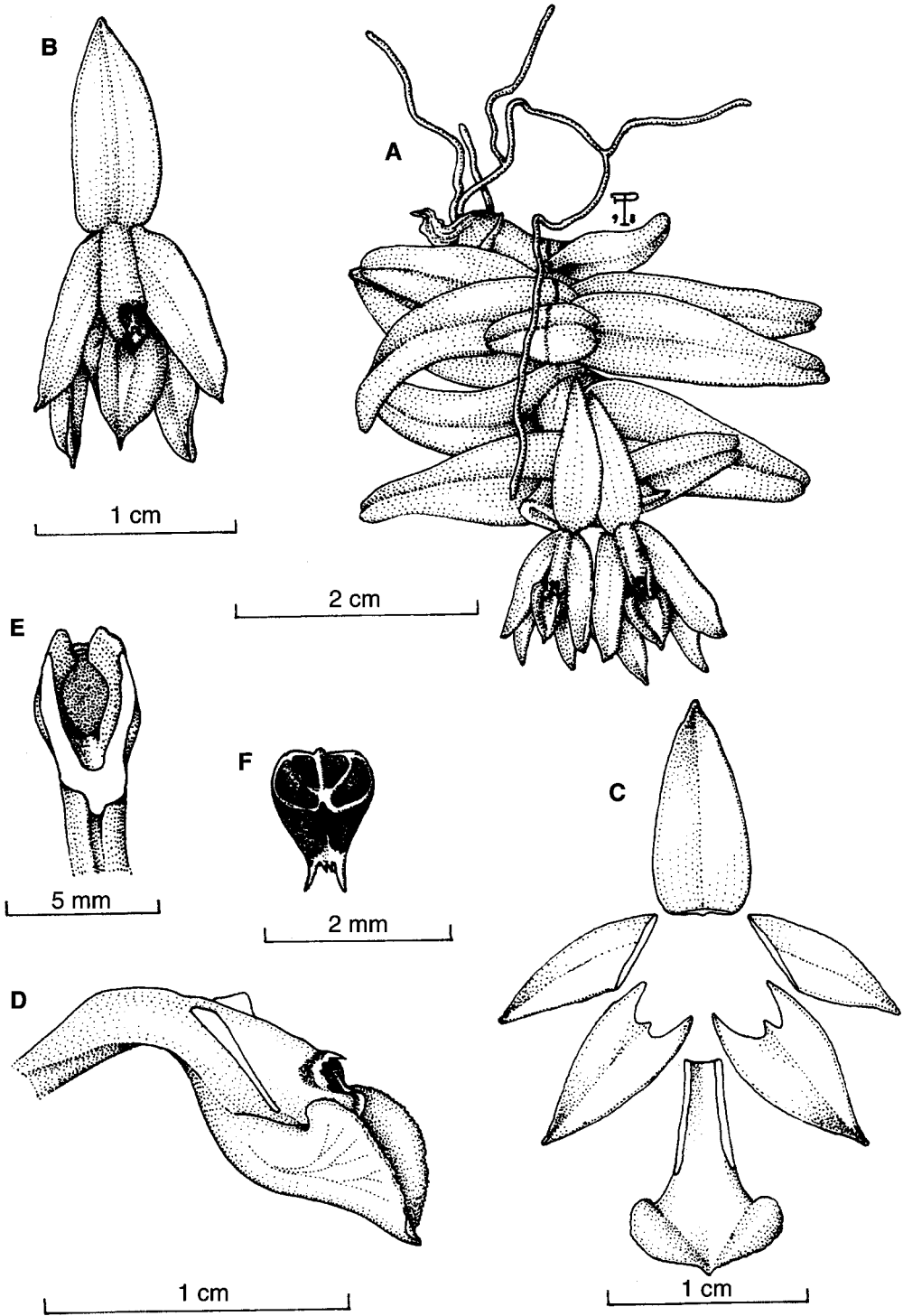


Figure 3. *Epidendrum congestoides* Ames & C. Schweinf. A - Habit. B - Flower. C - Dissected perianth. D - Column and lip, lateral view. E - Column, ventral view. F - Operculum. ILLUSTRATION VOUCHER: D. Castelfranco s.n. (Herb. Gaia Bot. Garden).

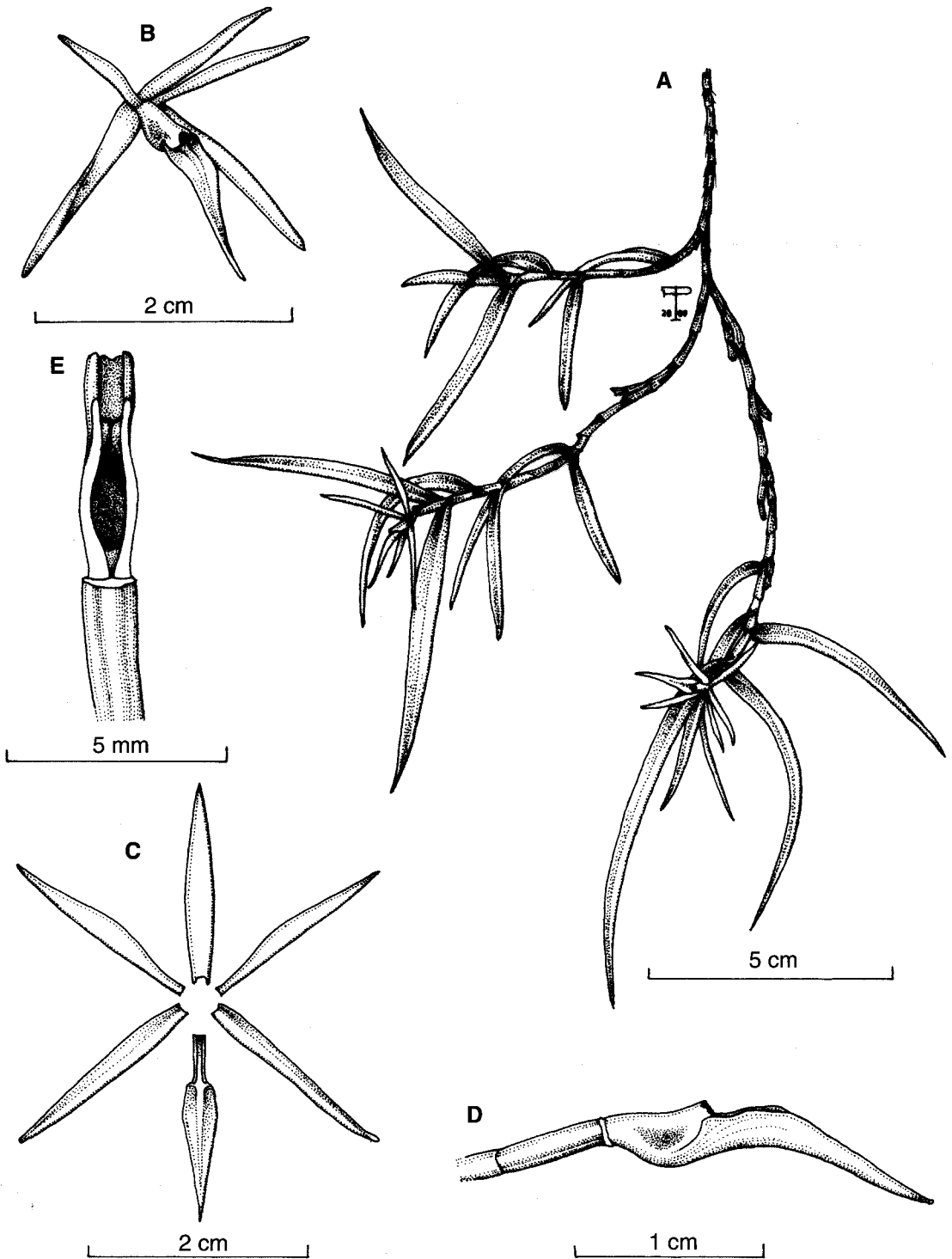


Figure 4. *Epidendrum isomerum* Schltr. A - Habit. B - Flower. C - Dissected perianth. D - Column and lip, lateral view. E - Column, ventral view. ILLUSTRATION VOUCHER: F. Pupulin 1658 (USJ).

Pollinia 4, laterally compressed, on a short caudicle. *Anther cap* cucullate, 4-celled, tridentate at apex, the lateral teeth longer.

DISTRIBUTION: Endemic to Costa Rica.

QUEPOS AREA: Naranjito, finca Juan Sáenz, flowered in cultivation at Gaia Botanical Garden, 14 June 1998, *D. Castelfranco s.n.* (Herb. Gaia Bot. Garden!).

PHENOLOGY: flowering mostly occurs in May and June.

2. *Epidendrum isomerum* Schltr., Fedde Rep. Sp. Nov. 2: 132. 1906. FIG. 4.

Recorded by Pupulin (1998) for the area of Quepos, this species was not illustrated in the orchid flora of Manuel Antonio National Park. An illustration is provided here based on a specimen collected by D. Castelfranco at Naranjito, finca Juan Sáenz, 10 Oct. 1998, flowered at Gaia Botanical Garden, 5 Oct. 1999, *F. Pupulin 1658* (USJ!).

3. *Epidendrum montis-narae* Pupulin & L. Sánchez, *sp. nova* FIG. 5.

TYPE: COSTA RICA. San José: Dota, eastern slopes and crest of Cerro Nara, 1050-1140 m, Premontane rain forest to Cloud forest, 15 Jan 1999, *F. Pupulin, D. Castelfranco & L. Spadari 1140* (holotype, USJ!; clonotype, AMO!).

Epidendro hameri Hágsater & L. Sánchez simile sed caulibus compressis, foliis superioribus non imbricatis, floribus majoribus, viridiflavis, sepalis, petalis et labello dissimilis.

Plant epiphytic, caespitose, 11-20 cm tall. *Stems* foliaceous, simple, laterally complanate, slightly fractiflex, 8-18 cm long, about 0.4 cm wide in diameter, covered by amplexicaul green sheaths, many-leaved. *Roots* basal, fibrous, flexuous, glabrous, produced at the base of the stem, about 1.8 mm in diameter. *Leaves* 4-8, alternate, distributed along the stem; blade elliptic to elliptic-ovate, irregularly bilobed at apex, coriaceous, somewhat erect, 2.4-3.7 cm long, 1.4-1.8 cm wide, articulated to the sheaths, persistent. *Inflorescence* apical, terminal from the mature growth, 5-7-flowered, subcorymbose, short raceme usually less than 1 cm long, concealed at the base by a large, cucullate, broadly ovate, green bract. *Flower bracts* much shorter than the ovary, triangular, inconspicuous, about 3 mm long. *Ovary* subclavate, terete, round in section, to 2.5-3 cm long. *Flowers* simultaneous, resupinate, greenish to yellowish green at anthesis, turning pale-golden bronze with age, fragrant at night, the scent fruity. *Sepals* subsimilar, spreading, free; oblanceolate-elliptic, acute, the margins revolute, the

dorsal 21 mm long, 6.5 mm wide; the laterals subfalcate, 23 mm long, 5.3 mm wide. *Petals* horizontal to slightly drooping, linear-ligulate, acute, margins revolute, 21.0 mm long, 2.1 mm wide. *Lip* with a long claw adnate to the column, the claw 7.7 mm long, the lamina 3-lobed, subreniform to transversely elliptic when spread, 11.2 mm long, 17.1 mm wide; lateral lobes larger than midlobe, reniform semiorbicular, entire; midlobe rounded, entire, forming 2-lobes, the lobes small, with a shallow sinus provided with a short apicule; disc with a pair of short, erect calli at the insertion of the column. *Column* straight to somewhat arcuate, stout, 12.5 mm long, the erose clinandrium projecting slightly beyond the apex of column, the rostellum slit slotted. *Pollinia* 4, obovoid, laterally compressed, on short, granular caudicles. *Anther cap* cucullate, subspherical, 4-celled.

ETYMOLOGY: named from the type locality along the slopes of Cerro Nara, in central Pacific Costa Rica.

DISTRIBUTION AND ECOLOGY: Only known from Costa Rica, on the eastern slopes and crest of Cerro Nara and Rio Savegre area. Growing epiphytic in premontane rain forest to cloud forest, between 90 and 1100 m altitude.

PARATYPES: Quepos area. Savegre: Santo Domingo, along the banks of Río Savegre, 27 Nov. 1999, *F. Pupulin, D. Castelfranco, L. Spadari & J. Matei 1848* and 1849 (USJ!). Without specific locality, a confiscated plant flowered at Gaia Botanical Garden, *GBG-1353* (USJ!).

PHENOLOGY: flowering occurs at least in November.

Epidendrum montis-narae is a member of the *Epidendrum difforme* complex and can be recognized by laterally compressed stems, elliptic-ovate, suberect leaves, 5-7, greenish to yellowish-green flowers, oblanceolate-elliptic, acute sepals, linear-ligulate, acute petals, 3-lobed lip, subreniform to transversally elliptic when spread, semiorbicular, entire lateral lobes, midlobe forming two small lobules, with a shallow sinus, apiculate. It is a close relative to *Epidendrum hameri* Hágsater & L. Sánchez, from Pacific slopes of Volcán Mombacho in Nicaragua, but this has somewhat laterally compressed stems, imbricating upper leaves, 1-2 small, very pale yellow-green, translucent flowers, obovate, rounded sepals, linear-spatulate, rounded petals, dolabriform, crenate lateral lobes. Another similar species from Pacific slopes is *E. citrosimum* Hágsater, endemic to the semideciduous and deciduous forests of the Sierra Madre in Mexico, but this species has terete stems, bright green flowers, sepals and petals rounded, clinandrium obsolete.

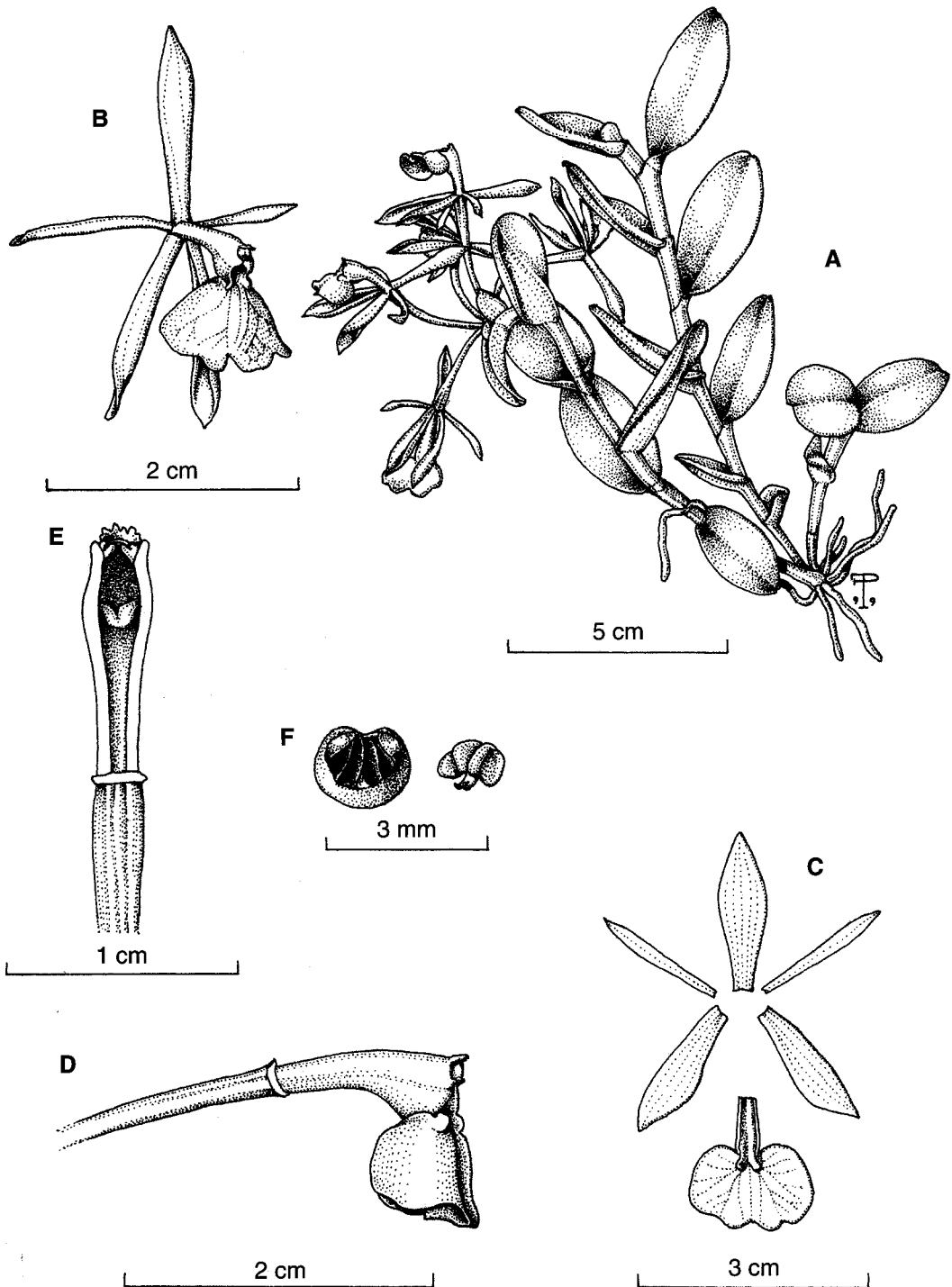


Figure 5. *Epidendrum montis-narae* Pupulin & L. Sánchez. A - Habit. B - Flower. C - Dissected perianth. D - Column and lip, lateral view. E - Column, ventral view. F - Operculum and pollinarium. ILLUSTRATION VOUCHER: F. Pupulin, D. Castelfranco & L. Spadari 1140 (USJ).

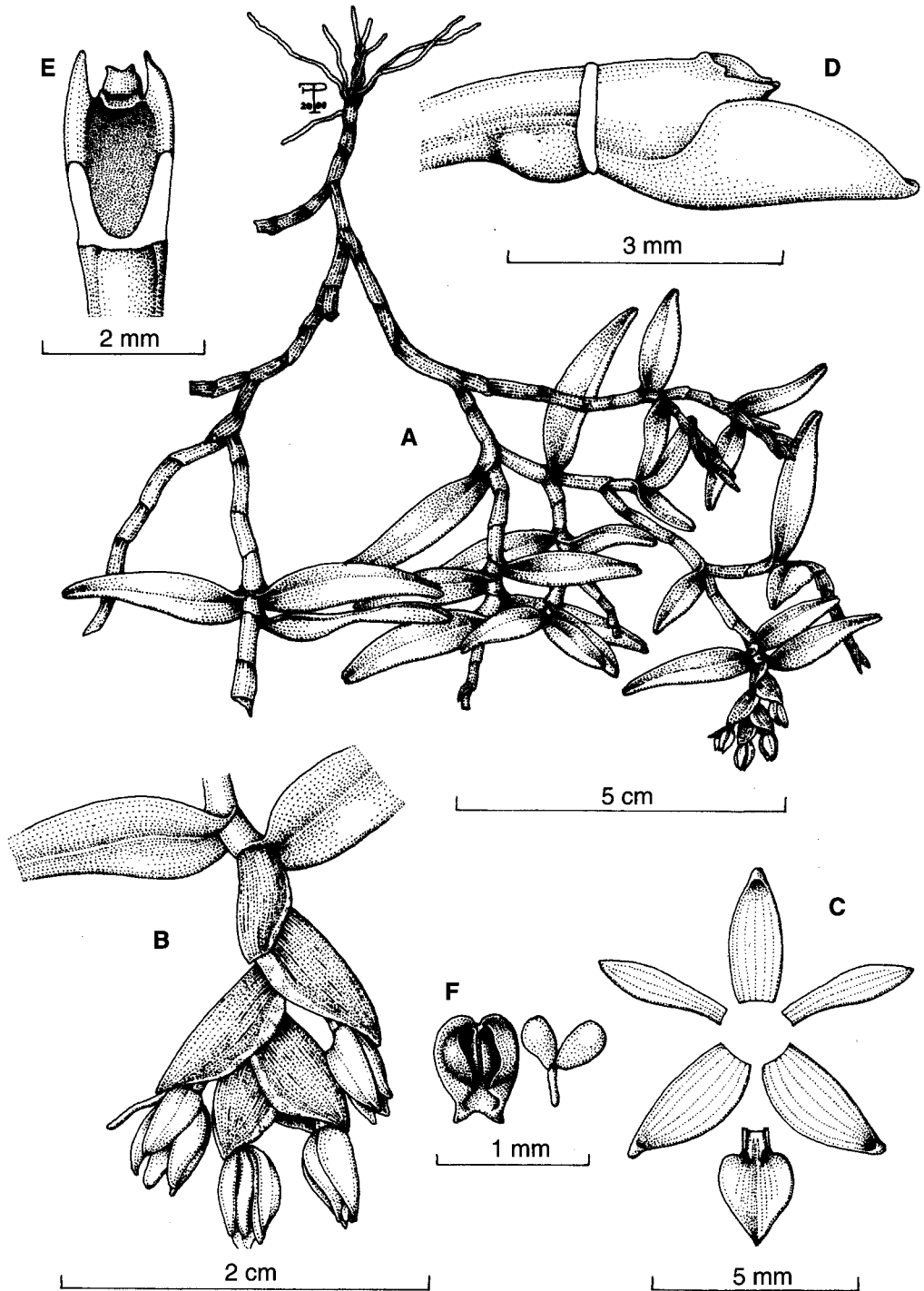


Figure 6. *Epidendrum strobiliferum* Rchb.f. A - Habit. B - Inflorescence. C - Dissected perianth. D - Column and lip, lateral view. E - Column, ventral view. F - Operculum and pollinarium. ILLUSTRATION VOUCHER: D. Castelfranco s.n. (Herb. Gaia Bot. Garden).

4. *Epidendrum strobiliferum* Rchb.f., Nederl. Kruidk. Arch. 4: 333. 1859. FIG. 6.

Isochilus ramosus Focke, Tijdschr. Natuurk. Wetensch. 4: 69. 1851.

Epidendrum strobiliferum var. *swartzii* Rchb.f. ex Griseb., Fl. Brit. W. Ind.: 618. 1864.

Epidendrum mosenii Barb. Rodr., Gen. Sp. Orch. Nov. 2: 144. 1881, non Rchb.f. 1880.

Epidendrum rodriguesii Cogn., Martius Fl. Bras. 3(5): 170. 1898.

Epidendrum verecundum Schltr., Fedde Rep. Sp. Nov. Beih. 17: 42. 1922.

Sphatiger strobiliferus (Rchb.f.) Small, Man. Southeast. Flora: 390. 1933.

Plant epiphytic, pendent, up to 50 cm tall. *Stems* foliaceous, simple or usually many-branched, somewhat fractiflex, covered by amplexicaul rugose sheaths, about 0.5 cm in diameter, the branches about 10 cm long, many-leaved. *Roots* fibrous, flexuous, glabrous, produced at the base of the main stem, less than 1 mm in diameter. Leaves ligulate to elliptic-lanceolate, coriaceous, obtuse to retuse, 0.8-4.5 cm long, 0.5-0.9 cm wide, articulated to the sheaths, deciduous with age. Inflorescence terminal at the apex of lateral branches, a 2-5-flowered distichous,

condensed spike, concealed by large, cucullate, broadly ovate, obtuse, glumaceous floral bracts. Flowers non-resupinate, small, yellow to yellowish green, coriaceous. Sepals subsimilar, broadly ovate to ovate-lanceolate, acute, 3-4 mm long, 1.3-2 mm wide. Petals oblique, linear-oblongate, obtuse to acute, 3 mm long, 0.5 mm wide. Lip shortly unguiculate, the claw adnate to the column, the lamina ovate to cordate, acute, strongly nerved, with somewhat involute margins; disc with a pair of short lamellae, 3 mm long, 2.0-2.7 mm wide. Column short, stout, with a pair of porrect, acute auricles at apex, about 2.2 mm long. Pollinia 2, on a short caudicle. Anther cap cucullate, ovate, bilobed at apex, 2-celled.

DISTRIBUTION: Florida, the West Indies, Mexico to Panama, Colombia, Venezuela, the Guyanas, Brazil, and Peru, rather common in lowland forests.

QUEPOS AREA: Naranjito, Finca Levi Chacón, about 100 m, March 1998, *D. Castelfranco s.n.* (Herb. Gaia Bot. Garden!).

PHENOLOGY: flowering mostly occurs in October and November.

Because of the new additions to the genus *Epidendrum* for the area, the following key is provided for field identification.

KEY TO THE *EPIDENDRUM* SPECIES OF QUEPOS AREA

- | | |
|--|-------------------------|
| 1. Inflorescence basal | <i>E. stamfordianum</i> |
| 1. Inflorescence terminal | 2 |
| 2. Stems branched | 3 |
| 3. Leaves narrowly lanceolate, acuminate; flowers solitary..... | <i>E. isomerum</i> |
| 3. Leaves wider, retuse; flowers 2-4 | 4 |
| 4. Plant < 20 cm long; flowers bract conspicuous, overlapping..... | <i>E. strobiliferum</i> |
| 4. Plant > 20 cm long; flowers bract inconspicuous..... | <i>E. sculptum</i> |
| 2. Stems not branched | 5 |
| 5. Leaves not articulate; plant < 7 cm high..... | 6 |
| 6. Lip blade ovate, with entire margins; petals serrulate..... | <i>E. congestum</i> |
| 6. Lip blade reniform, with serrulate margins; margins of petals entire..... | <i>E. congestoides</i> |
| 5. Leaves articulate; plant > 15 cm high..... | 7 |
| 7. Inflorescence 1-flowered; midlobe of lip acuminate..... | <i>E. nocturnum</i> |
| 7. Inflorescence many-flowered; midlobe of lip notched | 8 |
| 8. Lateral lobes of lip overlapping to median lobe when spread..... | <i>E. amparoanum</i> |
| 8. Lateral lobes of lip not overlapping to median lobe..... | <i>E. montis-narae</i> |

4. **GONGORA** Ruiz & Pav.

Cespitose, epiphytic herbs with ridged pseudobulbs, 2- (rarely 3-)foliate at apex. Leaves plicate, petiolate, elliptic, thin, prominently veined. Inflorescence a pendent raceme from the base of pseudobulbs, many-flowered. Flowers large, facing the rhachis. Sepals subequal, the lateral sepals often reflexed, the dorsal

sepal and the petals inserted on the upper portion of the column; lip fleshy and complexly 2-parted; the hypochile with or without lateral callosities, usually provided at apex with 2 slender antennae; the epichyle with a gibbose-conical projection above the basal constriction. Column slender, arcuate, dilated apically, provided with a foot, with terminal, incumbent, operculate anther. Pollinia 2, waxy.

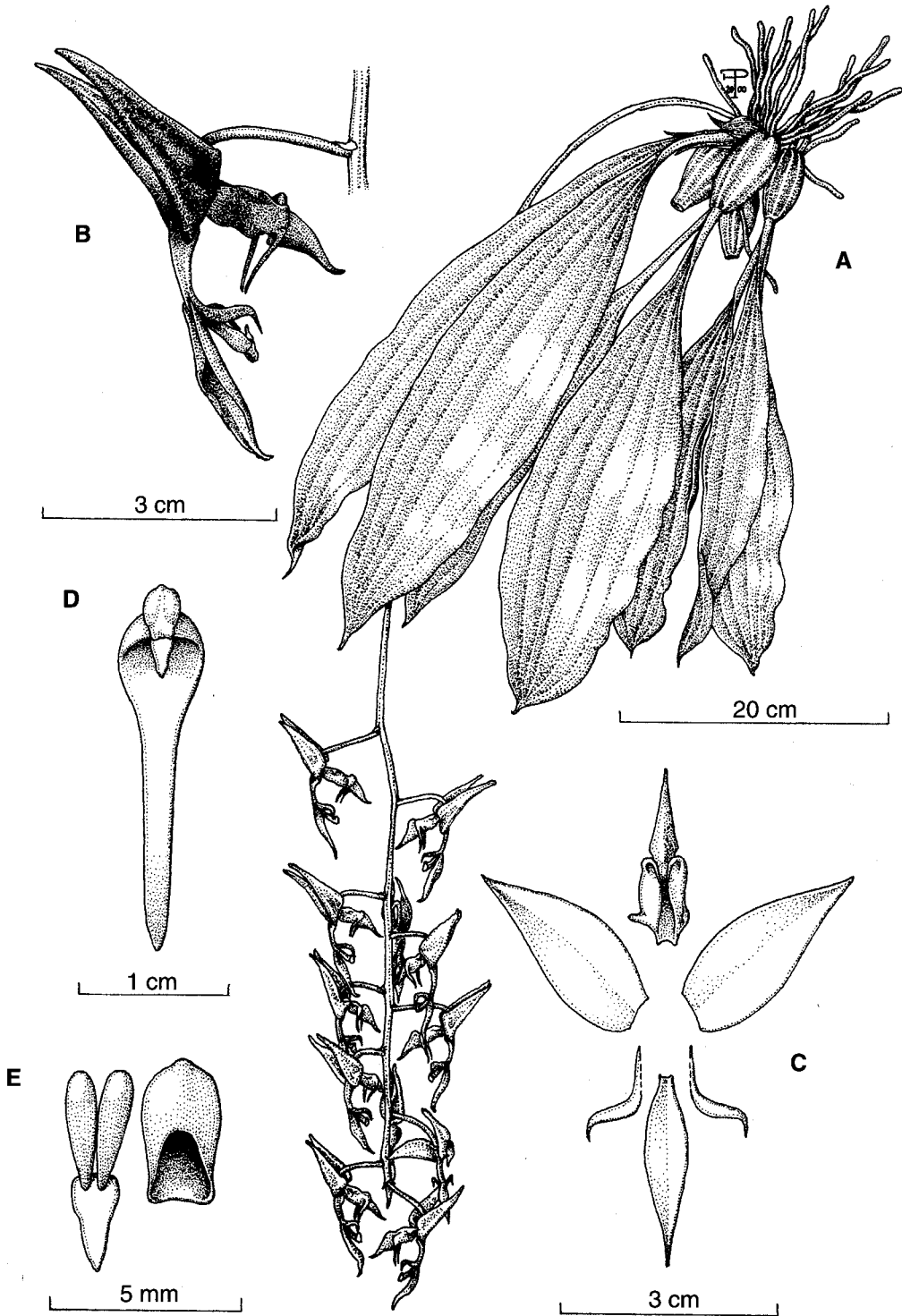


Figure 7. *Gongora claviodora* Dressler. A - Habit. B - Flower. C - Dissected perianth. D - Column, ventral view. E - Pollinarium and operculum. ILLUSTRATION VOUCHER: D. Castelfranco s.n. (Herb. Gaia Bot. Garden).

A somewhat difficult genus of 40 species restricted to the Neotropics.

1. *Gongora claviodora* Dressler, *Orquideologia* 7 (2): 75. 1972. FIG. 7.

Plant epiphytic, caespitose, to about 30 cm tall. *Roots* slender, glabrous. *Pseudobulbs* elliptic to ovate-elliptic, sulcate, 4 cm long, 3 cm wide, 2- (rarely 1-) foliate at apex. *Leaves* petiolate, elliptic, abruptly contracted at the shortly acuminate apex, rigidly undulate, 16-23 cm long including the conduplicate petiole, about 6 cm wide. *Inflorescence* an arcuate to pendent, 6-8-flowered raceme, arising from the base of mature pseudobulbs, brownish red spotted with dark brown, to 30 cm long. *Floral bracts* greenish white, ovate-lanceolate, 5 mm long; ovary with pedicel stout, terete, 3 cm long. *Flowers* showy, not resupinate, velvety red, fragrant. *Dorsal sepal* elliptic, acute, with reflexed margins, abaxially provided with a wide keel, inserted dorsally along the column, 17-19 mm long, 9-10 mm wide. *Lateral sepals* obliquely ovate, subacuminate, keeled along 3 nerves, 30 mm long, 18-20 mm wide. *Petals* falcate, acuminate, inserted at the apex of the column foot and adnate to the column to about the middle, 9.0 mm long, 3.5 mm wide. *Lip* fleshy, complexly 2-parted, basally articulated with the column foot, to 25 mm long; the hypochile saccate, of 2 erect, lateral lobes provided at the base with two short lobules and toward the apex with a pair of upturned, slender, acuminate bristles; the epichyle triangular. *Column* arcuate, terete, slightly widened toward the apex, 24 mm long including the foot. *Anther cap* operculate, ovate. *Pollinia* 2, narrowly oblong, on a short pandurate stipe.

DISTRIBUTION: Nicaragua and Costa Rica, previously reported mainly from higher altitudes.

QUEPOS AREA: Santo Domingo de Savegre, 85 m, along the banks of Río Savegre, 27 Nov. 1999, *F. Pupulin, D. Castelfranco, L. Spadari & J. Matei 1844* (USJ!).

PHENOLOGY: flowering occurs at least in April.

5. *HEXISEA* Lindl.

Cespitose, epiphytic herbs with simple or branched, segmented stems, 2-foliate at apex. *Leaves* coriaceous, usually deciduous, linear-ligulate. *Inflorescence* a simple, short raceme at the apex of the growths, few-flowered. *Flowers* small but showy. *Sepals* subequal, spreading, the dorsal free, the lateral ones sometimes shortly connivent at the base; petals similar to the sepals; lip simple, adnate at the base with the column, the base of the lamina geniculate

and provided with a fleshy callus. *Column* short, proximally adnate to the lip, winged, with incumbent, operculate anther. *Pollinia* 4, waxy.

A genus of about 6 species from Central and South America.

1. *Hexisea bidentata* Lindl., *J. Bot. (Hooker)* 1: 8. 1834. FIG. 8.

Plant epiphytic, caespitose, with sometimes branched stems composed of elongated swollen sections, to 50 cm tall. *Roots* slender, glabrous. *Pseudobulbs* segmented, subcylindric to fusiform, sulcate, to 10 cm long, 1 cm wide, the basal one stipitate, producing a new growth and leaves at apex. *Leaves* coriaceous, linear-ligulate, obtuse to retuse, 7-11 cm long, 1-2 cm wide. *Inflorescence* a short, few-flowered (1-7) raceme, to about 1 cm long, covered at the base by scarios, imbricating bracts. *Flowers* spreading, showy, bright orange to red with a brown callus at the base of lip. *Dorsal sepal* lanceolate to elliptic-lanceolate, acute, concave, dorsally carinate, 11-13 mm long, 3-4 mm wide. *Lateral sepals* obliquely ovate-lanceolate, acute, concave, dorsally carinate, 12-13 mm long, 3-4 mm wide. *Petals* linear-lanceolate to linear-oblong, acute, 10 mm long, 3 mm wide. *Lip* oblong-obovate, 8 mm long, 3 mm wide, the claw adnate to the base of the column to form a saccate cup, the disc provided with a basal fleshy, bifid callus, rounded and recurved at the geniculate base. *Column* short, adnate to the column in the proximal half, provided at apex with short, rounded wings, about 5 mm long. *Anther cap* operculate. *Pollinia* 4, waxy, in two collateral pairs.

DISTRIBUTION: From Mexico to Costa Rica, Panama, and South America, epiphytic in low and medium altitude forests.

QUEPOS AREA: Villa Nueva, finca Walker, about 200 m, collected by Mrs. Merli, 1995 (Herb. Gaia Bot. Garden!).

PHENOLOGY: flowering occurs at least in July and August.

The shallow nectary and red flowers of *Hexisea* have been traditionally used to separate it from *Scaphyglottis*, but such features probably represent an adaptation to hummingbird pollination, and the distinction between the two genera is questionable.

6. *MAXILLARIA* Ruiz & Pav.

1. *Maxillaria hedwigae* Hamer & Dodson, *l.c. Pl. Trop.* 800. 1982. FIG. 9.

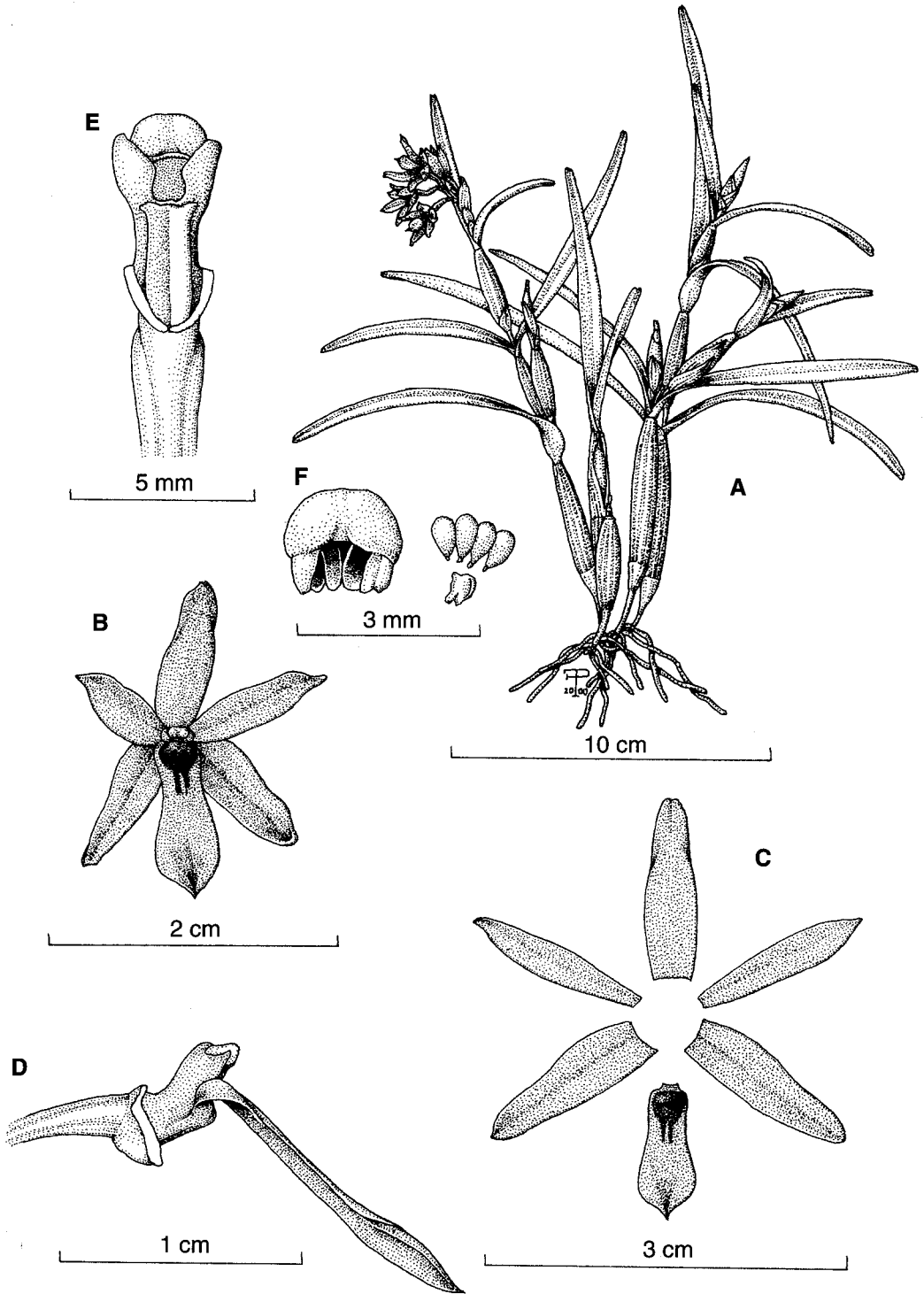


Figure 8. *Hexisea bidentata* Lindl. A - Habit. B - Flower. C - Dissected perianth. D - Column and lip, lateral view. E - Column, ventral view. F - Operculum, pollinia and caudicle. ILLUSTRATION VOUCHER: F. Pupulin 2194 (Herb. Gaia Bot. Garden).

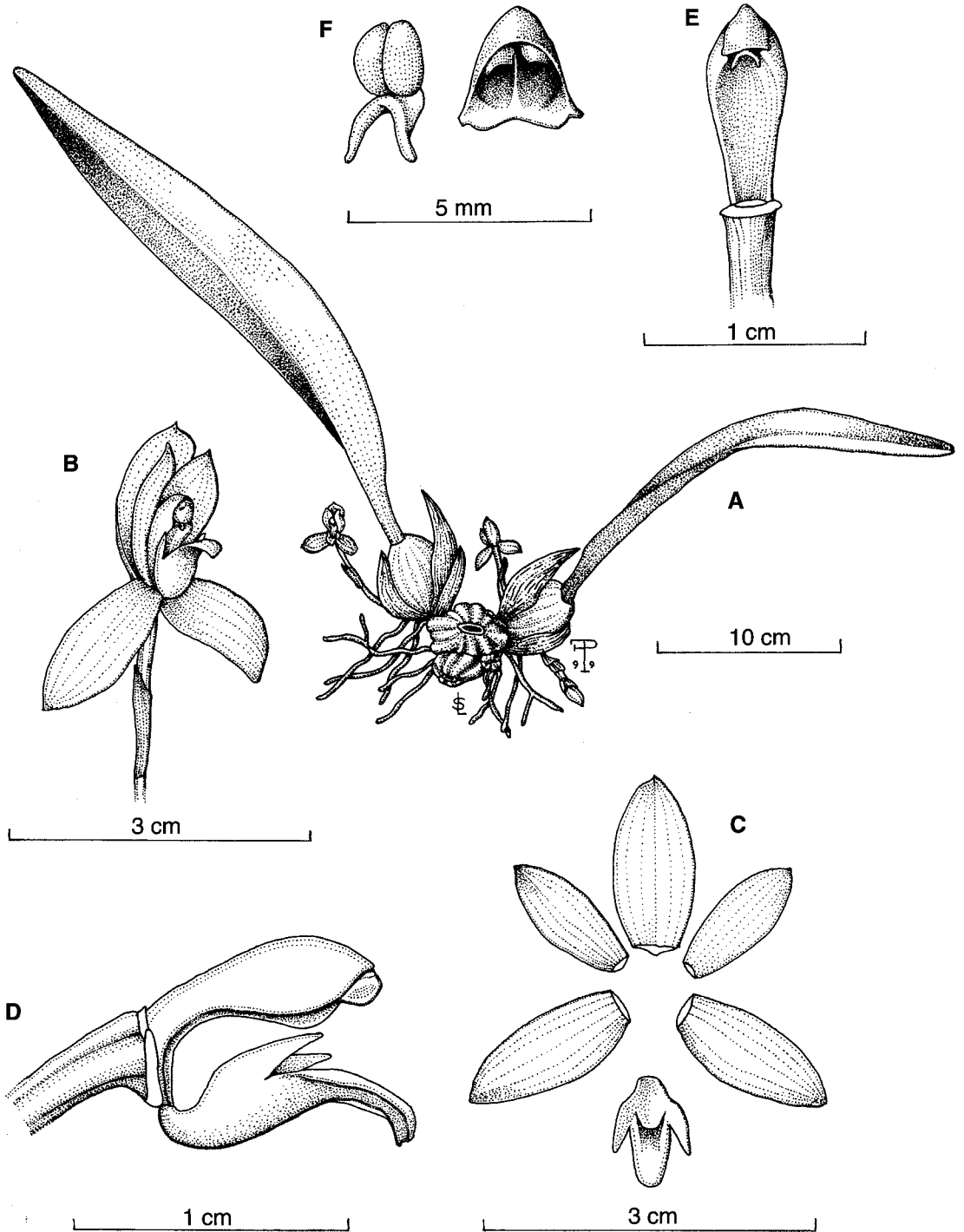


Figure 9. *Maxillaria hedwigae* Hamer & Dodson. A - Habit. B - Flower. C - Dissected perianth. D - Column and lip, lateral view. E - Column, ventral view. F - Pollinarium and operculum. ILLUSTRATION VOUCHER: F. Pupulin 1840 (USJ).

Plant epiphytic, caespitose, erect, usually forming small clumps. *Roots* fleshy, glabrous. *Pseudobulbs* ovoid to ovoid-conic, somewhat complanate, rugose, to 4.5 cm long, 2.8 cm wide, basally covered by 4-6 papyraceous, acute sheaths, 1-foliate at apex. *Leaves* petiolate, narrowly elliptic to ligulate, acute, coriaceous, with a prominent midvein adaxially, to 35 cm long 3.7 cm wide, the petiole about 3 cm long. *Inflorescences* basal, erect, to 5 cm long, covered at the base by 3-4 imbricating bracts and an inflated bract toward the middle. *Flowers* rather showy, white to yellowish cream, the lip bright orange. *Dorsal sepal* elliptic, apiculate, 1.8-2.0 cm long, 0.9 cm wide. *Lateral sepals* obliquely elliptic, concave, 1.8 cm long, 0.7 cm wide. *Petals* elliptic, acute, 1.6 cm long, 0.6 cm wide. *Lip* 3-lobed, 1.3 cm long, 0.8 cm wide; lateral lobes erect, linear-lanceolate, acuminate; the midlobe oblong, truncate to retuse, obscurely verruculose at apex; disc with a spatulate, glossy callus extending to the middle. *Column* arcuate, subclavate, winged, about 10 mm long, with a short foot. *Pollinia* 4, narrowly obovate, on a saddle-shaped stipe. *Anther cap* cucullate, white.

DISTRIBUTION: Guatemala, Honduras, Nicaragua, Costa Rica, and Colombia, in wet, low altitude forests.

QUEPOS AREA: Santo Domingo de Savegre, 85 m, along the banks of Río Savegre, 27 Nov. 1999, *F. Pupulin, D. Castelfranco, L. Spadari & J. Matei* 1840 (USJ!), 1843 (Gaia Botanical Garden, FAA collection!) and 1860 (USJ!).

PHENOLOGY: flowering occurs nearly all year long.

Although difficult to distinguish from the closely allied *M. acutifolia* Lindl. in dried material, the bright orange lip easily separate this species in living, fertile specimens. Previously reported from Guatemala to Costa Rica (Atwood, 1987), the range of this species is here extended to Colombia on the basis of the photograph

of an unidentified species published in *Native Colombian Orchids* (Escobar, 1991: 323, photo 366).

2. *Maxillaria scorpioidea* Kraenzl., Svensk. Vet. Akad. Handl. 46: 71. 1911.

Maxillaria rhodosticta Kraenzl., Fedde Rep. Sp. Nov. 24: 223. 1928.

Plant epiphytic, caespitose, erect, usually forming small clumps. *Roots* fleshy, glabrous. *Pseudobulbs* ovoid to ovoid-conic, somewhat complanate, rugose, to 4.5 cm long, 2.8 cm wide, basally covered by 4-6 papyraceous, acute sheaths, 1-foliate at apex. *Leaves* petiolate, narrowly elliptic to ligulate, acute, coriaceous, with a prominent midvein adaxially, to 35 cm long, 3.7 cm wide, the petiole about 3 cm long. *Inflorescences* basal, erect, to 5 cm long, covered at the base by 3-4 imbricating bracts and an inflated bract toward the middle. *Flowers* rather showy, white to yellowish cream, the lip bright orange. *Dorsal sepal* elliptic, apiculate, 1.8-2.0 cm long, 0.9 cm wide. *Lateral sepals* obliquely elliptic, concave, 1.8 cm long, 0.7 cm wide. *Petals* elliptic, acute, 1.6 cm long, 0.6 cm wide. *Lip* 3-lobed, 1.3 cm long, 0.8 cm wide; lateral lobes erect, linear-lanceolate, acuminate; the midlobe oblong, truncate to retuse, obscurely verruculose at apex; disc with a spatulate, glossy callus extending to the middle of lip. *Column* arcuate, subclavate, winged, about 10 mm long, with a short foot. *Pollinia* 4, narrowly obovate, on a saddle-shaped stipe. *Anther cap* cucullate, white.

DISTRIBUTION: From Mexico to western Panama, Brazil and Ecuador, in wet forests at low and intermediate altitudes. In Central America seemingly restricted to the Pacific drainage.

QUEPOS AREA: Villa Nueva, finca Walker, 200 m, 1997, *Merli s.n.* (Herb. Gaia Bot. Garden!).

PHENOLOGY: flowering usually occurs January to March.

KEY TO THE *MAXILLARIA* SPECIES OF QUEPOS AREA

- 1. Pseudobulbs 2-3 foliate at apex *M. scorpioidea*
- 1. Pseudobulbs 1-foliate at apex 2
 - 2. Plants with pseudobulbs scattered on a long rhizome..... 3
 - 3. Inflorescence erect..... *M. oreocharis*
 - 3. Inflorescence pendulous *M. neglecta*
 - 2. Plants caespitose (rhizome short)..... 4
 - 4. Basal leaves (cataphylls) absent..... *M. hedwigae*
 - 4. Basal leaves (cataphylls) present..... 5
 - 5. Plant small, about 5 cm tall..... *M. ponerantha*
 - 5. Plant more than 15 cm tall..... *M. crassifolia*

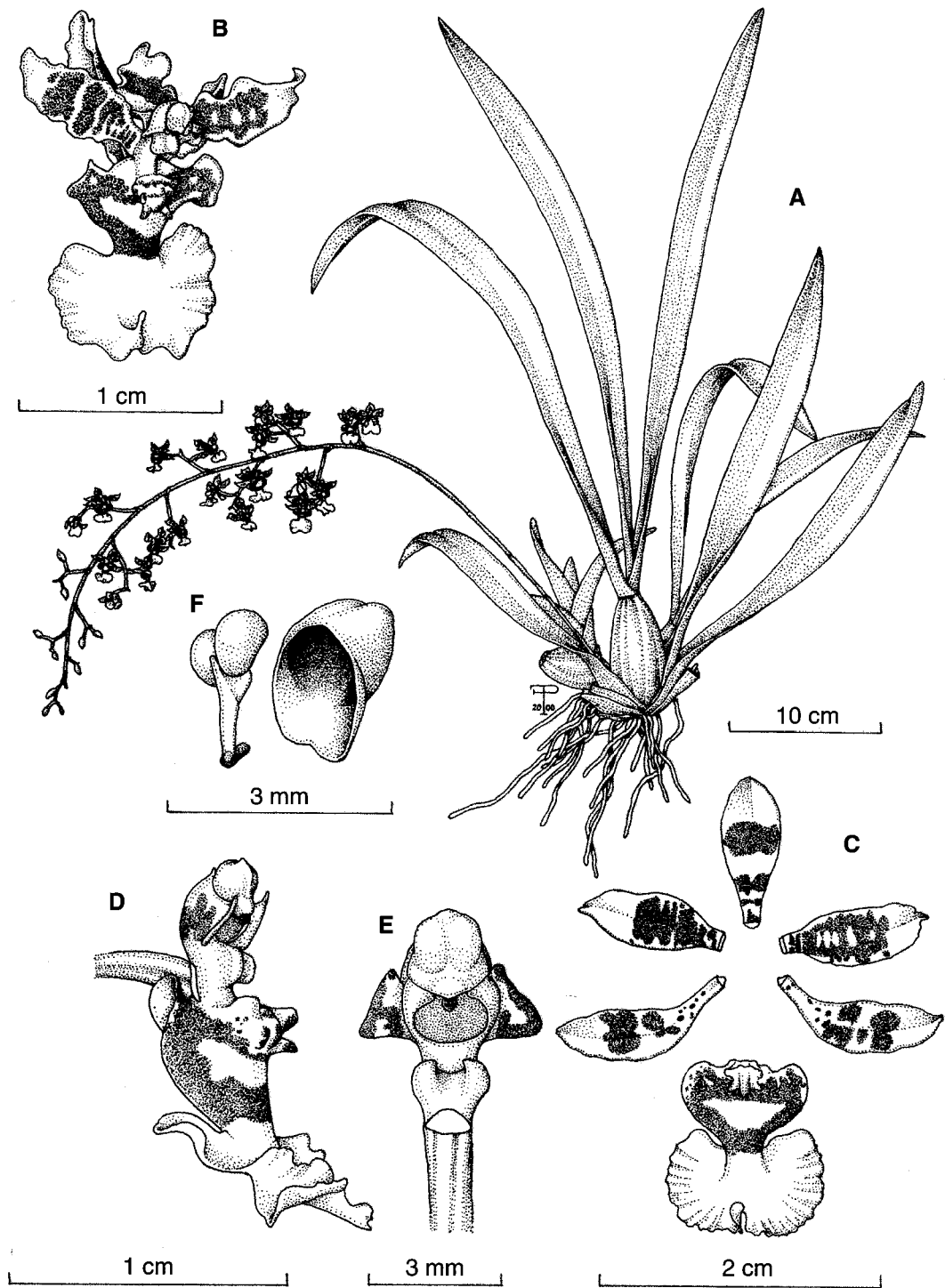


Figure 10. *Oncidium polycladium* Rehb.f. ex Lindl. A - Habit. B - Flower. C - Dissected perianth. D - Column and lip, lateral view. E - Column, ventral view. F - Pollinarium and operculum. ILLUSTRATION VOUCHER: F. Pupulin 1911 (USJ).

7. **ONCIDIUM** Sw.

1. *Oncidium polycladium* Rchb.f. ex Lindl., Fol. Orch. Oncidium, 47. 1855. FIG. 10.

Recorded by Pupulin (1998) for the area of Quepos, this species was not illustrated in the orchid florula of Manuel Antonio National Park. An illustration is provided here based on a specimen collected by D. Castelfranco at Quepos, in a small quebrada within the finca of Ministerio de Agricultura y Ganadería, 1996, flowered in cultivation at Gaia Botanical Garden, 9 Jan. 1999, *F. Pupulin 1911* (USJ!).

8. **PROSTHECHEA** Knowles & Westc.

Epiphytic herbs with ovoid or elongated, heteroblastic pseudobulbs, 1- to 3-foliolate at apex, the base involved in papyraceous sheaths. Leaves conduplicate, oblong to linear, subcoriaceous. Inflorescence terminal, sometimes produced from a spathaceous bract, few- to many- successively flowered raceme. Flowers from small to large and showy. Sepals subequal, free, spreading; the petals usually similar to sepals or slightly narrower or broader; lip free from the column or adnate only at the base, simple, provided with various kinds of calli. Column stout or slender, footless, often provided with apical wings. Pollinia 4, waxy.

A neotropical genus of about 92 species.

1. *Prosthechea abbreviata* (Schltr) W.E. Higgins, Phytologia 82(5): 376. 1997 (publ. 1998).

Epidendrum abbreviatum Schltr., Repert. Spec. Nov. Regni Veg. 3: 107. 1906.

Epidendrum prorepens Ames, Sched. Orch. 2: 33. 1923.

Encyclia abbreviata (Schltr.) Dressler, Brittonia 13: 264. 1961.

This species has been treated by Pupulin (1998a, 1998b) as *Encyclia abbreviata*. Since its description in 1828 the classification of the genus *Encyclia* has been problematic due to the unreliability of the floral character selected to define the genus, e.g. an adnate lip encircling the column. Parsimony analysis of the subgenera of *Encyclia* (Higgins, 1997) based on holomorphology showed that the genus is neither cohesive nor monophyletic. Morphological, chemical and molecular data (nuclear genome and chloroplast genome) supported the raise of *Encyclia* subgenus *Osmophytum* to generic level and its treatment as *Prosthechea*.

2. *Prosthechea chacaoensis* (Rchb.f.) W.E. Higgins, Phytologia 82(5): 377. 1997 (publ. 1998). FIG. 11.

Plant epiphytic, caespitose, erect. *Roots* fleshy, glabrous. *Pseudobulbs* ovoid to fusiform, 4-10 cm long, 1.8-3.0 cm wide, basally covered by 3-4 bracts becoming papyraceous with age, 2-foliolate at apex. *Leaves* oblong-elliptic to elliptic, obtuse, 10-24 cm long 1.5-3.5 cm wide. *Inflorescence* a terminal raceme 2- to several-flowered, to 15 cm long. *Flowers* showy, fragrant, whitish green, the lip veined with purple. *Dorsal sepal* elliptic, acute, 1.7 cm long, 0.6 cm wide. *Lateral sepals* obliquely subfalcate-elliptic, acute, concave, 1.7 cm long, 0.7 cm wide. *Petals* elliptic oblanceolate, acute, 1.3 cm long, 0.8 cm wide. *Lip* short unguiculate, widely ovate to orbicular, obtuse to apiculate, cochleate, basally adnate to the column, 1.0-1.4 cm long, 0.9-1.3 cm wide, provided at the base with an oblong-subquadrate, pubescent callus. *Column* subclavate, tridentate at apex, about 8 mm long. *Pollinia* 4, narrowly obovate, strongly complanate, on short granular caudicles. *Anther cap* cucullate, yellow, 4-celled.

DISTRIBUTION: Widespread from Mexico to South America.

QUEPOS AREA: Naranjito, about 50 m, epiphytic in Citrus orchard, 2 Jan. 1999, *F. Pupulin, D. Castelfranco & L. Spadari 1034* (USJ!).

PHENOLOGY: flowering occurs in March and April.

3. *Prosthechea prismatocarpa* (Rchb.f.) W.E. Higgins, Phytologia 82(5): 380. 1997 (publ. 1998).

FIG. 12.

Epidendrum prismatocarpum Reichb.f., Bot. Zeitung (Berlin) 10: 729-730. 1852.

Encyclia prismatocarpa (Reichb.f.) Dressler, Brittonia 13: 265. 1961.

Plant epiphytic, caespitose, erect. *Roots* fleshy, glabrous. *Pseudobulbs* ovoid to elliptic-ovoid, somewhat elongate, 4.5-9.0 cm long, 2.5-4.0 cm wide, 2-3-foliolate at apex. *Leaves* oblong-elliptic to elliptic, obtuse, 13-20 cm long 2.6-4.0 cm wide. *Inflorescence* an erect, terminal, few-flowered raceme, to 11 cm long, emerging from a papery bract to 6 cm long. *Flowers* showy, not fragrant, greenish yellow spotted with brown, the lip blotched with rose-purple. *Sepals* subsimilar, elliptic-lanceolate, acute, slightly concave at the base, 2.1 cm long, 0.5 cm wide. *Petals* ligulate-oblanceolate, subfalcate, acute, 1.8 cm long, 0.4 cm wide. *Lip* shallowly 3-lobed, clawed, the claw adnate to the column, acuminate, 1.8 cm long, 0.9 cm wide, the lateral lobes rounded, the midlobe trullate-lanceolate; the disc with a callus formed by a fleshy keel bilobed at apex, extending to the insertion of the midlobe. *Column* stout, straight, about 9 mm long,

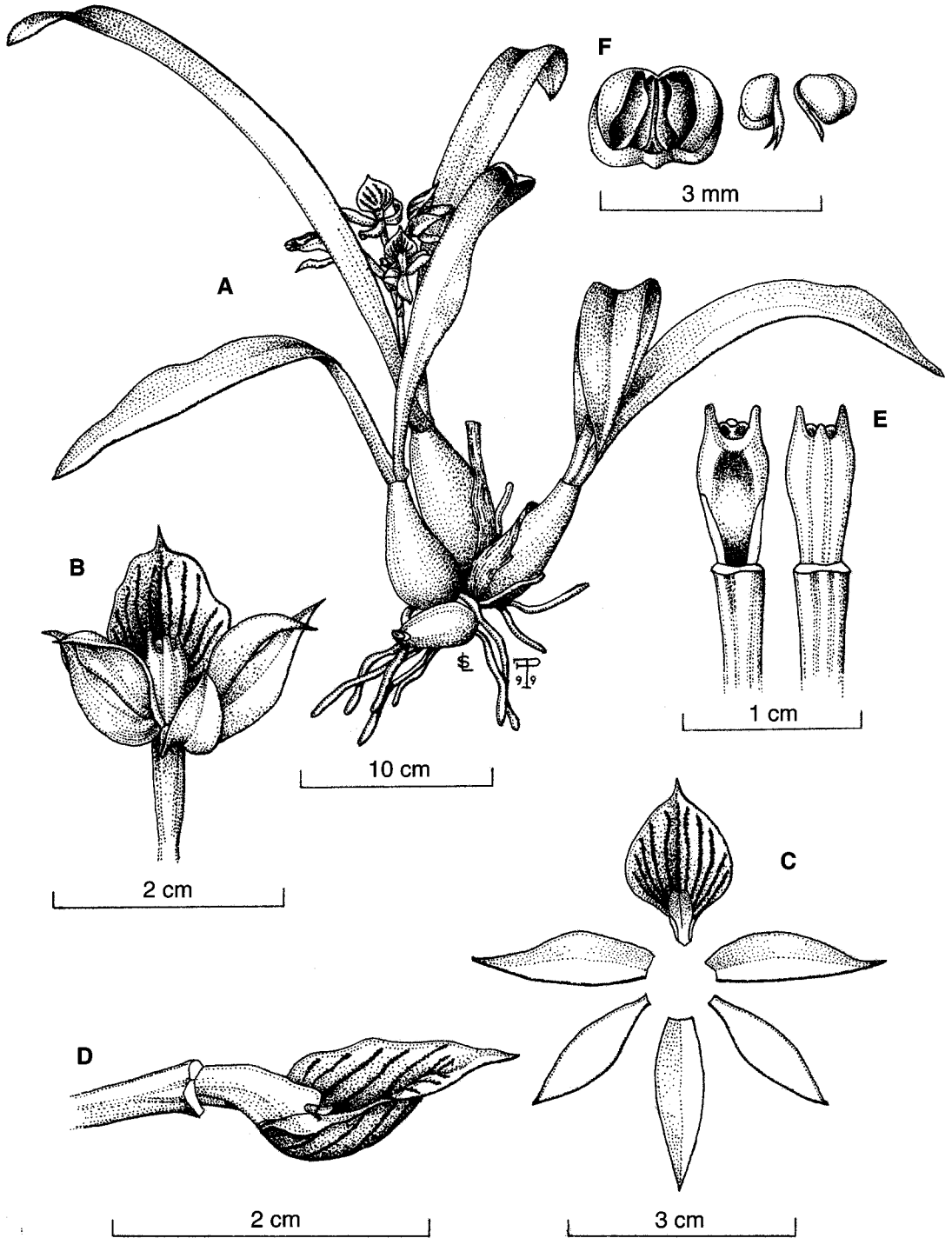


Figure 11. *Prosthechea chacaoensis* (Rchb.f.) W.E. Higgins. A - Habit. B - Flower. C - Dissected perianth. D - Column and lip, lateral view. E - Column, ventral and dorsal views. F - Operculum and pollinaria. ILLUSTRATION VOUCHER: *F. Pupulin 1034* (USJ).

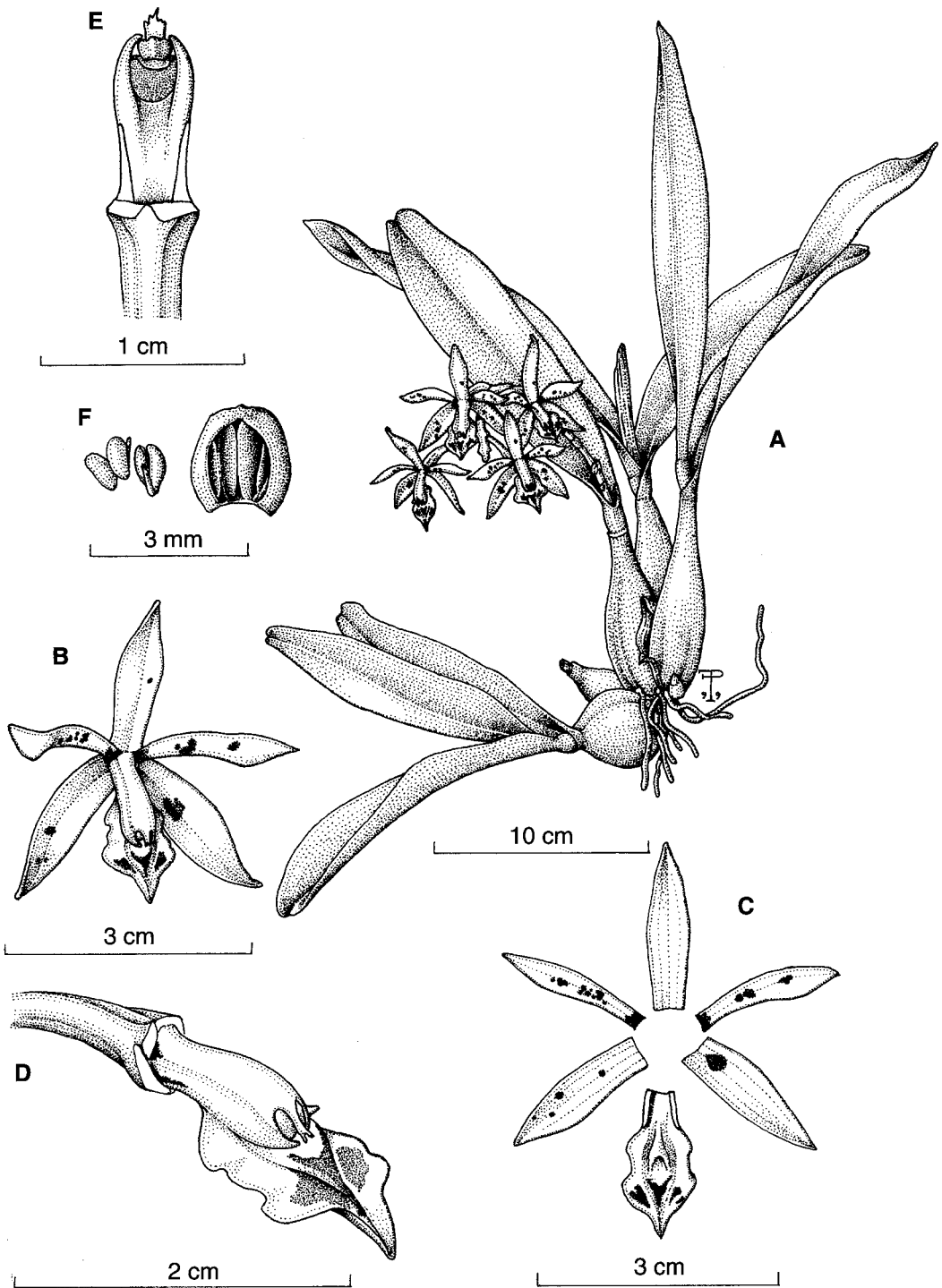


Figure 12. *Prosthechea prismatocarpa* (Rchb.f.) W.E. Higgins. A - Habit. B - Flower. C - Dissected perianth. D - Column and lip. E - Column, ventral view. F - Pollinaria and operculum. ILLUSTRATION VOUCHER: F. Pupulin 1431 (USJ).

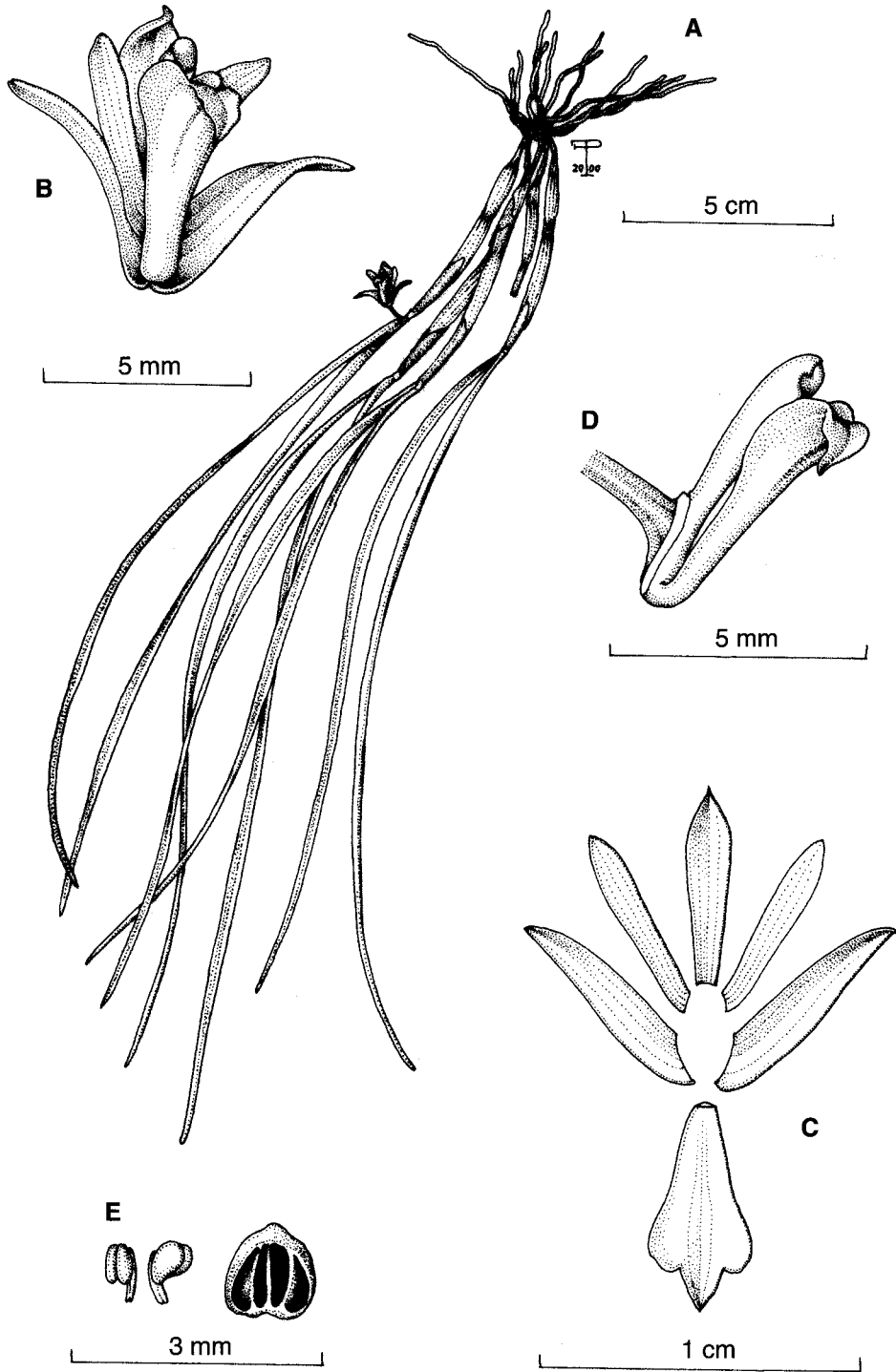


Figure 13. *Scaphyglottis boliviensis* (Rolfe) B. R. Adams. A - Habit. B - Flower. C - Dissected perianth. D - Column and lip, lateral view. E - Pollinaria and operculum. ILLUSTRATION VOUCHER: *F. Pupulin 1854* (USJ).

provided with 2 fleshy, lateral teeth and a central, lac-
erate projection. *Pollinia* 4, narrowly obovate, strong-
ly complanate, on short caudicles. *Anther cap* opercu-
late, 4-celled.

DISTRIBUTION: Costa Rica and Panama.

QUEPOS AREA: Villa Nueva, finca Walker, about 200
m, collected by Mrs. Merli, 1988, flowered in cultiva-
tion at Gaia Botanical Garden, 20 Apr. 1999, *F. Pupulin 1431* (USJ!).

PHENOLOGY: flowering occurs from April to August.
Typical forms of *P. prismatocarpa* usually grows in
premontane and lower montane forests above 1000 m
elevations. It is probable that this taxon include in
Costa Rica more than one species, and the above
mentioned plant is accepted here as *P. prismatocarpa*
waiting for a careful study of this complex based on
more distributional and morphological data. The
specimen from Quepos area may be distinguished
from *P. prismatocarpa* as accepted by Atwood and
Mora-Retana (1992: 1427) for the rhizome abbreviate
vs. elongate, the inflorescence produced on the previ-
ous pseudobulbs *vs.* on the new growth, the shorter
inflorescence (10 cm *vs.* 20-30 cm) and spathe (6 cm
vs. 10 cm), the non-fragrant flowers, the sepals acute
and slightly concave *vs.* acuminate and somewhat
reflexed at the base, respectively.

KEY TO THE *PROSTHECHEA* SPECIES OF QUEPOS AREA

- 1. Pseudobulbs well spaced on the rhizome; plants
creeping; leaves < 1 cm wide..... *P. abbreviata*
- 1. Pseudobulbs clustered on the rhizome; leaves > 1 cm
wide..... 2
- 2. Lip cochleate; inflorescence <10 cm long
..... *P. chacaoensis*
- 2. Lip sagittate; inflorescence >10 cm long.....
..... *P. prismatocarpa*

9. *SCAPHYGLOTTIS* Poepp. & Endl.

- 1. *Scaphyglottis boliviensis* (Rolfe) B. R. Adams,
Phytologia 64(4): 257-258. 1988. FIG. 13.

KEY TO THE *SCAPHYGLOTTIS* SPECIES OF QUEPOS AREA

- 1. Plants with superposed pseudobulbs forming chains..... 2
- 2. Column with steliadial arms..... *S. stellata*
- 2. Column without steliadial arms..... *S. prolifera*
- 1. Plants cespitose, without superposed pseudobulbs..... 3
- 3. Inflorescence many-flowered (>10); flowers 3 mm tall..... *S. micrantha*
- 3. Inflorescence 1-2 flowered; flowers about 1 cm tall..... *S. boliviensis*

10. *SOBRALIA* Poepp. & Endl.

- 1. *Sobralia macrophylla* Rchb.f., Bot. Zeitung 10:
71. 1852. FIG. 14.

Hexadesmia boliviensis Rolfe, Mem. Torrey Bot.
Club 6(1): 122. 1896.

Scaphyglottis huebneri Schltr., Beih. Bot.
Centralbl. 42(2): 95. 1925.

Plant epiphytic, cespitose, sometimes pendent, 25-
35 cm tall. *Roots* slender, glabrous. *Pseudobulbs* nar-
rowly cylindrical, slightly swollen, apically 2-foliolate at
apex, provided with 1-2 sheaths on the lower half.
Leaves subcoriaceous, linear-attenuate, 7-13 cm long,
0.3-0.5 mm wide. *Inflorescence* of 1-2 terminal flow-
ers. *Flowers* small, white to greenish white. *Dorsal*
sepal oblong-ob lanceolate, acute, carinate at apex, 5-
6 mm long, 1.5 mm wide. *Lateral sepals* narrowly
ovate, the base forming a mentum around the column
foot, the apex recurved, 6.0 mm long, 1.7 mm wide.
Petals elliptic, falcate, acute, 5.5 mm long, 1.0 mm
wide. *Lip* hinged to the column foot, 6 mm long, 3.0-
3.5 mm wide, apically 3-lobed, the lateral lobes
rounded and clasping the column, the midlobe subtri-
angular, recurved, the disc provided with a broad,
lamellate callus extending to the insertion of the mid-
lobe. *Column* slender, footed, about 5 mm long, with
a pair of stigmatic arms at the apical third. *Pollinia* 4,
in two pairs.

DISTRIBUTION: Nicaragua to Venezuela, Brazil,
Bolivia and Peru, usually in wet forests from low-
lands to about 1000 m elevation.

QUEPOS AREA: Santo Domingo de Savegre, along the
banks of Río Savegre, 85 m, 27 Nov. 1999, *F. Pupulin, D. Castelfranco, L. Spadari & J. Matei 1854*
(USJ!).

PHENOLOGY: flowering occurs most of the year.

Along the Pacific lowlands of central and southern
Costa Rica, together with *S. boliviensis* also the close-
ly related *S. laevilabia* Ames may be found.
However, the latter species usually forms chains of
superposed pseudobulbs, and shows an ecallose lip
(Adams, 1988; Atwood, 1989: 1387).

Plant epiphytic, cespitose, erect, to 60 cm tall.
Roots fleshy, glabrous. *Leaves* plicate-veined, elliptic,
abruptly acuminate, thin, 12-16 cm long, 4.5-8.0 cm
wide. *Inflorescence* apical, a 1-flowered raceme sub-

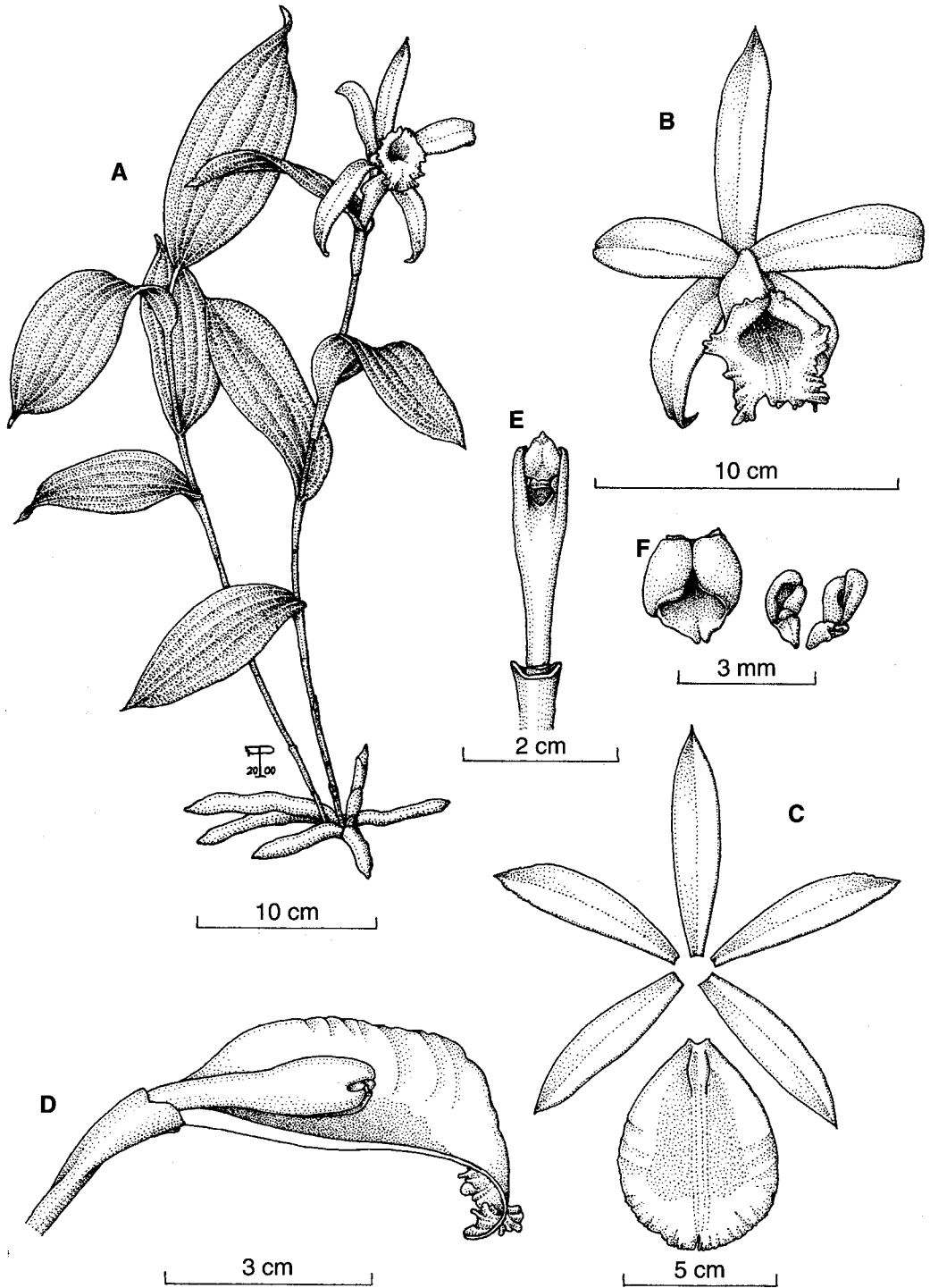


Figure 14. *Sobralia macrophylla* Rchb.f. A - Habit. B - Flower. C - Dissected perianth. D - Column and lip, lateral view (the lip longitudinally sectioned). E - Column, ventral view. F - Operculum and pollinaria. ILLUSTRATION VOUCHER: D. Castelfranco s.n. (Herb. Gaia Bot. Garden).

tended by infundibuliform sheaths. *Flowers* large, yellowish white, the inner part of the lip yellow. *Sepals* subsimilar, lanceolate, acute, dorsally carinate, 7 cm long, 1.4 cm wide. *Petals* lanceolate, obscurely falcate, acute, minutely erose at apex, 7 cm long, 1.5 cm wide. *Lip* obovate, retuse, the basal margins clasping the column, the distal third with undulate-crested margins, 7 cm long, 5.3 cm wide; callus at the base of the lip formed by two low, rounded keels. *Column* elongate, subterete, with two subquadrate

teeth at apex, about 3 cm long. *Anther cap* cucullate, obscurely 2-celled. *Pollinia* 8, mealy.

DISTRIBUTION: Nicaragua to Venezuela, Brazil, Bolivia and Peru, usually in wet forests from lowlands to about 1000 m elevation.

QUEPOS AREA: Quepos, Cerritos, 14 Jan. 2000, flowered in cultivation at Gaia Botanical Garden, accession number GBG-1342, 4 Apr. 2000, D. Castelfranco s.n. (Gaia Bot. Garden, FAA collection!).

PHENOLOGY: flowering April to July.

KEY TO THE *SOBRALIA* SPECIES OF QUEPOS AREA

- 1. Stem apically compressed; lip not deeply concave; flowers yellowish white..... *S. macrophylla*
- 1. Stem terete throughout; lip deeply concave; flower purple.....*S. decora*

11. **STANHOPEA** Frost ex Hook.

Cespitose, epiphytic herbs with ovoid, ridged, monophyllous pseudobulbs. Leaves plicate, petiolate, elliptic-lanceolate to broadly elliptic, coriaceous, prominently veined. Inflorescence a short, pendent raceme from the base of pseudobulbs, 2- to many-flowered, the rachis enveloped in several broad, papyraceous, imbricating bracts. Flowers usually large, on long pedicels. Sepals membranaceous, concave, the dorsal sepal erect, the laterals broader, reflexed, somewhat connate at the base; petals membranaceous, similar to the dorsal sepal but usually smaller; lip simple with a saccate hypochile and reduced apical lobe (Sect. *Ecornuta*) or complexly 2- to 3-parted with saccate hypochile, short mesochile usually provided with lateral horns and spreading epichile (Sect. *Eustanhopea*). Column elongate, somewhat arcuate, with or without terminal wings and terminal, incumbent, operculate anther. Pollinia 2, waxy.

A Neotropical genus of some 50 species.

- 1. *Stanhopea cirrhata* Lindl., J. Hort. Soc. London 3: 37. 1850. FIG. 15.

Plant epiphytic, cespitose, erect, to 70 cm tall. *Roots* flexuous, glabrous, somewhat directed upward. *Pseudobulbs* pyriform, strongly sulcate, monophyllous, 5.0-5.5 cm long, 4.0-4.5 cm wide, concealed at the base by bracts becoming papyraceous and fibrous with age. *Leaves* coriaceous, petiolate, elliptic, acute, prominently ribbed abaxially, 40-50 cm long including the petiole, 12-18 cm wide. *Inflorescence* a pendent, 2-flowered raceme to 25 cm long, the peduncle concealed by ovate, inflated bracts about 5 cm long; ovary 6-7 cm long including the pedicel. *Flowers* small for the genus, with cream sepals and yellow-orange petals;

the lip yellow-orange with horns tinged with wine-red to black. *Dorsal sepal* elliptic-ovate, concave, reflexed, strongly contracted at the apiculate apex, adnate to the base of the lip, 4.0-4.5 cm long, 2.3-2.5 cm wide. *Lateral sepals* ovate, acute, connate at the base, adnate to the base of the lip, 4.0-4.5 cm long, 2.3-2.5 cm wide. *Petals* elliptic-ovate, strongly reflexed, with somewhat undulate margins, 3.2-3.5 cm long, 1.3-1.5 cm wide. *Lip* fleshy, abaxially flattened, to 3.2 cm long, 2.1-2.4 cm wide; the hypochile deeply concave, carinate, with infolded margins, provided with 2 fleshy horns; the epichile suborbicular, obtuse to acute, slightly recurved. *Column* stout, broadened toward the middle and provided with narrow wings, about 2.5 cm long, the subquadrate apex with a pair of filiform, upcurved projections. *Pollinia* 2, elliptic, on a broad stipe, provided with a viscidium at the base.

DISTRIBUTION: Nicaragua, Costa Rica, and Panama, in seasonally dry lowlands to about 800 m elevation.

QUEPOS AREA: Naranjito, about 100 m, collected by D. Castelfranco, April 1999, flowered in cultivation at Gaia Botanical Garden, 12 Dec. 1999, *F. Pupulin* 1872 (USJ!).

PHENOLOGY: flowering occurs from September to November.

11. **VANILLA** Sw.

- 1. *Vanilla planifolia* C. Jackson, Andr. Bot. Repos. 8: t. 538. 1808. FIG. 16.

Plant hemiepiphytic, a scandent vine with leafy stems. *Roots* fleshy, produced singly at each node. *Stems* terete, grooved, to 8 mm in diameter, with distichous leaves produced at the nodes. *Leaves* ovate-elliptic to oblong, acute to acuminate, fleshy, 8-19 cm long, 2-8 cm wide. *Inflorescences* from the axils of

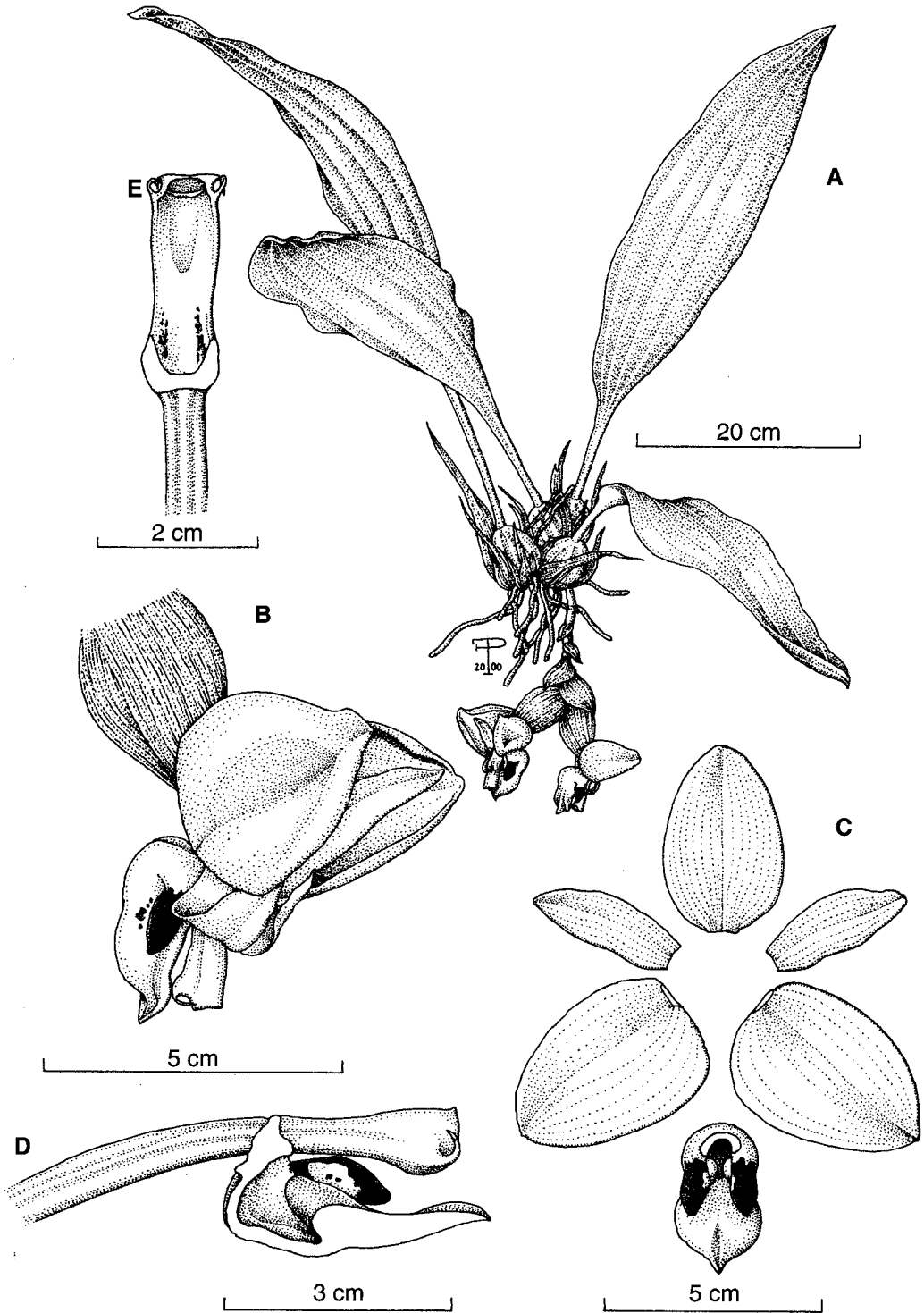


Figure 15. *Stanhopea cirrhata* Lindl. A - Habit. B - Flower. C - Dissected perianth. D - Column and lip, lateral view. E - Column, ventral view. ILLUSTRATION VOUCHER: F. Pupulin 1872 (USJ).

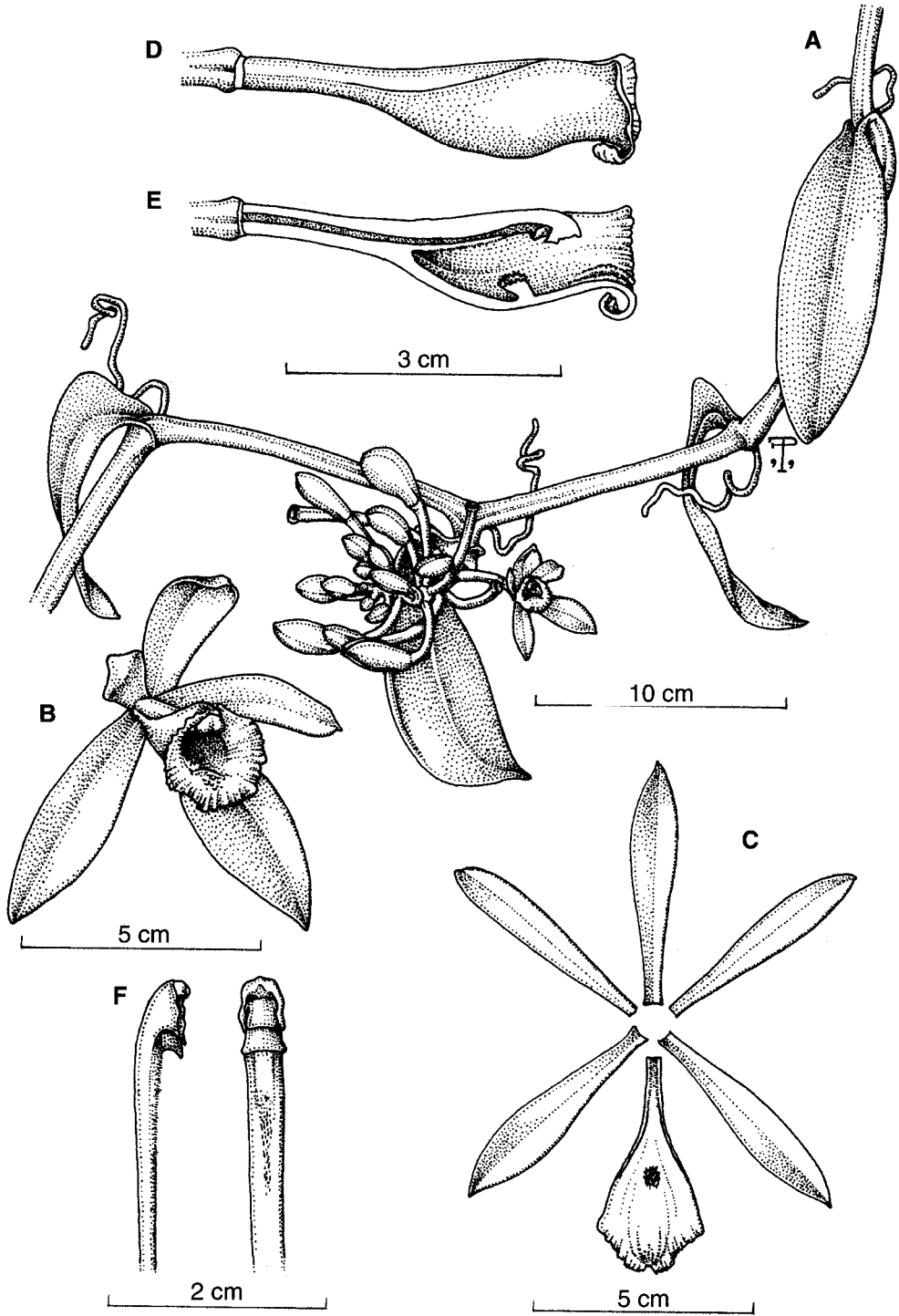


Figure 16. *Vanilla planifolia* C. Jackson. A - Habit. B - Flower. C - Dissected perianth. D - Column and lip, lateral view. E - Column and lip, longitudinal section. F - Column, lateral and ventral views. ILLUSTRATION VOUCHER: F. Pupulin 1429 (Herb. Gaia Bot. Garden).

the leaves, a short, successive, many-flowered, erect raceme, to 7 cm long; floral bracts oblong, obtuse, 6-10 mm long. *Flowers* showy, greenish yellow, the lip with bright yellow in the gorge. *Sepals* similar, linear-ob lanceolate, obtuse to acute, 5.0-6.5 cm long, 1.0-1.5 cm wide. *Petals* linear oblanceolate, acute, 4.6-6 cm long, 0.8-1.1 cm wide. *Lip* clawed, obovate-subrhombic, obscurely 3-lobed in front, 4-5 cm long, 1.6-3.0 cm wide; the lateral lobes erect, clasping the column; the midlobe retuse, with ruffled margins; disc with a tuft of long lacinate scales and longitudinal lines of short papillae extending to the apex of lip. *Column* slender, terete, abaxially pubescent, about 3 cm long. *Pollinia* 4, soft and mealy. *Anther cap* cucullate, white.

DISTRIBUTION: Mexico to Panama, perhaps also in the West Indies, widely cultivated throughout the Neotropic for the flavor of Vanilla extract.

QUEPOS AREA: road between Quepos and Manuel Antonio, km 2.7, epiphytic on large trees at Gaia Botanical Garden, 18 Apr. 1999, *F. Pupulin 1429* (Herb. Gaia Bot. Garden!).

PHENOLOGY: flowering occurs in April and May.

KEY TO THE *VANILLA* SPECIES OF QUEPOS AREA

1. Lip with verrucose longitudinal lines..... *V. planifolia*
1. Lip without verrucose longitudinal lines.. *V. pompona*

12. *XYLOBIUM* Lindl.

Cespitose, epiphytic herbs with ovoid or semiterete, short or elongate, 1-3-leaved pseudobulbs. Leaves plicate, petiolate, acute to acuminate, subcoriaceous, strongly veined. Inflorescence a short or elongate, erect or arching, many-flowered raceme from the base of pseudobulbs. Flowers usually showy, on short pedicels. Sepals subequal, membranaceous, spreading, dorsally carinate, the dorsal sepal free, the laterals broader, adnate to the foot of the column, forming a short to conspicuous mentum; petals membranaceous, similar to the dorsal sepal but usually smaller; lip simple or 3-lobed, the lateral lobes erect, the base articulate with the column foot, the disc smooth or provided with callus or erect keels. Column short, stout, semiterete, slightly arcuate, the apex sometimes narrowly winged, the base produced into a foot, the anther terminal, incumbent, operculate. 1-2-celled. *Pollinia* 2 or 4, waxy.

A Neotropical genus of some 20 species distributed from Mexico to Peru and Brazil, and the Antilles.

1. *Xylobium foveatum* (Lindl.) Nicholson, Ill. Dict. Gard. 4: 225. 1887. FIG. 17.

Maxillaria foveata Lindl., Edward's Bot. Reg. 25: Misc. p. 2. 1839.

Maxillaria concava Lindl., Edward's Bot. Reg. 30: Misc. p. 4. 1844.

Maxillaria stachyobiorum Rchb. f., Bot. Zeitung 10: 735. 1852.

Xylobium concavum Hemsl., Godm. & Salv., Biol. Cent. Am. Bot. 3: 252. 1883.

Xylobium stachyobiorum (Rchb. f.) Hemsl., Godm. & Salv., Biol. Cent. Am. Bot. 3: 252. 1883.

Xylobium ecuadorensis Rolfe, Kew Bull. 341. 1913.

Xylobium filomenoi Schltr., Fedde Rep. Spec. Nov. Beih. 9: 100. 1921.

Plant epiphytic, cespitose, erect. *Roots* slender, glabrous. *Pseudobulbs* oblong-ovoid, sulcate, 5 cm long, about 3 cm wide, 2-foliate at apex, covered at the base by 4-6 scarios, evanescent sheaths. *Leaves* plicate, petiolate, elliptic-ob lanceolate to elliptic, acuminate, coriaceous, to 32 cm long, 5.5 cm wide. *Inflorescences* 1-2, erect to arcuate, many-flowered racemes produced from the base of pseudobulb, to 22 cm long, provided with 5-7 infundibuliform, acute, scarios bracts. *Flowers* rather showy, fragrant, white to pale cream, the lip pale yellow, veined with pale tawn. *Dorsal sepal* oblong, acute, with slightly revolute margins, 12 mm long, 3 mm wide. *Lateral sepals* obliquely oblong-elliptic, acute, carinate, with revolute margins, shortly connate at the base to produce a conspicuous mentum, 13 mm long, 4 mm wide. *Petals* oblique, oblong-elliptic, acuminate, 11 mm long, 3 mm wide. *Lip* obovate-elliptic 3-lobed, 12 mm long, 8 mm wide, the lateral lobes elliptic, obtuse, erect, the midlobe suborbicular, obscurely retuse, fleshy, abaxially provided with a prominent keel; disc with a 3-carinate callus projecting to the middle of the lip. *Column* stout, semiterete, 8 mm long, with a foot about 4 mm long. *Anther cap* operculate, subglobose, 1-celled. *Pollinia* 4, waxy.

DISTRIBUTION: Mexico to Peru and Guyana, in seasonally wet forest.

QUEPOS AREA: Villa Nueva, finca Walker, 200 m, collected by Mrs. Merli, flowered in cultivation at Gaia Botanical Garden. 20 Dec. 1999, *F. Pupulin 1900* (Gaia Botanical Garden, FAA collection!).

PHENOLOGY: flowering occurs from November to February.

RESUMEN. Dieciséis especies de orquídeas se registran por primera vez para el área de Quepos, además de

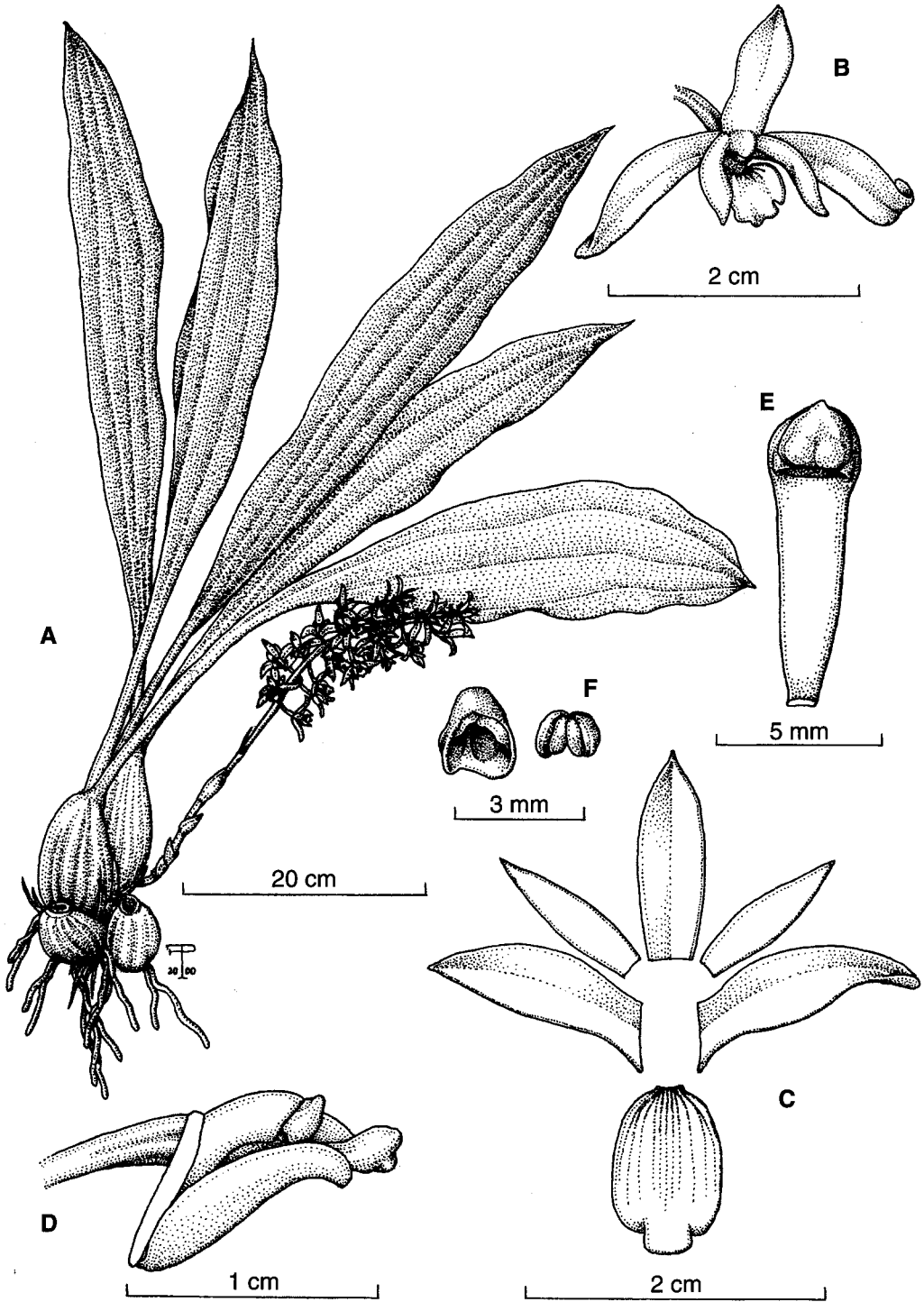


Figure 17. *Xylobium foveatum* (Lindl.) Nicholson. A - Habit. B - Flower. C - Dissected perianth. D - Column and lip, lateral view. E - Column, ventral view. F - Operculum and pollinarium ILLUSTRATION VOUCHER: F. Pupulin 1900 (Gaia Bot. Garden, FAA Collection).

aquéllas incluidas en el tratamiento de la familia en el Parque Nacional Manuel Antonio (Pupulin 1998b). Se proveen descripciones de los géneros que no habían sido previamente registrados para el área, y cada especie es descrita e ilustrada. Se proveen datos sobre distribución y fenología, junto con claves para los géneros que incluyen más de una especie en el área. Una nueva especie, *Epidendrum montis-narae* Pupulin & L. Sánchez, es descrita e ilustrada. Dos especies que habían sido comunicadas previamente, *Epidendrum isomerum* y *Oncidium polycladium*, se ilustran de material recolectado en el área de estudio.

ACKNOWLEDGEMENTS. I am grateful to Dario Castelfranco, Director of Gaia Botanical Garden, for the facilities offered and the good days spent in the field. I would thank M. Laura Spadari, who rendered many of the drawings. Mr. Walker and Mrs. Merli liberally provided for this study orchid specimens from their collection. Field work was in part supported by a grant of Gaia Botanical Garden.

CITED LITERATURE

- Adams, B. R. 1988. New species and combinations in the genus *Scaphyglottis* (Orchidaceae). *Phytologia* 64(4): 249-258.
- Atwood, J.T. 1987. The vascular flora of La Selva Biological Station, Costa Rica - Orchidaceae. *Selbyana* 10(1): 76-145.
- _____. 1989. Orchids of Costa Rica. Part 1. *Ic. Pl. Trop.* 14: 1301-1400.
- _____. & D.E. Mora-Retana. 1992. Orchids of Costa Rica. Part 2. *Ic. Pl. Trop.* 15: 1401-1500.
- Brako, L. & J. L. Zarucchi. 1993. Catalogue of the Flowering Plants and Gymnosperms of Peru. *Mon. Syst. Bot. Missouri Bot. Gard.* 45: 1-1286.
- Dodson, C. H. & P. M. Dodson. 1980. Orchids of Ecuador. *Ic. Pl. Trop.* 1: 1-100.
- Dressler, R.L. & F. Pupulin. 1996. *Macroclinium allenorum*, a new Costa Rican species well illustrated forty years ago. *Lindleyana* 11(1): 34-36.
- Escobar R., R. (ed.). 1991. Native Colombian Orchids, vol. 3. Medellín, Editorial Colina.
- Estrada, A. & A. Cascante. 1998. *Matisia tinamastiana* (Bombacaceae): una nueva especie arborescente del Pacífico central de Costa Rica. *Brenesia* 49-50: 79-85.
- Hamer, F. 1985. Orchids of Nicaragua. Part 6. *Ic. Pl. Trop.* 13: 1201-1300.
- Higgins, W.E. 1997. A reconsideration of the genus *Prosthechea*. *Phytologia* 82(5): 370-383 (publ. 1998).
- Hodel, D., G. Herrera & A. Cascante. 1997. A remarkable new species and additional novelties of *Chamaedorea* from Costa Rica and Panama. *Palm J.* 137: 32-44.
- McLeish, I., N. R. Pearce & B. R. Adams. 1995. Native Orchids of Belize. Rotterdam, Balkema.
- Pupulin, F. 1998a. Orchids of Manuel Antonio National Park. San José, MesoAmerican Press, 75 pp.
- _____. 1998b. Orchid florula of Parque Nacional Manuel Antonio, Quepos, Costa Rica. *Rev. Biol. Trop.* 46(4): 961-1031.
- _____. 2000. New species of Costa Rican Orchidaceae. *Lindleyana* 15: 17-28.
- Sánchez G., J. 1998. *Tachia parviflora* Maguire & Weaver (Gentianaceae): un nuevo registro para Costa Rica. *Brenesia* 47-48: 87-88.
- Schweinfurth, C. 1961. Orchidaceae, Orchids of Peru. *Fieldiana, Bot.* 30(4): 787-1005.