

DISTRIBUTION: Along the Pacific slope of El Salvador, Honduras, Costa Rica, and Colombia; a fruiting specimen from Michoacán, Mexico, may belong here. **ECOLOGY:** Hemiepiphyte at relatively high altitudes (800-1300 m), often in rather dry places. Flowers recorded in April (El Salvador and Honduras) and September-February (Colombia).

The identity of *V. calyculata* has been obscure and no original specimens are known to us. However, Schlechter's description can be applied with confidence to the taxon above described and illustrated in Fig. 1. No other species known from Colombia (*V. columbiana*, *V. dressleri*, *V. espondeae*, *V. hostmanii*, *V. methonica*, *V. odorata*, *V. pompona*, *V. ribeiroi*, and *V. sprucei*) agrees with the description of *V. calyculata*.

The specific epithet makes reference to the calyculus, a minute, cup-like structure sometimes distinguished in some vanillas and more developed in the species of the related genera *Epistephium* and *Lecanorchis*. The calyculus in *V. calyculata* is rather conspicuous when compared with other vanillas, and is more evident in pollinated ovaries that start to swell. Schlechter's description differs from our material of *V. calyculata* in the column described as glabrous instead of pubescent below the stigma (a trait found in all American penicillate Vanillas) and its smaller measurements of the perianth segments. We believe that Schlechter's description could have been based on a bud. However, the calyculus, the sessile, oblong, rather small leaves, the deeply excised midlobe of lip, the pubescent lip claw, the 3-5 thickened midveins on the disc, the unusually high altitude for a *Vanilla* and its strong resemblance with the Brazilian *V. chamissonis* (its sister species, Soto unpublished) suggest that the name *V. calyculata* may be applied to this taxon with confidence.

Vanilla calyculata is distinguished from *V. chamissonis* by its larger, bell-shaped, pendant, yellowish flowers with revolute, flaring tepals, and the longer midlobe of the lip.

Despite its unique characters, specimens of *V. calyculata* have been regarded by Reichenbach and Rolfe (1896; e.g. *Lehmann* 2263) as *V. pompona*. Later it was reported from El Salvador (Hamer, 1974) as *V. phaeantha* Rchb.f. José Linares, from Escuela Agrícola Panamericana has told us that this species is abundant, well-known, and usually confused with *V. pompona* in the dry valleys of central Honduras.

The specimen *O. Pank sub F. Hamer 203* bears peloric flowers where the column has two anthers and two very odd stigmas.

OTHER RECORDS: **EL SALVADOR:** La Palma-Finca El Refugio, río Nanuapa, 1000 m alt., terr. climbing oaks or manzana rosa, collected 3.4.1969. April 11 1969, *O. Pank y F. Hamer 203* AMES(*112862; *113837)! **HONDURAS:** **COMAYAGUA:** Fruit triangular, up to 6 in. long. Climbing in shrubs, thicket along river, plain near Sihuatepeque. 1050 m altitude. 7/23/36, *T.G. Yunker, R.F. Dawson & H.R. Youse 6045* *AMES(46667)! G! K! *MO(1115382)! NY! **MORAZAN:** flores cremas, bejuco sobre arbustos. Aguas abajo de la Quebrada de Sta. Clara. Alt. 850 m, Abril 28, 1948, *A. Molina 808* *F(1676153)! Bejuco, creciendo sobre rocas y arbustos, flores amarillentas algo fragantes (por la tarde). Quebrada Santa Clara, ca. 2 km al norte del Zamorano, alt. 800 m. Mpio de San Antonio de Oriente. 19 de junio de 1996. *J. L. Linares 3386* MEXU! **EL PARAISO:** Mpio. Moroceli, Quebrada El Cajocote conocida también como El Terrero, 8.7 km al N de Moroceli, por el camino a Mata de Plátano. Veg. riparia, veg. circundante selva baja caducifolia y bosque de pino-encino, 14° 10'10" N, 86°51'06" W, 680 m. Bejuco creciendo sobre Guettarda macrosperma, flores amarillo pálido con el ápice amarillo oro, olor suave y dulce, 29 abril 2004, *J. L. Linares 7313* MEXU! [cf., sterile] "Vainilla", trepadora sobre árboles y matorrales, de Barranco de las Mesas, Alt. 900 m, Agosto 1, 1957, *L.O. Williams & A. Molina 8575* F(1590341)! Open savannah, Las Mesas region near Yuscarán. August, 1960, *H.W. Pfeiffer 1454* *US(2563382)! **COLOMBIA:** **TOLIMA:** Fingerdick, bis 5 m lang. Bl. dickfleischig & dunkelgrün. Blt. grünlich meist mit heller Lippe. Früchte bis 8 cm lang. Auf Bäumen in Zavannen -Wäldern bei La Plata. 800-1500 m. 3.12.1882. *F.C. Lehmann 2263* BM! G! *Vanilla*, white and red inside, cultivated *E. Dryander 2379* BM! "Columbien" *Lehmann W(59043)*, in part, the flower and probably the right shoot!

The following sterile specimens may belong here: **MEXICO:** **MICHOACAN:** Hacienda de Coahuayula, Feb. 1901, *G.M. Emrick 16* F(95476)! **COLOMBIA:** [cf., leaves atypically broad] **TOLIMA:** La Plata, 1000-1300, **Lehmann 6278* AMES(14875)!

2. *Vanilla costaricensis* Soto Arenas, *sp. nov.*

TYPE: **COSTA RICA:** ALAJUELA: Llanura de San Carlos. Alt. 200 m., Feb. 20, 1966. Lip white, tepals same green as leaves; vine. Lowland rain forest between Los Chiles and Venecia. *A. Molina R., L.O. Williams, W.C. Burger and B. Wallenta 17565*, holo. CR(062310)! iso. MO(2367689)!

Species *Vanillae oroanae* similis floribus minoribus, labello integro brevior differt.

Hemiepiphytic vine, leafy. **Stems** keeled, 8 mm thick (in dried condition); internodes ca. 12.5 cm long. Aerial, free **roots** dorsiventrally compressed, pale brownish, ca. 2.5 mm wide. **Leaves** petiolate, the petiole canaliculate, ca. 17 mm long, 9 mm wide; blade elliptic, abruptly mucronate, base acute to attenuate, green, membranaceous (in dried condition), 21-22 x 8.7-9.5 cm. **Inflorescence** similar to the vegetative shoots, but smaller, elongate, a 3-4-flowered raceme (probably longer and more floriferous when completely developed), 28-32 cm long, internodes up to 6 cm long; peduncle 15-23 cm, rachis ca. 3 mm thick. **Bracts** foliaceous, subpetiolate, the petiole ca. 3 mm long; blade elliptic, acute-acuminate, base obtuse-rounded, membranaceous, 2.9-7.3 x 1.6-3.4 cm. **Flowers** successive, 2 open at once, with spreading segments, ca. 3.5 cm in diameter; tepals green, lip white. **Ovary** rather sigmoid, 34-40 x 3.5 mm. **Dorsal sepal** strongly twisted and the margins contorted-widely undulate, elliptic, apex acute, rounded, base cuneate, ca. 10 veined, smooth, 41 x 11 mm. **Lateral sepals** narrowly elliptic, acute-subacute, base obtuse, margins undulate, reflexed, smooth, ca. 10 veined, 41 x 10.5 mm. **Petals** narrowly elliptic, apex truncate, notched, base widely cuneate, strongly twisted, widely undulate-contorted, with the lateral margins reflexed, difficult to spread out without distortion, ca. 10 veined, 35.5 x 9 mm. **Lip** attached to the column less than 2 mm, slightly arcuate, almost straight, with the lateral margins erect forming a throat around the column, quadrate-flabellate, entire, apex truncate, obscurely trilobed, the lateral lobes as long as the midlobe, or slightly longer, base rounded-truncate, the apical margin entire to dentate, ca. 26 veined; 24-27 x 20-21 mm; **callus** made up of a pair of flat, broad keels along the axial line, from the base to the beginning of the apical third, then separated in 3 low, erect, congested keels ending at the apex; additional lateral keels with complanate warts adorn the basal half. **Column** relatively short, straight to very slightly arcuate, semiterete, with a dilated apex, 16 mm long; smooth, except by the callus of verrucose keels at base, ca. 5 mm long; vertical wings flabellate, ca. 1.5 x 3 mm. **Stigma** lobed, the midlobe, convex, very prominent, almost perpendicular to the column axis, ca. 2 x 1.5 mm; lateral lobes much smaller, fused in an ovate-

subquadrate, emergent blade, ca. 0.5 mm long. **Anther** galeate, protruding at apex, laterally compressed, 4 mm long, with a long, thick filament 1.2 mm long. Fig. 3.

DISTRIBUTION: Known only from northern Costa Rica.

ECOLOGY: In lowland rain forest at 200 m altitude; flowering in February.

This species is known only from the type locality and it has been misidentified as *V. mexicana* Miller, a different, closely related species from the West Indies and northeastern South America. *Vanilla mexicana* has a distinctly trilobed lip, with the apex of the lateral lobes slightly above the middle of the lip; in *V. costaricensis* the lip is entire, flabellate, with the apex truncate and just obscurely trilobed, but the lateral lobes of the apex are subequal or slightly longer than the midlobe; additionally, the keels at the apex of the lip in *V. mexicana* are much more conspicuous. *Vanilla costaricensis* has large bracts similar to those of *V. inodora* Schiede, easily distinguished by the cushion-like, axial callus on the lip. Also closely related are *V. guianensis* and *V. martinezii* with much larger flowers, straight sepals, more rugose keels, and shorter inflorescence, with reduced bracts. The species was illustrated by Dr. Rafael Lucas Rodríguez (Rodríguez C. *et al.*, 1986) based on a specimen that has not been located.

The closest relative of *Vanilla costaricensis* is *V. oroana* Dodson of Ecuador. They have similar inflorescences and flower morphology, with the column almost identical. However, *V. oroana* has a longer, relatively narrower, trilobed non-truncate lip, and the surface of the lateral, basal part is minute, but conspicuously more sculptured than in *V. costaricensis*. *Vanilla oroana* flowers are in general much larger.

In the examined material of *V. costaricensis* (and also *V. oroana*) the lateral lobes of the stigma are fused to each other to form an ovate-subquadrate, emergent blade. This is notoriously different from the concave stigma found in other membranaceous (e.g. *V. inodora*). However, observation of this trait is difficult because of the poor preservation of the column, and the large amount of sticky substance in the stigmatic area, visible in fresh material but absent in pressed specimens.

OTHER RECORDS: **COSTA RICA:** ALAJUELA: Llanura de San Carlos. Alt. 200 m., Feb. 20, 1966. Lip white, tepals same green as leaves; vine. Lowland rain forest between Los Chiles and Venecia. A. Molina R., L.O. Williams,

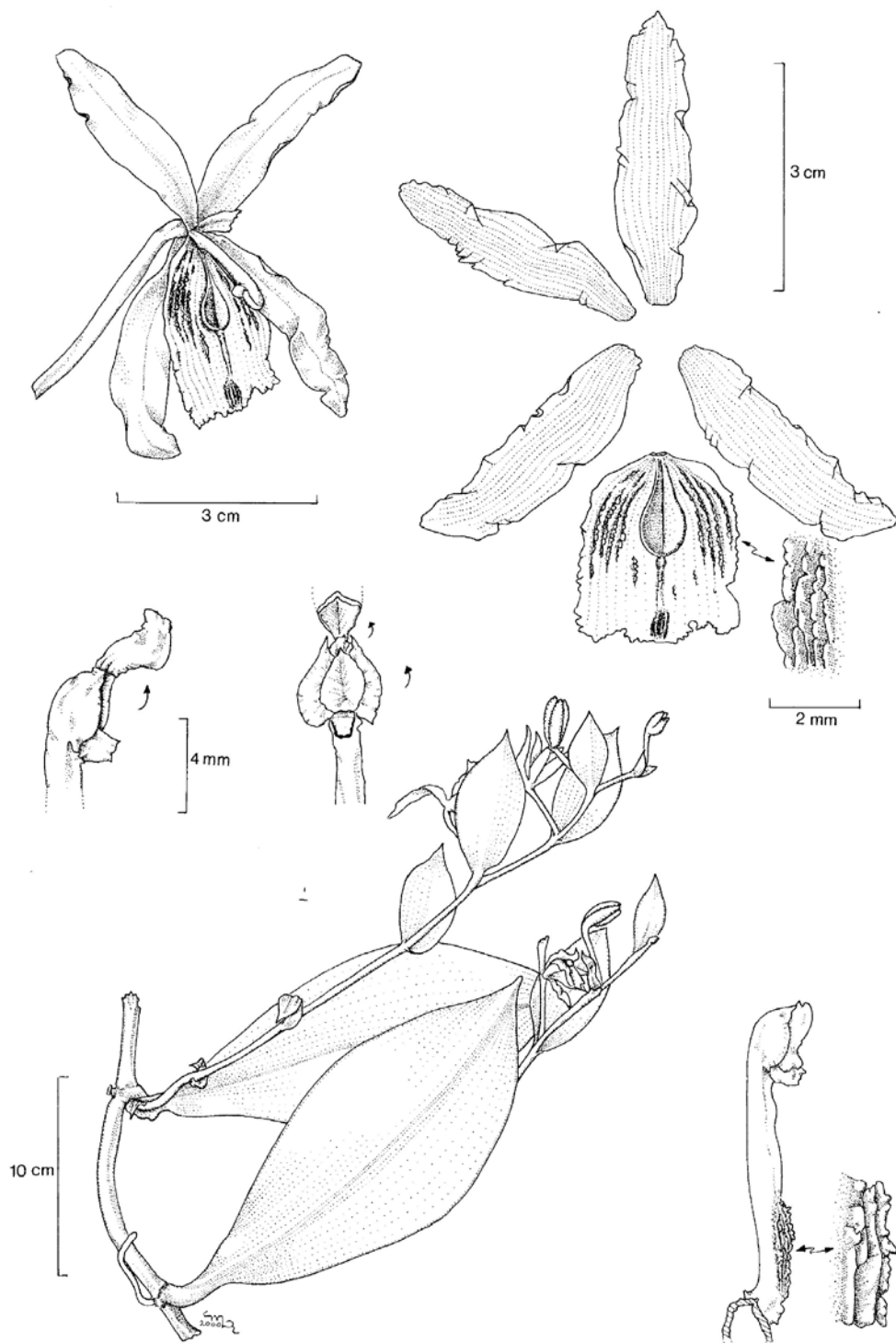


FIGURE 3. *Vanilla costaricensis* Soto Arenas. Based on A. Molina *et al.* 17565, except floral dissection and column based on A. Molina *et al.* 17567. Drawing by M. López.

W.C. Burger and B. Wallenta 17567 *SEL(016793)!
*F(1771938)!

3. *Vanilla cribbiana* Soto Arenas, *sp. nov.*

TYPE: **MEXICO**: CHIAPAS: Mpio. Ocosingo: Estación de Biología Chajul, en el borde del Río Lacatúm; a 680 m del Puente Hamaca, por la vereda a Arroyo Miranda, ca. 180 m s.n.m., selva alta perennifolia en plano, ca. 8 m de alto, flores con tépalos blanco-cremosos, sépalos verdosos en la superficie externa, labelo atrompetado, amarillo intenso con rayas anaranjadas en las venas, labelo extendido y truncado, sin papilas, no deflexo en el ápice, flores bien abiertas. Fragancia muy intensa y conspicua, a mentol y cítrico. Ovario verde-blanquecino con papilas. 20 junio 1996, *M. Soto 7945* y *R. Solano*, holo. *AMO!; iso. K !, AMO (in spirit)!

Vanillae hostmanii primo adpectu similis, sed foliis minoribus, inflorescentiis minoribus paucifloribus, labello obscure 3-lobato, lobo medio distincto, subquadrato, quinque nervis papillosis incrassatis in centro apice ornato versus circa decem nervos in lobos laterales extensos

COMMON NAMES: "Vainilla".

Hemiepiphytic vine, somewhat branching, leafy, up to 12 m high. **Stems** terete, smooth, green, 3-5 mm thick; internodes 3-9 cm long. Aerial, free **roots** pale subterete, brownish, ca. 2 mm thick; attaching, aerial roots conspicuously dorsiventrally compressed, 2-5 mm wide. **Leaves** subpetiolate, petiole 1-1.5 cm long; blade obliquely elliptic to elliptic-oblong, abruptly acuminate-apiculate, stiff, brittle, 10-22 x 2.3-7.5 cm. **Inflorescence** a ca. 10-flowered raceme (rarely up to 30 flowers), 30-37(-110) mm long, rachis 18-22(95) mm long, 4 mm thick. **Bracts** ovate-triangular, obtuse, very concave, progressively smaller towards the apex, up to 8 x 4 mm. **Flowers** successive, 2-3 open at once, with spreading segments, apparently ephemeral, very showy, white-cream tepals, sepals externally cream-greenish, lip deep yellow with orange stripes, ca. 8 cm diameter; fragrance strong, mentholate and citric, similar to that of *V. pompona*. **Ovary** arcuate, dorsiventrally slightly compressed, thickened at the very base, whitish-green, conspicuously papillose,

more densely towards the perianth, sulcate, the grooves twisted, 44-46 mm long, 4-5.5 mm thick. **Dorsal sepal** narrowly elliptic, apex subacute-rounded, subcalyptrate, minutely apiculate, base attenuate, flat, apically concave, 9-veined, minutely papillose on the abaxial surface, the papillae in longitudinal rows and forming transverse, undulate rows, very fleshy and stiff; 63-65 x 12.5-13.5 mm. **Lateral sepals** obliquely oblong-elliptic (upper margin curved, lower margin more straight), apex subacute-rounded, subcalyptrate, base attenuate, canaliculate basally, slightly convex, apically concave, apex somewhat recurved, margins conspicuously involute, ca. 12-14-veined, minutely papillose in the abaxial surface, the papillae in longitudinal rows and forming transverse, undulate rows, very fleshy and stiff; 60-65 x 12.5-14 mm. **Petals** oblanceolate, very slightly oblique (the lower margin more straight), slightly arcuate, apex obtuse, widely rounded, somewhat thickened at apex, base attenuate, basally canaliculate, slightly concave towards the apex, with an elevated, axial, flat keel on the dorsal surface, ending in a long triangular, flat, free (ca. 2 mm) process; dorsal surface conspicuously canaliculate apically, surface colliculate, the cells in longitudinal rows, 14-veined; with granular, thread-like, somewhat branched inclusions; 64 x 12.5-13.5 mm. **Lip** attached to the column along the margins of the basal half (ca. 28 mm), tubular, trumped-shaped, cymbiform, deepest near the middle; axially grooved on the abaxial surface; when spread out 50-52 x 38 mm; unguiculate, claw with 4 obscure bands of unicellular, minute, elongate, yellow-brownish, trichomes; the blade obscurely flabellate, trilobed, margin conspicuously entire, subtruncate, lip with inclusions similar to those found in the petals; lateral lobes widely and obliquely triangular, overlapping above the column, 33 x 16 mm; midlobe small, subquadrate-ovate, slightly deflexed, smooth, the apex flat, ca. 8.5 x 14 mm; **penicillate callus** made up by ca. 10 congested, retrorse, trapezoidal, laciniated scales, the scales sometimes united to each other along the lateral margins, ca. 5 x 4 mm; the region just after the penicillate callus, smooth, with denser inclusions; with 5 low, rugose, rounded, densely papillose keels confluent in an apical cushion-like thickening, 4-6 secondary, more inconspicuous keels, shorter, not reaching the apex. **Column** elongate, 34 mm long,