

THE GENUS *ANATHALLIS* (PLEUROTHALLIDINAE) IN MEXICO

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ABSTRACT. *Anathallis* encompasses nearly 120 neotropical orchid species, with Mexico representing the northernmost limit of its distribution. Around fifteen Mexican species were initially classified in *Anathallis* during the current century. However, several of them have been reclassified in recent years into *Lankesteriana*, *Specklinia*, and *Stelis*. Currently, *Anathallis* in Mexico includes *A. greenwoodii*, *A. lewisiae*, *A. minutalis*, *A. oblanceolata*, *A. sertularioides*, and *A. yucatanensis*. This work presents the taxonomic treatment for these species, models of their potential distribution, and the assesses of their conservation status in Mexico. For this, specialized literature, living and herbarium specimens, and online databases were examined. For each species, a description, drawing, photograph, and distribution map were prepared, along with information on nomenclature, habitat, phenology, comparison with similar species, and an assessment of their risk status is provided. Mexican *Anathallis* plants are characterized by their diminutive habit, rhizomatous growth, semi-open flowers with acute sepals and petals, free lateral sepals, mobile lip, and winged column. Five species are recognized among them: *A. lewisiae*, *A. minutalis*, *A. oblanceolata*, *A. sertularioides*, and *A. yucatanensis*. *Anathallis greenwoodii* exhibits a morphology more similar to *Lankesteriana* and it was transferred accordingly. *Anathallis oblanceolata* was previously known only from the type locality and is redescribed based on specimens previously confused with *A. minutalis*. Both species are endemic to the mountainous regions of Mexico. *Anathallis lewisiae*, *A. sertularioides*, and *A. yucatanensis* grow in warm, lowland areas along the Gulf of Mexico coast and Yucatan Peninsula. The extinction risk assessment assigned the category of species subject to special protection to the five Mexican taxa. For each taxon the extent of its distribution in Mexico and the environmental variables determining it were estimated; the areas with the highest probability for the presence each species were identified. Finally, we designate here lectotypes for *Pleurothallis minutalis*, *P. tenuissima*, and *P. trichopoda*.

RESUMEN. *Anathallis* incluye casi 120 especies de orquídeas neotropicales y México representa el límite norte de su distribución. Durante el presente siglo, hasta quince especies mexicanas han sido clasificadas en *Anathallis*. Pero en los últimos años varias de ellas han sido reclasificadas a géneros como *Lankesteriana*, *Specklinia* y *Stelis*. Actualmente *Anathallis* de México incluye *A. greenwoodii*, *A. lewisiae*, *A. minutalis*, *A. oblanceolata*, *A. sertularioides* y *A. yucatanensis*. Este trabajo presenta el tratamiento taxonómico para dichas especies, el modelado de su distribución potencial y la evaluación de su estatus de conservación en México. Para ello se revisó literatura especializada, especímenes vivos y registros en colecciones científicas y bases disponibles en línea. Para cada especie se presenta una descripción, dibujo, fotografía, mapa de distribución; además, se proporciona información sobre su nomenclatura, hábitat, fenología, comparación con especies similares y una evaluación de su estatus de riesgo. En México las plantas de *Anathallis* se caracterizan por su hábito diminuto, crecimiento rizomatoso, flores semiabiertas con sépalos y pétalos agudos, sépalos laterales libres entre sí, labelo móvil y columna alada. El género incluye cinco especies mexicanas: *A. lewisiae*, *A. minutalis*, *A. oblanceolata*, *A. sertularioides* y *A. yucatanensis*. *Anathallis greenwoodii* exhibe una morfología más similar con *Lankesteriana* y por ello se transfiere a este género. *Anathallis oblanceolata* solo era conocida de la localidad tipo, aquí se redescribe a partir de especímenes previamente confundidos con *A. minutalis*. Ambas especies son endémicas en las zonas montañosas de México. *Anathallis lewisiae*, *A. sertularioides* y *A. yucatanensis*

crecen en zonas cálidas y bajas de la costa del Golfo de México y Península de Yucatán. La evaluación del riesgo de extinción asignó la categoría de especie sujeta a protección especial a los cinco taxones mexicanos. Para cada taxón se estimó la extensión de su distribución en México y las variables ambientales que la determinan; se identificaron las áreas con mayor probabilidad de presencia de cada especie. Finalmente, se designan aquí lectotipos para *Pleurothallis minutalis*, *P. tenuissima* y *P. trichopoda*.

KEYWORDS / PALABRAS CLAVE: *Anathallis oblanceolata*, endemismos mexicanos, *Lankesteriana*, *Lepanthes* affinity, Mexican endemism, neotropical orchids, orquídeas neotropicales, *Panmorphia*

Introduction. The phylogenetic arrangement of the Pleurothallidinae subtribe initially included nine affinities: *Acianthera* Scheidw., *Dilomilis* Raf., *Lepanthes* Sw., *Masdevallia* Ruiz & Pav., *Octomeria* R.Br., *Phloeophila* Hoehne & Schltr., *Pleurothallis* R.Br., *Restrepia* Kunth, and *Specklinia* Lindl. (Karremans 2016). But the *Dilomilis* affinity was subsequently separated and recognized as its own subtribe, Dilomilinae (Dietrich in Dietrich *et al.* 2007, Karremans & Vieira-Uribe 2020). Following Karremans (2016), Bogarín, Karremans & Fernández (2018) and Bogarín *et al.* (2019), the *Lepanthes* affinity now encompasses 14 genera: *Anathallis* Barb.Rodr., *Draconanthes* (Luer) Luer, *Fronitaria* Luer, *Gravendeelia* Bogarín & Karremans, *Lankesteriana* Karremans, *Lepanthes* Sw., *Lepanthopsis* (Cogn.) Ames, *Opilionanthe* Karremans & Bogarín, *Pendusalpinx* Karremans & Mel.Fernández, *Pseudolepanthes* (Luer) Archila, *Stellamaris* Mel.Fernández & Bogarín, *Trichosalpinx* Luer, *Tubella* (Luer) Archila, and *Zootrophion* Luer. It is worth noting that the name *Tubella* was found to be an invalid in Orchidaceae and has been replaced with *Karma* Karremans (2023). Six genera of the *Lepanthes* affinity are presented in Mexico: *Anathallis*, *Lankesteriana*, *Karma*, *Lepanthes*, *Lepanthopsis*, and *Trichosalpinx*. With the exception of *Lepanthes*, which boast nearly 70 species in Mexico, the other four genera within this affinity are each represented by seven or fewer species in this country.

Anathallis was originally proposed to accommodate two Brazilian species, *A. fasciculata* Barb. Rodr. and *A. racemosa* Barb.Rodr. Over time, the former name has been considered a synonym of *A. obovata* (Lindl.) Pridgeon & M.W.Chase and was designated as the lectotype of the genus (Garay 1974). On the other hand, *A. racemosa* is currently treated as a synonym of *Stelis aurea* (Lindl.)

Karremans. For a long time *Anathallis* remained subsumed within the synonymy of *Pleurothallis* (Cogniaux 1896, Garay 1974, Luer 1986). However, Pridgeon, Solano & Chase (2001) demonstrated that *Pleurothallis*, as delimited by Luer (1986), was polyphyletic, and various unrelated groups were segregated into distinct genera (Pridgeon & Chase 2001, 2002). Consequently, *Anathallis* was redefined to encompass *Pleurothallis* sect. *Acuminatae* Lindl. and *P.* sect. *Muscosae* Lindl. (Pridgeon & Chase 2001, Pridgeon, 2005). Subsequent studies revealed that *Anathallis barbulata* (Lindl.) Pridgeon & M.W.Chase and similar species formed a clade closely related to *Trichosalpinx*, prompting their segregation into *Lankesteriana*. Meanwhile, *Pleurothallis* sect. *Acuminatae* was found to be closely related to *Stelis* Sw. and their species were accordingly transferred (Karremans 2014).

On the other hand, Luer (2006) proposed *Panmorphia* Luer to include *Pleurothallis* sect. *Muscosae* and *Palmoglossum* Klotzsch ex Rchb.f., with *P. sertularioides* (Sw.) Spreng. designed as the type species. However, *Panmorphia* also encompasses *Pleurothallis barbulata* and related species currently classified under *Lankesteriana*. Additionally, *P. sertularioides*, the type species of *Panmorphia*, has been found to be nested within *Anathallis* and closely related to *A. obovata*, the type species of *Anathallis* (Chiron, Guiard & van den Berg 2012, Karremans 2014, Bogarín *et al.* 2018). Consequently, *Panmorphia* is non-monophyletic and cannot be distinguished from *Anathallis*. Nevertheless, Archila (2014[2015]a) transferred 54 binomials from *Anathallis*, *Panmorphia* (including *Lankesteriana*), and *Specklinia* to *Trichosalpinx*, rendering this genus paraphyletic. *Anathallis* is recognized here as a monophyletic group based on *Pleurothallis* sect. *Ala-*

tae Luer and *Panmorphia* (excluding species of *Lankesteriana*), as delimited by Karremans (2014), Bogarín *et al.* (2018), and Karremans & Vieira-Uribe (2020).

Anathallis extends its northern distribution to Mexico, where its richness is comparatively lower than in South America. At the start of the 21st century, eight Mexican *Pleurothallis* species were reclassified into the genus *Anathallis* by Pridgeon & Chase (2001, 2002). These species included *A. abbreviata* (Schltr.) Pridgeon & M.W.Chase, *A. barbulata*, *A. comayaguensis* (Ames) Pridgeon & M.W.Chase, *A. dolichopus* (Schltr.) Pridgeon & M.W.Chase, *A. minutalis* (Lindl.) Pridgeon & M.W.Chase, *A. platystylis* (Schltr.) Pridgeon & M.W.Chase, *A. scariosa* (Lex.) Pridgeon & M.W.Chase, and *A. sertularioides* (Sw.) Pridgeon & M.W.Chase. Later, additional combinations were made in *Anathallis* for *Pleurothallis haberi* Luer, *P. involuta* L.O.Williams, *P. lewisiae* Ames, *P. oblanceolata* L.O.Williams, and *P. yucatanensis* Ames & C.Schweinf., and a new species, *A. greenwoodii* Soto Arenas & Salazar, was described (Hágsater & Soto-Arenas 2003). As a result, Soto-Arenas *et al.* (2007) included 14 Mexican species in *Anathallis*. However, within this genus, there was a grouping of small plants with rhizomatous habit and successively flowered racemes (e.g., *A. barbulata* and *A. minutalis* and their allies), alongside larger plants with caespitous habit and simultaneously flowered raceme (e.g., *A. dolichopus*, *A. platystylis*, and *A. scariosa*). Karremans (2014) further separated the species with a minute habit, frequently congested raceme, fused lateral sepals, and tailed apices of sepals and petals in *Lankesteriana*, which encompasses five Mexican species (*A. abbreviata*, *A. barbulata*, *A. comayaguensis*, *A. involuta*, and *A. haberi*). *Anathallis platystylis*, *A. dolichopus*, and *A. scariosa* shared morphological characteristics with *Stelis* (e.g., large plant size, caespitous habit, racemes longer than the leaves, simultaneously flowering, and partially fused lateral sepals), and were consequently reclassified accordingly (Solano 2008c; Karremans 2014). Currently, *Anathallis* comprises six species in Mexico: *A. greenwoodii*, *A. lewisiae*, *A. minutalis*, *A. oblanceolata*

(L.O.Williams) Solano & Soto-Arenas, *A. sertularioides*, and *A. yucatanensis* (Ames & C. Schweinf.) Solano & Soto-Arenas. But the current name of one of them, *A. greenwoodii*, needs to be transferred to another genus within the *Lepanthes* affinity. The objective of this study was elaborate the taxonomic treatment of this group by reviewing live specimens, material in scientific collections, and specialized literature.

Material and methods

Information sources.— Nomenclatural information was obtained from type specimens and original descriptions. For publications, the protologues were accessed through the Biodiversity Heritage Library (<http://www.biodiversitylibrary.org>). Type specimens were revised from the AMO herbarium and online collections at the Field Museum of Natural History (F, <http://fieldmuseum.org/explore/department/botany/collections>), Missouri Botanical Garden (MO, <http://www.mobot.org>), Naturhistorisches Museum Wien (W, <http://www.nhm-wien.ac.at/en/research/botany>), Oak Ames Orchid Herbarium (AMES, www.huh.harvard.edu), Smithsonian Institution (US, botany.si.edu/), and Swedish Museum of Natural History (S, <http://www.nrm.se/>). Mexican specimens of *Anathallis* were thoroughly examined by directly consulting of AMO, ARIZ, ASU, ENCB, FCME, FEZA, HEM, IEB, MEXU, OAX, UAMIZ, TEX, XAL, and XALU herbaria. Other specimens were accessed through online searches of the herbaria AMES, BM, F, K, MO, P, US, and W, as well as from the Global Biodiversity Information Facility (<https://www.gbif.org>), SEINet data portal (<https://swbiodiversity.org/seinet/index.php>), and the citizen science network iNaturalista (<http://www.naturalista.mx>). The taxonomic identity of all specimens was verified.

Line drawings were prepared for each species using fresh or rehydrated specimens. A drawing tube adapted to a stereomicroscope (Wild Heerbrugg Type 308700, Gais, Switzerland) was used for this purpose. For each species, comprehensive information is provided, including nomenclature, distribution, habitat, phenology, comparison with similar taxa, conservation status as per Mexican

regulations (SEMARNAT 2010), taxonomic notes, and specimens with documented presence in Mexico. Mexican states, floristic provinces (Rzedowski & Reyna-Trujillo 1990), and countries where each species has been recorded were assigned. The vegetation type where each species has been reported follows Rzedowski (2006). Keys for genera within the *Lepanthes* affinity found in Mexico and Mexican species of *Anathallis* were also prepared. Some clarifications regarding the usage of terms employed here in the morphology of plants of the Pleurothallidinae subtribe are provided below. The term ‘sympodium’ follows Dressler (1993) and Pridgeon et al. (2005); for ‘bilabiate flower,’ Fon-Quer (2000) is followed. Regarding the use of ‘stem’ instead of ‘ramicaule’ to denote the caulinar axis bearing leaves and inflorescences in a Pleurothallidinae, Rasmussen (1985) and Solano (2015) were adopted.

Potential distribution modeling.—The geographic coordinates of each species’ locality records were determined whenever available information allowed. Subsequently, they were overlaid onto a digital elevation model map of Mexico using QGIS 3.22.9 (QGIS Development Team 2023). A vector layer was created to serve as a reference region for each species’ distribution, referred as area M, which was generated by summing the areas occupied by the species’ localities on layers for political divisions (INEGI 2021), floristic provinces (Rzedowski & Reyna-Trujillo 1990), and vegetation types of Mexico (INEGI 2017). The layers with 19 bioclimatic variables were obtained from WorldClim (<https://www.worldclim.org/data/bioclim.html>) at a resolution of 30 s.

Additionally, the digital elevation model of Mexico was obtained and cropped to match the size of area M for each species. Since these layers could exhibit high correlation, we initially ran a model in MaxEnt 3.4.1 (Phillipps et al. 2023) to select a subset of the least correlated variables. We then used this subset to create the final model, utilizing between 5 and 11 variables per model.

In MaxEnt, default options were used, with Hinge features deactivated, and Create response curves and Do jackknife to measure variable im-

portance activated, using a logistic model as the output format. In Settings/basic, the Random seed function was activated, and a value of 30% was assigned to the Random test percentage function, selecting 100 replicates per model and one run per Bootstrap. In the Settings/advanced section, the Write plot data function was activated, while Extrapolate and Do clamping were deactivated. The Apply threshold rule was set at the 10-percentile training presence. Subsequently, the command was executed, and the model was run.

To select the best model for each species, we considered the area under the curve (AUC) with the following criteria: 0.9–1.0 (excellent), 0.8–0.9 (good), 0.7–0.8 (acceptable), 0.6–0.7 (poor), and 0.5–0.6 (failed). Model selection also considered models that utilized the largest subset of environmental variables while minimizing the omission of known localities. Values greater than 0.8 were achieved when modeling included at least 12 localities for each species. The habitat suitability level for the model was categorized into four classes: not suitable (≤ 0.10), low suitability (0.11–0.30), moderate suitability (0.31–0.70), and high suitability (≥ 0.71) (Deb, Jamir & Kikon 2017, Usmani et al. 2023).

Conservation status assessment.—The conservation status of each species was assigned using the Species Risk Assessment Method (MER by its acronym in Spanish) for wild species in Mexico, as described in Annex Normative II of NOM-059-SEMARNAT-2010 (SEMARNAT 2010). This method standardizes the decision criteria for risk categories using taxon-specific information. It is based on four independent criteria: A) the extent of the taxon’s distribution in Mexico, B) the status of the habitat concerning the taxon’s natural development, C) the intrinsic biological vulnerability of the taxon, and D) the impact of human activity on the taxon. Each of these criteria has several subcriteria that are numerically evaluated in ascending order of risk. For each criterion, the sum of the points is normalized against its maximum score, so the maximum value is 1. The sum of the values assigned to the four criteria represents the cumulative risk assessment.

KEY FOR THE GENERA OF *LEPANTHES* AFFINITY IN MEXICO

Mexican species of *Lepanthes* affinity belong to the following six genera, they can be identified with the following key.

1. Stems with at least three internodes, covered by lepanthiform sheaths 2
 2. Stems producing adventitious modules at the apex; raceme longer than the leaf, flowers simultaneous ***Karma***
 - 2a. Stems not (or rarely) producing adventitious modules; raceme shorter or longer than the leaf; flowers successive or simultaneous 3
 3. Flowers bilabiate; lateral sepals united in a concave synsepal; column with a foot; anther ventral ***Trichosalpinx***
 - 3a. Flowers extended, lateral sepals if united not forming a concave synsepal; column without a foot; anther dorsal or apical 4
 4. Flowers simultaneous; lip entire, not embracing the column; stigma 2-lobed ***Lepanthopsis***
 - 4a. Flowers successive; lip with 2 conspicuous blades and a minute appendix (rarely entire), embracing the column; stigma entire ***Lepanthes***
- 1a. Stems of two internodes, covered by tubular adpressed sheaths 5
 5. Sympodium cespitose; lateral sepals united in a bifid synsepal; sepals and petals not acuminate or acute; petals frequently caudate; lip ciliate ***Lankesteriana***
 - 5a. Sympodium rhizomatous; lateral sepals free; sepals and petals acuminate or acute; petals not caudate; lip not ciliate ***Anathallis***

TAXONOMIC TREATMENT

Anathallis Barb.Rodr., Gen. Sp. Orch. 1: 23. 1877.

Lectotype (designated by Garay, 1974): *Anathallis fasciculata* Barb.Rodr., Gen. Sp. Orch. 1: 23. 1877 = *Anathallis obovata* (Lindl.) Pridgeon & M.W.Chase.

Syn.: *Palmoglossum* Klotzsch ex Rehb.f. *Xenia* Orchid. 1: 174. 1856, *nom. illeg.*, based on *Pleurothallis crassifolia* Rehb.f. *nom. illeg.*, not Focke (1849).

Syn.: *Pleurothallis* sect. *Anathallis* (Barb.Rodr.) Cogn. Fl. Bras. 3(4): 380. 1896.

Syn.: *Pleurothallis* sect. *Margaritifera* Schltr. Notizbl. Bot. Gart. Berlin-Dahlem 7: 272. 1918, *nom. illeg.*, based on *Plurothallis margaritifera* Schltr.

Syn.: *Pleurothallis* sect. *Alatae* Luer, Monogr. Syst. Bot. Missouri Bot. Gard. 76: 99. 1999. Type: *Pleurothallis obovata* Lindl. = *Anathallis obovata*.

Syn.: *Panmorphia* Luer, Monogr. Syst. Bot. Missouri Bot. Gard. 105: 144. 2006. Type: *Epidendrum sertularioides* Sw. = *Anathallis sertularioides*.

Minute epiphytes or lithophytes *plants*. *Rhizome* relatively elongated, erect, or creeping, formed by 3 internodes between adjacent stems. *Roots* flexuous, whitish, terete. *Stem* terete, abbreviated, formed by two internodes, with an annulus near the apex of the upper internode, covered by tubular, obtuse, mucronate, scarious, and overlapping sheaths. *Leaf* fleshy or fleshy thickened, emarginate and mucronate at the apex, petiolate to subpetiolate. *Inflorescence* emerging from the annulus, equal to or longer than the leaf, racemose; covered at the base by a conduplicate, scarious, and carinate spathaceous bract; peduncle filiform, with 1–3 membranaceous, tubular bracts. *Floral bracts* obliquely infundibuliform, obtuse, minutely mucronate, membranaceous. *Flowers* tiny, half open, successive, or simultaneous. *Sepals* free, acuminate, or acute at the apex, translucent, glabrous, somewhat fleshy. *Petals* porrect, acuminate or acute at the apex, translucent, glabrous, sometimes ciliated. *Lip* vibratile, unguiculate, entire or shortly 3-lobed, attached to the foot column by an oblong, membranous claw. *Column* arcuate or erect, channeled ventrally, wings

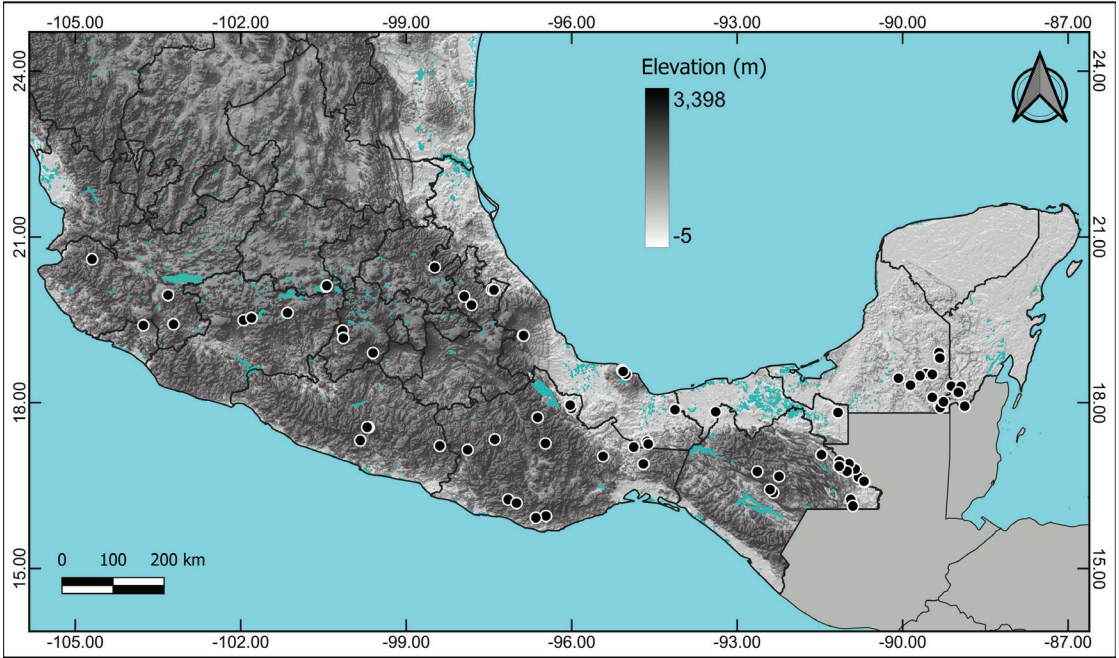


FIGURE 1. Map of recorded localities (dots) in México for the genus *Anathallis*. Map by E. Licona.

prominent and a conspicuous foot, clinandrium covering the anther. *Stigma* a ventral cavity, viscous; rostellum laminar, helmet-like. *Anther* ventral; pollinia two, yellow, laterally compressed, provided with laminar caudicles, curved and divergent from each other. *Ovary* trigonous, arching, glabrous, articulated to a terete pedicel. *Capsule* ellipsoid or obovoid, trigonous, with persistent perianth.

The genus *Anathallis* comprises just over 120 species distributed in the Neotropics, from Mexico, extending southward to Bolivia and southern Brazil, including the Antilles (Pridgeon 2005). In Mexico, species of this genus are distributed from Jalisco, Guanajuato, and northern Puebla and Veracruz to Chiapas and the southern Yucatan Peninsula (Fig. 1).

The five species of *Anathallis* can be identified with the following key:

- 1. Plants with subsessile, orbicular to obovate-elliptic, nearly prostrate to the substrate leaves2
- 2. Leaves adaxially rough-warty; lip 3-lobed; plants from < 400 m elevation *A. lewisiae*
- 2a. Leaves glabrous; lip entire; plants from > 500 m elevation *A. minutalis*

- 1a. Plants with leaves petiolate, linear or oblanceolate leaves, erect relative to the substrate..... 3
- 3. Inflorescence longer than the leaf; leaves linear; flowers simultaneous..... *A. yucatanensis*
- 3a. Inflorescence as long as the leaf; leaves oblanceolate to elliptical; flowers successive.....4
- 4. Floral bract with reddish hairy trichomes; petals lanceolate; lip entire; plants from >1100 m elevation..... *A. oblanceolata*
- 4a. Floral bract glabrous; petals falcate-lanceolate; lip 3-lobed; plants from < 950 m elevation *A. sertularioides*

- 1. *Anathallis lewisiae* (Ames) Solano & Soto Arenas, Icon. Orchid. 5–6: x. 2003.
 - ≡ *Pleurothallis lewisiae* Ames, Proc. Bol. Soc. Washington 44: 42. 1931.
 - ≡ *Specklinia lewisiae* (Ames) Luer, Monogr. Syst. Bot. Missouri Bot. Gard. 95: 261. 2004.
 - ≡ *Panmorphia lewisiae* (Ames) Luer, Monogr. Syst. Bot. Missouri Bot. Gard. 105: 164–165, f. 129. 2006.
 - ≡ *Trichosalpinx lewisiae* (Ames) Archila, Revista Guatemalensis 17: 70. 2014[2015].
- TYPE: GUATEMALA. Department of Izabal, near

Puerto Barrios, on a mango tree about forty miles from the coast, 175 feet, August 1930, *M.W. Lewis* 2 (holotype: AMES-74405!; isotype: AMES-74406!).

Rhizomatous, scandent, epiphyte *herb*, up to 2 cm tall. *Roots* 0.5–0.7 mm diameter. *Rhizome* 3.0–6.5 mm long between adjacent stems, 0.8 mm diameter. *Stem* 1–4 mm long, the annulus 0.6–1.5 mm below the apex. *Leaf* 6–15 × 4.5–8.0 mm, fleshy, slightly arcuate, elliptic, orbicular-elliptic or obovate, rounded, subpetiolate, adaxially rough-warty. *Inflorescence* 1–2 per stem, as long as the leaf, 5–15 mm long; peduncle 3–9 mm long, 0.25 mm diameter, the base covered by a spatheaceous bract 0.5 mm long, with 1 additional tubular bract, 0.5 mm long; rachis with 2–4 successive flowers. *Floral bracts* hispidulous, 1.0–1.7 mm long. *Flowers* 4.3–4.5 mm tall, 6.4 mm long, 3.7 mm wide, sepals and petals yellowish to green-yellowish, purple at their apices, lip purple, column yellow-greenish and purple at the apex. *Sepals* conduplicate, 3-veined; dorsal sepal oblong-lanceolate, acute, 4.4–5.0 × 1.8–2.0 mm; lateral sepals 4.3–5 × 1.3–1.5 mm, obliquely lanceolate, acute. *Petals* oblong, obtuse to rounded, shortly apiculate, glandular-papillose, 1-nerved, 3.5–3.7 × 0.9–1.2 mm. *Lip* 2.3–3.0 × 0.6–1 mm, minutely 3-lobed, oblong, acute, 3-nerved, glandular-papillose; lateral lobes near the middle, triangular-rounded, erect; the blade with a pair of submarginal calli along the middle part, channeled among them, with a pair of mammillae calli at the base. *Column* 1.8–2.6 mm long, 0.9 mm wide, slightly arcuate, wings oblong, erose along the margins, clinandrium lacerate, foot column 1 mm long. *Anther* subglobose, 0.45 mm long and wide. *Pollinia* 0.45 mm long, obovoid. *Ovary* 0.9–1.5 mm long, pedicel 1.5–2.5 mm long. *Capsule* not seen. (Fig. 2–3).

DISTRIBUTION: Mexico, Guatemala, Belize, Honduras, Nicaragua, Costa Rica, and Panama. In Mexico it is found in the Gulf of Mexico Coast floristic province, in Chiapas, Oaxaca, and Veracruz states. The accepted distribution model for *A. lewisiae* yield a predicted AUC = 0.861, where the most influential variables being precipitation in the wettest month (41.8%), annual temperature range (32.1%), and the Mexican digital elevation model (11.3%). The model predicted three primary areas with the highest probability of distribu-

tion: the Lacandon forest (Chiapas), Los Chimalapas-Uxpanapa (Oaxaca, Veracruz), and Los Tuxtlas (Veracruz). For *A. lewisiae*, the potential distribution area was estimated to be 27,649.9 km², equivalent to 1.41% of Mexico's total territory (Fig. 4).

HABITAT: Epiphyte in evergreen tropical forest, semideciduous tropical forest, and mangrove swamp at elevations ranging 3 to 400 m.

PHENOLOGY: It flowers from May to December.

TAXONOMIC NOTES: This species is characterized by its diminutive, creeping habit, rough-warty leaves, obliquely oblong, obtuse petals with denticulate-cilia, and a shortly 3-lobed, oblong, acute lip (Fig. 2–3). Another species that shares similar characteristics, at least in its floral morphology, is *A. sertularioides* (Sw.) Pridgeon & M.W.Chase, with which it become sympatric. However, it can be distinguished by its larger and erect habit (*vs.* scandent), oblanceolate leaves (*vs.* elliptic, orbicular, or obovate), and single flowered inflorescence (*vs.* 2–4-flowered inflorescence). Another species with similar habit is *A. minutalis* (Lindl.) Pridgeon & M.W.Chase, but it can be differentiated by its very fleshy-thickened, obovate to rounded, glabrous leaves (*vs.* fleshy-thickened, almost orbicular), and entire lip (*vs.* shortly 3-lobed).

This species was originally described as *Pleurothallis lewisiae* based on a specimen collected in Izabal, Guatemala (Fig. 5). In Mexico, it was first documented as *Pleurothallis lewisiae* by Soto-Arenas (1988) from a specimen collected in Chiapas. Subsequently, the taxon has been reported with the same name by Soto-Arenas (1988), Hågsater *et al.* (1998), Martínez, Ramos & Chiang (1994), and Espejo-Serna & López-Ferrari (1998); as *Parmorphia lewisiae* by Luer (2023), and as *Anathallis lewisiae* by Salazar (2013), Villaseñor (2016), and Krömer *et al.* (2020).

CONSERVATION STATUS. In the four criteria of the MER evaluation, the species obtained the following scores: A) geographic distribution = 0.4545, B) habitat characteristics = 0.2222, C) intrinsic biological vulnerability = 0.1739, and D) impact of human activity = 0.4000; resulting in a total score of 1.2506. Since this value is ≥1.0 and <1.5, and the sum of criterion D is ≥ 0.3, the corresponding risk category is Subject to Special Protection (Pr). In Veracruz, its habitat has undergone sig-

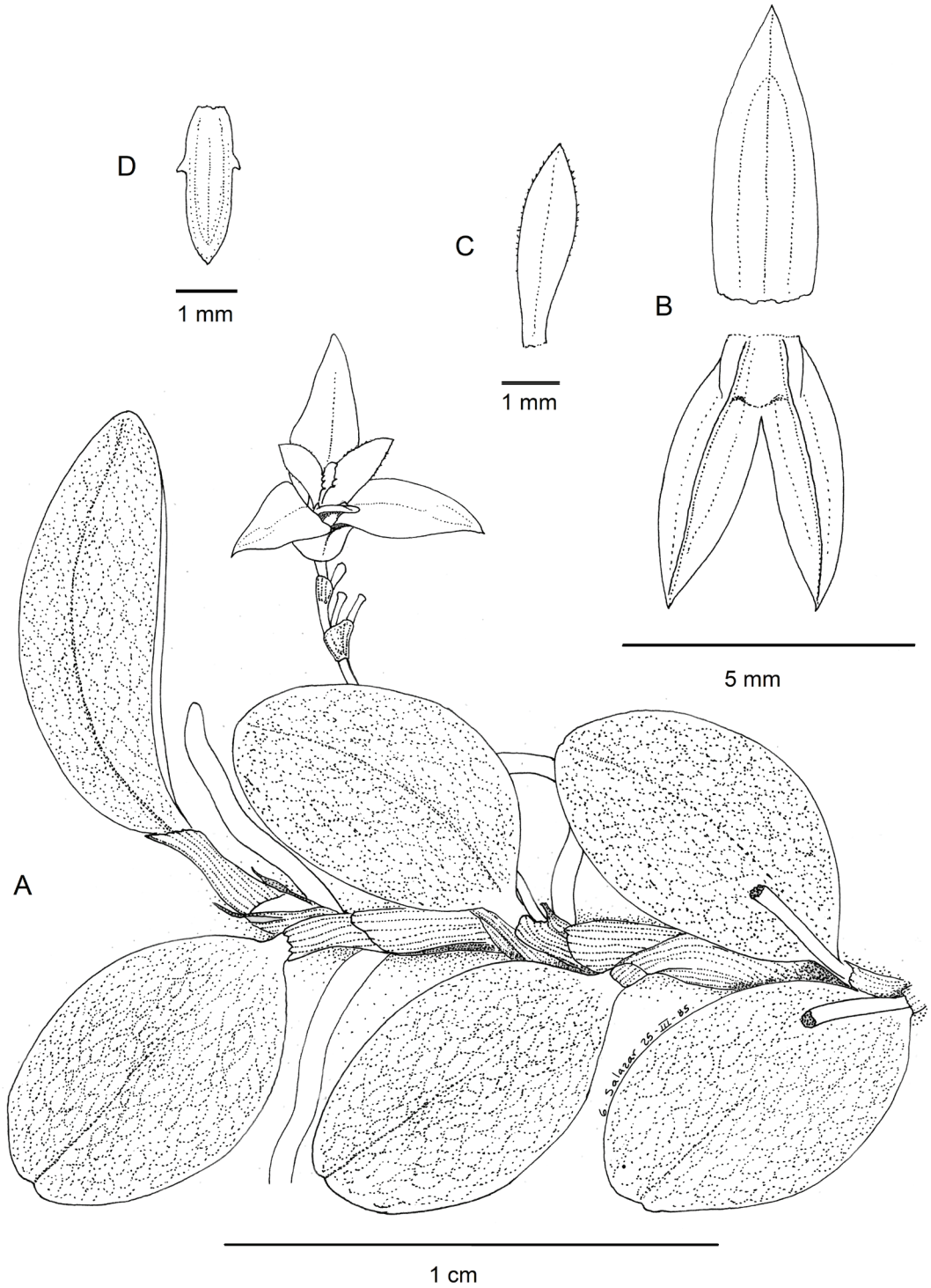


FIGURE 2. *Anathallis lewisiae*. A. Habit. B. Dorsal and lateral sepals dissected. C. Petal. D. Lip. Drawing by G. Salazar based on G. Salazar 225. Reproduction with permission of the AMO Herbarium.

nificant transformation due livestock, sugarcane plantations, and human settlements. In Oaxaca and Chiapas, however, there are still well-preserved habitat where local populations thrive. Some of these localities are situated within natural protected areas, such as the Los Tuxtlas (Veracruz), Montes Azules (Chiapas), and Lacan-Tun Biosphere Reserves (Chiapas), as well as the Palenque Natural Monument (Chiapas).

SPECIMENS EXAMINED. MEXICO. **Chiapas:** municipio Ocosingo, Chancalá road, Jul 1977, *W. R. Thurston 1536* (AMO[photo]!); a 4 km de Crucero Corozal camino Palenque-Boca Lacantum, 10 Aug. 1984, *E. Martínez 6883* (MEXU!, MO!), *E. Martínez 6935* (MEXU!), *E. Martínez 6983* (MEXU!); campamento COFOLASA, 24 Km al SE de Crucero Corozal sobre camino Palenque-Boca Lacantum, 16 Oct. 1984, *E. Martínez 8553* (MEXU!), 7 Dec. 1984, *E. Martínez 9267* (MEXU!), Boca Lacantum, sobre Carretera Fronteriza del Sur, 26 Oct. 1984, *E. Martínez 8741-bis* & *C. Aguilar* (MEXU!); 24 Km al SE de Crucero Corozal sobre camino Palenque-Boca Lacantum, *E. Martínez 25454* (MEXU!), *E. Martínez 24993* (AMO!); Crucero Corozal, *E. Martínez 25454* (CHAPA! MEXU!), *E. Martínez 25543-A* (AMO!); Crucero Corozal, Aug. 1992, *R. Solano 717* (AMO!), *R. Solano 835* (AMO!); Estación Biológica Chajul, vereda de Puente Hamaca a la Sabana, *G. Salazar 8606 et al.* (MEXU!). Estación Biológica Chajul, 26 Jun. 1999, *S. Sinaca 2726* (MEXU!); km 60 del camino Chancalá-Monte Líbano, cerca de El Tumbo, entre Metzabok y la Laguna Ocotálito, 18 Jun. 1986, *M. Soto 4227-bis* & *E. Martínez* (AMO!); ojo de agua de San Javier, 23 km al SE de Nuevo Guerrero camino a Boca Lacantum, 29 Jan. 1986, *E. Martínez 16932* (XAL[mixed with *A. sertularioides*]!). **Oaxaca:** municipio San Juan Bautista Tuxtepec, Bethania, 2 Sep. 2020, *C. Refugio-Venegas s.n.* (OAX!). Municipio Santa María Chimalapa, camino a Santa María Chimalapa, 20 Nov. 2005, *M. Martínez-García 132* (MEXU!). **Veracruz:** municipio Catemaco, Punta Ostión, bahía Sontecomapan, 17 Aug. 1972, *J.H. Beaman 6474* (MEXU!). Municipio Las Choapas, *A. Franco 103* (XAL). Municipio Hidalgotitlán, *P.E. Valdivia 131* (XAL). Municipio San Andrés Tuxtla, cerro Viguía, Estación de Biología Tropical Los Tuxtlas, 16 Nov. 1984, *G. Ibarra 2152-bis et al.* (MEXU!); Estación de Biología Tropical Los Tuxtlas, *G. Salazar s.n.* (AMO[drawing]!); Estación de Biología Tropical Los Tuxtlas, límite N sobre camino a Laguna Escondida, 8 Dec. 1984, *G. Salazar 225* (AMO! MEXU!); Estación de Biología Tropical Los Tuxtlas, 15 May 1986, *S. Sinaca 725* & *Chigo* (MEXU!).

NATURALISTA OBSERVATION: MEXICO. **Chiapas:** municipio Marqués de Comillas, 11 Jul. 2020, *R. Ortiz s.n.* (<https://www.naturalista.mx/observations/53280908>).



FIGURE 3. *Anathallis lewisiae*. Photograph by R. Solano based on *E. Hågsater 4577*.

2. *Anathallis minutalis* (Lindl.) Pridgeon & M.W.Chase, *Lindleyana* 16(4): 249. 2001.

≡ *Pleurothallis crassifolia* Rchb.f., *Linnaea* 22: 832. 1849[1850], *nom. illeg., non* Focke, 1849.

≡ *Palmoglossum crassifolium* Klotzsch ex Reichb.f., *Xenia Orchid.* 1: 174. 1856, *nom. inval.*

≡ *Pleurothallis minutalis* Lindl., *Folia Orchid. Pleurothallis* (9): 40. 1859, replacement name for *P. crassifolia* Rchb.f.

≡ *Humboldtia minutalis* (Lindl.) Kuntze, *Revis. Gen. Pl.* 2: 668. 1891.

≡ *Specklinia minutalis* (Lindl.) Luer, *Monogr. Syst. Bot. Missouri Bot. Gard.* 95: 262. 2004.

≡ *Panmorphia minutalis* (Lindl.) Luer *Monogr. Syst. Bot. Missouri Bot. Gard.* 105: 167–168, f. 134. 2006.

≡ *Trichosalpinx minutalis* (Lindl.) Archila, *Revista Guatemalensis* 17(1): 71. 2014[2015].

TYPE: MEXICO. unknown locality, “blühte im

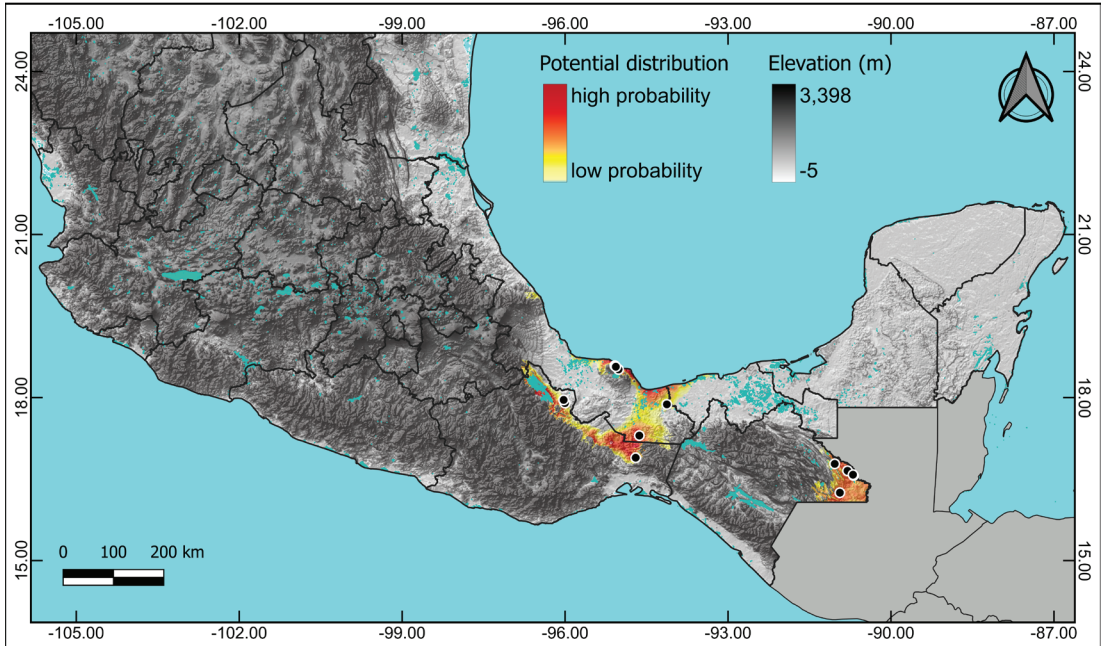


FIGURE 4. Potential distribution of *Anathallis lewisiae* in Mexico. Map by E. Licona.

Juli 1839, eine von C. Ehrenberg aus Mexico mitgebrachte Pflanze" (lectotype designated here W-25566! labelled as *Palmoglossum crassifolium*).

Syn.: *Pleurothallis sarcophylla* A.Rich. & Galeotti, *nomen* based on Sierra d'Oajaca à 7000, Juquila, H.G. Galeotti 48 (W-12719! with a watercolor by Galeotti and a floral sketch by Richard).

Syn. *Humboldtia pachyphylla* Kuntze, Revis. Gen. Pl. 2: 668. 1891, *nom. inval.*, replacement name for *Pleurothallis crassifolia* Rehb.f.

Rhizomatous, scandent *herb*, up to 5 cm tall. *Roots* 0.6–1.0 mm diameter. *Rhizome* 2–7 mm long between adjacent stems, 0.8–1.0 mm diameter. *Stems* 2.5–6.0 mm long, 0.5–1.0 mm diameter, arcuate, the annulus 1.5–2.0 mm below the apex. *Leaf* 18–25 × 4–7 mm, very fleshy-thickened, arcuate, elliptic to obovate, rounded, subpetiolate, the lamina biconvex and axially sulcate. *Inflorescence* 15–24 mm long, as long as the leaf; peduncle 6–13 mm long, 0.3–0.5 mm diameter, the base covered by a spatheaceous bract, 0.4–0.8 mm long, with 1–2 additional tubular bracts, 1–2 mm long;

rachis 5–8 mm long, with 2–3 successive flowers. *Floral bracts* 1–2 mm long, shortly apiculate. *Flowers* 3.7–5.0 mm tall, 2–3 mm wide, sepals and petals yellowish, sometimes brownish purple tinged toward their apices and along the mid-vein, lip purple, column yellowish, anther purple. *Sepals* concave, 3-veined; dorsal sepal 4.5–5.0 × 1.5–1.8 mm, ovate, acute; lateral sepals 4.0–4.8 × 1.4–1.5 mm, ovate-lanceolate, oblique, acute, shortly apiculate. *Petals* 3.0–3.8 × 0.7–0.9 mm, falcate-lanceolate, long acuminate, marginally denticulate, 1-veined. *Lip* 2.7–3.1 × 0.7–1.0 mm, entire, oblong-pandurate, acute, longitudinally sulcate, glandular-postulate, 3-veined, with a pair of minute protuberances at the base and two submarginal, low calli along the basal 2/3; the base with an oblong claw, 0.3 mm. *Column* 1.7–2.4 mm long, 0.6–0.9 mm wide, arcuate, wings oblong, entire along their margins, with the apex narrowly triangular, acute and incurved, clinandrium denticulate, foot column 0.6–0.7 mm long. *Anther* orbicular, 0.5–0.8 mm long and wide. *Pollinia* 0.3 mm long, obovoid, longitudinally cleft. *Ovary* 0.8–1.5 mm long, pedicel 1.5–6.5 mm long. *Capsule* 7.5 mm long, 4.2 mm diameter (Fig. 6–7).

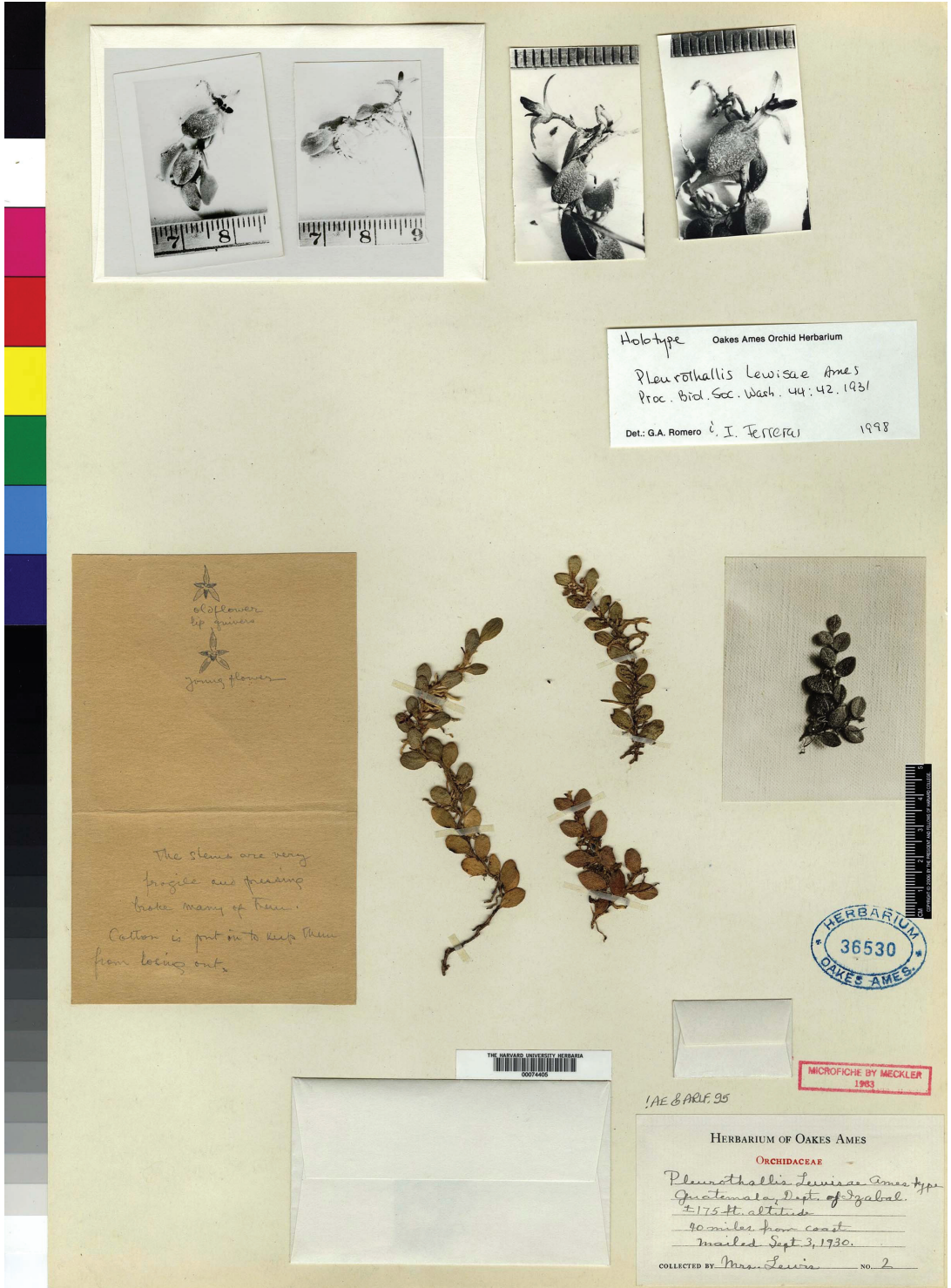


FIGURE 5. Holotype of *Pleurothallis lewisiae*, M.W. Lewis 2 (AMES-74405). Reproduction with permission of the Oak Ames Orchid Herbarium, Harvard University.

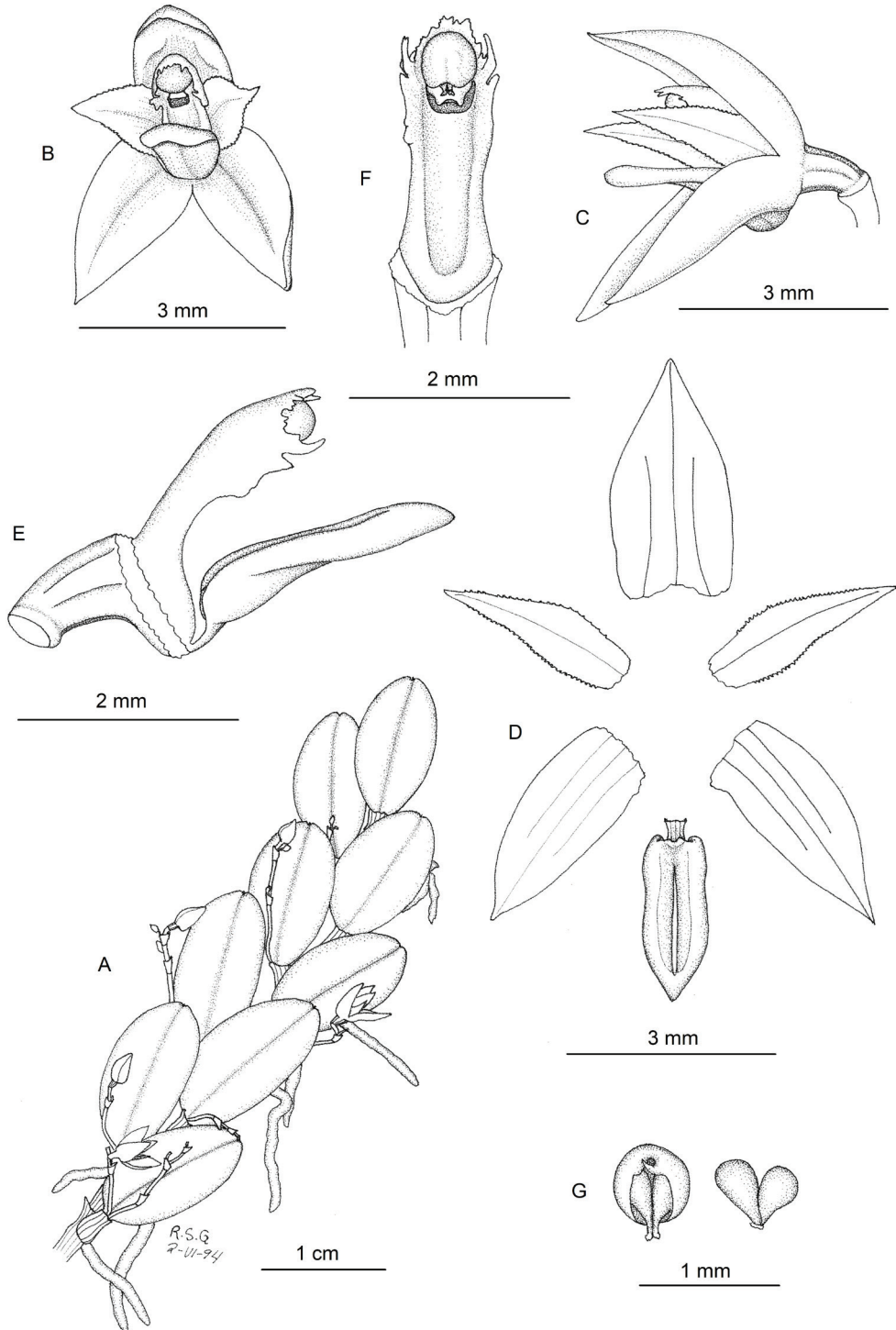


FIGURE 6. *Anathallis minutalis*. A. Habit. B. Flower, frontal view. C. Flower, lateral view. D. Floral dissection. E. Lip, column, and ovary, lateral view. F. Column, ventral view. G. Anther cap and pollinarium. Drawing by R. Solano based on E. Hågsater 4633.

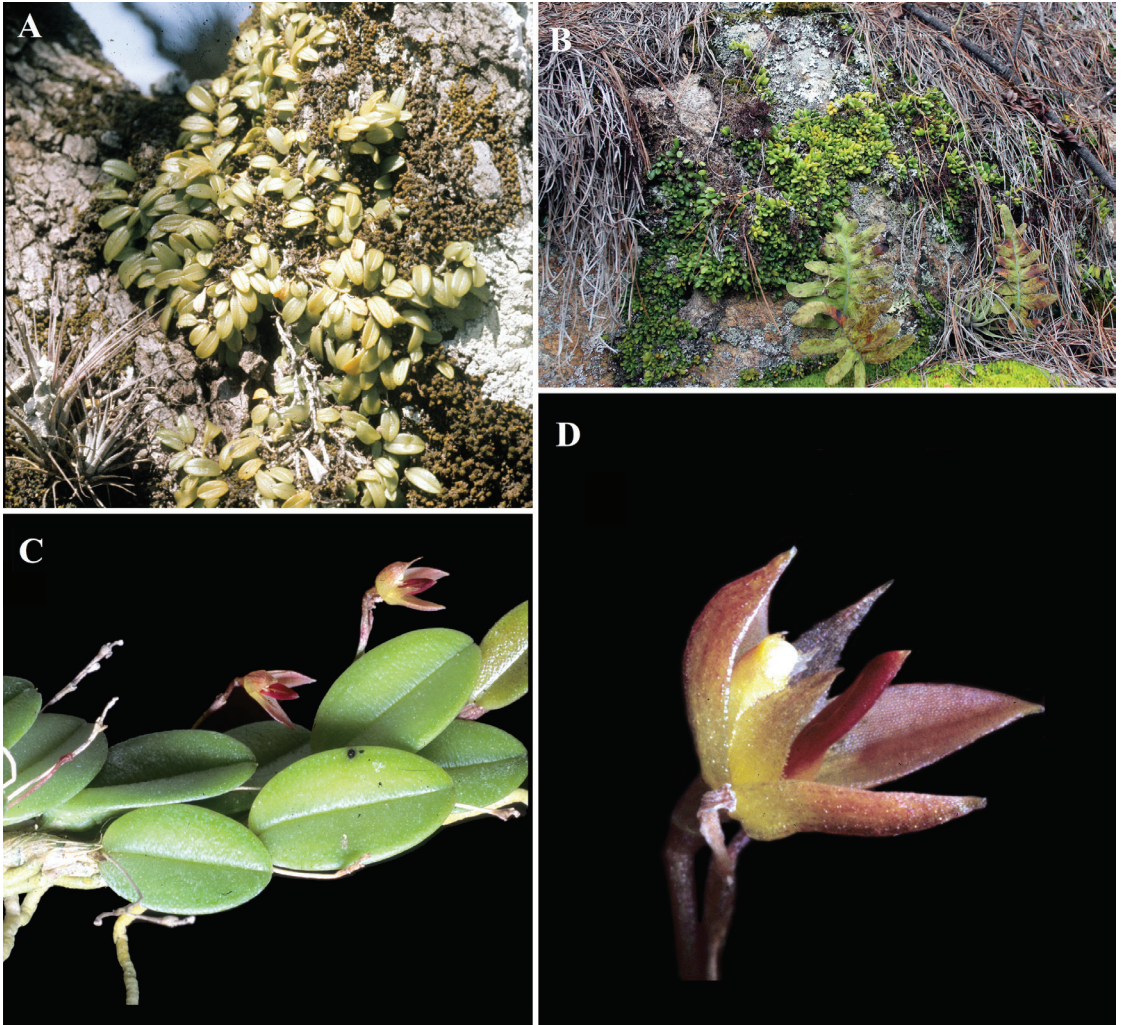


FIGURE 7. *Anathallis minutalis*. **A.** Plant in its habitat growing as epiphyte. **B.** Plant in its habitat growing as lithophyte. **C.** Segment of a sympodium with flowers (E. Hagsater 4633). **D.** Flower (E. Hagsater 4633). Photographs by E.W. Greenwood (A) and R. Solano (B–D).

DISTRIBUTION: Mexico and probably Guatemala. It grows at Meridional and Trans-isthmian Highlands floristic provinces, in Colima, Chiapas, Guanajuato, Guerrero, Jalisco, Michoacán, Oaxaca, and Veracruz. The accepted distribution model for *A. minutalis* yield a predicted AUC = 0.947, with the most influential variables being minimum temperature of the coldest month (28.4%), temperature seasonality (28.2%), and precipitation of the coldest month (13.6). The model identified four primary areas with the highest probability of distribution: Transverse Volcanic System (México, Michoacán,

Morelos), Sierra Madre del Sur (Guerrero, Oaxaca), Sierra Madre Oriental (Puebla, Veracruz), and Chiapas Highlands. For *A. minutalis* the potential distribution area was estimated to be 135,649.95 km², equivalent to 6.90% of Mexico's total territory (Fig. 8).

HABITAT: Epiphyte or lithophyte, in oak forest and semi-deciduous tropical forest, at elevations ranging 1620 to 2450 m. The creeping plants often form carpets on tree's limbs or rocks covered by mosses or lichens.

PHENOLOGY: It flowers from July to November.

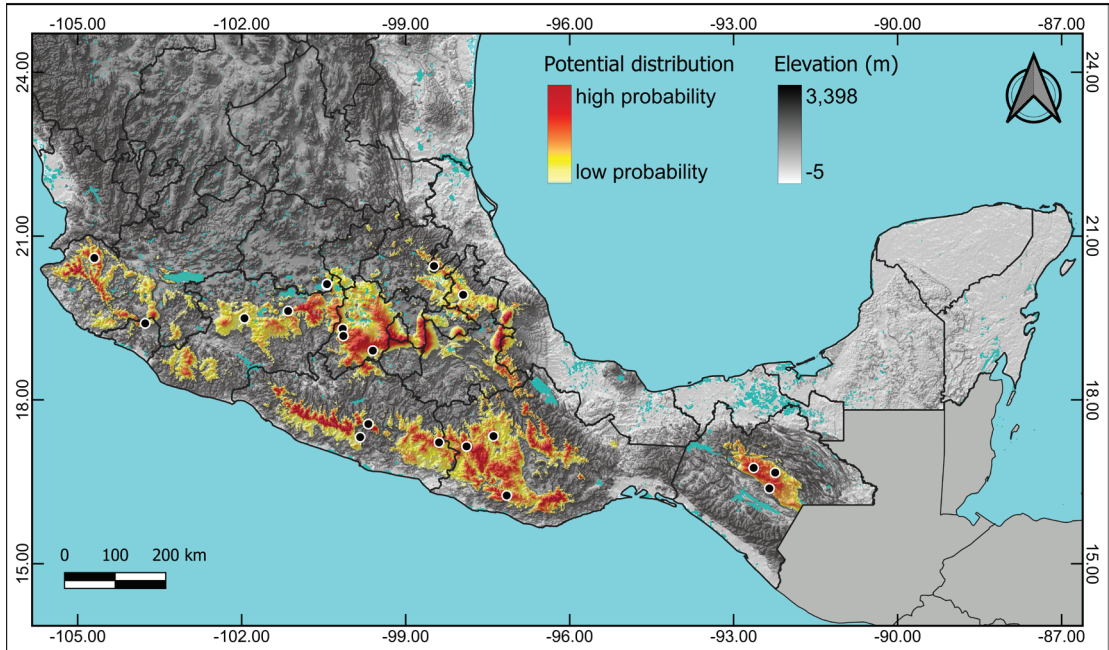


FIGURE 8. Potential distribution of *Anathallis minutalis* in Mexico. Map by E. Licona.

TAXONOMIC NOTES: *Anathallis minutalis* is distinguishable by its minute rhizomatous, branching plants, with inconspicuous stems, fleshy-thickened, orbicular-elliptic and subsessile leaves, and 2-flowered raceme shorter than or as long as the leaf (Fig. 6–7). The most similar species is *A. oblanceolata*, both can be sympatric in some regions in Southern Mexico. However, the later differs by its erect habit (vs. creeping), oblanceolate, long petiolate, and fleshy leaves (vs. orbicular-elliptic, subsessile, fleshy-thickened), lanceolate, acute dorsal sepal (vs. ovate, acute) and the lanceolate lateral sepals (vs. ovate-lanceolate), and lanceolate-ligulate, rounded lip (vs. oblong-pandurate, acute). Another somewhat similar species is *A. sertularioides*, but it differs by its linear, long petiolate leaves (vs. elliptic, rounded, subsessile) and a single-flowered inflorescence (vs. 2-flowered inflorescence).

Anathallis minutalis was originally described by Reichenbach (1850) as *Pleurothallis crassifolia*, based on a Mexican specimen from an unknown locality collected in 1839. However, this binomial was deemed an illegitimate homonym due to the previous existence of a similar name by Focke (1849). Subsequently, Lindley (1859) proposed *Pleurothallis minutalis* as a

replacement name. Nearly simultaneously in 1840, a second specimen was collected in Southern Oaxaca, *H.G. Galeotti 48* (in W-12719, Fig. 9) and labeled as *Pleurothallis sarcophylla*, an unpublished name. The sheet includes a watercolor done by Galeotti himself, as well as a floral analysis by A. Richard. Both illustrations depict a plant that coincides with our concept of *Anathallis minutalis*.

In the protologue of *P. crassifolia*, Reichenbach (1850) mentioned that Carl A. Ehrenberg obtained the specimen in Mexico, from which the author prepared the description. However, there is no further information about the specimen or the collection where it was deposited. Tropicos indicates the Ehrenberg's specimen is the holotype of *P. crassifolia* and that it is deposited in K, but it has not been located. So, according with articles 9.1 and 9.3 of the Shenzhen Code (Turland *et al.* 2018), a lectotype for *P. minutalis* is required. Therefore, the Ehrenberg's specimen in W, labelled as *Palmoglossum crassifolium* by Reichenbach, was selected here as the lectotype.

Luer (2006) indicated that a specimen collected by Kienast (not Kienert, as the author erroneously wrote), labeled with this name in W (Fig. 15B), is the holotype



FIGURE 9. Specimen of *Anathallis minutalis* collected by Galeotti 45 (in W-12719) and labelled as *Pleurothallis sarcophilla*, which includes a watercolor by Galeotti and floral sketch by Richard. Reproduction with permission of the Naturhistorisches Museum Wien.

of *Pleurothallis crassifolia*. However, Kienast's specimen was collected in 1878, almost 40 years after Ehrenberg's specimen, the type for *P. crassifolia* mentioned by Reichenbach, and nearly 30 years after this author published that name. Therefore, Kienast's specimen cannot be the type for Reichenbach's name. The examination of the illustration and plant fragments mounted on Kienast's sheet indicates that it corresponds to *A. oblanceolata*. On the other hand, Otto Kuntze (1891) proposed *Humboldtia pachyphylla* as a replacement name for *P. crassifolia*. However, since the latter turns out to be an invalid name, Kuntze's name is also invalid.

Luer (2023) included the name of *Epidendrum pygmaeum* Hook., originally published by Hooker in 1834, as a synonym of *Panmorphia minutalis*. However, Hooker's description and illustration were based on a Brazilian specimen that corresponds to what is now known as *Prosthechea pygmaea* (Hook.) W.E.Higgins. Furthermore, Hooker himself had described the same Brazilian specimen as *Epidendrum pygmaeum* a year early (Hooker 1833), making Hooker's 1833 name a later homonym.

Anathallis minutalis was reported from Puebla by Miguel-Vázquez *et al.* (2020), but the voucher specimen (*Espejo et al.* 5366 in UAMIZ) was determined as *A. oblanceolata*. The species has also been reported in Guatemala by Dix & Dix (2000) and Archila *et al.* (2018), but no information about voucher specimens is provided. There is a specimen at AMES (*M.W. Lewis 26a*) obtained from a market of Guatemala City in 1942 and determined by D. S. Correll as *Pleurothallis minutalis*, which was the basis for its report in Guatemala (Ames & Correll 1952). However, even though the Lewis' specimen lacks flowers, their oblanceolate leaves with a distinct petiole and inflorescences shorter than the stem show that it is more similar with *A. sertularioides*. Luer reported the species for Guatemala, too, based on the specimen collected in "Alta Verapaz, Cobán National Park La Choa [the correct name is probably Lachúa], 200 m, 21 Nov. 1990, collected by H. Ibañez sub. C. A. Luer 14861 (MO)". However, this specimen could be another species, considering that all known records for *A. minutalis* are from 1620 to 2450 m elevation in Mexico. This Guatemalan locality (at 200 m) is situated in a region of lowlands that is warm and humid, where species of the genus that occur are *A. lewisiae*, *A. sertularioides*, and *A. yucatanensis*.

Hemsley (1882–1886) included *P. minutalis* in a checklist of Mexican and Central American orchids. By the end of the 19th century, it remained the sole taxon of what now is *Anathallis* in Mexico. The species has been reported for Mexico as *Pleurothallis minutalis* by Williams (1951), McVaugh (1985), Soto Arenas (1988), Espejo-Serna & López-Ferrari (1998); as *A. minutalis* by Nava-Bernal (2007), Solano (2008a), Szeszko-Fabila (2011), Salazar (2013), Solano *et al.* (2016), Villaseñor (2016), and Krömer *et al.* (2020); and as *Panmorphia minutalis* by Luer (2023). A taxonomic treatment for this species was published by García *et al.* (2003) and Solano (2008a). Unfortunately, the taxon was misinterpreted in these treatments, as they included a specimen of *A. oblanceolata* illustrated in García *et al.* (2003).

CONSERVATION STATUS: In the four criteria of the MER evaluation, the species obtained the following scores: A) geographic distribution = 0.3636, B) habitat characteristics = 0.3333, C) intrinsic biological vulnerability = 0.1739, and D) impact of human activity = 0.4000; resulting in a total score of 1.2708. Since this value is ≥ 1.0 and < 1.5 , and the sum of criterion D is ≥ 0.3 , the corresponding risk category is Subject to Special Protection (Pr). Populations of *A. minutalis* exhibit generally low densities, but it is widespread in Mexico. In some localities the habitat remains relatively well-preserved. The only protected area in Mexico where the species is known to occur is the Omiltemi State Ecological Park, in Guerrero. However, in Oaxaca, some localities are found in forest protected by local communities, where people are responsible for its surveillance.

SPECIMENS EXAMINED: MEXICO. **Chiapas:** municipio Chanal, 26 Apr. 1961, *R. Alava s.n.* (AMES!, UCJEPS!, K, MO); municipio Las Rosas, along Las Rosas road, 8 Dec. 1966, *R. McCullough 1776* (SEL). Unknown locality, cultivated in Moxviquil, *R. Solano s.n.* (OAX[photo!]). Unknown locality, *M. A. Soto s.n.* (AMO[photo!]). **Colima:** municipio Comala, System of volcano of Colima, barranca Delgado, SW of Hacienda San Antonio, 13 Apr. 1935, *O. Nagel sub E. Östlund 4040* (AMES!). **Guerrero:** municipio Chilpancingo de los Bravo, near Santa Barbara, SW of Chilpancingo, 12 May 1934, *J. González sub E. Östlund 1668* (AMES!); S of Chilpancingo, cumbre de Joveritos, 19 Oct. 1936, *J. González sub E. Östlund 3257* (AMES!); Omiltemi, 3 Aug. 1967, *M. Sousa 3147* (MEXU!). **Jalisco:** municipio Mascota, between El Pantanal and Juanacatlán, *R. González T. 1182* (AMO[drawing!]). **Mexico:** municipio Ocuilan

de Arteaga, Chalmita, 10 Aug. 2007, *H. Nava-Bernal 119* (AMO!). Municipio Valle de Bravo, Los Saucos, *D. Szeszko s.n.* (AMO[photo]!). **Michoacan:** municipio Morelia, al S de Morelia camino Santa María-San Miguel del Monte, *R. Jiménez 1044* (AMO!). Municipio Zinacueritiro, Pedregal del Corú, 13 Aug. 2008, *J. Valdéz s.n.* (OAX!). **Oaxaca:** municipio Juxtlaahuaca, Yuvi Ka'nu, al SW de Coicoyán, 11 Aug. 1989, *A. de Avila 651* (MEXU!). Municipio Putla Villa de Guerrero, 1 km al S desviación a Juxtlaahuaca viniendo de Tlaxiaco, 30 Jul. 1983, *R. Torres 3360* (MEXU!). Municipio San Pedro Tidaa, paraje Nanua, 8 Nov. 2013, *R. Solano 4141* (OAX!). Municipio Santa Catarina Juquila, Sierra d'Oajaca, Juquila, 1840, *Galeotti 45* (W!). Municipio Santiago Comaltepec, km 114 highway 125 [Oaxaca-Tuxtepec], 15 Jan 1975, *E. W. Greenwood s.n.* (AMO[photo]!). **Veracruz:** municipio Huayacocotla, 25 Apr. 1971, *R. Hernandez 1200* (F! MEXU!).

NATURALISTA OBSERVATIONS: MEXICO. **Guanajuato:** municipio Jerécuaro, Sierra de Puruagua, 6 Oct. 2020, *M. Lugo* (<https://www.naturalista.mx/observations/64373803>); Sierra de Puruagua, 23 Feb. 2021, *M. Lugo* (<https://www.naturalista.mx/observations/70801556>). **Guerrero:** municipio Chilpancingo de los Bravo, Jan. 2019, *E. Salmerón Barrera* (<https://www.naturalista.mx/observations/108158947>). Municipio General Heliodoro Castillo, May 2021, *E. Salmerón Barrera* (<https://www.naturalista.mx/observations/112225173>). **Michoacán:** municipio Erongarícuaro, 9 Apr. 2023, “*Toky Irekua Ka Huarikua*” (<https://www.naturalista.mx/observations/154386834>).

3. *Anathallis oblancheolata* (L.O. Williams) Solano & Soto Arenas, Icon. Orchid. 5–6: x. 2003

- ≡ *Pleurothallis oblancheolata* L.O. Williams, Bot. Mus. Leaf. 12(7): 241–243. 1946.
- ≡ *Specklinia oblancheolata* (L.O. Williams) Luer, Monogr. Syst. Bot. Missouri Bot. Gard. 95: 262. 2004
- ≡ *Panmorphia oblancheolata* (L.O. Williams) Luer, Monogr. Syst. Bot. Missouri Bot. Gard. 105: 169. 2006
- ≡ *Trichosalpinx oblancheolata* (L.O. Williams) Archila, Revista Guatemalensis 17(1): 72. 2014[2015].

TYPE: MEXICO: Oaxaca, In damp forests on trees, Pacific side, river valley Copalita, northwest of Pluma Hidalgo, 1000–1100 m, 1 Sept. 1937, *O. Nagel & J. González sub E. Östlund 6456* (Holotype: AMES-74507!; isotypes: F-46440! S, G-7000!).

Rhizomatous, erect herb, up to 5 cm tall. *Roots* 0.6–1.0 mm diameter. *Rhizome* 4–7 mm long between adjacent stems, 1 mm diameter. *Stems* 2.5–10.0 mm long, 0.8–1.0 mm diameter, the annulus 1.5–3.0 mm below the apex. *Leaf* 18–45 × 4–7 mm, fleshy, oblanceolate, rounded, gradually attenuate toward the base into a conspicuous, channeled petiole. *Inflorescence* equal to or shorter than the leaf, 15–24 mm long; peduncle 6–13 mm long, 0.4–0.5 mm diameter, the base covered by a spathaceous bract up to 4 mm long, with 2 additional obliquely tubular, obtuse overlapping bracts, 1–2 mm long; rachis 5–8 mm long, with 2 successive flowers. *Floral bracts* 1.5–2.0 mm long, covered with reddish glandular-pilose trichomes. *Flowers* 3.7–5.0 mm high, 2 mm wide, sepals and petals bright yellowish, sometimes brownish purple tinged toward their apices and along the mid-vein, lip purple, column yellow, anther purple. *Sepals* conduplicate, 3-veined; dorsal sepal 4.5–5.0 × 1.5–1.8 mm, lanceolate, acute; lateral sepals 4.0–4.7 mm × 1.4–1.5 mm, lanceolate, oblique acute, shortly apiculate. *Petals* 3.0–3.8 mm × 0.7–0.9 mm, falcate-lanceolate, long acuminate, marginally erose-papillose, 1-veined. *Lip* 2.7–3.1 × 0.7–1.0 mm, entire, lanceolate-ligulate, rounded, 3-veined, glandular-postulate, longitudinally sulcate, with a basal low callus; the base with a pair of protuberances and a claw 0.3 × 0.3 mm. *Column* 1.7–2.4 mm long, 0.7–0.9 mm wide, wings oblong, marginally lacerate, clinandrium serrulate, foot column 0.6–0.7 mm long. *Anther* 0.8 mm long and wide, ovoid. *Pollinia* 0.8 mm long, longitudinally cleft. *Ovary* 0.8–1.5 mm long, pedicel 1.5–6.5 mm long. *Capsule* 7.5 mm long, 4.2 mm diameter. (Fig. 10–12).

DISTRIBUTION: Endemic to México. It grows at Meridional and Trans-isthmian Highlands floristic provinces in Guerrero, Jalisco, Mexico, Michoacán, Oaxaca, Puebla, and Veracruz states. The accepted distribution model for *A. oblancheolata* yields a predicted AUC = 0.846, with the most influential variables being maximum temperature of the warmest month (63.6%), mean annual temperature (10.8%), and mean diurnal temperature range (8.1%). The model identified four primary areas with the highest probability of distribution: Transverse Volcanic System (México, Michoacan, Morelos), Northern Highlands of Oaxaca, Southern Highlands of Oaxaca, and Chiapas Highlands, where the species has not yet been recorded. For *A. oblancheolata*, the potential distribution was estimated to be 116,517 km², equivalent to 5.93% of Mexico's total territory (Fig. 13).

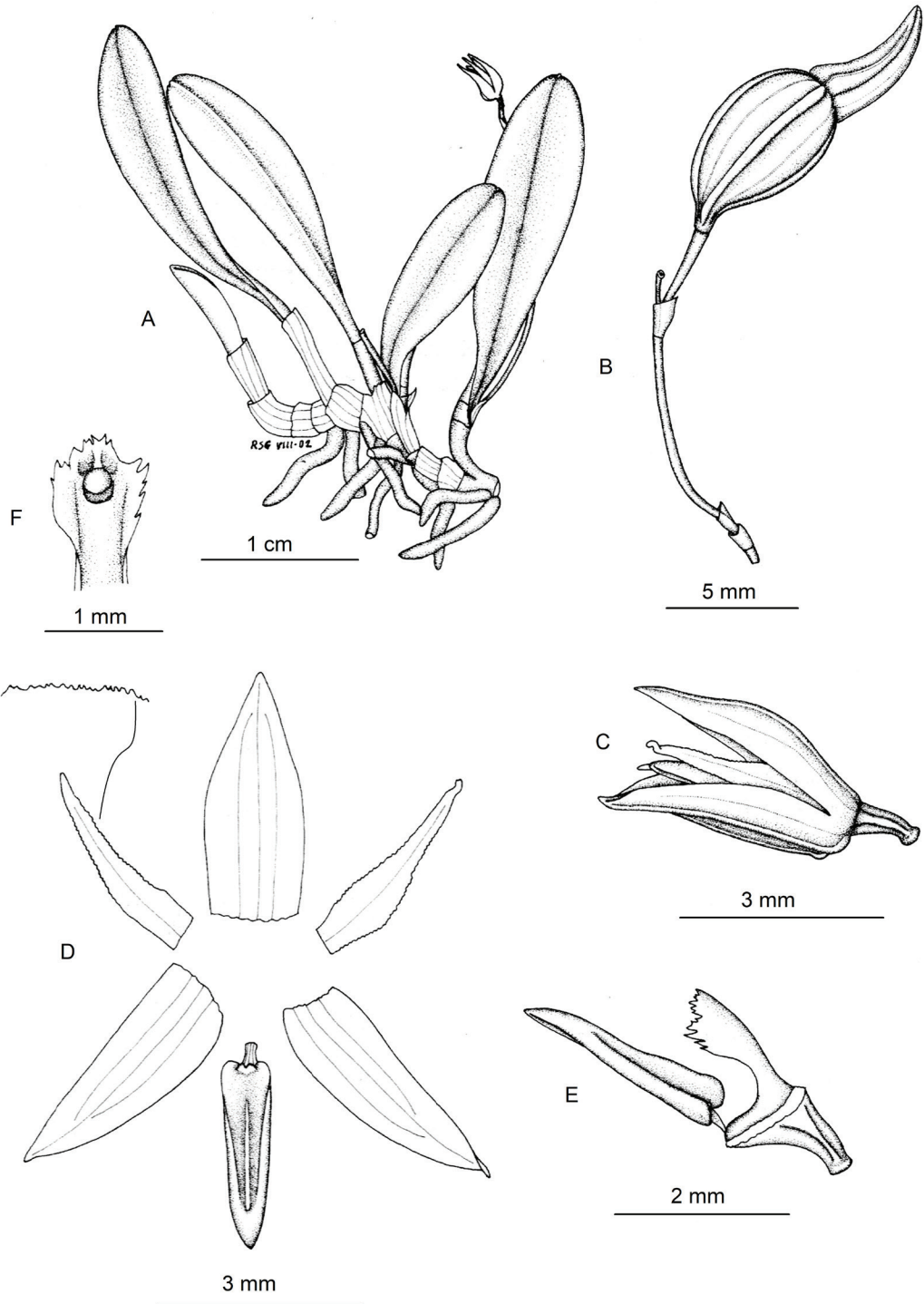


FIGURE 10. *Anathallis oblanceolata*. **A.** Habit. **B.** Inflorescence with a mature capsule. **C.** Flower, lateral view. **D.** Floral dissection. **E.** Lip, column, and ovary, lateral view. **F.** Apical portion of the column in ventral view. Drawing by R. Solano based on E. Pérez 3511.

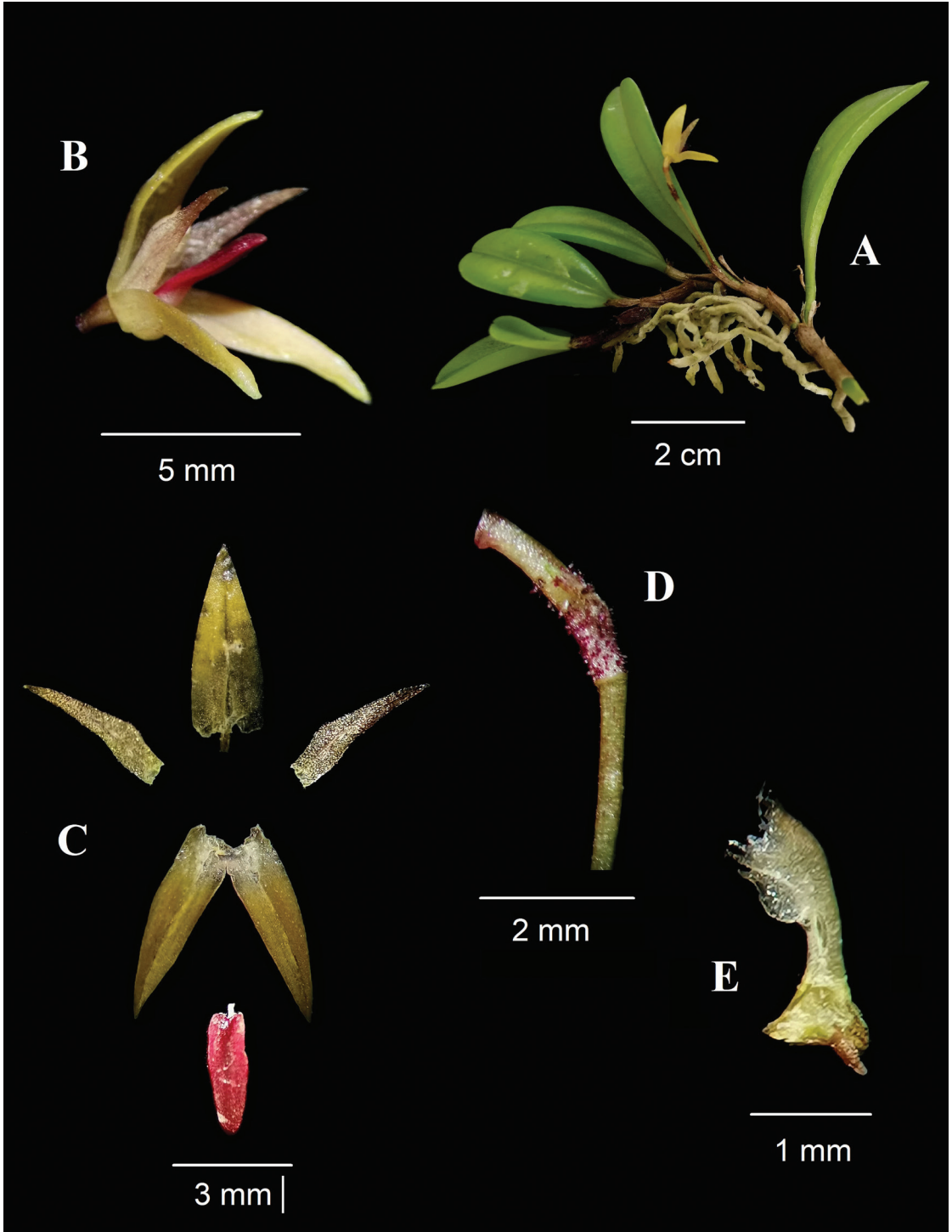


FIGURE 11. *Anathallis oblanceolata*. A. Habit. B. Flower, lateral view. C. Floral dissection. D. Segment of an inflorescence with the senescent flower. E. Column, lateral view. Plate by R. Solano based on G. Salazar s.n.



FIGURE 12. *Anathallis oblanceolata*. A. Module composed by a rhizome, stem, leaf, and inflorescence. Based on G. Salazar *s.n.* B. Group of leaves and inflorescences. C. Flower, lateral view. Based on G. Salazar *s.n.* Photographs by R. Solano (A, C) and R. Jiménez (B).

HABITAT: Epiphyte or lithophyte, in oak and cloud forests, at elevations ranging from 1100 to 2250 m.

PHENOLOGY: It flowers in August–October, with fruits ripening in October.

TAXONOMIC NOTES: *Anathallis oblanceolata* is distinguished by its minute rhizomatous habit, oblanceolate, erect leaves with a well-defined petiole, floral bracts covered with reddish trichomes, and lip longer than the column (Fig. 10–12). It is most similar to *Anathallis minutalis*, as was noted by Williams (1946, 1951). However, it differs by its creeping habit (*vs.* erect), orbicular-elliptic, sessile, fleshy-thickened leaves (*vs.* oblanceolate, long petiolate, and fleshy leaves), ovate, acute dorsal sepal (*vs.* lanceolate, acute), ovate-lanceolate lateral sepals (*vs.* lanceolate), and oblong-pandurate, acute lip (*vs.* lanceolate-ligulate, rounded).

This species was described in 1946 from a specimen collected in 1937 in Pluma Hidalgo, Oaxaca (Fig. 14–15A). However, the oldest known specimen dated almost seventy years earlier from Mirador, Veracruz, it was collected by Z. Kienast and is in W (Fig. 15B), where originally was labeled as *Pleurothallis crassifolia* and later as *P. minutalis*. This reflects that since the 19th century, there has been confusion in including specimens of what is now *A. oblanceolata* within *A. minutalis*. Luer (1975) mistakenly treated *Pleurothallis oblanceolata* as a synonym of *P. minutalis*; also, it appears that the Luer’s description for *P. minutalis*

was based on a specimen of *A. oblanceolata*, as the accompanying illustration exhibits characteristics consistent with this species. This situation may have led to William’s plant being misidentified as *A. minutalis*, resulting in herbarium collections erroneously bearing this name (or one of its nomenclatural synonyms) for specimens that belong to *A. oblanceolata*. This also led to the inclusion of *A. oblanceolata* specimens in the description of *A. minutalis* in treatments by García *et al.* (2003) and Solano (2008a). A recent review of herbarium and alive material has allowed for the clear differentiation of the two species here.

Anathallis oblanceolata was previously considered a micro-endemic species from Southern Oaxaca, where the original vegetation has been altered by agroecological practices, and it was known from only a few sightings. Consequently, it was included as a species at risk (SEMARNAT 2019) and considered as extinct in the wild by Soto-Arenas, Solano & Hågsater (2007). It was the fourth species belonging to *Anathallis* to be reported for Mexico. Historically, the taxon has only been documented from Oaxaca state (Soto-Arenas 1988, Salazar 2013, Solano *et al.* 2016). However, Williams (1951) erroneously reported its presence in Chiapas, an error perpetuated by Espejo-Serna & López-Ferrari (1998) and Villaseñor (2016). The drawing of *A. minutalis* in García *et al.* (2003) indeed correspond to *A. oblanceolata*. The presence of *A. oblanceolata* in Guerrero, Jalisco,

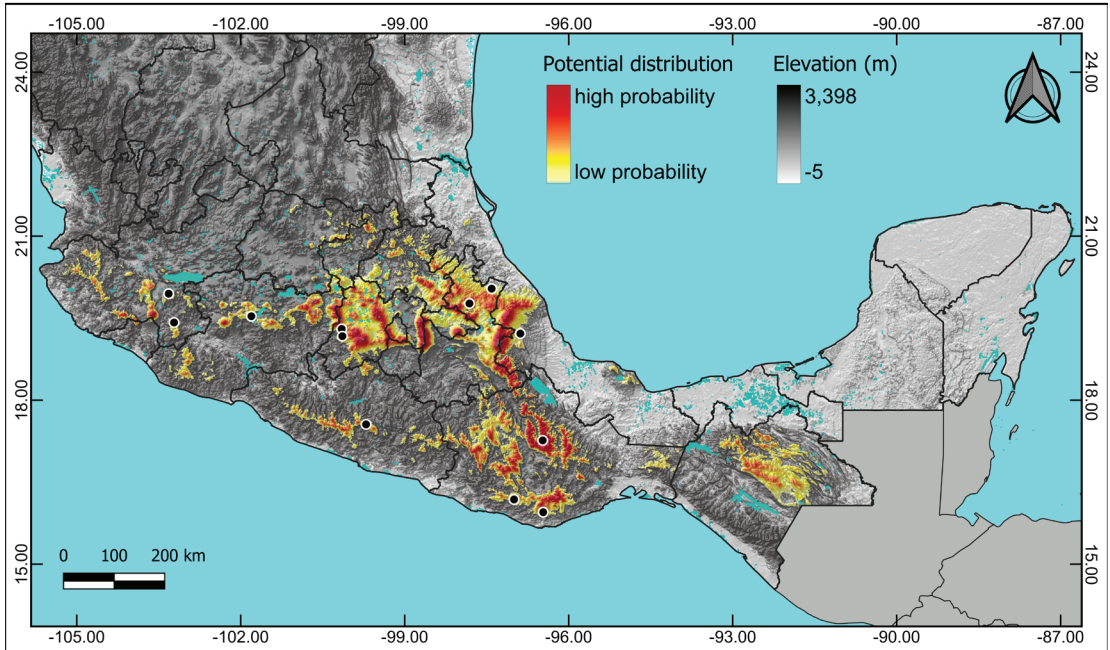


FIGURE 13. Potential distribution of *Anathallis oblancoolata* in Mexico. Map by E. Licona.

Mexico, Michoacán, Puebla, and Veracruz states is reported here for the first time, based on specimens previously confused with *A. minutalis*.

CONSERVATION STATUS: In the four criteria of the MER evaluation, the species obtained the following scores: A) geographic distribution = 0.3636, B) habitat characteristics = 0.3333, C) intrinsic biological vulnerability = 0.1739, and D) impact of human activity = 0.4000; resulting in a total score of 1.2708. Since this value is ≥ 1.0 and < 1.5 , and the sum of criterion D is ≥ 0.3 , the corresponding risk category is Subject to Special Protection (Pr). *Anathallis oblancoolata* had previously been classified as an endangered species (P) (SEMARNAT, 2019), largely due to its apparent status as a microendemism with high habitat specificity (Soto-Arenas *et al.* 2007). However, the MER assessment demonstrates that the taxon must be reclassified to another lower-risk category. Although there are no populations within natural protected areas, the species has widespread distribution in Mexico, and several localities do not face severe habitat threats. One locality in Guerrero is situated in the Omiltemi State Ecological Park. Additionally, in Oaxaca, some populations are located in forest protected by local communities, where community people are responsible for its surveillance and protection.

SPECIMENS EXAMINED: MEXICO. **Estado de Mexico:** Municipio Donato Guerra, *D. Szeszko-Fabila s.n.* (AMO[photo]!). Municipio Tenancingo, *M. A. López s.n.* (Amo[photo]!). **Guerrero:** municipio Chilpancingo de los Bravo, Omiltemi, *G. Salazar s.n.* (AMO photo!). **Jalisco:** municipio Tecalitlán, near Ciudad Guzmán, cañada del Laurel, cerro de La Ribera, 19 Sep. 1936, *O. Nagel & J. Navarro sub. E. Östlund 6338* (AMES!, CAS! SEL!). **Michoacan:** municipio Erongaricuro, en el pedregal de Tócuaro, 15 Oct. 1996, *E. Pérez 3511* (IEB!), 22 Aug. 1997, *E. Pérez 3694* (IEB!); Pedregal de Tócuaro, Municipio Pátzcuaro, near Patzcuaro, 6000 ft, cultivated in Cleremont, CA, 22 Feb. 1979, *W. Gann s.n.* (SEL!). **Oaxaca:** municipio San Jerónimo Coatlán, 7 km al NE del campamento maderero Cerro Sol brecha a Progreso, 6 Oct. 1988, *A. Campos 2599* (MEXU!). Municipio Santa Catarina Lachatao, 26 Aug. 2017, *J. Santiago s.n.* (MEXU!). **Puebla:** Municipio Ayototxco de Guerrero, 31 Aug. 2019, *G. Salazar s.n.* (MEXU!). Municipio Tetela de Ocampo, cañon de Escahuasco, 15 Oct. 1995, *A. Espejo et al. 5366* (UAMIZ!). **Veracruz:** [municipio Totutla] Mirador, Huatusco, May 1878, *Z. Kienast s.n.* (W!).

NATURALISTA OBSERVATIONS: MEXICO. **Jalisco:** Concepción de Buenos Aires, entre Concepción de Buenos Aires y los Aguas, 4 Aug. 2013, *J. Moreno* (<https://www.naturalista.mx/observations/2867438>). **Oaxaca:** Santa Catarina Lachatao, 15 Aug. 2018, *B. Nuñez-Oberg* (<https://www.naturalista.mx/observations/15713121>).

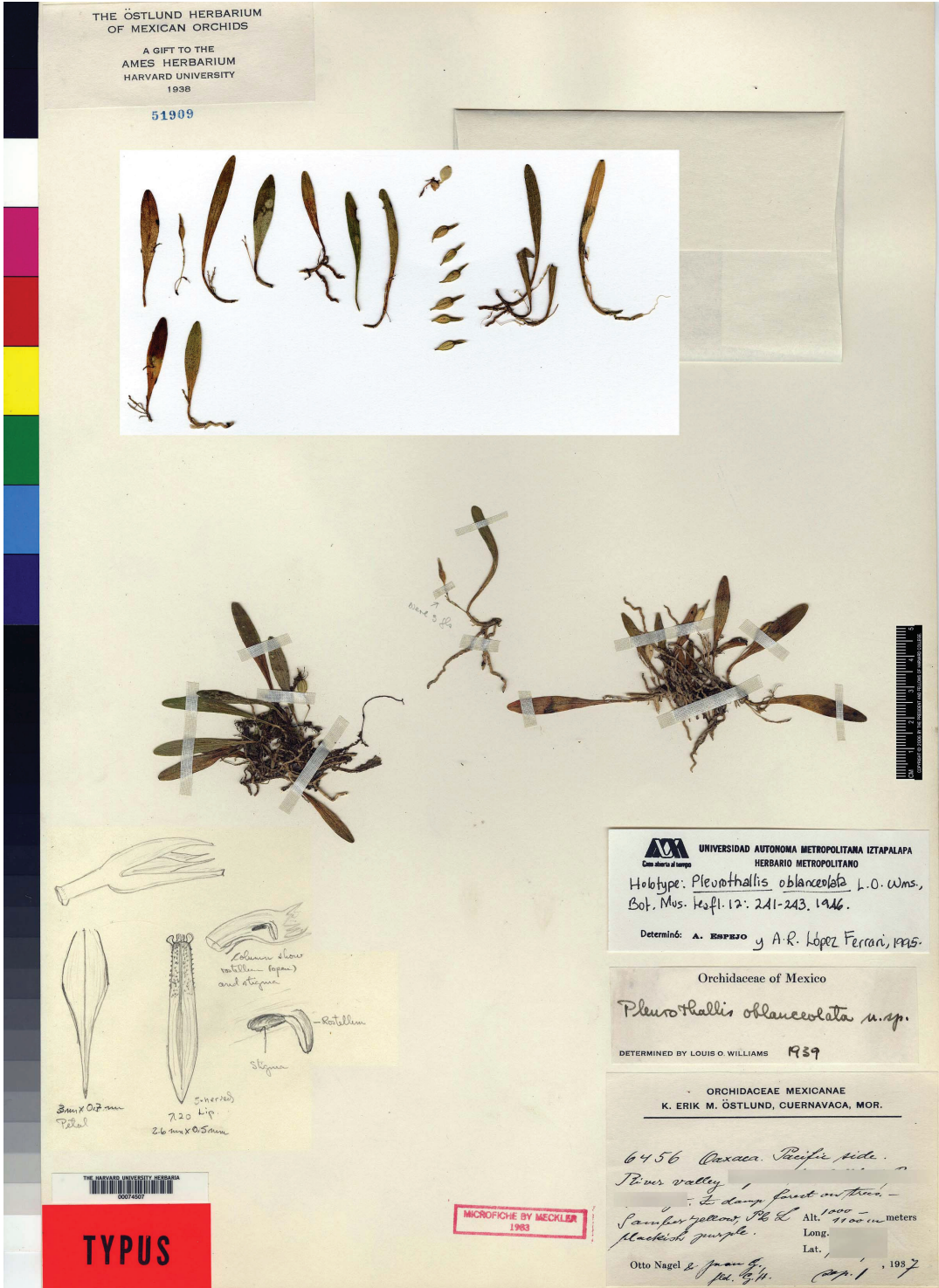


FIGURE 14. Holotype of *Pleurothallis oblanceolata*, Nagel & González sub E. Östlund 6456 (AMES-74507). Reproduction with permission of the Oak Ames Orchid Herbarium, Harvard University.

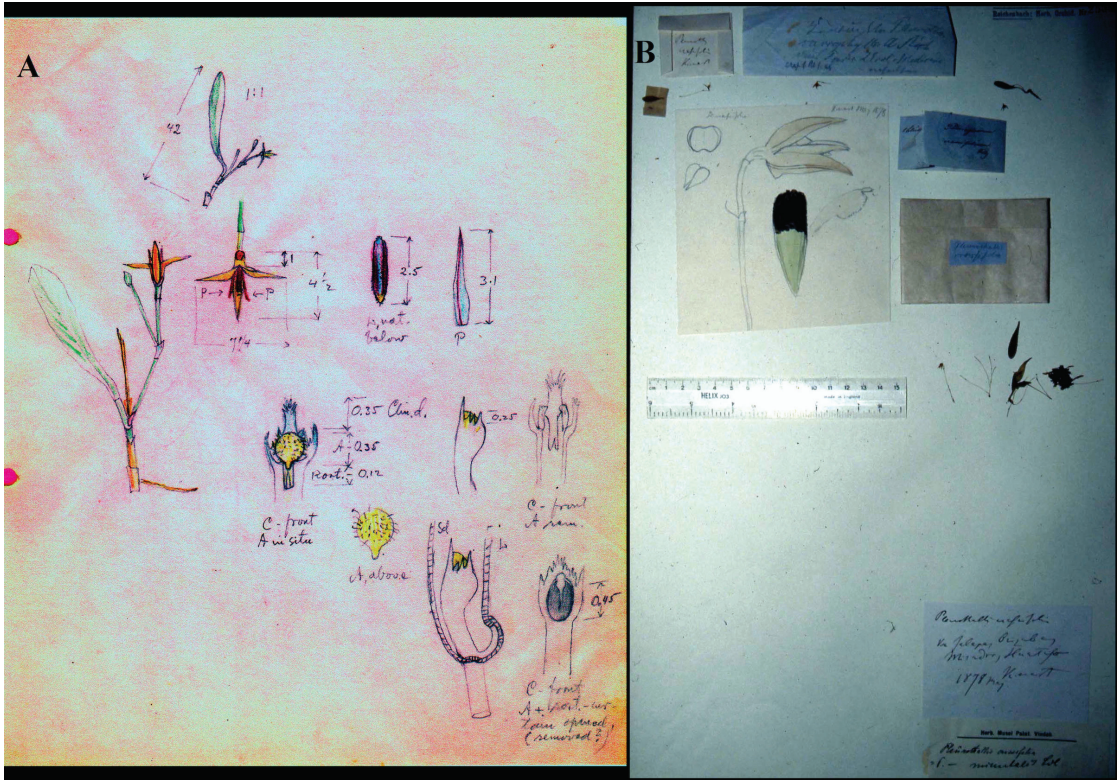


FIGURE 15. *Anathallis oblanceolata*. **A.** Drawing by E. Östlund based on the type. Reproduction with permission of the AMO Herbarium. **B.** Specimen collected in May 1878 by Z. Kienast (Mirador, Veracruz, México) and labelled as *Pleurothallis crassifolia* in W. Reproduction with permission of the Naturhistorisches Museum Wien.

4. *Anathallis sertularioides* (Sw.) Pridgeon & M.W.Chase, Lindleyana 16(4): 250. 2001.
 ≡ *Epidendrum sertularioides* Sw., Prodr. 122. 1788
 ≡ *Dendrobium sertularioides* (Sw.) Sw., Nova Acta Regiae Soc. Sci. Upsal., ser. 2, 6: 83. 1799.
 ≡ *Pleurothallis sertularioides* (Sw.) Spreng., Syst. Veg. [Sprengel] 3: 721. 1826.
 ≡ *Specklinia sertularioides* (Sw.) Lindl., Gen. Sp. Orchid. Pl. 8. 1830.
 ≡ *Humboldtia sertularioides* (Sw.) Kuntze, Revis. Gen. Pl. 2: 668. 1891.
 ≡ *Specklinia sertularioides* (Sw.) Luer, Monogr. Syst. Bot. Missouri Bot. Gard. 95: 263. 2004, *nom. illeg.*
 ≡ *Panmorphia sertularioides* (Sw.) Luer, Monogr. Syst. Bot. Missouri Bot. Gard. 105: 174–176, f. 145. 2006.
 ≡ *Trichosalpinx sertularioides* (Sw.) Archila, Revista Guatemalensis 17(1): 72. 2014[2015].

- TYPE: JAMAICA: unknown locality, “provenit in arboribus densis antiquae montium”, Swartz *s.n.* (Sintypes in BM-82293!, G-168992!, S-R-1968!, S-R-1969! W-16974!).
 Syn.: *Pleurothallis tenuissima* Rchb. f., Linnea 18: 399–400. 1844
 = *Humboldtia tenuissima* (Rchb.f.) Kuntze Revis. Gen. Pl. 2: 668. 1891.
 TYPE: MEXICO: [Chiapas], unknown locality, “Tropiches Mexiko”, *Leibold*. Lectotype designed here: *F.E. Leibold* 620 (W!), drawings at AMES-74790!, AMES-74791).
 Syn.: *Pleurothallis trichopoda* A.Rich. & Galeotti, Ann. Sci. Nat., Bot. sér. 3, 3: 17. 1845, non Rchb.f 1856, *nom. illeg.*
 = *Humboldtia trichopoda* (A.Rich. & Galeotti) Kuntze, Revis. Gen. Pl. 2: 668. 1891.
 TYPE: MEXICO: Fl. jaunes clair, chènes à 2500–4000, Cordillera, Veracruz, 1840, Juliet 1840.

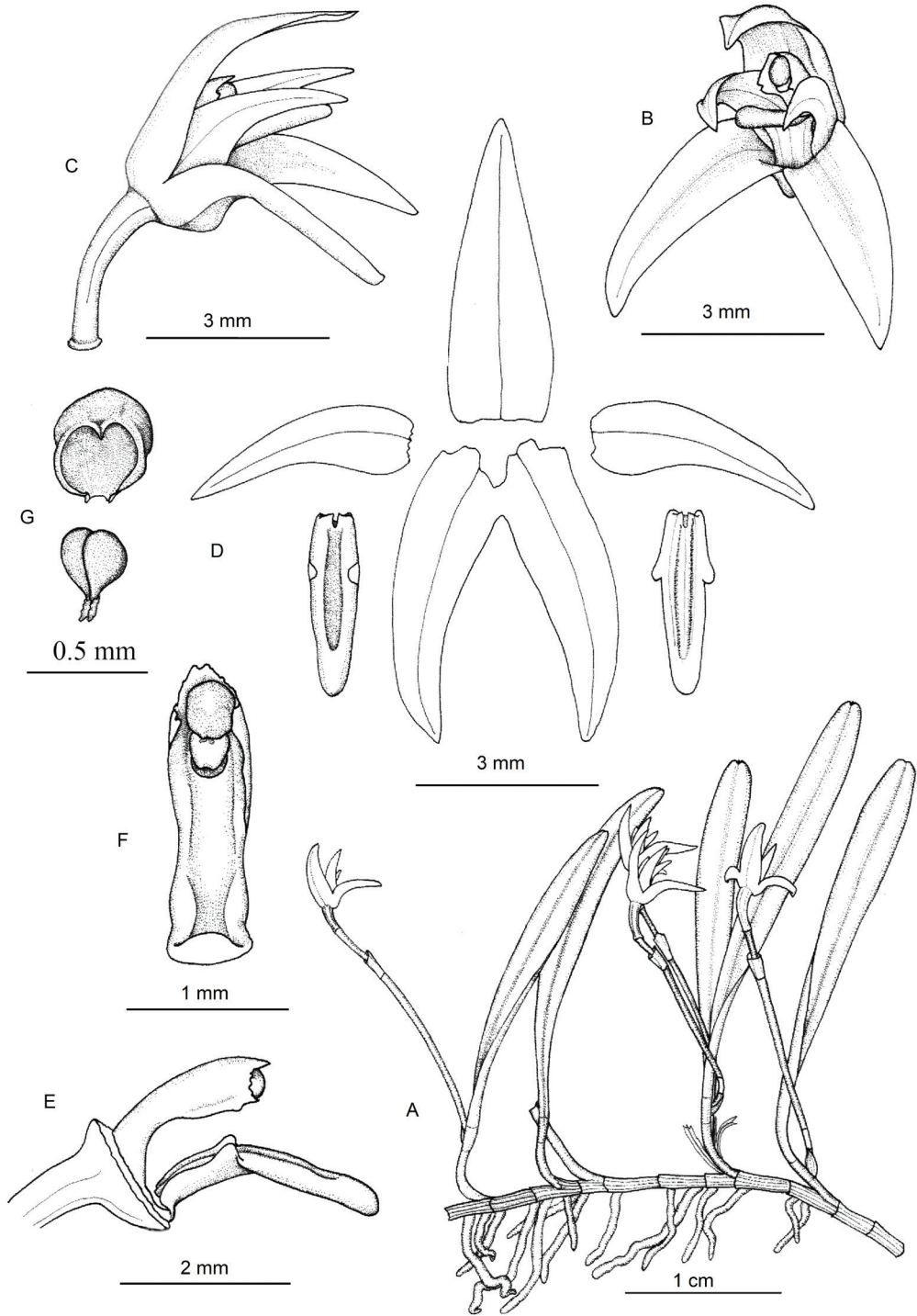


FIGURE 16. *Anathallis sertularioides*. **A.** Habit. **B.** Flower, frontal view. **C.** Flower, lateral view. **D.** Floral dissection. **E.** Lip, column, and ovary, lateral view. **F.** Column, ventral view. **G.** Anther cap and pollinarium. Drawing by R. Solano based on R. Jiménez 1129.

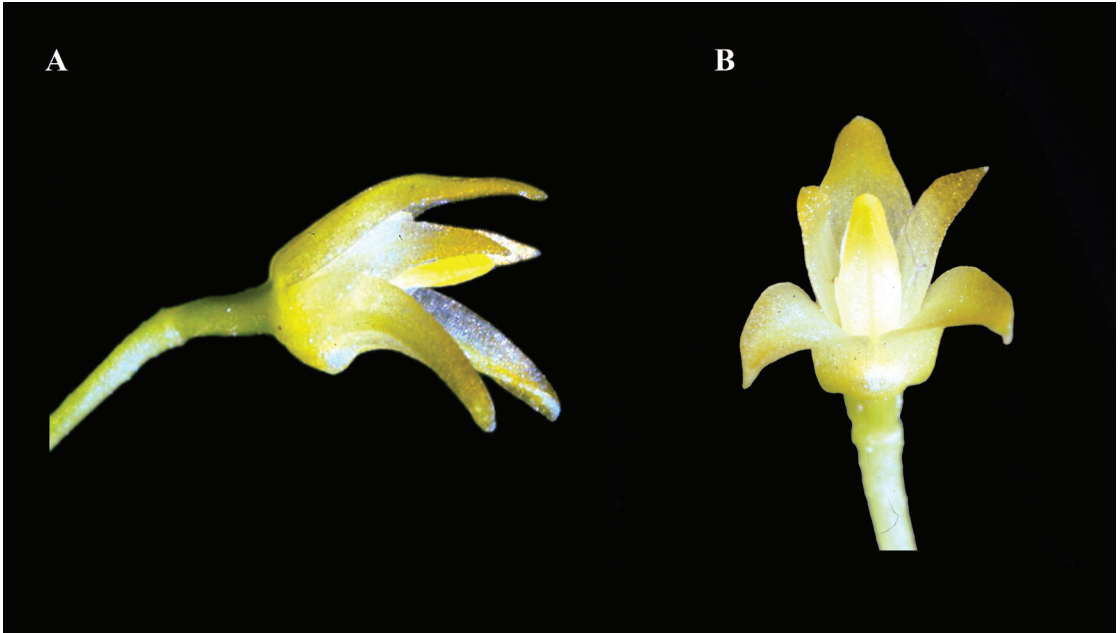


FIGURE 17. *Anathallis sertularioides*. **A.** Flower, lateral view. **B.** Flower, frontal view. Photographs by R. Solano based on E. Hågsater 12884.

Lectotype here designated: *H.G. Galeotti* 5166 (W-12717!; isolectotypes: AMES! BR!, G-168983!, K).

Repent, erect *herb*, up to 4 cm tall, including the inflorescence. *Rhizome* 2–7 mm long between adjacent stems, 0.6 mm diameter. *Roots* 0.5–0.6 mm diameter. *Stems* 2.5–7.0 mm long, 0.5–0.7 mm diameter, the annulus 0.7–1.5 mm below the apex. *Leaves* 10–33 × 2–4 mm, fleshy, linear-oblongate, rounded, attenuate toward the base into a channeled petiole. *Inflorescence* 1.0–3.5 cm long, 1-flowered; peduncle 1.5–2.3 cm long, covered at the base by a spathaceous bract 1 mm long, with 1 additional tubular bract 1.0–1.7 mm long. *Floral bract* tubular, obtuse, shortly apiculate, 1–2 mm long. *Flowers* 3.7–5 mm tall, 3.0–3.5 mm long, yellowish green, pointed upward. *Sepals* conduplicate, 1-nerved; dorsal sepal 4.0–5.3 × 1.5–1.7 mm, triangular-lanceolate, slightly falcate, acute, incurved at the apex; lateral sepals 3.7–5.0 × 1.2–1.4 mm, obliquely lanceolate, acute, deflexed near the middle, gibbous at their bases. *Petals* 3.2–3.9 × 0.8–1.1 mm, falcate-lanceolate, long acuminate, 1-nerved. *Lip* 2.7–3.0 × 0.6–0.9 mm, shortly 3-lobed, linear-lanceolate, rounded, 3-nerved, trun-

cate at the base, margins revolute towards the apex, longitudinally channeled, with two mammillae calli at the base; lateral lobes at the middle, subtriangular, rounded, incurved, 0.25 × 0.30 mm. *Column* 1.8–2.0 mm long, 0.6 mm wide, arching, wings marginally dentate, clinandrium dentate, foot column shorter than the body. *Anther* 0.3–0.4 mm long and wide, globose. *Pollinia* 0.2–0.3 mm long, piriform. *Ovary* 1.7–2.5 mm long, pedicel 2–7 mm long. *Capsule* 6–7 mm long, 2.4–2.8 mm in diameter (Fig. 16–17).

DISTRIBUTION: Mexico, Belize, El Salvador, Guatemala, Honduras, Nicaragua, Costa Rica, Cuba, and Jamaica. In Mexico it grows along the Gulf of Mexico Coast and Yucatan Peninsula floristic provinces, in Chiapas, Oaxaca, Puebla, Tabasco, and Veracruz. The accepted distribution model for *A. sertularioides* yields a predicted AUC = 0.968, with the most influential variables being annual precipitation (53.7%), precipitation of the coldest month (17.9%), and annual temperature range (9.3%). The model predicted four primary areas with the highest probability of distribution: the Lacandon forest (Chiapas), Chinantla-Chimalapas-Los Tuxtlas (Oaxaca, Veracruz), Pluma Hidalgo (Southern Oaxaca), and Northern Highlands of Puebla. For *A.*

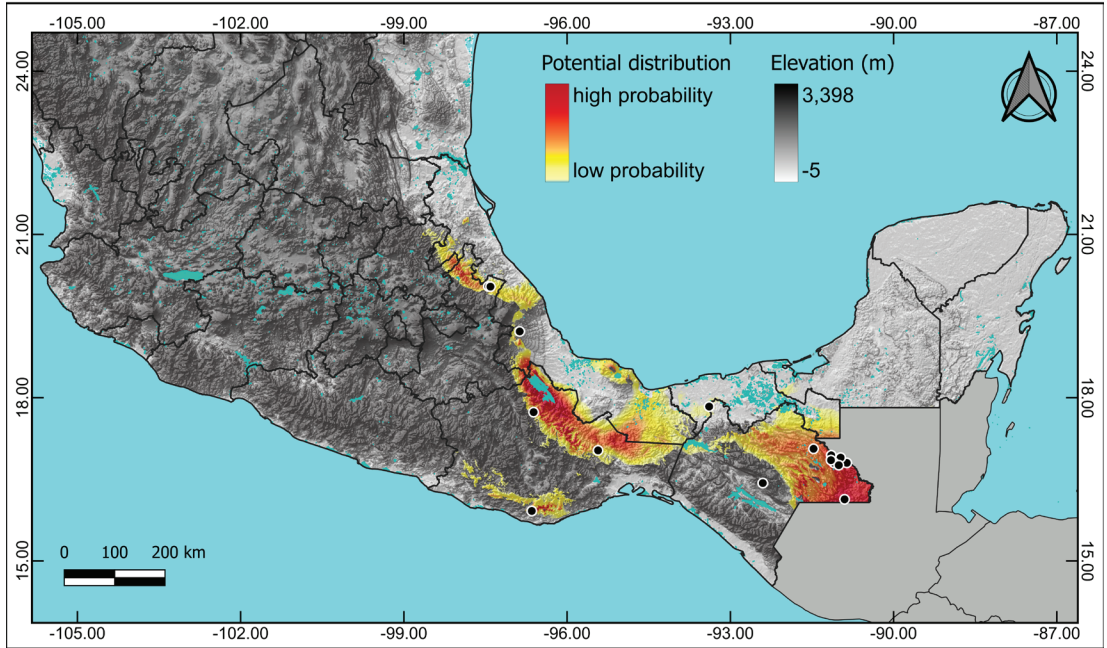


FIGURE 18. Potential distribution of *Anathallis sertularioides* in Mexico. Map by E. Licona.

sertularioides, the potential distribution area was estimated to be 97,409.85 km², equivalent to 4.96% of Mexico's total territory (Fig. 18).

Vásquez & Ibsch (2000) reported the species from Bolivia as *P. sertularioides*. However, this report was likely based on a similar species, or a taxon from *Madisonia* Luer, as delimited by Smidt *et al.* (2021). This genus encompasses Amazonian plants with habit and floral morphology similar to *P. sertularioides*. However, *Madisonia* is the sister group of *Octomeria* R.Br., and both genera occupy a basal position within Pleurothallidinae.

HABITAT: Epiphyte in evergreen rain forest, semideciduous tropical forest, and tropical oak forest, at elevations ranging 120 to 950 m. It can be locally abundant, and creeping plants commonly form carpets on the tree limbs.

PHENOLOGY: It flowers from January to September, with fruits ripening from November to February.

TAXONOMIC NOTES: *Anathallis sertularioides* is characterized by its long repent habit, abbreviated stems, linear-oblongate leaves, an inflorescence reduced

to one functional flower, lanceolate sepals, falcate-lanceolate petals, and 3-lobed, linear-lanceolate lip (Fig. 16–17). The most similar species is *A. oblanceolata*, but it can be differentiated by its shorter rhizome, broader leaves (4–7 mm wide vs. 2–4 mm wide), inflorescence with 2 successive flowers (vs. 1 functional flower), and a single lip (vs. shortly 3-lobed). *Anathallis yucatanensis* is similar too, it differs by its raceme longer than the leaf (vs. as long as the leaf), an inflorescence with 3–6 simultaneous flowers (vs. 1 functional flower), yellowish flowers (vs. bright yellowish and purple tinged), long acuminate petals (vs. long acute), and a single lip (vs. shortly 3-lobed).

Apparently, the plants from the Antilles are very similar to those from the mainland; maybe the type specimen (Fig. 19) has broader leaves and slightly smaller flowers. Unfortunately, it is difficult to evaluate these differences when this form is known from very few specimens. The type of *P. tenuissima* (Fig. 20) has longer and narrower leaves; otherwise, it seems to be conspecific with *A. sertularioides*. *Pleurothallis trichopoda* was described from a specimen collected by Galeotti (Fig. 21) in Veracruz, probably in the vicinity of El Mirador-Totutla, where other col-



FIGURE 19. Syntype of *Epidendrum sertularioides*, Swartz s.n. (S-1968). Reproduction with permission of the Swedish Museum of Natural History.

lections by the same collector originated. Specimens from this same region are morphologically indistinguishable from those from other regions of Mexico for this species.

In the past, *Pleurothallis sertularioides* var. *trinitensis* Griseb. has been considered under the synonym of *P. sertularioides* (Cogniaux 1910). However, it has a 2–3 flowered inflorescence (vs. 1-flowered), with distant, pale purple flowers (vs. yellowish green) along the rachis, with a purple lip (vs. yellow), leading to its rec-

ognition as a different species, *Pleurothallis trinitensis* (Griseb.) Carnevali and Romero-González (Romero & Carnevali 2000). This plant is very similar to *Pleurothallis spiculifera* Lindl., both names may turn out to be conspecific, which is now included in *Madisonia*.

This species was originally described by Swartz (1788) as *Epidendrum sertularioides* from a specimen collected in Jamaica (Fig. 19). McLeish *et al.* (1995) and Luer (2006, 2023) pointed out that the holotype of *Epidendrum sertularioides* is in S, but nei-

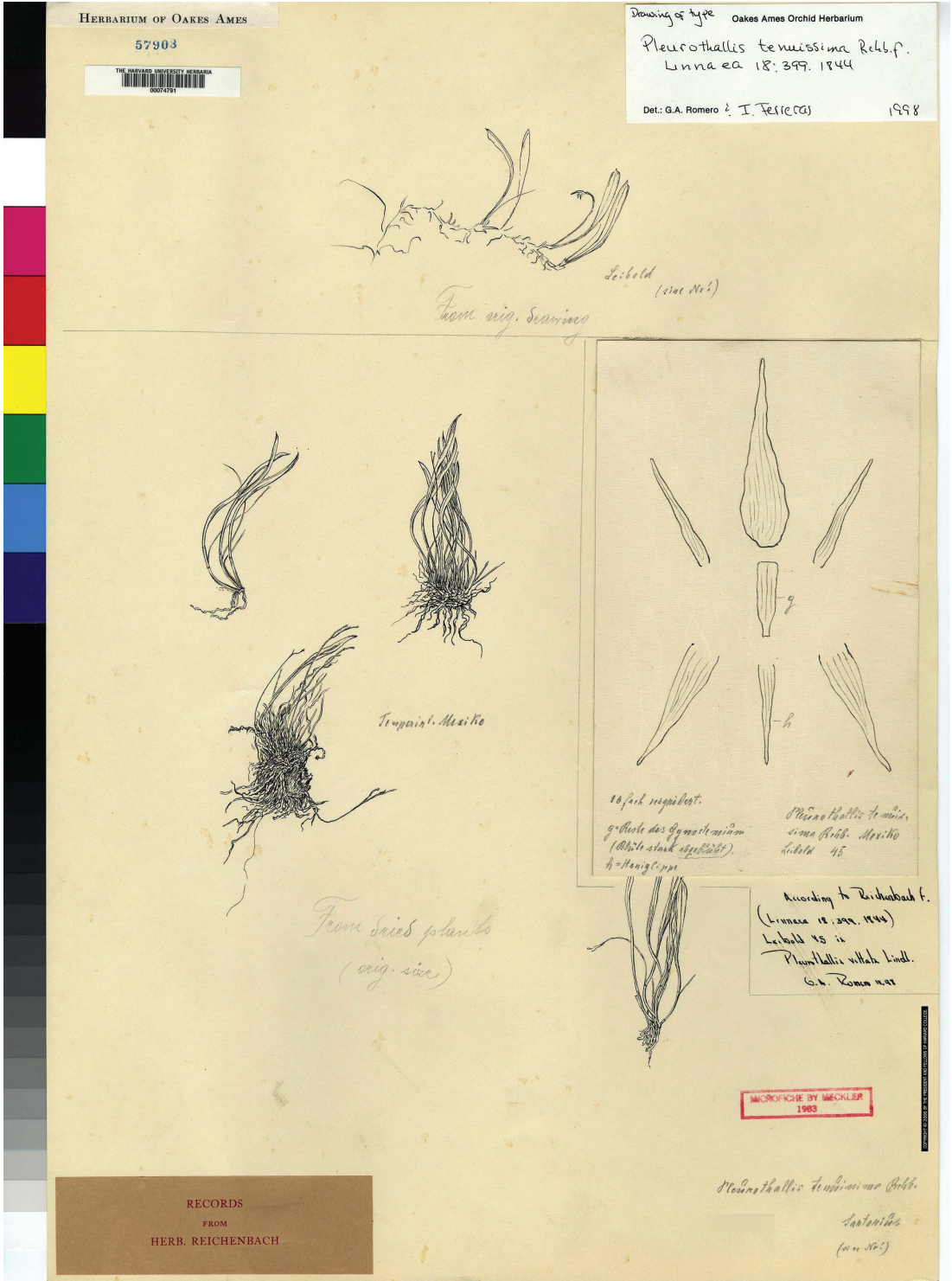


FIGURE 20. Drawing based on the type of *Pleurothallis tenuissima*, F.E. Leibold 620 (AMES-00047791). Reproduction with permission of the Oak Ames Orchid Herbarium, Harvard University.

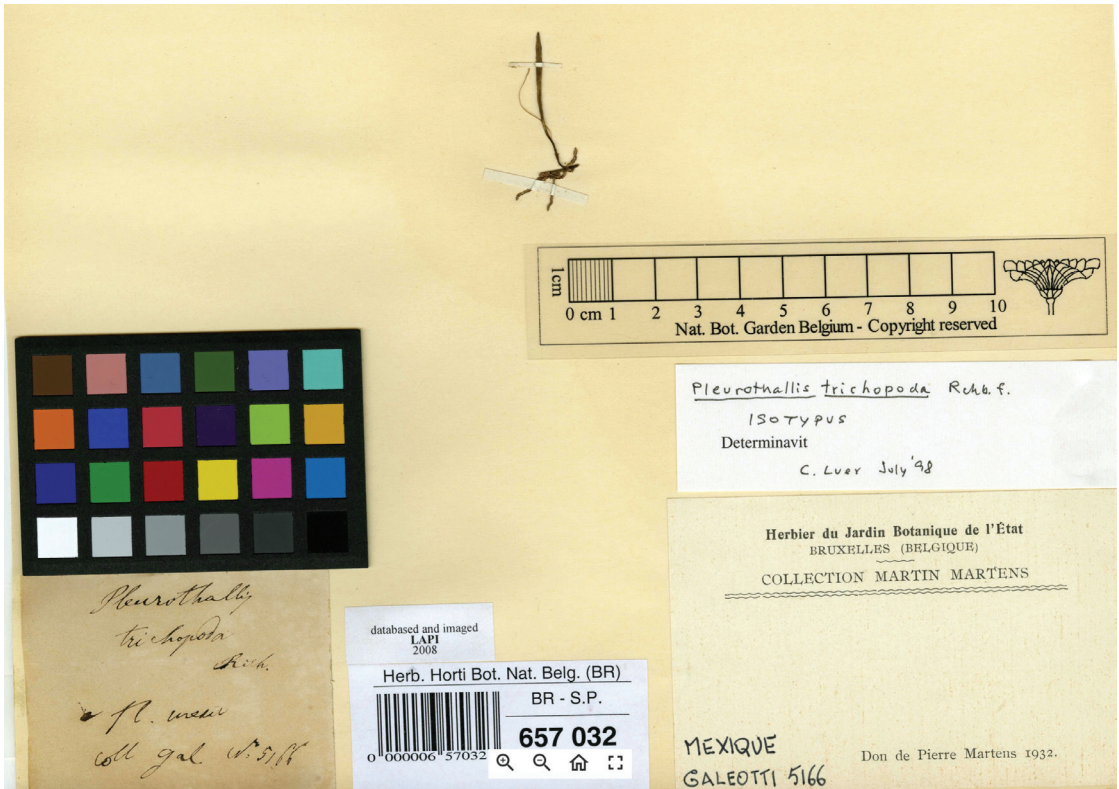


FIGURE 21. Isotype of *Pleurothallis trichopoda*, H.G. Galeotti 5166 (BR-657032). Reproduction with permission of the Jardin Botanique Meise, Belgium.

ther of them specified which specimen it is. However, in the protologue, Swartz did not make any reference to a type specimen. Specimens collected by Swartz in Jamaica and labelled as *Specklinia sertularioides* have been located in BM, G, S, and W, which are designated here as syntypes. On the other hand, Luer (2006) designated holotypes for the two heterotypic synonyms of this species. For *P. tenuissima*, *Leibold 620* at W, with isotypes at AMES and BR, and for *P. trichopoda*, *Galeotti 5166* at W. Although the protologue of *P. tenuissima* mentioned Leibold as a collector of the plant from which Reichenbach published the name, it did not specify the collection number. Meanwhile, in the protologue of *P. trichopoda* there wasn't any indication of a type by Richard and Galeotti. According to art. 9.1 of Shenzhen Code (Turland *et al.* 2018), a "holotype of a name of a species ... taxon is the one specimen or illustration either (a) indicated by the author(s) as the nomenclatural type or (b) used by the author(s) when no type was indi-

cated"; while art. 9.3 states that a "lectotype is one specimen or illustration designated from the original material ... if the name was published without a holotype, or if the holotype is lost or destroyed". Thus, specimens *Leibold 620* and *Galeotti 5166* don't turn out to be the holotypes for *P. tenuissima* and *P. trichopoda*, respectively. They should be designated as their lectotypes, as proposed here.

This species was originally described as *Epidendrum sertularioides* from Jamaica. Later, it was described again twice, almost simultaneously from Mexican specimens, as *Pleurothallis tenuissima* (Fig. 20) by Reichenbach (1844), and *Pleurothallis trichopoda* (Fig. 21) by Richard & Galeotti (1845). Therefore, this species was the second documented in Mexico for what now is *Anathallis*. However, both Reichenbach and Richard & Galeotti were unknown by botanists for almost a century. So, the first Mexican report of this species was published by Williams (1951), based on a specimen collected in Oaxaca. In Mexico the spe-

cies has been reported as *Pleurothallis sertularioides* by Soto-Arenas (1988), Espejo-Serna & López-Ferrari (1998), and Martínez *et al.* (1994); as *Panmorphia sertularioides* by Luer (2023), and as *Anathallis sertularioides* by Salazar (2013), Noguera-Savelli & Cetzal-Ix (2014), Villaseñor (2016), and Krömer *et al.* (2020).

CONSERVATION STATUS: In the four criteria of the MER evaluation, the species obtained the following scores: A) geographic distribution = 0.4545, B) habitat characteristics = 0.2222, C) intrinsic biological vulnerability = 0.1739, and D) impact of human activity = 0.3000; resulting in a total score of 1.1506. Since this value is ≥ 1.0 and < 1.5 , and the sum of criterion D is ≥ 0.3 , the corresponding risk category is Subject to Special Protection (Pr). This species is an abundant epiphyte in the lowland tropical forest. Some populations are protected in the Calakmul (Campeche), Lacan-Tun (Chiapas), and Montes Azules (Chiapas) biosphere reserves, as well in Bonampak natural monument (Chiapas). However, the species' habitat is located in the region where the Mexican government is building the Tren (Train) Maya project. Undoubtedly, the edge effect associated with the railway tracks' layout, as well as the development of tourist infrastructure, and the increase in the human population in the region, will negatively affect the forests where the taxon currently grows.

SPECIMENS EXAMINED: MEXICO. **Chiapas:** municipio Ocosingo, a 6.2 km al NO de Crucero San Javier, 20 Jun. 2003, *G. Aguilar 7168* (MEXU!); 0.4 km al N del banco de grava de San Javier, 23 Nov. 2002, *D. Álvarez 2473 et al.* (MEXU!); Crucero Corozal, 10 Jun. 1984, *E. Martínez 6471* (MEXU!); en Crucero Corozal, sobre la Carretera Fronteriza del Sur, 17 Jun. 1984, *E. Martínez 6579* (MEXU!); a 4 km al S de Frontera Corozal, sobre el río Usumacinta, 29 May 1985, *E. Martínez 12343* (MEXU!, MO!); ojo de agua de San Javier, 23 km al SE de Nuevo Guerrero camino a Boca Lacantum, 29 Jan. 1986, *E. Martínez 16932* (MEXU!, TEX!, XAL[mixed with *A. lewisiae*]!), *E. Martínez 25043* (MEXU!); ojo de agua de San Javier, *E. Martínez 24983* (AMO! MEXU!); ojo de agua de San Javier, *E. Martínez 25034* (AMO!); porción N de la Omega, Monumento Natural Yaxchilán, 10 Feb. 1999, *J. Meave 2260* (MEXU!); 2.8 km al N de la Estación Biológica de Chajul, 26 Jun. 1999, *S. Sinaca 2725* (MEXU!). Municipio Venustiano Carranza, 3 mi S of Aguatenango along road to Pinola-Las Rosas, 15 Jul. 1966, *D. E. Breedlove 14546* (F!, MICH!, TEX!). **Oaxaca:** municipio Mazatlán Villa de Flores, near Mazatlan, 30 Jun. 1960, *T. MacDougall s.n.* (AMES!). Municipio San

Pedro Sochiapan, finca Union Francesa, near Rio Blanco, 28 Jun. 1939, *R. E. Schultes 725* (AMES!); road near San Pedro Sochiapan, 1 Jul. 1939, *R. E. Schultes 758* (AMES!). **Puebla:** municipio Ayototxo de Guerrero, Cuauhtémoc, en la junta del río Atekakalach con el río Apulco, 2 Jul. 2016, *M. Jiménez & M. Gorostiza 31388* (MEXU!); **Tabasco:** municipio Huimanguillo, a orillas de la laguna del Rosario, 7 Feb. 1987, *M. A. Magaña 1738 et al.* (MEXU!, UJAT!). **Veracruz:** municipio Totutla, Zacuapan, 20 Aug. 1933, *O. Nagel sub E. Östlund 2654* (AMES! sketch in AMO!); El Mirador, 25 Jun. 1977, *F. Ventura 14158* (AMO! ASU!, CAS!, ENCB!, SEL!). Municipio Xalapa, *E. Pérez sub R. Jiménez 1129* (AMO!).

NATURALISTA OBSERVATIONS: MEXICO. **Puebla:** municipio Cuetzalan del Progreso, orillas del río Tecolutla, cerca de Zacatipan, 31 May 2015, *R. Alvarez-Mora* (<https://www.inaturalist.org/photos/116697164>).

5. *Anathallis yucatanensis* (Ames & C.Schweinf.) Solano & Soto Arenas, Icon. Orchid. 5–6: x 2003.

≡ *Pleurothallis yucatanensis* Ames & C.Schweinf., Bot. Mus. Leaflet 1(2): 4–5. 1932.

≡ *Specklinia yucatanensis* (Ames & C.Schweinf.) Pridgeon & M.W.Chase Lindleyana 16(4): 260. 2001.

≡ *Trichosalpinx yucatanensis* (Ames & C.Schweinf.) Archila, Revista Guatemalensis 17(1). 72. 2014[2015].

TYPE:MEXICO: Yucatan [Península], Campeche, [Escárcega municipality, La] Tuxpeña, 230 m, 8 November 1931, *C.L. Lundell 912* (Holotype: AMES-74877!; isotypes: F-46445! MICH-1115262! US-93716[photo in MEXU!]!).

Repent, erect *herb*, up to 4 cm tall, including the inflorescence. *Roots* 0.5 mm diameter. *Rhizome* 1.5–3.5 mm long, 0.6 mm diameter. *Stems* 2–4 mm long, 0.4–0.5 mm diameter, the annulus close to the apex. *Leaves* 8–20 × 3.0–4.5 mm, fleshy, oblanceolate, rounded, gradually attenuate toward the base into a channeled petiole. *Inflorescence* up to 3.5 cm long; peduncle 1.5–2.3 cm long, covered at the base by a spathaceous bract 0.7–0.8 mm long, with 2–3 additional tubular bracts, 0.8–1.5 mm long, rachis up to 10 mm long, with 3–6 simultaneous flowers. *Floral bracts* 0.7–1.0 mm long. *Flowers* 2.8–3.5 mm tall, erect or ascendent, subcongested, yellowish or whitish yellow. *Sepals* conduplicate, slightly fleshy,

3-nerved; dorsal sepal 2.5–3.6 × 1.0–1.2 mm, lanceolate, acute; lateral sepals 2.3–3.4 × 0.8–1.0 mm, obliquely lanceolate, long acute, gibbous at their bases. *Petals* 2.5–3.9 × 0.5–0.9 mm, linear-lanceolate, oblique, long acute, slightly fleshy, 1-nerved. *Lip* 1.2–1.6 × 0.4–0.6 mm, single, oblong, rounded, recurved, and emarginate at the apex, 3-nerved, the margins upward at the basal middle, with two submarginal and raised calli at the middle, channeled between them. *Column* 1.0–1.8 mm long, wings subquadrate, marginally dentate and triangular at the apex, clinandrium dentate; foot column longer than the body. *Anther* 0.3 mm long and wide, globose-ovoid. *Pollinia* 0.2 mm long, piriform. *Ovary* 0.5–0.9 mm long, pedicel parallel to the rachis, 1.0–1.5 mm long. *Capsule* not seen. (Fig. 22–23).

DISTRIBUTION: Mexico, Belize, Guatemala, and Nicaragua, probably in Honduras. In Mexico it grows along the Gulf of Mexico Coast and Yucatan Peninsula floristic provinces, in Campeche, Chiapas, Oaxaca, Quintana Roo, Tabasco, and Veracruz. The accepted distribution model for *A. yucatanensis* yield a predicted AUC = 0.853, with the most influential variables being Mexican digital elevation model (69.5%), mean temperature of the warmest quartet (20.0%), and isothermally (4.3). The model predicted four primary areas with the highest probability of distribution: Southern Yucatan Peninsula (Campeche, Quintana Roo), the Lancandon forest (Chiapas), Chinantla-Los Chimalapas (Oaxaca), and Los Tuxtlas (Veracruz), where the species has not yet been recorded. For *A. yucatanensis*, the potential distribution area was estimated to be 56,145.79 km², equivalent to 2.86% of Mexico's total territory (Fig. 24).

HABITAT: Epiphyte in evergreen tropical forest, semideciduous tropical forest, and oak forest, at elevations ranging from 150 to 300 m.

PHENOLOGY: It flowers from October to December, with fruits ripening in December.

TAXONOMIC NOTES: *Anatallis yucatanensis* is characterized by its small and creeping habit, a raceme longer than the leaf, with 3–6 yellowish flowers opening simultaneously and an entire, oblong lip (Fig. 22–23). The most similar species is *A. sertularioides*,

but it has a relatively larger habit, an inflorescence nearly equal in length to the leaf (*vs.* longer than the leaf), with only one functional flower (*vs.* 3–6 successive flowers), and a shortly 3-lobed lip (*vs.* entire lip). Luer (1975) considered this species similar to *Pleurothallis grobyi* Bateman ex Lindl., which is now under *Specklinia* (Luer, 1986). Therefore, when Pridgeon & Chase (2001) resurrected *Specklinia*, they transferred *P. yucatanensis* as part of it. However, *A. yucatanensis* shares similar habit and a set of floral traits with *A. sertularioides* and other *Anathallis* members, justifying its reclassification accordingly.

Hamer (2001) reported this species for Nicaragua based on a specimen from Jinotega with an elevation of 1170 m (*Heller 11011*). However, the specimen may have been misidentified, as *Anathallis yucatanensis* is a plant of the evergreen tropical forest from low areas along the coastal plains of the Gulf of Mexico and the Caribbean Sea.

This species was the third *Anathallis* described from Mexico, as *Pleurothallis yucatanensis*, from a specimen collected in Campeche in 1931 (Fig. 25). Subsequently, it has been documented in the country as *P. yucatanensis* by Williams (1951), Soto-Arenas (1988), Martínez *et al.* (1994), Espejo-Serna & López-Ferrari (1998), Hágsater *et al.* (1998), and Carnevali *et al.* (2001); as *Anathallis yucatanensis* by Salazar (2013), Noguera-Savelli & Cetzal-Ix (2014), Villaseñor (2016), and Krömer *et al.* (2020); and as *Specklinia yucatanensis* by Luer (2023). A taxonomic treatment for this species was published by Solano (2008b).

CONSERVATION STATUS: In the four criteria of the MER evaluation, the species obtained the following scores: A) geographic distribution = 0.4545, B) habitat characteristics = 0.2222, C) intrinsic biological vulnerability = 0.1739, and D) impact of human activity = 0.3000; resulting in a total score of 1.1596. Since this value is ≥ 1.0 and < 1.5 , and the sum of criterion D is ≥ 0.3 , the corresponding risk category is Subject to Special Protection (Pr). This species is a common epiphyte in Mexican lowland evergreen tropical forests, where it can be locally abundant. Some populations are protected in Calakmul (Campeche), Montes Azules (Chiapas),

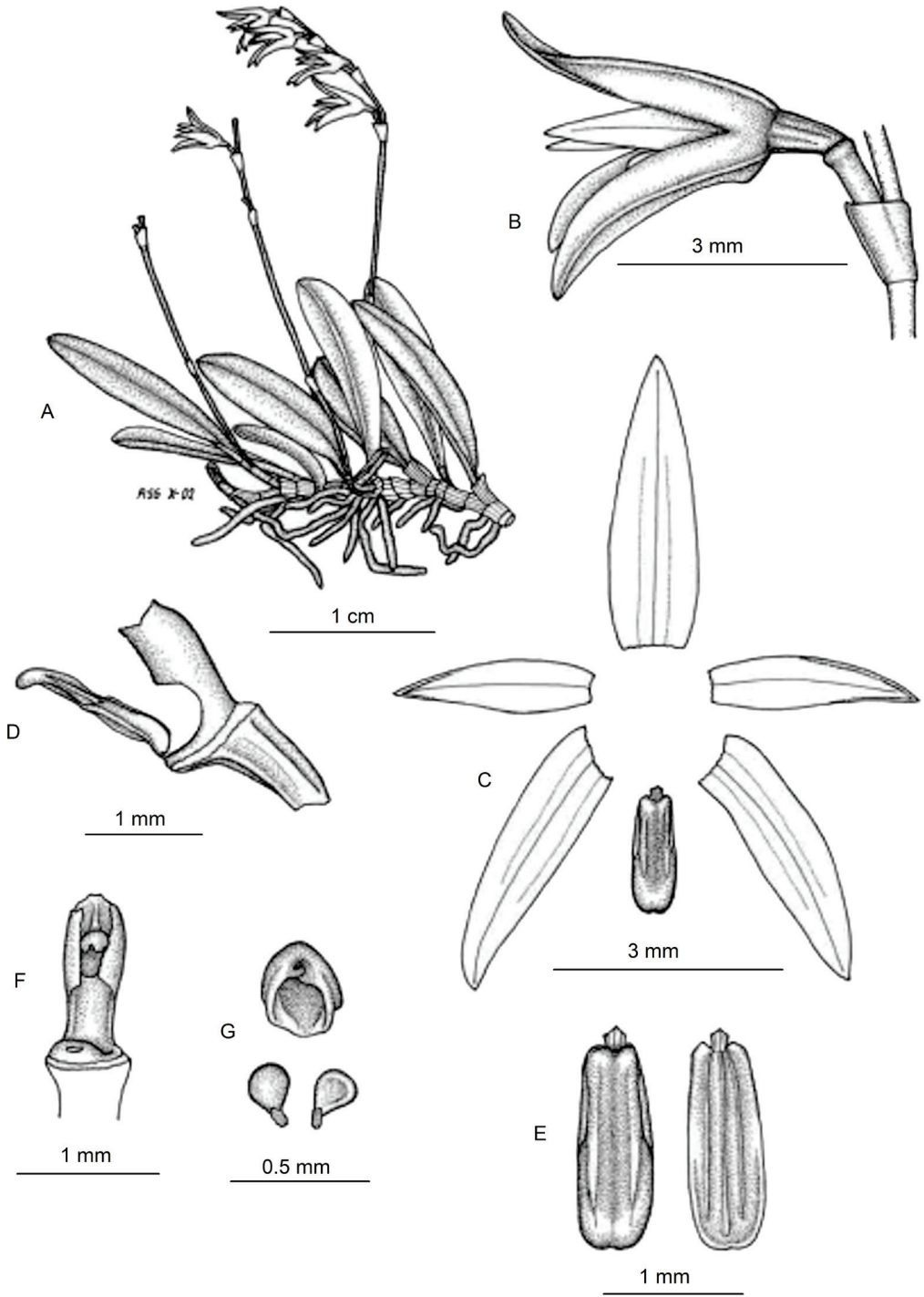


FIGURE 22. *Anathallis yucatanensis*. A. Habit. B. Flower, lateral view. C. Floral dissection. D. Lip, column, and ovary, lateral view. E. Lip, ventral and dorsal views. F. Column, ventral view. G. Anther cap and pollinarium. Drawing by R. Solano based on E. Martínez 29479.

Lacan-Tun (Chiapas) and Sian Kaan (Quintana Roo) biosphere reserves, as well as in natural monument Yaxchilan (Chiapas). However, it's noting that the species' habitat lies within the region where the Mexican government is currently constructing the Tren (Train) Maya project. Undoubtedly, the associated edge effects from the railway tracks' layout, the development of tourist infrastructure, and the increase in the human population in the region will likely have negative impacts on the forests where this taxon currently thrives.

SPECIMENS EXAMINED: MEXICO. **Campeche:** municipio Calakmul, southern Campeche, collected Nov. 1994, pressed 21 Nov. 1994, *J. Andrews ex M. Sarmiento s.n.* (AMO!); 200–300 m de Becán, 3 Feb. 1998, *G. Carnevali 4958 et al.* (CICY); a la orilla de la carretera Xpujil-Dzibalchén, al N de La Nueva Vida, 13 Oct. 1997, *E. Lira 120* (MEXU!); 500 m al N del poblado 11 de Mayo, 15 Oct. 1997, *E. Madrid 165-C* (MEXU!); 10 km al SE de Dos Naciones, camino a El Civalito, 3 Oct. 1997, *E. Martínez 29320-A et al.* (MEXU!); 6 km al NW de Dos Naciones, camino a ranchería El Sacrificio, 27 Oct. 1997, *E. Martínez 29749 et al.* (MEXU!); 9 km al SE de Dos Naciones camino a El Civalito, 4 Dec. 1998, *E. Martínez 31422* (MEXU!); a 1 km al E de 16 de Sep., 6 Dec. 1998, *E. Martínez 31543* (MEXU!); 3 km al E de La Nueva Vida camino a La Mancolona, 7 Dec. 1998, *E. Martínez 31616 et al.* (MO!, TEX!), *E. Martínez 31618 et al.* (MEXU!, TEX!); 25 km al S de Xpujil, carretera a Laguna Alvarado, 5 May 1998, *G. Carnevali & Ramírez 5339* (CICY); 18.7 Km al O de Xpujil, *J. C. Soto 21656* (MEXU!). Torre, 35 km al norte de la zona arqueológica, 23 Nov. 1999, *D. Méndez & B. Christopher 84* (LSU!). Palizada, El Vapor, 25–28 Jul. 1939, *E. Matuda 3895* (MEXU!). **Chiapas:** municipio Ocosingo, Campamento COFOLASA, a 24 Km al SE de Crucero Corozal, sobre camino Palenque-Boca Lacantum, 7 Dec. 1984, *E. Martínez 9226* (MEXU!), *E. Martínez 9269* (MEXU!), *E. Martínez 25048* (MEXU!); porción N de la Omega, Monumento Natural Yaxchilán, 12 Dec. 1997, *A. Rincón 850* (MEXU!). **Oaxaca:** municipio Santa María Chimalapas, *Hernández 946* (CHAPA!). **Quintana Roo:** municipio Othon P. Blanco, 5 km al N de La Unión, 5 Dic. 1997, *G. Carnevali 4894* (CICY!); ejido Caobas, sabana del Jaguactal, *G. Carnevali 5298 et al.* (AMES! CICY!); Sabana El Jaguactal, 9.5 km al E de carr. hacia Tres Garantías, *G. Carnevali 5292* (CICY!); El Aguacate, ejido Tres Garantías, carr. a Dos Aguadas, 28 Mar. 1999, *L. Ibarra sub E. Hágsater 12216* (AMO!); 9 km antes del Ejido La Unión, 9 May 1981, *E. Ucán & S. Flores 955* (CICY!); Ejido Caobitas, 16 May 1984, *E. Ucán et al. 3369* (XAL! CICY!). **Tabasco:** Balancán, carretera no. 25,



FIGURE 23. *A. yucatanensis* in its habitat, Calakmul, Campeche. **A.** Habit of the plant. **B.** Inflorescence. Photographs by David Angel Burgos Mex.

a 3 km sobre la EWO a la carretera no. 20, *P.E. Valdivia 2081* (XAL!). **Veracruz:** Uxpanapa, *P.E. Valdivia 973-B* (XAL!).

NATURALISTA OBSERVATIONS: MEXICO. **Campeche:** municipio Calakmul, Apr. 2023, *I. Arellano* (<https://www.inaturalist.org/observations/166199300>); Calakmul, 18.431152 N, -89.504923 W, Oct. 2021, *R. Vela* (<https://www.inaturalist.org/observations/106721409>); Calakmul, 18.182517 N, -89.250958, 21 Oct. 2021, *D.A. Burgos-Mex* (<https://www.inaturalist.org/observations/104950069>).

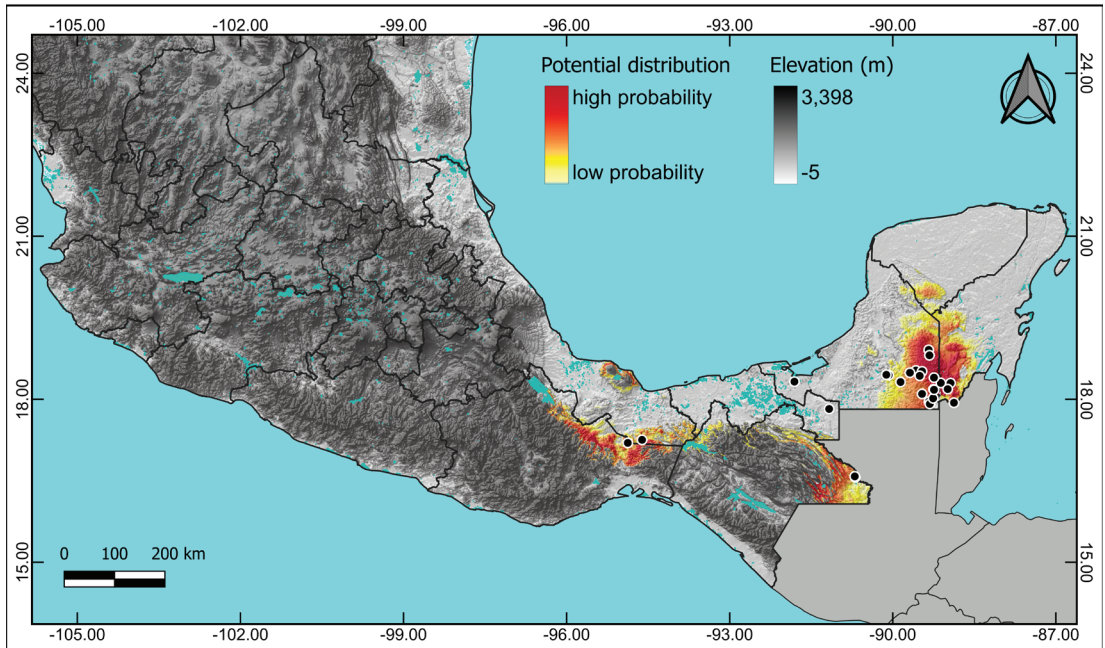


FIGURE 24. Potential distribution of *Anathallis yucatanensis* in Mexico. Map by E. Licona.

NEW COMBINATION AND A NOTE IN *LANKESTERIANA*

To maintain the circumscription of *Anathallis* in Mexico, the following combination is required in the *Lankesteriana* genus.

Lankesteriana greenwoodii (Soto Arenas & Salazar) Solano *comb. nov.*

Basionym: *Anathallis greenwoodii* Soto Arenas & Salazar, *Icon. Orchid.* 5–6: t. 519. 2003.

TYPE: MEXICO: Oaxaca, Distrito Ixtlán, km 46.7 del camino Ixtlán de Juárez–Talea de Castro, en la desviación a Tanetzé de Zaragoza y Juquila Quijanos, 25 Mar. 2000, pressed from cultivate material 19 Dec. 2001, *M. Soto 9441 et al.* (Holotype: AMO!; isotype: AMO!).

TAXONOMIC NOTES: Currently, this species has only been documented from Northern Oaxaca. It shares similarities with two other species: *L. comayaguensis* (Ames) Karremans, from Central America, and *L. involuta* (L.O. Williams) Karremans, from Western and Southern Mexico. While there are no available DNA accessions for this taxon to assess its phylogenetic position, its morphology suggests a closer af-

finity with *Lankesteriana* than with *Anathallis*. This is evident in its diminutive, creeping habit, bilabiate flowers, fused lateral sepals forming a synsepal, falcate and caudate petals, and glandular cilia along the margins of the lip (Fig. 26).

Lankesteriana haberi (Luer) Karremans, *Lankesteriana* 13(3): 327. 2014.

≡ *Pleurothallis haberi* Luer *Selbyana* 23(1): 36, f. 27. 2002.

≡ *Anathallis haberi* (Luer) Solano & Soto Arenas, *Icon. Orchid.* 4–5: t. 520. 2003.

≡ *Specklinia haberi* (Luer) Luer, *Monogr. Syst. Bot. Missouri Bot. Gard.* 95: 261. 2004: 261.

≡ *Panmorphia haberi* (Luer) Luer, *Syst. Bot. Missouri Bot. Gard.* 105: 158. 2004 2006.

TYPE: COSTA RICA: Alajuela, Reserva Biológica Monteverde, río Peñas Blancas, 15 Dec. 1987, *W. Haber & E. Bello 7917* (Holotype in CR!, isotype in MO).

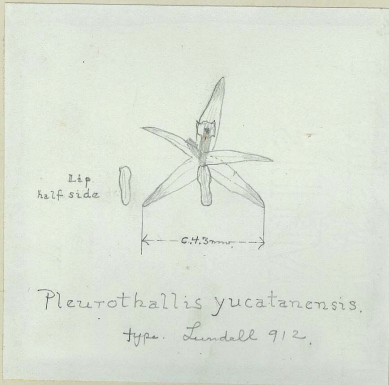
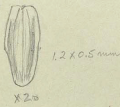
Syn.: *Lankesteriana glandulosa* Archila & Szlach., *Revista Guatemalensis* 17(2): 73 2014[2015], *nom. inval.*

In Herb. Univ. Michigan is a representative of this species. Its data are:—

British Honduras, Yucatan Peninsula, Maskall. Percy Gentle 964. Dec. 1933.

Holotype Oakes Ames Orchid Herbarium
Pleurothallis yucatanensis Ames & C. Scherer
 Bot. Mus. Leaf. 114. 1932
 Det.: G.A. Romero & I. Tellez 1998

The lip is thickened from here forward



Pleurothallis yucatanensis.
 Type: Lindell 912.



***Pleurothallis yucatanensis* Ames & Scherer**
furth, sp. nov.

Herba epiphytica, pusilla. Rhizoma repens, caulibus numerosis brevissimis ornatum. Folia oblanceolata, apice rotundato minute bilobulata. Racemi laxiflori, pauciflori. Flores pusilli. Sepala lateralalia anguste lanceolata, uninervia. Sepalum dorsale majus, lanceolatum, concavum. Petala triangulari-linearia. Labelum oblongum, apice late rotundatum, parte inferiore leviter dilatata. Columna apice alato-dilatata.

Plant very small, up to 5 cm. tall, epiphytic, recalling *P. sertularioides* Lindl. Rhizome creeping, entirely invested by imbricating scarious nervose sheaths. Roots fibrous, glabrous, stout for the plant. Stems very short, approximate, ascending, unifoliate, about 2.5 mm. long, when young entirely invested by imbricating tubular scarious sheaths. Leaf oblanceolate, 8–15 mm. long, about 2.8–3.5 mm. wide, broadly rounded at the apex with a minutely bilobed apiculate tip, gradually narrowed to a 1-jointed petiole, very rugose in the dried specimen. Inflorescence conspicuously surpassing the leaf, solitary, about 3 cm. tall; peduncle capillary, adorned below the middle with one close tubular sheath; racemes very lax, 2- to 5-flowered. Floral bracts loose, infundibuliform, twice or thrice surpassed by the slender ascending pedicels. Flowers small, segments of the perianth subparallel, slightly thickened toward the apex. Lateral sepals free, narrowly lanceolate, 2.5 mm. long, 1- or obscurely 3-nerved, acute, carinate on the outer side. Dorsal sepal slightly longer, lanceolate, about 2.8 mm. long, obtuse, concave, obscurely 3-nerved. Petals linear-triangular, 2.5 mm. long, 1-nerved, acute, slightly oblique. Labellum much shorter, simple, very shortly clawed; lamina oblong or lanceolate-oblong in outline with the erect sides of the lower half slightly dilated from a cuneate base, about 1.4 mm. long, broadly rounded at the apex, 3-nerved, minutely auriculate at base. Column short, almost 1.2 mm. long, with an abrupt quadrate wing on either side of the upper half, extended in a foot. Anther cupuliform.

Pleurothallis yucatanensis suggests *P. sertularioides* Lindl., but differs in having racemose inflorescences and simple lip.

MEXICO, Yucatan, C. L. Lundell 912, November 8, 1931. Common on tree trunks and old logs. (TYPE in Herb. Ames No. 37882).

Bot Mus Leaf. 1, 1932-33

allied to *gobyi*



PLANTS OF YUCATAN

No. 912 Date Nov. 8, 1931
 Name *Pleurothallis yucatanensis*, Oct 5
 Locality
 Common on tree trunks and old logs.
 C. L. LUNDELL, Collector

FIGURE 25. Holotype of *Pleurothallis yucatanensis*. Reproduction with permission of the Oak Ames Orchid Herbarium, Harvard University.

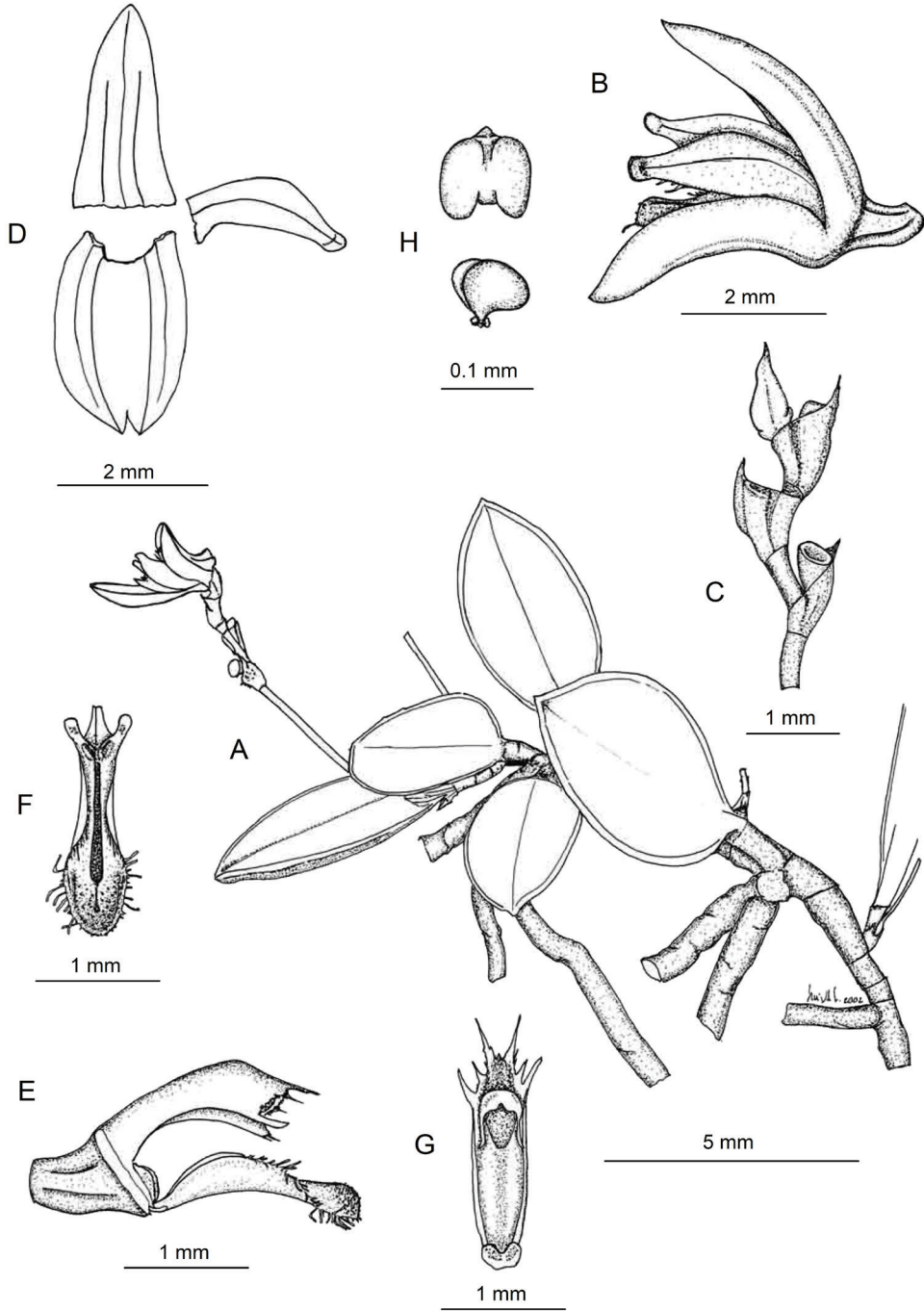


FIGURE 26. *Lankesteriana greenwoodii*. **A.** Habit. **B.** Flower, lateral view. **C.** Segment of an inflorescence without flowers. **D.** Floral dissection. **E.** Lip, column, and ovary, lateral view. **F.** Lip. **G.** Column, ventral view. **H.** Anther cap and pollinarium. Drawing by M. Soto based on the type of *Anathallis greenwoodii*. Reproduction with permission of the AMO Herbarium.

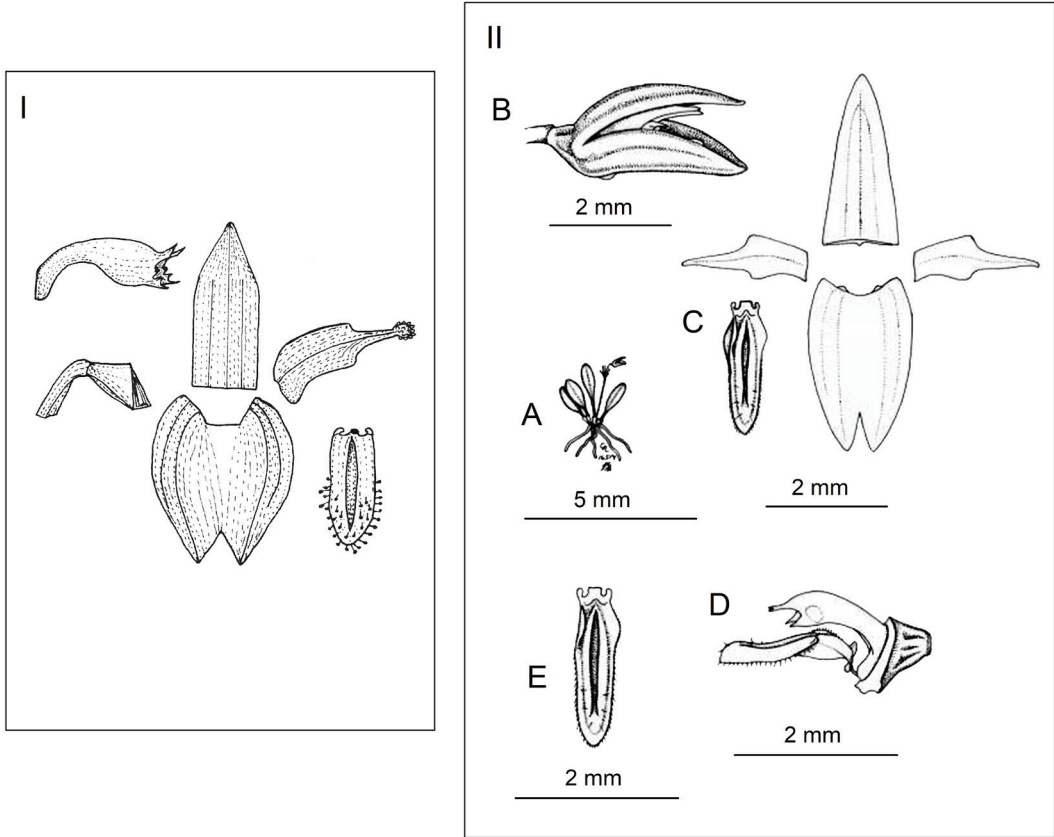


FIGURE 27. **I.** *Lankesteriana glandulosa*, floral sketch by F. Archila based on the type specimen. The scale bar from the original drawing was removed. Evidently it was incorrect, as it represented 5 cm when it should probably be 1 mm. Reproduction with permission of the AMO Herbarium. **II.** *Lankesteriana haberi*. **A.** Habit. **B.** Flower, lateral view. **C.** Floral dissection. **D.** Lip, column, and ovary, lateral view. **E.** Lip, ventral view. Drawing by C. A. Luer based on the type of *Pleurothallis haberi*. Reproduction with permission of Missouri Botanical Garden Press.

HOLOTYPE: GUATEMALA. Coban: Alta Verapaz, Setaña Cangüinik, 500 m, colectada por Fredy Archila, Mar. 2008, FA-s.n. (BIGU).

TAXONOMIC NOTE: The online databases of Missouri Botanical Garden (<http://legacy.tropicos.org>), International Plant Names Index (<https://www.ipni.org>), Plants of the World Online (<https://powo.science.kew.org/>), and Karremans *et al.* (2021) consider *L. glandulosa* an invalid name. This determination is due to the authors' failure to provide a diagnosis (in Latin or English) or reference to a previous and effective published diagnosis, thereby violating art. 38 and 39 of the Shenzhen code (Turland *et al.* 2018). Plants of the World Online also highlights that being an invalid name, *L. glandu-*

losa becomes an unplaced name, which cannot be considered as an accepted name or included as a synonym for another.

The specimen described by Archila (2014[2015] b, Fig. 27I) has floral segments larger in size compared to the type and Mexican specimens of *L. haberi*. But apart from that, *L. glandulosa* proves to be indistinguishable from the latter, as observed in Luer (2002) and Solano & Soto-Arenas (2003) (Fig. 27II and 28, 29, respectively). Both exhibit a minute and caespitose habit, with abbreviated stems, obovate leaves with a well-defined petiole, successive and congested flowers at the apex of a raceme, oblong-lanceolate dorsal sepal, fused lateral sepals forming an elliptical and shortly bifid synsepal, oblong petals with an apically papillose

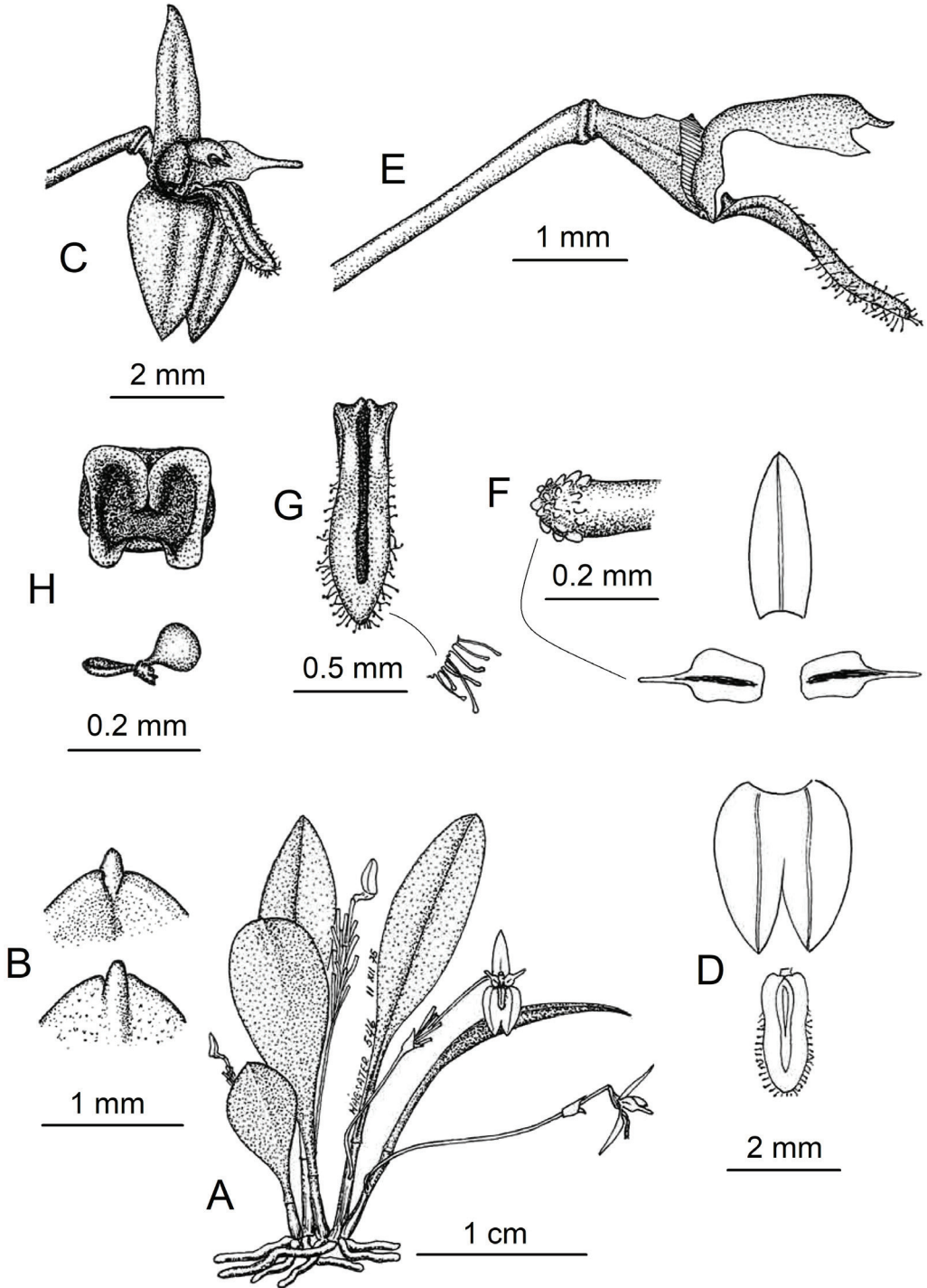


FIGURE 28. *Lankesteriana haberi*. **A.** Habit. **B.** Detail of the leaf apex in adaxial and abaxial view. **C.** Flower, $\frac{3}{4}$ view. **D.** Floral dissection. **E.** Lip, column, and ovary, lateral view. **F.** Detail of the petal apex. **G.** Lip, ventral view, with detail of cilia. **H.** Anther cap and pollinarium. Drawing by E. Hågsater based on *E. Hågsater 556*. Reproduced with the kind permission of the AMO Herbarium.



FIGURE 29. *Lankesteriana haberi*. Photograph by E. Hágsater based on E. Hágsater 556. Reproduced with the kind permission of the AMO Herbarium.

terete tail, oblong-lanceolate, ciliate lip, and arcuate, prominently winged column, with a lacerated clinandrium. Furthermore, the distribution range of *L. haberi* extends from Chiapas (Mexico) to Costa Rica, encompassing elevations of 180–900 m, which includes the type locality of *L. glandulosa*.

Conclusions. A total of 15 Mexican species have been previously included within *Anathallis*. However, three of these species, namely *A. dolichopus*, *A. platystylis*, and *A. scariosa*, have been reassigned to *Stelis*. Another species, *A. fuegii* (Rchb.f) Pridgeon & M.W.Chase, was transferred to *Specklinia*. Five taxa, *A. abbreviata*, *A. barbulate*, *A. comayaguensis*, *A. haberi*, and *A. involuta*, have been segregated into *Lankesteriana*. Meanwhile, *A. greenwoodi* was transferred here to *Lankesteriana*. The remaining five species are the ones that still belong to the genus *Anathallis*. Table 1 provides an overview of the taxonomic history of this genus in Mexico.

The Mexican *Anathallis* species recognize here are *A. lewisiae*, *A. minutalis*, *A. oblanceolata*, *A. sertularioides*, and *A. yucatanensis*. From them, *A. minutalis* and *A. oblanceolata* are distributed

along the forests of the main mountain ranges in the tropical region of the country, where their distribution sometimes overlaps. On the other hand, *A. lewisiae*, *A. sertularioides*, and *A. yucatanensis* are representative species found in the orchid flora of low, warm, and humid regions along the Gulf of Mexico Coast and Yucatan Peninsula. Table 2 provides a comparative summary of the morphological characteristics among these five species. *Anathallis oblanceolata* is re-described here based on Mexican specimens previously confused with *A. minutalis*. For each taxon, a risk category was proposed following the regulations applicable to wild plant species in Mexico. This allows for evaluations to be comparable to those conducted for other species in the country's flora.

ACKNOWLEDGMENTS. To the curators of the herbaria that facilitated the review of specimens presented in this study. To the institutions that granted permission to reproduce the digitalized images of type specimens and drawings. The financial support provided by the Mexican Comisión Nacional para el Conocimiento y Uso de la Biodiversidad (CONABIO, project KT005).

TABLE 1. Binomials associated with the genus *Anathallis* that have been included in different checklists for Mexico.

Soto-Arenas (1988)	Soto-Arenas <i>et al.</i> (2007)	Villaseñor (2016)	Solano <i>et al.</i> (2020)	Accepted name
<i>Pleurothallis abbreviata</i> Schltr.	<i>Anathallis abbreviata</i> (Schltr.) Pridgeon & M.W.Chase	<i>Anathallis abbreviata</i> (Schltr.) Pridgeon & M.W. Chase	<i>Lankesteriana abbreviata</i> (Schltr.) Karremans	<i>Lankesteriana abbreviata</i> (Schltr.) Karremans
<i>Pleurothallis barbulate</i> Lindl.	<i>Anathallis barbulate</i> (Lindl.) Pridgeon & M.W.Chase	<i>Anathallis barbulate</i> (Lindl.) Pridgeon & M.W.Chase	<i>Lankesteriana barbulate</i> (Lindl.) Pridgeon & M.W.Chase	<i>Lankesteriana barbulate</i> (Lindl.) Pridgeon & M.W.Chase
<i>Pleurothallis comayaguensis</i> Ames	<i>Anathallis comayaguensis</i> (Ames) Pridgeon & M.W.Chase	<i>Anathallis comayaguensis</i> (Ames) Pridgeon & M.W.Chase	<i>Lankesteriana comayaguensis</i> (Ames) Karremans	<i>Lankesteriana comayaguensis</i> (Ames) Karremans
<i>Pleurothallis dolichopus</i> Schltr.	<i>Anathallis dolichopus</i> (Schltr.) Pridgeon & M.W. Chase	<i>Anathallis dolichopus</i> (Schltr.) Pridgeon & M.W.Chase	<i>Stelis poasensis</i> (Ames) Karremans & Chinchilla	<i>Stelis poasensis</i> (Ames) Karremans & Chinchilla
<i>Pleurothallis fuegii</i> Rchb.f.	<i>Anathallis fuegii</i> (Rchb.f.) Pridgeon & M.W. Chase	<i>Anathallis fuegii</i> (Rchb.f.) Pridgeon & M.W.Chase	<i>Specklinia fuegii</i> (Rchb.f.) Solano & Soto Arenas	<i>Specklinia fuegii</i> (Rchb.f.) Solano & Soto Arenas
—	<i>Anathallis greenwoodii</i> Soto Arenas & Salazar	<i>Anathallis greenwoodii</i> Soto Arenas & Salazar	<i>Anathallis greenwoodii</i> Soto Arenas & Salazar	<i>Lankesteriana greenwoodii</i> (Soto Arenas & Salazar) Solano
—	<i>Anathallis haberi</i> (Luer) Solano & Soto Arenas	<i>Anathallis haberi</i> (Luer) Solano & Soto Arenas	<i>Lankesteriana haberi</i> (Luer) Karremans	<i>Lankesteriana haberi</i> (Luer) Karremans
<i>Pleurothallis involuta</i> L.O.Williams	<i>Anathallis involuta</i> (L.O.Williams) Solano & Soto Arenas	<i>Anathallis involuta</i> (L.O.Williams) Solano & Soto Arenas	<i>Lankesteriana involuta</i> (L.O.Williams) Karremans	<i>Lankesteriana involuta</i> (L.O.Williams) Karremans
<i>Pleurothallis lewisiae</i> Ames	<i>Anathallis lewisiae</i> (Ames) Solano & Soto Arenas	<i>Anathallis lewisiae</i> (Ames) Solano & Soto Arenas	<i>Anathallis lewisiae</i> (Ames) Solano & Soto Arenas	<i>Anathallis lewisiae</i> (Ames) Solano & Soto Arenas
<i>Pleurothallis minutalis</i> Lindl.	<i>Anathallis minutalis</i> (Lindl.) Pridgeon & M.W.Chase	<i>Anathallis minutalis</i> (Lindl.) Pridgeon & M.W.Chase	<i>Anathallis minutalis</i> (Lindl.) Pridgeon & M.W.Chase	<i>Anathallis minutalis</i> (Lindl.) Pridgeon & M.W.Chase
<i>Pleurothallis oblanceolata</i> L.O.Williams	<i>Anathallis oblanceolata</i> (L.O.Williams) Solano & Soto Arenas	<i>Anathallis oblanceolata</i> (L.O.Williams) Solano & Soto Arenas	<i>Anathallis oblanceolata</i> (L.O.Williams) Solano & Soto Arenas	<i>Anathallis oblanceolata</i> (L.O.Williams) Solano & Soto Arenas
<i>Pleurothallis platystylis</i> Schltr.	<i>Anathallis platystylis</i> (Schltr.) Pridgeon & M.W.Chase	<i>Anathallis platystylis</i> (Schltr.) Pridgeon & M.W.Chase	<i>Stelis platystylis</i> (Schltr.) Solano & Soto Arenas	<i>Stelis platystylis</i> (Schltr.) Solano & Soto Arenas
<i>Pleurothallis scariosa</i> (Lex.) Lindl.	<i>Anathallis scariosa</i> Lex.) Pridgeon & M.W.Chase	<i>Anathallis scariosa</i> Lex.) Pridgeon & M.W.Chase	<i>Stelis scariosa</i> (Lex.) Karremans	<i>Stelis scariosa</i> (Lex.) Karremans
<i>Pleurothallis sertularioides</i> (Sw.) Spreng.	<i>Anathallis sertularioides</i> (Sw.) Pridgeon & M.W.Chase	<i>Anathallis sertularioides</i> (Sw.) Pridgeon & M.W.Chase	<i>Anathallis sertularioides</i> (Sw.) Pridgeon & M.W.Chase	<i>Anathallis sertularioides</i> (Sw.) Pridgeon & M.W.Chase
<i>Pleurothallis yucatanensis</i> Ames & C.Schweinf.	<i>Anathallis yucatanensis</i> (Ames & C.Schweinf.) Solano & Soto Arenas	<i>Anathallis yucatanensis</i> (Ames & C.Schweinf.) Solano & Soto Arenas	<i>Anathallis yucatanensis</i> (Ames & C.Schweinf.) Solano & Soto Arenas	<i>Anathallis yucatanensis</i> (Ames & C.Schweinf.) Solano & Soto Arenas

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TABLE 2. Summary of the main differences between Mexican species of the genus *Anathallis*.

Character	<i>A. lewisiae</i>	<i>A. minutalis</i>	<i>A. oblanceolata</i>	<i>A. sertularioides</i>	<i>A. yucatanensis</i>
Leaf texture	fleshy	fleshy-thickened	fleshy	fleshy	fleshy
Leaf form	orbicular-elliptic or obovate, rounded	elliptic to obovate, rounded	oblanceolate, rounded	linear-oblanceolate, rounded	oblanceolate, rounded
Leaf size (length × wide)	6.0–15.0 × 4.5–8.0 mm	18.0–25.0 × 4.0–7.0 mm	18.0–45.0 × 4.0–7.0 mm	10.0–33.0 × 2.0–4.0 mm	8.0–20.0 × 3.0–4.5 mm
Leaf base	subpetiolate	subpetiolate	forming a conspicuous petiole	forming a conspicuous petiole	forming a conspicuous petiole
Inflorescence	as long as the leaf	as long as the leaf	equal to or shorter than the leaf	as long as the leaf	Longer than the leaf
Flores per raceme	2–4, successive	2–3, successive	2, successive	1 functional flower	3–6, simultaneous
Tepals color	yellow to yellowish green, purple at their apices	bright yellowish, sometimes brownish purple tinged toward their apices and along the mid-vein	bright yellowish, sometimes brownish purple tinged toward their apices and along the mid-vein	Yellowish green	yellowish or whitish yellow
Dorsal sepals	ovate-lanceolate, abruptly acute, 4.4–5.0 × 1.8–2.0 mm	ovate, acute, 4.5–5.0 × 1.5–1.8 mm	lanceolate, acute, 4.5–5.0 × 1.5–1.8 mm	triangular-lanceolate, acute, 4.0–5.3 × 1.5–1.7 mm	lanceolate, acute, 2.5–3.6 × 1.0–1.2 mm
Lateral sepals	obliquely lanceolate, acute, 4.3–5.0 × 1.3–1.5 mm	obliquely ovate-lanceolate, acute, 4.0–4.8 × 1.4–1.5 mm	obliquely lanceolate, acute, 4.0–4.7 mm × 1.4–1.5 mm	obliquely lanceolate, acute, 3.7–5.0 × 1.2–1.4 mm	obliquely lanceolate, long acute, 2.3–3.4 × 0.8–1.0 mm
Petals	oblong, obtuse, 3.5–3.7 × 0.9–1.2 mm	falcate-lanceolate, long acuminate, 3.0–3.8 × 0.7–0.9 mm	falcate-lanceolate, long acuminate, 3.0–3.8 mm × 0.7–0.9 mm	falcate-lanceolate, long acuminate, 3.2–3.9 × 0.8–1.1 mm	linear-lanceolate, oblique, 2.5–3.9 × 0.5–0.9 mm
Lip	3-lobed, ligulate-lanceolate, acute, 2.3–3.0 × 0.6–1.0 mm	entire, oblong-pandurate, acute, 2.7–3.1 × 0.7–1.0 mm	entire, lanceolate-ligulate, rounded, 2.7–3.1 × 0.7–1.0 mm	3-lobed, linear-lanceolate, rounded, 2.7–3.0 × 0.6–0.9 mm	entire, oblong, rounded, 1.2–1.6 × 0.4–0.6 mm
Wings of the column	oblong, marginally erose	oblong, marginally entire	oblong, marginally lacerate	oblong, marginally dentate	subquadrate, marginally dentate
Clinandrium	lacerate	denticulate	serrulate	dentate	dentate
Elevation range	3–400 m	1620–2450 m	1100–2250 m	120–950 m	150–300 m

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