NOVELTIES IN THE ORCHID FLORA OF VENEZUELA VII. CYMBIDIEAE, CATASETINAE. NOTES ON *GALEANDRA* (ORCHIDACEAE), INCLUDING A NEW SPECIES[1]

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Abstract. A new species of *Galeandra* from the state of Apure, Venezuela, is described and illustrated. The new species, *in vivo*, is easily distinguished by its unpleasant fragrance that reminds one of the smell emitted by the American roach, and in the herbarium by a set of unique morphological characters. We also present miscellaneous herbarium notes on *Galeandra* and a bilingual key to identify the species of the genus found in Venezuela.

Resumen. Se describe y se ilustra una nueva especie de *Galeandra* del estado Apure, Venezuela. La nueva especie, *in vivo*, se distingue facilmente por su fragancia desagradable que recuerda a la cucaracha americana y, en el herbario, por una serie de caracteres morfológicos únicos. También se presentan notas misceláneas sobre el género *Galeandra* y una clave bilingüe para identificar las especies presentes en Venezuela.

Keywords: Amazonas, *Galeandra*, Orchidaceae, *Periplaneta*, Venezuela

Galeandra Lindl. is restricted to the Americas, where it is found from Florida and the West Indies to southern Brazil and Argentina (Monteiro et al. in Pridgeon et al., 2009: 29). Recent publications place this genus in Catasetinae (Romero-González and Pridgeon in Pridgeon et al., 2009: 11–12; Monteiro et al., 2010; Batista et al., 2014). It includes some 69 described taxa (IPNI, 2014), of which 39 binomials are currently accepted (Plant List, 2014); the actual number of species is uncertain. The genus is most diverse in the Amazon and Orinoco River basins, with only six species in Central America and Mexico (one undescribed) and one in Florida and the West Indies.

The genus was first documented By Alexander Rodrigues Ferreira (1756–1815) and his team during their expedition to the Rio Negro in the 1780s. At least one of the unpublished drawings from this expedition, preserved in the Fundação Biblioteca Nacional (Brazil) dated 1785 ("Do Rio Negro;" mss1255473; Biblioteca Nacional Digital Brasil, 2014) represents what would be described as *Galeandra devoniana* R.H.Schomb. ex Lindl. some 50 years later (Fig. 1). Nonetheless, the first published record was by Francis Bauer (1758–1840) in his famous work *Illustrations of Orchidaceous Plants* (in installments between 1830 and 1838; *Galeandra* in part II, Genera plate VIII, 1832; Bauer, 1830–1838). The description of *Galeandra* is attributed to Lindley, but the book to Bauer and Lindley. Therefore, the authorship of the genus *Galeandra* can be as simple as "Lindl." or as convoluted as "Lindl. in F. A. Bauer and Lindl."

A phylogenetic study of *Galeandra* (Monteiro et al., 2010) revealed two clades sister to *Galeandra devoniana* (one of the showiest species, bearing articulate leaves; Fig. 1); one clade includes all the terrestrial species, bearing non-articulate leaves, the other all the epiphytic ones, bearing articulate leaves. Incidentally, *Tupacamaria* Archila, recently proposed to include the clade of *Galeandra* with all the terrestrial species (Archila, 2008, 2013), is phylogenetically untenable because it renders *Galeandra* paraphyletic (i.e., *Tupacamaria* is imbedded in *Galeandra* as elucidated by Monteiro et al., 2010).

Eleven species of *Galeandra* have been documented in Venezuela (Romero-González, 2003), mostly south of the Orinoco river. Here we describe and illustrate a new epiphytic species from the Sinaruco river, Apure state. This showy species is easily distinguished *in vivo* by its unpleasant odor that reminds one of the smell emitted by the American roach, and in the herbarium by a set of unique characters. We also present miscellaneous herbarium notes on *Galeandra* and a bilingüal key to identify the species found in Venezuela.

We are grateful to Bobbi Angell and Natalie Warford (R.I.P.) for the excellent drawings, to Bruno Manara for his help selecting the specific epithet of the new species, to the staff and curators of K, MO, NY, PORT, VEN, and particularly TFAV for their assistance with loans and visits, to the DEA-Amazonas of Ministerio del Poder Popular para el Ambiente of Venezuela (currently part of Ministerio del Poder Popular para Ecosocialismo, Hábitat y Vivienda) for their logistic support, to Irina Ferreras and Daniel Santamaria for their invaluable help in the herbarium, to Francisco Urbani and Leonardo Venegas for geographical information, to Germán Carnevali and William Cetzal for comments, and to the Orchid Society of Arizona (O.S.A.) for its generous financial support (to G.A.R.-G.). Field work on the San Miguel river and the Cariche mountains in June 2009 could not have been completed without the help of Carlos and Oscar Gómez, Demetrio Aragua, Emiro Yuriyuri, Pascual Garrido, and José Miguel Aragua†, to whom this article is dedicated.

[1] Previous articles in this series were Romero-González and Batista (2009), Romero-González et al. (2010a, b), Romero-González and Meneguzzo (2012), and Romero-González et al. (2013a, b).

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FIGURE 1. *Galeandra devoniana* R.H.Schomb. ex Lindl. Photograph by G. A. Romero-González (*Romero et al. 4051*, TFAV).

NOMENCLATURE

Galeandra blattiodora G.A.Romero & C.Gómez, *sp. nov.* TYPE: VENEZUELA. Apure: río Sinaruco, *Ex Hort.* Carlos Gómez, flowering 10 December 2005, *sub G. A. Romero & C. Gómez 3522* (Holotype: TFAV; Isotype: AMES [flower in spirit], VEN [dry flowers]). Fig. 2–4.

The new species is similar to *Galeandra magnicolumna* G.A.Romero & Warford, but differs *in vivo* in the fetid, unpleasant odor of the flowers, which reminds one of a place heavily infested by the American roach, *Periplaneta americana* L. (versus a sweet, pleasant fragrance), and in herbarium specimens by the absence of pubescence on the labellum and column (versus densely pubescent), and the short, conical anther (versus elongate, clavate).

Epiphytic *herbs*, *pseudobulbs* of up to 10 internodes, narrowly fusiform, up to 42 cm high to the base of the inflorescence, up to 2.0 cm in diameter at its thickest point. *Leaves* dark green, stiff, 3-veined, articulate, linear lanceolate, up to 32 cm long × 1.5 cm wide, the sheaths and lower portions of the blade with small red spots and red pigment at the articulation, present when plants first flower, shed as the flowering season progresses. *Inflorescence* a spike, occasionally with 1 or 2 branches in robust plants, with up to 15 flowers borne in succession, 1–3 at a time, the base covered with papyraceous, narrowly lanceolate bracts, 4.0 cm long × 0.4 cm wide, decreasing in size toward the apex of the peduncle, the peduncle up to 18 cm long; rachis up to 10 cm long; floral bracts lanceolate, 0.7 cm long × 0.2 cm wide at the base. *Ovary pedicellate*, olive green, 2.5 cm long, 1.5 mm in diameter at the widest point. *Flowers* overall light lime green, the margins of the sepals and petals slightly brownish red, the margins of labellum and especially the apex white, the column and the anther light lime green. *Dorsal sepal* narrowly obovate, 2.0–2.3 cm long, 0.6 cm wide, *lateral sepals* falcate, 2.0–2.3 cm long, 0.6 cm wide. *Petals* narrowly obovate, 2.0 cm long, 0.7 cm wide. *Labellum* (including spur) 8.0 cm long, 4.0 cm wide at the apex when spread; spur, to the base of the column, 5.5 cm long, lined with short trichomes; labellum disk with five conspicuous keels (Fig. 2–3). *Column* 1.2 cm long through the axis, winged, the ventral surface naked except for two tufts of multicellular trichomes at each side of the base (the trichomes similar to the ones inside the spur), strongly concave below the stigma, wings curving outward then inward, with a lateral span of 6–7 mm, the margins of the clinandrium fringed. Rostellum horseshoe-shaped. Anther beaked, 4.0–4.5 mm long, 2.8–3.2 mm wide at the base, the base scrotiform, the tip 3 mm long, conical. Pollinarium with viscidium, stipe, and two pollinia; viscidium and stipe hippocrepiform, firm, minutely celled, elastic (the viscidium hidden on the inner margin of the stipe), 6.5 mm high, 5.8 mm wide; pollinia juxtaposed, sulcate, ovoid-globose, 1.9 mm long, 1.2 mm wide.

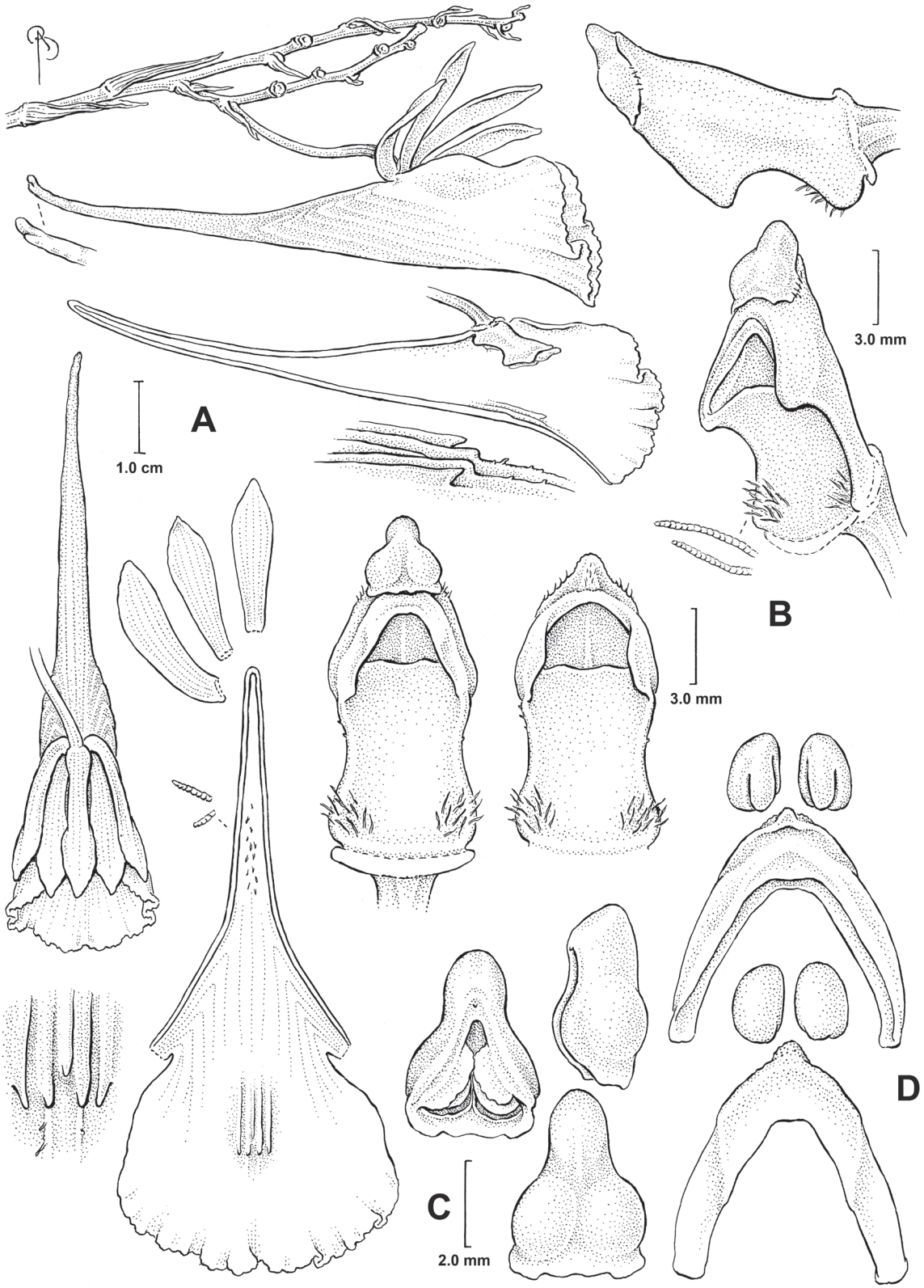

FIGURE 2. *Galeandra blattiodora* G.A.Romero & C.Gómez. **A**, views of the flower and labellum; **B**, views of the column; **C**, views of the anther; **D**, views of the pollinarium and pollinium. Drawn by Bobbi Angell based on photographs and material preserved in alcohol of an Isotype (*G. A. Romero & Gómez 3522*, AMES).

FIGURE 3. *Galeandra blattiodora* G.A.Romero & C.Gómez. Front view. Photographs by G. A. Romero-González based on the holotype (*G. A. Romero & Gómez 3522*, VEN).

FIGURE 4. *Galeandra blattiodora* G.A.Romero & C.Gómez. Side view. Photographs by G. A. Romero-González based on the holotype (*G. A. Romero & Gómez 3522*, VEN).

Etymology: Derived from Blattidae, the name designating the family encompassing most of the common household roaches, including the American cockroach, *Periplaneta americana*; and the Latin *odor*, smell, scent, in reference to the odor emitted by the flowers of the new species, similar to the fetid, disagreeable odor of a place infested by the American cockroach.

Additional material examined: [Municipio Pedro Camejo, Parque Nacional Santos Luzardo], laguna la Guacharaca, ca. 14 km due W of the northern end of the Galeras of Cinaruco; 6°42'N, 67°27'W; elev. 70 m. Low gallery forest surrounding the laguna. Epiphyte, perianth green, the upper part of the lip white, 24 February 1979, *G. Davidse & A. C. González 15706A* (VEN [No. 167368], MO [No. 2705767]); same locality, 40 m, bosque inundable al borde de la laguna, suelo limoso con alto contenido de materia orgánica, epífita, pétalos verdosos, labelo blanco cremoso, 31 February 1989, *T. Ruiz, R. Gómez, R. Smith, R. Winfield y O. Díaz 4428* (MY [not seen], VEN [271922]).

Galeandra blattiodora is closely related to *G. magnicolumna* G.A.Romero & Warford (Fig. 5–6). However, it differs from the latter in the fetid fragrance, the absence of trichomes on the labellum and the ventrum of the column, and in the shape of the anther (see key below).

The unpleasant odor of the flowers of the new species is most peculiar (calling it a "fragrance" would be a contradiction in terms!). Plants first flowered in the garden of one of the authors (C.G.), where they continued to flower December–March, maintaining their foul fragrance while the plants survived in cultivation for three years. The pheromone of *Periplaneta americana* is Periplanone B (Sass, 1983), a compound not known in any orchid floral scent (Kaiser, 1993). It, however, would not be unexpected in Orchidaceae where floral scents range from exquisite to the smell of death (van der Niet et al., 2011) or even feces (the compound Skatole, an indole that occurs naturally in mammal feces, is a minor component of many orchid fragrances [Kaiser, 1993] and an active attractant to several species of euglossine bees; Romero-González, unpublished data).

Based on the overall size of the flowers, *Galeandra blattiodora* is most likely pollinated by a species of *Eulaema* Lepeletier, as is *G. magnicolumna* (Romero and Warford, 1995).

The additional specimens cited here were originally referred to *Galeandra magnicolumna* (Romero and Warford, 1995). Flowers of one of the specimens (*Davidse & González 15706A*, MO) were re-examined and they are unequivocally referable to *G. blattiodora*. We refer the second specimen, *Ruiz et al. 4428*, to the same species, given that it was collected in the same general locality.

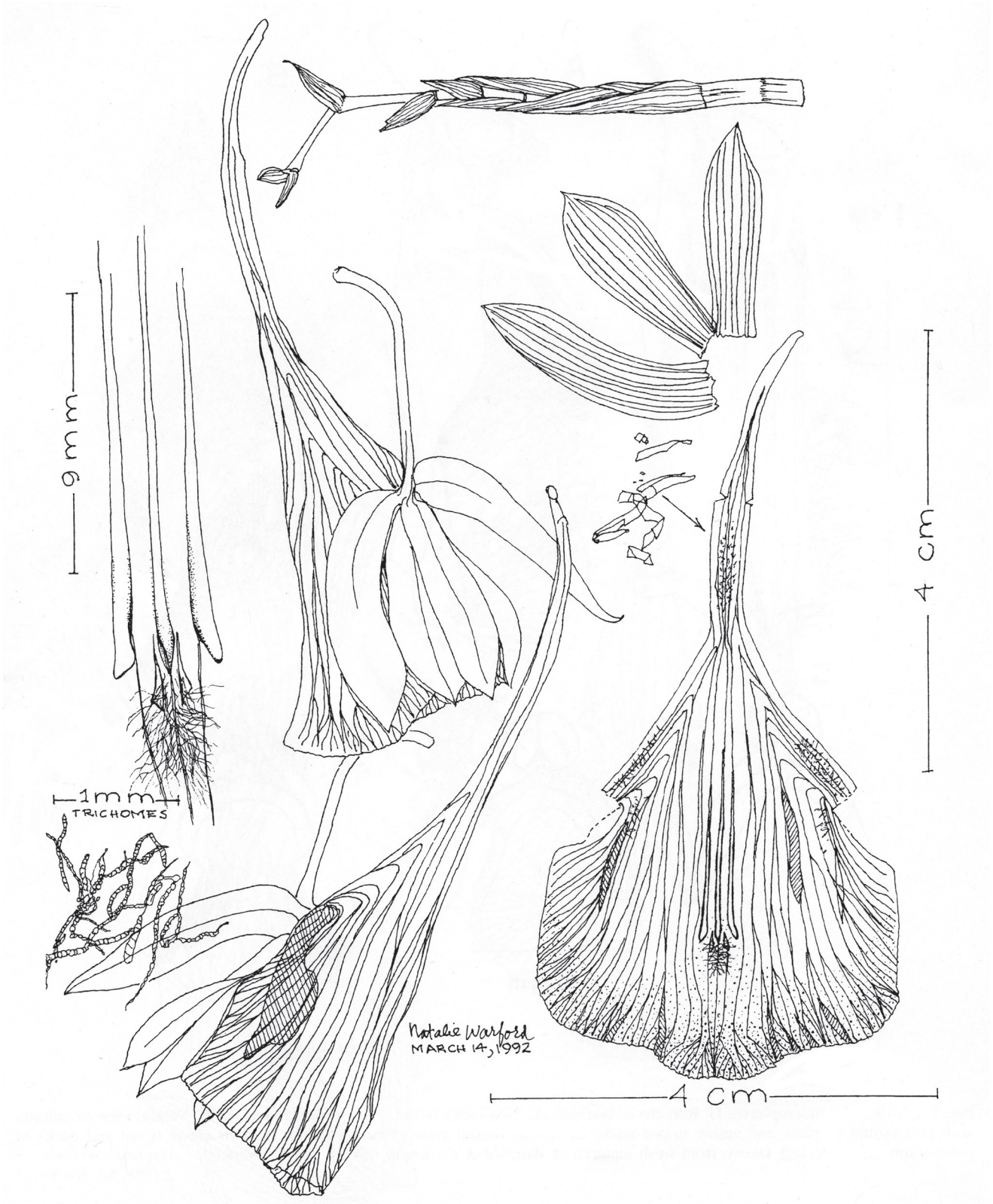

FIGURE 5. *Galeandra magnicolumna* G.A.Romero & Warford. Views of the labellum. Drawn from hydrated, herbarium material by Natalie Warford based on *G. Escobar 866* (AMES).

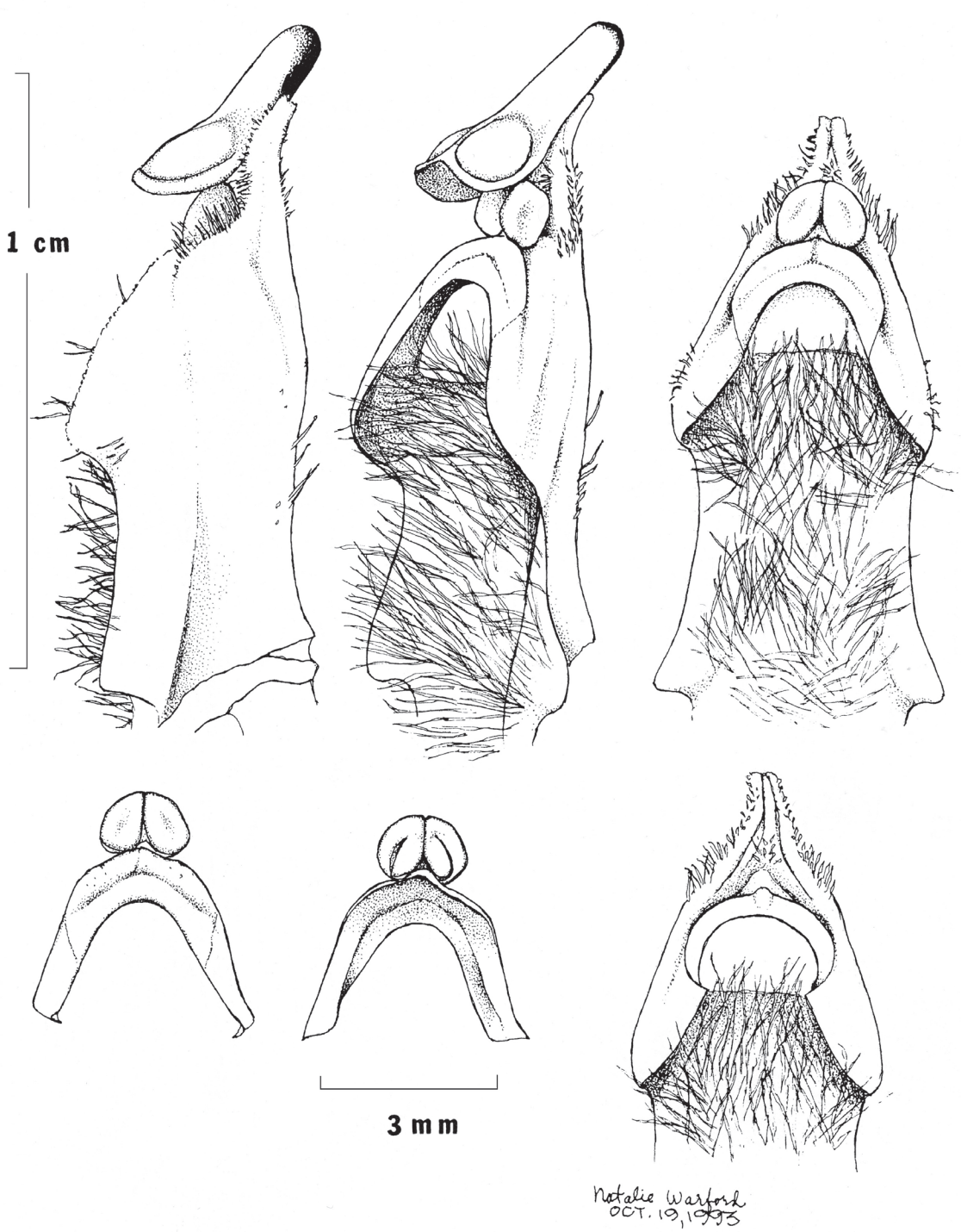

FIGURE 6. *Galeandra magnicolumna* G.A.Romero & Warford. Views of the column. Drawn from hydrated, herbarium material by Natalie Warford based on *G. Escobar 866* (AMES).

HERBARIUM NOTES

Galeandra carnevaliana G.A.Romero & Warford, Lindleyana 10: 75. 1995.

A second specimen of this apparently rare species, known only from the type collection, was brought to our attention:

VENEZUELA. Bolívar, Municipio Piar, bajo Caroní, sector Cerro Morichito, morichal, 7°53'01.2"N, 63°00'11.6"O, 100–130 m, hierba flores moradas, poco frecuente, 24 June 2006, *W. Díaz & A. Pérez 8347* (VEN [393337]).

Galeandra claesii Cogn., Lindenia 9: 17. 1893; J. Orchidées 202. 1893. TYPE: BRAZIL. Without any other locality, originally collected by M. F. Claes, *ex Hort*. L'Horticulture Internationale (Holotype: BR).

Synonym: *Galeandra schunkii* V.P. Castro & Chiron, TYPE: BRAZIL. Espíritu Santo: Município de Marechal Floriano, 500–600 m, "environ 70 km du littorial, floraison en culture en juin 2008," *V. P. Castro 106* (Holotype: SP, not seen), ***syn. nov.***

The authors of *G. schunkii* compared their new species to *G. dives* Rchb.f. and *G. stangeana* Rchb.f. (Castro Neto and Chiron, 2009), two distantly related species, instead of *G. claesii* (Cogniaux, 1893a,b), from which it is morphologically undistinguishable.

Galeandra juncea Lindl., Sert. Orchid. sub t. 37. 1840. TYPE: GUYANA. River Berbice, *R. H. Schomburgk 269* (Lectotype, designated by Romero-González, 2005, K; isolectotypes AMES, BM, G [two specimens], K [two specimens], P, US).

Specimens examined: COLOMBIA. [Magdalena:] Santa Marta, Escalera de los Indios, rare, observed only on open hillsides, 250 m, August 1898 [1899], *H. H. Smith 2264* (AMES, NY, US). Vichada: río Muco, "Pirófila de flores amarillentas y la parte superior violeta," 6 July 1972, *I. Cabrera R. 2358* (COL). VENEZUELA. Carabobo: Hacienda de Cura, near San Joaquin, 480–1200 m, 15 August 1918, *H. Pittier 8003* (US). Trujillo: Cerro del Baño, at NO de Motatán, 27 October 1927, *P. Christ 63* (VEN [23980]). PANAMA. Provincia de Panamá: Isla Taboga, "1.5 ft.," flowers reddish purple and white, 8–?9 December 1924, *L. E. Chesseman 483* (US); same general locality, flowers pale lavander, 0–350 m, 16 December 1938, *P. Allen 1268* (MO). Provincia de Cocle: Penonomé, Llanos, Flowers purple and white, 25 August 1960, *J. E. Ebinger 1015* (MO, US).

As circumscribed by Romero-González (2005), this terrestrial, showy species, is locally frequent in many localities in the eastern (Carnevali et al., 2007) and western Guayana Shield (e.g., *Cabrera 2358*, COL). However, it is apparently rare elsewhere and, it has not been collected in Venezuela since 1927, in Colombia since 1889, or in Panamá since 1960. The population in Carabobo state, Venezuela, is probably extirpated, because the area has been heavily disturbed (c.f., Magallanes, 2005), although the one in Trujillo, in "cerro El Baño," near a popular thermal spring (Urbani, 1991), may still survive. The status of the populations in Sierra de Santa Marta, Colombia, and Panama is unknown.

Galeandra minax Rchb.f., Gard. Chron. N.S. 1: 786. 1874. 786. TYPE: ORIGIN UNKNOWN. *Ex Hort*. Veitch (Reichenbach Orchid. Herb. No. 25363, W).

Synonym: *Galeandra lacustris* Barb. Rodr., *Gen. Sp. Orchid*. 1: 86. 1877. TYPE: BRAZIL. Amazonas, *J. Barbosa Rodrigues s.n.* (Holotype: apparently lost; original drawing, RB, copy K, reproduced in Barbosa Rodrigues, 1996: 156).

We recently collected this species along the Guainía river, a tributary of the Río Negro and therefore of the Amazon river. It appears to be the same species that G. C. K. Dunsterville drew from cerro Moriche, along río Manapiare, a tributary of the Ventuari river in the Orinoco river basin (Dunsterville and Garay, 1966: 110–111, 1979: 323; Romero-González and Carnevali, 2000: 341).

VENEZUELA. Amazonas: Municipio Autónomo Maroa, río Guainía, 1–2 km al sur de Maroa, vegetación inundada al este del río, planta epífita sobre *Leopoldinia pulchra* Mart., 20 June 2009, *G. A. Romero, C. Gómez, O. Gómez, J. M. Aragua & D. Aragua 4056* (TFAV). Fig. 7–8.

Galeandra pubicentrum C.Schweinf., Amer. Orchid Soc. Bull. 11: 429, t. 12. 1943. TYPE: PERU. Loreto: vicinity of Iquitos, *G. Klug 10095* (Holotype: AMES; Isotype: US).

During the June 2009 field trip to the Cariche mountains (Romero-González, 2009), we also collected a specimen of *Galeandra publicentrum*, the first record of this species for Venezuela (Romero-González and Gómez, 2009).

VENEZUELA. Amazonas: Municipio Autónomo Maroa, cuenca del río San Miguel, alto Mee, entre el campamento base y el desecho, hierba epífita, flores amarillo-verdosas, ápice del labelo blanco, con una mancha roja en el ápice, ápice de la antera marrón rojizo, 18 junio 2009, *G. A. Romero, C. Gómez, O. Gómez, J. M. Aragua & D. Aragua 4055* (TFAV). Fig. 9–10.

Here we also reproduce an excellent drawing of the type of *Galeandra pubicentrum* at AMES (Fig. 11).

The following is a bilingual key that can be used to identify species of *Galeandra* from Venezuela and surrounding areas in Brazil, Colombia, and Guyana. Authors are cited for species hitherto not cited in the text.

Key to the species of *Galeandra* found in Venezuela
[Clave para identificar las especies de *Galeandra* de Venezuela]

1a. Plants terrestrial, without evident pseudobulbs [plantas terrestres, sin pseudobulbos evidentes] 2

1b. Plants epiphytic, with conspicuous pseudobulbs [plantas epífitas, con pseudobulbos evidentes] 4

2a. Plants found in shady habitats, below the canopy of forests; when in flower, leafless; inflorescence appearing to be produced directly from the surface of the substrate [plantas de bosque, de ambientes sombreados, cuando en flor, sin hojas, inflorescencia pareciera surgir directamente de la superficie del substrato] . . . . . ***G. beyrichii*** Rchb.f.

2b. Plants found in open, sunny habitats; when in flower, with 1 or 2 green leaves; inflorescence produced from the base of the upper most leaf [plantas de ambientes soleados, cuando en flor, con 1 ó 2 hojas verdes, la inflorescencia surge de la base de la hoja apical] 3

3a. Labellum entire [labelo entero] . . . . . ***G. carnevaliana***

3b. Labellum conspicuously trilobate [labelo conspicuasmente trilobulado] . . . . . ***G. juncea***

4a. Flowers with a recurved spur [flores con el espolón recurvado] . . . . . ***G. devoniana***

4b. Flowers with a straight spur [flores con el espolón recto] 5

5a. Labellum with 2 high, conspicuous keels, diminishing in size towards the base, apex of the labellum colored deep purple, labellum and column without trichomes [labelo con dos quillas conspícuas, que disminuyen en tamaño hacia la base; ápice del labelo púrpura intenso, labelo y columna sin tricomas] . . . . . ***G. duidensis*** Garay & G.A.Romero

5b. Labellum with 3–5 conspicuous keels or, if 2 present, low and inconspicuous; apex of the labellum not colored deep purple, labellum and column with or without trichomes [labelo con 3–5 quillas o, si hay dos presentes, inconspicuas; ápice del labelo sin color purpura intenso, labelo y columna con o sin tricomas] 6

6a. Labellum with two inconspicuous keels, labellum and column without trichomes [labelo con dos quillas inconspícuas, labelo y columna sin tricomas] . . . . . ***G. badia*** Garay & G.A.Romero

6b. Labellum with 3–5 conspicuous keels, labellum and column with or without trichomes [labelo con 3–5 quillas conspícuas, labelo y columna con o sin tricomas] 7

7a. Labellum with 3 or 4 keels; spur nearly as long or slightly longer than the lamina of the labellum [labelo con 3 ó 4 quillas; espolón casi tan largo como la lámina del labelo] 8

7b. Labellum with 3–5 keels; spur 1.5–2.0 times as long or longer than the lamina of the labellum [labelo con 3–5 quillas; espolón al menos 1.5–2.0 veces o más largo que que lámina del labelo] 10

8a. Labellum with 4 keels, the two outer ones conspicuously larger than the inner ones, labellum and column without trichomes [labelo con 4 quillas, las exteriores conspicuasmente más elevadas que las interiores, columna sin tricomas] . . . . . ***G. minax***

8b. Labellum with 3 keels, column conspicuously pubescent [labelo con tres quillas, columna conspicuamente pubescente] 9

9a. Labellum apex, beyond the keels, with short trichomes, barely extending beyond the disk; labellum obtuse to rounded [labelo, en el ápice, más allá de las quillas, con tricomas cortos, que no llegan al ápice obtuso del labelo] . . . . . ***G. stangeana*** Rchb.f.

9b. Labellum apex, beyond the keels, with long trichomes, extending almost to the margin, labellum deeply emarginate [labelo, en el ápice, más allá de las quillas, con tricomas largos, que se extienden casi al ápice; labelo profundamente emarginado . . . . . ***G. pubicentrum***

10a. Labellum with 3 keels; labellum and column conspicuously pubescent; column 4–5 mm wide [labelo con tres quillas; labelo y columna conspicuamente pubescentes; columna de 4–5 mm de largo] . . . . . ***G. macroplectra*** G.A.Romero & Warford

10b. Labellum with 5 keels, labellum and column conspicuously pubescent or not, column 6–7 mm wide [labelo con 5 quillas, labelo y columna conspicuamente pubescente o no; columna de 6–7 cm de largo] 11

11a. Fragrance sweet, agreeable; labellum, including the spur, light to strongly flush with pink; labellum disk and ventrum of the column conspicuously pubescent; anther 6–7 mm long, clavate, the tip, *in vivo*, deep maroon [fragancia dulce, agradable; labelo, incluyendo el espolón, ligera o fuertemente teñido de rosado; labelo y ventro de la columna conspicuamente pubescente; antera 6–7 mm de largo, clavada, el ápice, *in vivo*, de color rojo-vino intenso] . . . . . ***G. magnicolumna*** G.A.Romero & Warford

11b. Fragrance fetid, disagreeable; labellum, including the spur, white to greenish-white; labellum disk without trichomes, ventrum of the column with only isolated trichomes at the sides of the base; anther 4.0–4.5 mm long, conical, the tip, *in vivo*, yellowish green [fragancia desagradable; labelo, incluyendo el espolón, blanco o blanco-verdoso; disco del labelo sin tricomas, ventro de la columna con sólo tricomas aislados en el margen de la base; antera 4.0–4.5 mm de largo, cónica, la punta, *in vivo*, amarillo verdoso] . . . . . ***G. blattiodora***

FIGURE 7. *Galeandra minax* Rchb.f. Side views of the flowers. Photographs by G. A. Romero-González based on *Romero et al. 4056* (TFAV).

Figure 8. *Galeandra minax* Rchb.f. Above and front view of the flower. Photographs by G. A. Romero-González based on *Romero et al. 4056* (TFAV).

FIGURE 9. *Galeandra pubicentrum* C.Schweinf. Photographs by G. A. Romero-González based on *Romero et al. 4055* (TFAV).

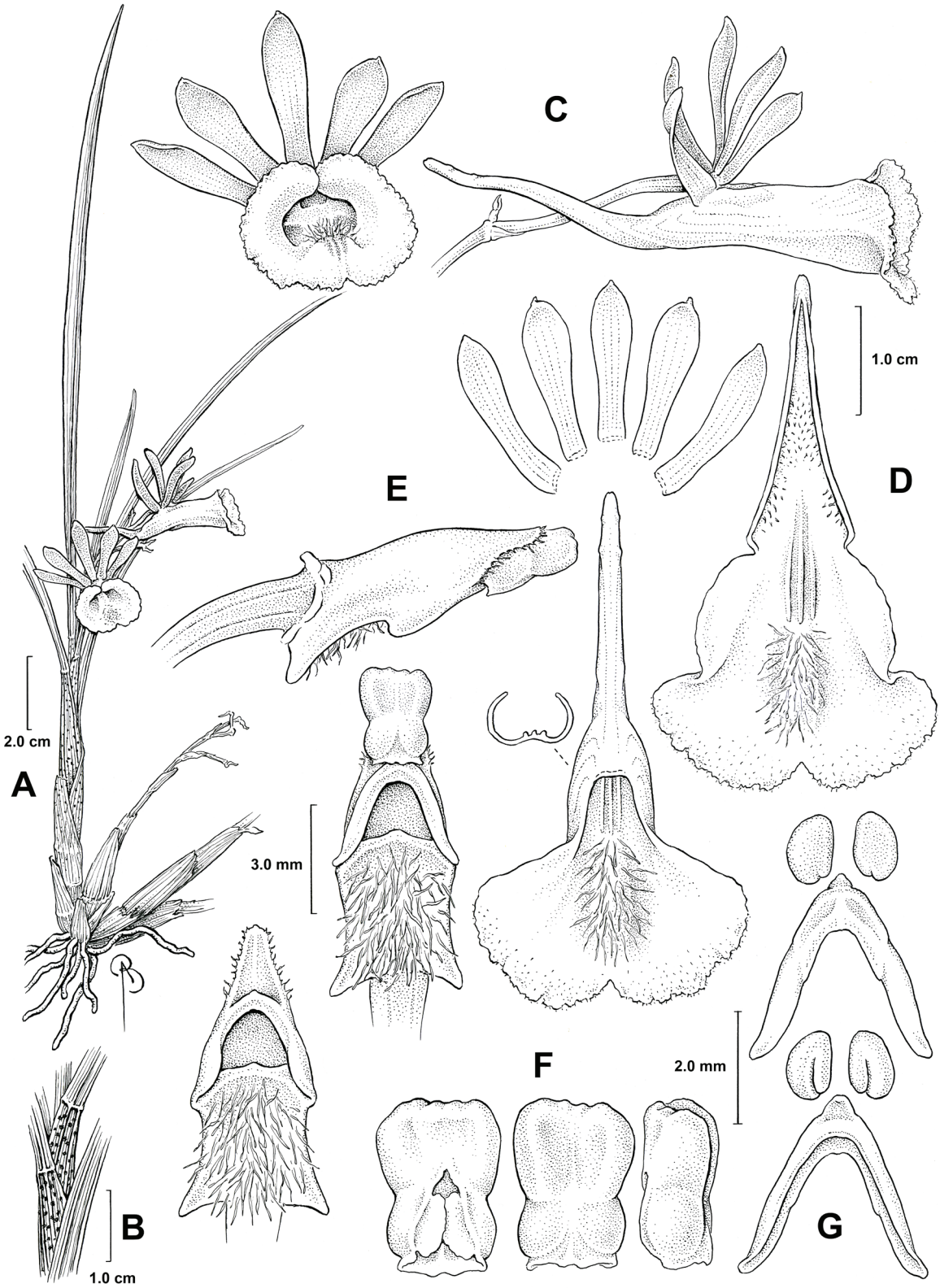

FIGURE 10. *Galeandra pubicentrum* C.Schweinf. **A**, habit; **B**, detail of the peudobulb; **C**, flower in side view; **D**, details of the labellum; **E**, views of the column; **F**, views of the anther; **G**, views of the pollinarium. Drawing by Bobbi Angell based on *Romero et al. 4055* (TFAV).

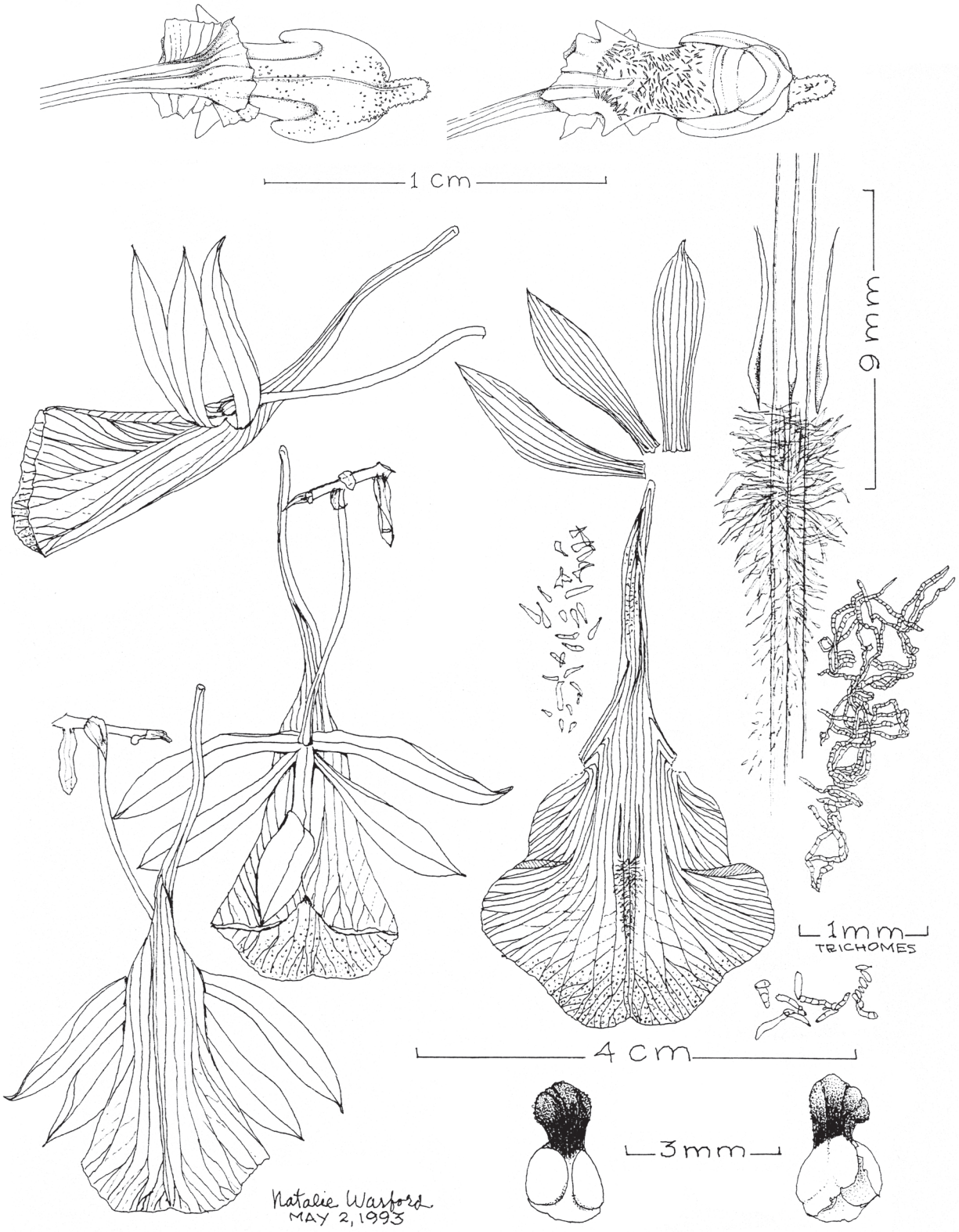

FIGURE 11. Galeandra *pubicentrum* C.Schweinf. Drawing by Natalie Warford based on the holotype, *Klug 10095* (Holotype: AMES).

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