

TWO NEW SPECIES OF MORMOLYCA FROM COSTA RICA AND PANAMA

DIEGO BOGARÍN & FRANCO PUPULIN

ABSTRACT. Two new species of *Mormolyca* from Costa Rica and Panama are described and illustrated. *Mormolyca fumea* is compared with *M. moralesii*, from which it differs mainly by the larger sheaths and petioles, the yellowish-green sepals and petals, the ovate lip, yellow at apex and with a purple callus. *Mormolyca culebrica* is similar to *M. dressleriana*, from which it can be distinguished by the white flowers, the lip stained with purple, with an ovate midlobe narrowing towards the truncate apex, and the shorter callus. These two new species belong to the formerly known *Maxillaria rufescens* complex, today merged into a broadly defined *Mormolyca*. A key to the species of the genus is provided for Mesoamerica and Greater Antilles.

Key words. Maxillariinae, *Maxillaria rufescens* complex, *Mormolyca*, *M. culebrica*, *M. fumea*, Orchidaceae, Costa Rica, Panama, new species.

The Austrian botanist Eduard Fenzl (1808-1879) established *Mormolyca* in 1850. According to its original circumscription, the genus included, until recently, only six species ranging from Mexico to northern South America, all having inflorescences as long as leaves and flat, open flowers without a column foot (Garay & Wirth 1959). Species of the *Maxillaria rufescens* alliance [including *M. acutifolia* (Lindl.) M. A. Blanco, *M. dressleriana* (Carnevali & J.T. Atwood) M. A. Blanco, *M. hedwigiae* (Hamer & Dodson) M. A. Blanco, *M. moralesii* (Carnevali & J.T. Atwood) M. A. Blanco, *M. richii* (Dodson) M. A. Blanco, *M. rufescens* (Lindl.) M. A. Blanco, *M. suarezorum* (Dodson) M.A. Blanco, among others] are vegetatively similar to those of *Mormolyca s.s.*, with caespitose, unifoliate pseudobulbs subtended by papery bracts and sessile, acute leaves (Carnevali *et al.* 2001). Based on vegetative morphology, Atwood and Mora de Retana (1999) had suggested a close relationship between *Mormolyca* and the *Maxillaria rufescens* alliance. This supposition was confirmed by molecular studies in the Maxillariinae performed by Whitten *et al.* (2007). In their analysis, *Chrysocycnis* Linden & Rchb. f. and *Maxillaria* section *rufescens* are firmly nested within *Mormolyca*, and thus they transferred the species of the former two groups into a broad concept of *Mormolyca* (Blanco *et al.* 2007).

Carnevali *et al.* (2001) provided a synopsis of the *Maxillaria rufescens* complex for Mexico, Central America, and the Greater Antilles, recognizing five species. Three species of this complex are known to occur in Costa Rica and Panama: *M. dressleriana*, *M. hedwigiae*, and *M. moralesii* (Carnevali & Atwood 1996, Carnevali *et al.* 2001, Atwood 2003). In the framework of the ongoing botanical explorations intended for the project "Inventory and Taxonomy of Neotropical Orchidaceae," we describe and illustrate the following two new species of *Mormolyca* from Costa Rica and Panama, allied to what we called the *Maxillaria rufescens* alliance:



©F. Pupulin

Mormolyca traditionally included six species ranging from Mexico to northern South America, having inflorescences as long as leaves and flat, open flowers like those of *Mormolyca ringens*.

This specimen was photographed at Gaia Botanical Garden in Costa Rica.

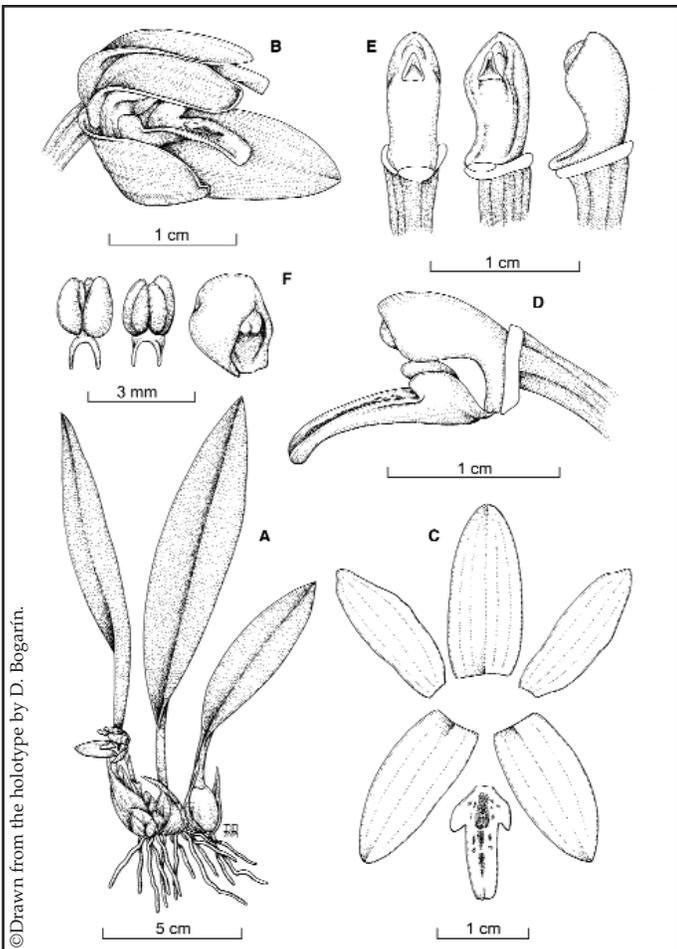


©F. Pupulin

Mormolyca ringens, a close-up of the flower. This specimen was photographed at Gaia Botanical Garden in Costa Rica.



Mormolyca fumea is endemic to Costa Rica. Plants grow in lower montane rain forest along the Caribbean watershed of Talamanca range. Plants flower from January to February.



Mormolyca fumea Bogarín & Pupulin. A: Habit. B: Flower in natural position. C: Dissected perianth. D: Column and lip, lateral view. E: Column, front and lateral views. F: Pollinarium (front and dorsal view) and anther cap.

Mormolyca fumea Bogarín & Pupulin, *sp. nov.*

TYPE: COSTA RICA. Cartago: Jiménez, Pejivalle, Tucurrique, Bajos del Humo, between rivers Humo and Vueltas, eastern slopes of Cerros Duán, 9°48'36.7" N 83°45'16.2" W, 1396 m, lower montane rain forest, epiphytic on trees in pastures and forest edges, 24 November 2008, D. Bogarín 5729, R.L. Dressler, R. Gómez & R. Trejos, (Holotype, CR; isotype, JBL-spirit).

Species habitu cum Mormolyca moralesii (Carnevali & J.T. Atwood) M.A. Blanco congruens, petiolis vaginisque longioribus, sepalis petalisque luteolis viridulis (vs. luteos brunneolos), labello longiore ovato (vs. oblongum), callo labelli puberulo purpureo (vs. farinaceum album), apice labelli luteo (vs. purpureum maculatum) differt.



Known from Honduras to Costa Rica, *M. moralesii* presents a broad elevational range, spanning elevations from tropical wet forests close to sea level up 1100 m. Collected in the A.M. Brenes Biological Reserve along the Caribbean watershed of the Cordillera de Tilarán in Costa Rica, this plant was photographed at Jardín Botánico Lankester.

Plant epiphytic, caespitose, to 23 cm tall. **Roots** brownish to orange, produced from the base of the pseudobulb and the rhizome, 0.9-1.0 mm in diameter. **Pseudobulbs** clustered, ovoid to subpyriform, 3 x 2 cm, unifoliate apically, surface rugose, longitudinally many-ridged, subtended by scarious sheaths becoming shredded and leafless with age, 4-6.5 cm long. **Leaves** elliptic-oblong, acute, petiolate, conduplicate, coriaceous, 17-20 x 2-3 cm; petiole 2.5-4.0 cm long. **Inflorescence** erect, larger or as long as the pseudobulb, produced from the rhizome, up to 6.5 cm; peduncle 4 cm long. **Floral bracts** 1.6 x 1.0 cm, broadly obovate, obtuse, shorter than the ovary. **Ovary** terete, ridged, 2 cm long. **Flowers** resupinate, ringent, scented, the sepals and petals yellowish to pale green, the lip yellowish, blotched with purple towards the apex. **Sepals** subsimilar, concave at base, the margins slightly revolute. **Dorsal sepal** ovate, subacute, 1.9 x 0.8 cm. **Lateral sepals** oblong, acute to subacute, 1.9 x 0.8 cm. **Petals** oblong, subacute, slightly crenate, concave at base, the mar-

gins somewhat revolute, 1.6 x 0.5 cm. **Lip** three-lobed, adnate to the column foot, the lateral lobes erect, perpendicular to the midlobe in natural position, 1.3-1.6 cm long, 0.7 cm wide between the expanded apices of the lateral lobes, mid-lobe 1.3 cm long, oblong, the apex subtruncate, shallowly emarginate; lateral lobes 5 mm long, ca. 1 mm wide at the base, acute or subacute, emerging just below the middle portion of the lip; disk bearing a sticky purplish callus reaching the middle of midlobe, thicker at the base and at the insertion of the lateral lobes. **Column** 1 cm long, arcuate, wide near the apex, slightly winged, hemiterete, the foot 2 mm long, the anther apical, the stigma ventral. **Pollinarium** with four ovoid pollinia in pairs, the two pairs subequal and attached to a horseshoe-shaped stipe. **Anther cap** cucullate, smooth.

DISTRIBUTION. Known only from Costa Rica.

HABITAT. Plants grow in lower montane rain forest in disturbed secondary vegetation and scattered trees in pastures, along the Caribbean watershed of Talamanca range at 1400 m elevation.

ETYMOLOGY. From the Latin *fumeus*, "of the smoke" (*humo* in Spanish), in reference to the type locality of El Humo in Tukurrique, Cartago, Costa Rica.

PHENOLOGY. Plants have been recorded in flower from January to February.

This species closely resembles *M. moralesii* but differs in having sepals and petals yellowish-greenish (vs. yellow suffused with brown), a larger lip up to 1.3 cm long (vs. 1 cm) with the midlobe ovate, narrowing towards the apex (vs. oblong), and sticky callus, minutely haired, stained with purple and running up to the middle of the lip (vs. farinose, white and running up to 3/4 of the lip). Moreover, the apex of the lip is spotted with purple in *M. moralesii*, while in *M. fumea* there are only a few red spots at the base and purple blotches towards the callus apex. Plants of *M. fumea* are somewhat larger than those of *M. moralesii*. The petioles are larger in *M. fumea*, varying from 2.5-4.0 cm long (vs. up to 1.5 cm). The sheaths enveloping the pseudobulb are twice the length of the pseudobulb rather than as long as the pseudobulb in *M. moralesii*.

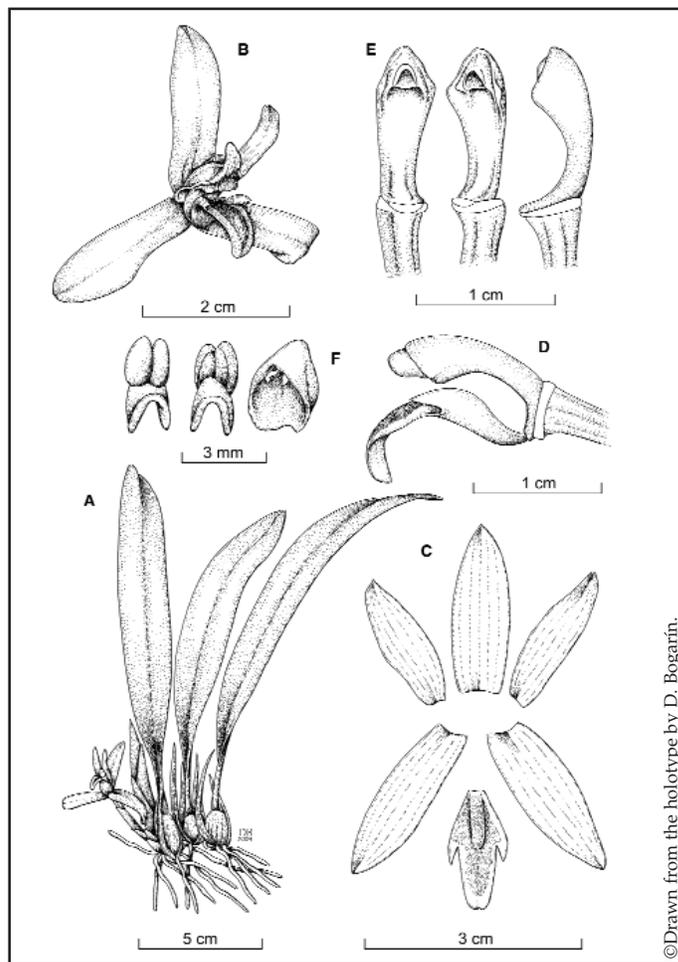
***Mormolyca culebrica* Bogarín & Pupulin, sp. nov.**

TYPE: PANAMA. Bocas del Toro: Culebra, between rivers Estrella and Changuinola, 1200 m, a plant collected by Erick Olmos, without further locality data, in cultivation at Finca Dracula, Cerro Punta, Chiriquí, Panama, 12 December 2006, *D. Bogarín* 2951 (Holotype, PMA; isotypes, JBL-spirit).

Species Mormolycae dresslerianae (Carnevali & J.T. Atwood) M.A. Blanco *similis*, *floribus albis* (vs. *marroninum*), *labello ovato truncato* (vs. *quadratum vel panduratum emarginatum*) *callo labelli brevior*e differt.



Mormolyca culebrica is known only from western Panama in Bocas del Toro province. Plants of this species bloom from January to February.



A-F: *Mormolyca culebrica* Bogarín & Pupulin. A: Habit. B: Flower in natural position. C: Dissected perianth. D: Column and lip, lateral view. E: Column, front and lateral views. F: Pollinarium (front and dorsal view) and anther cap.

Plant epiphytic, caespitose, to 30 cm tall. **Roots** brownish to orange, produced from the base of the pseudobulb and the rhizome, 0.9-1.0 mm in diameter. **Pseudobulbs** clustered, ovoid to subpyriform, 2.0 x 2.5 cm, unifoliate apically, surface rugose, longitudinally many-ridged, subtended by ovate, acuminate, scarios sheaths becoming shredded and bladeless with age up to 3.5 cm long. **Leaves** elliptic-oblong, acute, petiolate, conduplicate, coriaceous, 17.0-25.0 x 2.4-3.3 cm; petiole 2.5 cm long. **Inflorescence** erect, larger than the pseudobulb, produced from the rhizome, up to 5 cm long; peduncle 3 cm long. **Floral bract** 1.3 x 1.0 cm, broadly obovate, obtuse. **Ovary** terete, ridged, 1.5-2.5 cm long. **Flowers** resupinate, spreading, scented, the sepals and petals whitish to pale green, the lip whitish, stained with purple towards the apex. **Sepals** subsimilar, slightly concave at base, the margins slightly revolute. **Dorsal sepal** ovate, subacute, 2.2 x 0.7 cm. **Lateral sepals** oblong, acute to subacute, 2.0 x 0.7 cm. **Petals** spatulate, subacute, slightly crenate, concave at base, subparallel to the column in natural position, the margins somewhat revolute, 1.8 x 0.6 cm. **Lip** three-lobed, adnate to the column foot, the lateral lobes erect, perpendicular to the midlobe in natural position, 1.5-1.6 cm long, 0.7 cm wide between the expanded apices of the lateral lobes, the mid-lobe 1.5 cm long, oblong, the apex subtruncate, shallowly emarginate, slightly curved downward; lateral lobes 5 mm long, ca. 1 mm wide at base, acute, emerging just below the middle portion of the lip; disk bearing a sticky purplish callus reaching the middle of midlobe, thicker at the base and at the insertion of the lateral lobes. **Column** 1.5 cm long, arcuate, wider near the apex, slightly winged, hemiterete, with a foot 3 mm long, the anther apical, the stigma ventral. **Pollinarium** with four ovoid pollinia in pairs, the two pairs subequal and attached in a wide horseshoe-shaped stipe. **Anther cap** cucullate, smooth.

DISTRIBUTION. Known only from western Panama.

HABITAT. Plants grow in tropical wet forest in secondary vegetation, along the Caribbean watershed of the Talamanca range in Bocas del Toro province, at 1200 m elevation.

ETYMOLOGY. Named from the type locality of Culebra in Bocas del Toro province, Panama; the Spanish word *culebra*, from the Latin *colubra*, means 'snake'.

PHENOLOGY. Plants have been recorded in flower from January to February.

This species is similar to *M. dressleriana* but differs in having white flowers and the lip stained with purple (vs. dull maroon). The lip midlobe is ovate, narrowing towards the truncate apex (vs. subquadrate-pandurate, emarginate) and the lateral lobes are narrower and acute (vs. subacute). The callus of the lip is not well developed and is shorter than the lateral lobes, whereas in *M. dressleriana* the farinose callus runs up to 3/4 of the lip.



Endemic to Costa Rica and western Panama, *M. dressleriana* has dull maroon flowers, unique in the genus *Mormolyca*. This plant, originally collected in central Pacific Costa Rica, flowered in November 2001 at Jardín Botánico Lankester.



One of the more widespread species in the genus, *M. hedwigiae* ranges from Guatemala (and possibly Mexico) to Colombia. It is relatively frequent in warm, lowland to premontane rain forest from sea level to about 700 m in elevation.



Originally described from Nicaragua, *M. hedwigiae* is easily recognized by its greenish to yellowish flower with a bright orange lip. Among Mesoamerican *Mormolyca*, *M. hedwigiae* is the only species with an acute lip. Collected in Costa Rica, along the Río Savegre, this specimen flowered in cultivation at Gaia Botanical Garden.



Lip comparison between the species of *Mormolyca* from Costa Rica and Panama. A: *M. ringens* (JBL-08325). B: *M. moralesii* (F. Pupulin 4582). C: *M. hedwigiae* (F. Pupulin 3163). D: *M. fumea* (D. Bogarín 5772). E: *M. culebrae* (D. Bogarín 2951). F: *M. dressleriana* (D. Bogarín 2688). All vouchers in JBL-spirit collection. Scale bar = 1 cm.

Lip shape is also similar to that of *M. hedwigiae*, but the latter differs in having an orange lip with larger lateral lobes and a prominent callus, thicker at the middle. Also, plants of *M. hedwigiae* are larger and more robust as compared with those of *M. culebrae*.*

Acknowledgements

We acknowledge the scientific services of the Costa Rican Ministry of Environment, Energy and Telecommunications (MINAET) and its National System of Conservation Areas (SINAC) together with Autoridad Nacional del Ambiente (ANAM) of Panama, for issuing the collecting permits under which wild species treated in this paper were collected, and for extending the necessary documentation to import orchid specimens from abroad for comparison. We are indebted to Andrés Maduro and Erick Olmos of Finca Dracula, Panama, who provided critical material and information to describe this species. To Robert L. Dressler for his continuous support on our projects and to Reynaldo Gómez and Rafael Trejos for assisting dur-

ing field work activities of LBG. The present paper is part of the Project 814-A7-015, "Inventario y taxonomía de la flora epífita de la región Neotropical — Orchidaceae", sponsored by the Vice-Presidency of Research, University of Costa Rica.

References

- Atwood, J. T. 2003. *Maxillaria*. Manual de las Plantas de Costa Rica Vol III. Orchidaceae-Zingiberaceae. *Monogr. Syst. Bot. Missouri Bot. Gard.* **93**: 291-332.
- Blanco, M.A., G. Carnevali, M. Whitten, R.B. Singer, S. Koehler, N. H. Williams, I. Ojeda, K.M. Neubig & L. Endara. 2007. Generic realignments in Maxillariinae (Orchidaceae). *Lankesteriana* **7**(3): 515-537.
- Carnevali, G. & J. T. Atwood. 1996. Two new species in the *Maxillaria rufescens* complex from Central America. *Lindleyana* **11**: 27-33.
- Carnevali, G., J. L. T. Muñoz, & M. Gómez-Juarez. 2001. A synopsis of the *Maxillaria rufescens* complex in Mexico, Central America, and the Greater Antilles. *Brittonia* **53**: 454-465.

Key to the Species of *Mormolyca* s.l. from Mesoamerica and the Greater Antilles

1. Inflorescences as long as the leaves; sepals and petals with purple stripes; lip retuse, <0.7 cm long -----*M. ringens*
1. Inflorescences shorter than leaves; sepals and petals without stripes; lip truncate or slightly emarginated, >1 cm long -----2
2. Sepals and petals segments deep dull red-maroon; lip dark red-maroon-----*M. dressleriana*
2. Sepals and petals segments white or yellow; lip orange or yellow -----3
3. Lip orange, spotless; lateral lobes of lip extending beyond the middle of lip -----*M. hedwigiae*
3. Lip white or yellow, purple stained or purple-magenta spotted; lateral lobes of lip occupying the first basal of the third lip-----4
4. Lip midlobe ovate -----5
5. Sepals and petals white, spatulate; flowers spreading -----*M. culebrica*
5. Sepals and petals yellowish-greenish, oblong; flowers ringent -----*M. fumea*
4. Lip midlobe oblong, subquadrate or rectangular -----6
6. Inflorescences pendent; flowers not opening (plants from the Greater Antilles)-----*M. pudica*
6. Inflorescences erect or patent; flowers spreading (plants from Mesoamerica) -----7
7. Leaves 26-33 mm wide; peduncle 22-26 mm long (plants from Mexico) -----*M. sotoana*
7. Leaves 13-17 mm wide; peduncle 8-12 mm long (plants from Nicaragua to Panama) -----*M. moralesii*



Flower morphology of the species of *Mormolyca* from Costa Rica and Panama. A: *M. dressleriana* (D. Bogarín 2688). B: *M. fumea* (D. Bogarín 5772). C: *M. hedwigiae* (F. Pupulin 3163). D: *M. moralesii* (F. Pupulin 4582). E: *M. ringens* (JBL-08325). F: *M. culebrae* (D. Bogarín 2951). All vouchers in JBL-spirit collection.

Garay, L. A., & M. Wirth. 1959. On the genera *Mormolyca* Fenzl and *Cyrtoglottis* Schltr. *Canad. J. Bot.* 37: 479-490.

Whitten, W. M., M. A. Blanco, N. H. Williams, S. Koehler, G. Carnevali, R. B. Singer, L. Endara, & K. M. Neubig. 2007. Molecular phylogenetics of *Maxillaria* and related genera (Orchidaceae: Cymbidieae) based on combined molecular data sets. *Amer. J. Bot.* 94: 1860-1889.

About the Authors

Diego Bogarín is particularly interested in the evolution and systematics of Neotropical Orchidaceae. He is developing floristic projects for conservation in Costa Rican national parks and has participated in research projects on DNA barcoding and orchid conservation with the Royal Botanic Gardens, Kew. He is an orchid taxonomist at Lankester Botanical Garden and Research Associate of the Ángel Andreetta Research Center on Andean Orchids of the University Alfredo Pérez Guerrero, Ecuador.

Franco Pupulin is a Senior Research Professor at the University of Costa Rica, where he works with Lankester Botanical Garden. He is especially interested in the systematics and evolution of advanced orchid groups in subtribes *Oncidiinae*, *Pleurothallidinae* and *Zygopetalinae*. Franco is working on several monographic and floristic projects on Neotropical orchid floras. Author of more than one hundred scientific articles and several books on the orchids of the Mesoamerican region, he is a research Associate of the Oakes Ames Orchid Herbarium at Harvard University and the Marie Selby Botanical Gardens, and the director of the Ángel Andreetta Research Center on Andean Orchids of the University Alfredo Pérez Guerrero, Extension Gualaceo, Ecuador.



Diego Bogarín
Jardín Botánico Lankester
Universidad de Costa Rica.
P.O. Box 302-7050
Cartago, Costa Rica, A.C.

Centro de Investigación en Orquídeas de los Andes "Ángel Andreetta"
Universidad Alfredo Pérez Guerrero
Ecuador
E-mail: diego.bogarin@ucr.ac.cr



Franco Pupulin
Jardín Botánico Lankester
Universidad de Costa Rica.
P.O. Box 302-7050
Cartago, Costa Rica, A.C.

Centro de Investigación en Orquídeas de los Andes "Ángel Andreetta"
Universidad Alfredo Pérez Guerrero
Ecuador

Harvard University Herbaria
Cambridge, MA, U.S.A.

Marie Selby Botanical Gardens
Sarasota, FL, U.S.A.

This article has been peer reviewed. Being peer reviewed gives an article academic status and it also increases the stature of the journal.