
LANKESTERIANA

VOL. 8, No. 3

DECEMBER 2008

- Vanilla planifolia*, the first Mesoamerican orchid illustrated,
and notes on the de la Cruz-Badiano Codex**
LUIS D. GÓMEZ P. _____ 81
- A new *Phragmipedium* from Colombia**
WESLEY E. HIGGINS & PAULA VIVEROS _____ 89
- Listado de especies de la familia Orchidaceae
para el estado Sucre, Venezuela**
CARLOS LEOPARDI & LUIS J. CUMANA _____ 93
- Vegetative anatomy of Calypsoeae (Orchidaceae)**
WILLIAM LOUIS STERN & BARBARA S. CARLSWARD _____ 105
- Book reviews** _____ 113
- Index of taxonomic novelties published in Lankesteriana, Vol. 1—8** _____ 115



LANKESTERIANA

INTERNATIONAL JOURNAL ON ORCHIDOLOGY

Copyright © 2008 Lankester Botanical Garden, University of Costa Rica
Effective publication date: December 31, 2008

Layout: Jardín Botánico Lankester.

Cover: Flower of *Phragmipedium manzurii* W.E. Higgins & P. Viveros. Drawing by S. Dalström.

Printer: Litografía Ediciones Sanabria S.A.

Printed copies: 500

Printed in Costa Rica / Impreso en Costa Rica

R Lankesteriana / International Journal on Orchidology
No. 1 (2001)-- . -- San José, Costa Rica: Editorial
Universidad de Costa Rica, 2001--

v.

ISSN-1409-3871

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



VANILLA PLANIFOLIA, THE FIRST MESOAMERICAN ORCHID ILLUSTRATED, AND NOTES ON THE DE LA CRUZ-BADIANO CODEX

LUIS D. GÓMEZ P.

Academia Nacional de Ciencias, Costa Rica
Apartado 676-2050, San Pedro, Costa Rica
gomezp@ots.ac.cr

ABSTRACT. Abstract. The Codex Barberini lat. 241 or Codex Badianus is a manuscript by Martín de la Cruz, entitled *Libellus Medicinalibus Indorum Herbis* and the first New World herbal, written in 1552. It includes 249 medicinal plants of which only 184 are illustrated. Among the plants depicted is tlilxochitl which is the Nahuatl name, even to this day, for *Vanilla planifolia* Andrews. Thus, the illustration of that plant in the Codex constitutes the first illustration of a Mesoamerican orchid done for European readers and antedates the publication of the genus and its species by two centuries. Some new historical aspects of the Codex are presented.

KEY WORDS: *Vanilla*, tlilxochitl, Codex de la Cruz-Badiano

The situation and conditions of the indigenous peoples in the early colonial times in the New World were of hopelessness and brutality. An extraordinary figure appears in Bartolomé de las Casas (1484 1566), considered by many as the father of anti-imperialism and anti-racism who, in 1520, presented a defense of the Indians to Emperor Charles V. In 1523 he commenced writing his *Apologética historia de las Indias* and *Historia de las Indias* (the latter not to be published until 1875!) and, finally, in 1542 he succeeds in obtaining from the Emperor the promulgation of the Nuevas Leyes prohibiting slavery, the beginning of the end for the infamous systems of “encomiendas”, and promotes the proper education of Native Americans. In 1543 las Casas published his demolishing denunciation of the Spanish exploitation and barbaric cruelty, *La Destrucción de los Indios*.

The sadness of those events have been treated by many authors. Of import for these notes Keen (1999), Pincherle (1952), Somolinos (1964), Viesca (1992). Whether with or without new laws, the Spanish settlers and the criollos born in the Americas, maintained a disdain for things indigenous, and it is sad to admit that those sentiments of inequality still prevail in many parts of Latin America. But de las Casas influenced many others in positions of power, both secular and ecclesiastical.

It was in that atmosphere that under the auspices of the Viceroy of New Spain, Antonio de Mendoza and the Bishop of Mexico Juan de Zumárraga, both in favor of the protection of the Indians and scarcely thirty years after the fall of Tenochtitlan, that the Colegio de Santa Cruz de Tlatelolco, was founded in 1536 by the Franciscan friars thus becoming the first institution of higher learning in the continent (Borgia, 1944). However, Viceroy Mendoza was transferred to Perú and Bishop Zumárraga died in 1548. The Colegio taught Nahuatl, Latin, Greek as well as crafts such as illumination, bookbinding and other European arts to the descendants of the Aztec nobility and other principal people. Among its first teachers were some important figures in the recording of Mexican ethnography, anthropology and Nahuatl literature: Alonso de Molina, Andrés de Olmos, Bernardino de Sahagún. Even fray Juan de Torquemada, himself a fine historiographer, unfortunately later linked to the Inquisition, was a professor at Tlatelolco. As a student was one Juan Badiano and in some capacity a native healer, Martín de la Cruz, both from Xochimilco. Mason (2004) says both were convert priests while others supposed them both to be medics but we know nothing about these two individuals.

As the opposition and ill-will of the peninsulares and criollos toward the Indians and the Colegio persisted,

Antonio de Mendoza's son, Francisco, requested that a compilation of local healing practices and herbs be produced for the King of Spain, by now Phillip II, son of Charles V, in another effort to demonstrate that the Indians were knowledgeable, capable of learning from Europeans and very worthy of support from the Viceroyalty and the protection of the King. Martin de la Cruz was commissioned to produce the volume and Juan Badiano was charged with its translation from Nahuatl into Latin. That is the origin of the Codex. The administration of the Colegio was given to the native Franciscans in 1554, financial support from government sources stopped in 1606 and by the middle of the 17th century the Colegio de Tlatelolco ceased to exist. For more on its history Somolinos (1964, 1996).

The original text in Nahuatl has disappeared but the project was under the tutelage of friar Jacobo de Grado, superior of the convent and the Colegio, who did oversee the production and translation of the manuscript for Francisco Mendoza who had it sent to Phillip or possibly took it himself to the court in Madrid (Goodman 1990, Martínez 1994) and the Codex must have been in the royal library at El Escorial at least until the 17th century, and forgotten. That is until it was found in the possession of don Diego de Cortavila y Sanabria, Apothecary to the King and founder of a medicinal plant garden on the palatial premises, as well as developing one of his own. The Codex was later obtained by Cardinal Francesco Barberini who was sent as Nunzio to Spain by his uncle Maffeo Barberini who was pope Urban VIII. The Cardinal was an avid bibliophile with a penchant for Americana, specially early texts, and he incorporated the Codex into his library.

There has been much doubt as to how the codex passed to Cortavila. Martínez Millán (1994) supposes that it was given by the Infanta Juana to the Convento de las Descalzas Reales which she had founded. Juana, youngest sister to Philip II, governed Spain in his absence and actually met with Francisco Mendoza to discuss, among other things the "*capitulaciones*" or agreements concerning for the commerce of medicinal plants between Spain and Nueva Espana. Cortavila was the pharmacist for Juana and all members of the royal house which also included Infanta Margarita de la Cruz, a niece of Juana and also a nun at said convent,

who might have presented her apothecary with the *Libellus* as an appropriate gift to a renowned herbalist. The frontispiece of the Codex bears a hand written inscription "*ex libris didaçi Cortauila*", this book belongs to Diego Cortavila.

One could easily suppose that Cortavila, very much in the favour of the King had access to the royal library and its massive and mostly uncatalogued treasures and decided to keep it for the better practice of his *métier*? In any case, Cortavila did not promote the Codex among his learned acquaintances and seems not to have been particularly interested in the Mexican manuscript. Otherwise, his close friend and collaborator Bartolomé de Cienfuegos, pharmacist, bibliophile and fine grower of herbs would have mentioned it in his careful notes (Arévalo 1935, Rey 2004).

How it came to the hands of Barberini has been another mystery. His Eminence bought many things from many people being a patron of the Arts and Sciences. Did he also buy the Codex or pushed his ecclesiastical weight to obtain it? The recent publication of the personal secretary and *factotum* to the Cardinal, Cassiano dal Pozzo's, detailed and meticulous notes of Barberini's trip to Spain (Anselmi 2006) solves the problem. The entry for June 26, 1626 records a visit of Barberini and his retinue to Cortavila's botanical garden where the pharmacist presented His Eminence with "*un libretto di Semplici diversi Indiani con le sue figure, e virtu appropriate alla maggior parte dell' indispositioni di corpi humani*". Barberini simply walked away with a precious gift. What then?

Francesco Barberini founded the Vatican Library in 1679, not long before his death, but he was also an illustrious member of the Accademia dei Lincei, so respected that at the demise of its patron founder Prince Federico Cesi, the Cardinal was suggested as his successor. (Gabrieli 1880). The Accademia, as most cognoscenti in Europe, was enthralled with the exotic new things from the New World (Guerrini 2008) and was contemplating the publication of a materia medica prepared by the Neapolitan physician Nardo Antonio Recchi, based on Francisco Hernández de Toledo's *Rerum medicarum Novae Hispaniae Thesaurus*, the *Tesoro Messicano*. One would think that Barberini would have promoted the manuscript in his possession as an equal candidate but he did not, or there is no evidence that he tried.

However, diligent dal Pozzo, also a member of the Lincei had a quasi-facsimilar copy done by the painter Vincenzo Leonardi of Grimignano in the winter of 1626-27 (Mason 2004) and that copy became known to many people after it was used as a pictorial source of Mexican flora to accompany the illustration of Mexican fauna and a first version of Hernández' *Rerum*, in Johan Faber's *Animalia Mexicana descriptionibus scholjstique exposita, thesauri rerum medicarum novae hispaniae*, published in Rome in 1628 with the beneplacito of the Lincei. That is the copy that eventually Pozzo's heirs sold to pope Clement XI who in turn sold it to his nephew Cardinal Alessandro Albani who in turn sold it to George III of England (Byland 2000) and it is now in the Royal Library at Windsor Palace. It is stamped with dal Pozzo's Coat of Arms. Another quandary solved.

It has been suggested that a second copy might have been done for Francesco de Stelluti, with Cesi, van Heeck and de Filiis one of the founders and Consigliere Maggiore of the Accademia, but if so it is lost. Why would Stelluti, the author of *Melissographia*, the first anatomical description of insects under Galileo's microscope, wish for a copy? Because he was charged by Cesi with the edition of the *Tesoro Messicano*, on which he worked in close collaboration with dal Pozzo. In the original plan for this edition, Barberini was the dedicatee but when the Cardinal was banned from Rome in 1644 by pope Innocent X, Barberini's name was deleted. The final edition by the Lincei appeared in 1651.

Incidentally, the work of Hernández, may be considered as a report of the first scientific expedition to the New World in 1571 and was translated into Spanish by friar Francisco Ximénez and published in México in 1615.

And what of the original Codex? It rested forgotten and ignored in the shelves of Barberini and later, when the entire Barberini collection, some 60000 plus items, was incorporated into the Vaticana by pope Leo XIII in 1902 (Major 1931), it rested under the signature Barberini lat. 241, forgotten and ignored a few more decades until a student of the Barberini entries, Charles Upson Clark, a historian of early American medicine at the Smithsonian Institution, discovered it and announced it to the world in 1929. According to Sharp

(2005) Clark brought the manuscript to the attention of Dr. William Welch at Johns Hopkins University and Welch's interest prompted the first facsimilar edition by Emmart. León Portilla (2002) writes in error that the discovery dates to 1925 and was almost simultaneous by Clark, Giuseppe Gabrieli an erudite Lincei y Lynd Thorndike, a historian of science. To León Portilla's commentary I must add that Gabrieli did not discover the original Codex but the dal Pozzo copy at Windsor (Gabrieli 1929), Lynd Thorndike was in Rome trying to enumerate and describe the contents of the Barberini collection dealing with the history of science and obviously listed the Codex among the items (Thorndike 1929-1930). The true date of discovery remains as 1929. The original de la Cruz-Badiano manuscript was returned to Mexico by pope John Paul II in 1990 (Durazo *et al.* 1991).

After its discovery by Clark there have been several facsimilar editions of the de la Cruz Badiano Codex as I the *Libellus* should be justly known: The W. Gates edition of 1939 as *The de la Cruz-Badiano Aztec Herbal* (Publications 22, 23 of the Maya Society, Baltimore) which does not reproduce the illustrations in color, the Emily Walcott Emmart edition of 1940, *The Badianus manuscript (Codex Barberini, Latin 241). An Aztec herbal of 1552*, published by Johns Hopkins, the edition by the Instituto Mexicano de Seguro Social in 1964, followed by the Fondo de Cultura Económica in Mexico in 1991 with a second printing in 1994, reprinted in 1996 which is the one I own, all as *Libellus Medicinalibus Indorum Herbis*. Francisco Guerra, a physician in Mexico who has written much about pre-Columbian medicine, published an edition without pictures in 1955, being the first translation into Spanish. In 2000 the publishing house of Dover has produced a new facsimile of Gates' edition. For more on other editions and versions *cf* Somolinos (1996).

The Codex has been described in the editions mentioned above and by Robertson (1959), Fernández (1964) and Stolz (1964). It was written in a format slightly smaller than *quarto* (15.2 x 20.6 cm) on European paper, as per the watermarks from the mill of Basili Accinelli of Genoa whose paper was rather frequent in the colonial New World, the folios sewn into eight quires or booklets, bound in red velvet with a six cords spine. The inks are ferric gall for the text

and elsewhere and for the red rectangle created on each page a minium gall ink (Zetina et al 2008). The calligraphy is cancelleresca. The text is in a Latin of Pliny's style, and although sufficient it nevertheless conveys the feeling that Badiano may not have been the most advantaged pupil of the Colegio. The folios are numbered in the upper right corner only of the front or *recto* of the page, the *verso* is not. The paintings are a fine example of syncretism of Renaissance style expressed through Aztec canons. Throughout several pages are blank. The text is organized in thirteen chapters, each dealing with medical conditions thought by de la Cruz to be somewhat related.

The botanical aspects of the Codex have been very poorly treated by Gates (1939) and very well by Emmart (1940), Reko (1947), Miranda and Valdés (1964, 1996). It is the last entry of Chapter 10, that has caught my attention (Fig.1).

The *verso* of page 56 shows the paintings of four plants: mecaxochitl, tlilxochitl, hueynacatzli and copalxochitl. The depiction of the first two is somewhat confusing because the artist has chosen to show the plants intertwined. The second root system corresponds to tlilxochitl. Under the drawings is a title followed below by the materia medica for the plants illustrated, which read;

Viatoris presidium.

"Dessicati flores mecaxochitl, tlilxochitl, hueynacatzli, arborum copalxochitl et atoyaxocotl cortices, folia srboris axocotl, albus tus, ceratum xochiocotzotl, et yolloxochitl ita terantu ut puluerunt; puluerasta uero intra notissimi et fragantissimi floris huacalxochitl concauitatem ponito, quo huius floris odorem redolentissimum capiant, spirentque. Postremo laudatissimum florem yolloxochitl tandem accipito quem decenter excauato, cuius factae concauitati salutiferum puuisculum condito, uasculam collo suspendito"

Which I freely translate as:

For the traveller a protection.

"[The] dried flowers of mecaxochitl, tlilxochitl, hueynacatzli [and] the barks of the trees copalxochitl and atoyaxocotl, leaves of the tree axocotl, white

incense, [the] wax of xochiocotzotl, and yolloxochitl [all together] pound to a fine powder. Once powdered put into the cavity of the showy and very fragrant flowers of huacalxochitl, as in there the scents will intensify and [are] trapped the odours [of that flower]. All that done, one of the much-praised flowers of yolloxochitl is taken which has a concavity in its center, and in this hollow the salutiferous powder [is] put [and that] little basket is suspended from the neck [of the traveller]"

It is, rather than a remedy for specific diseases of travellers, a charm to keep the traveller from potential harm and reminds one of the amulets, talismans and similar trinkets worn around the neck in the Middle Ages to avoid contagion. The word *presidium*, instead of the correct *praesidium*, is one of the many examples of Badiano's faulty Latin.

The second plant is illustrated without flowers but with its pods (vainillas, or small pods) and corresponds to *Vanilla planifolia* still called tlilxochitl, meaning "black flower" by today's Nahuatl speakers and it is the only orchid mentioned in the Codex.

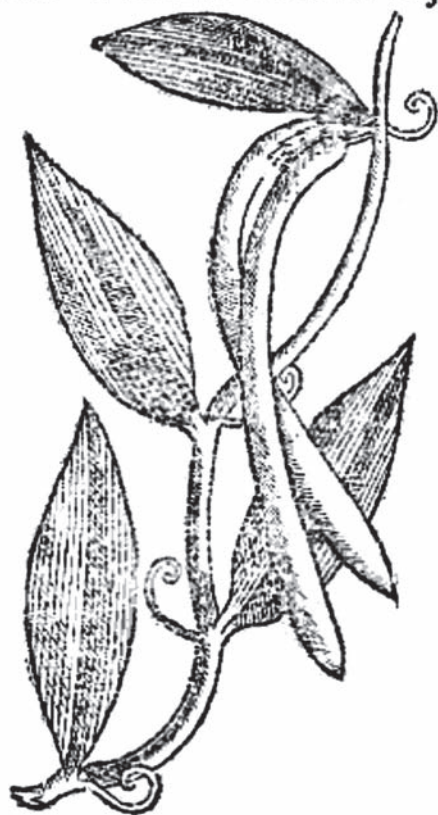
Mecaxochitl or "plant of the strings" is an species of *Piper* as many of them are called "cordoncillos"; hueynacatzli or "large ears" was thought by Emmart and Reko to represent *Cymbopogon penduliflorum* (Dunal)Baill., a species with pendulous flowers on long pedicels, characters hard to be missed by keen native observers. I interpret it as *Enterolobium cyclocarpon* (Jacq.) Griseb., its fruits resembling big ears and, furthermore, the illustration suggests mimosoid flowers to me. This species is known as guanacaste in many parts of its range. Copalxochitl or "flower of copal" corresponds according to Reko to *Cyrtocarpa procera* Kunth could be any of the plants that yield aromatic resins or latices (Stross 1997, Langenheim 2003); axocotl or "fruit of the water" Reko identifies this as *Spondias purpurea* L., and atoyaxocotl or fruit of the river could refer to *Pachira aquatica* Aubl., much used throughout its range as an aromatizer. Xochiocotzotl, qualified by *ceratum*, is the gummy resin or turpentine from *Liquidambar styraciflua* L. or even from *Pinus spp.* (Breedlove & Laughlin 1993). Yolloxochitl or "flower of the heart" is *Talauma mexicana* (DC) G.Don (53v); huacalxochitl or "flower in shape of a



FIGURE 1. Page 56 verso. of *Libellus Medicinalibus Indorum Herbis*, the de la Cruz-Badiano Codex. The second plant (left to right) is tlilxochitl, *Vanilla planifolia* Andrews, the first depiction of a Mesoamerican orchid.

38 RERVM MEDICARVM NO. HISP.

De TLILXOCHITL seu flore nigro Araco Aromatico. Cap. XV.



VOLVIBILIS herba est Tlilxochitl, fo-
lijs Plantaginis prædita, sed pinguioribus,
& longioribus, viroreque infectis saturato, singu-
lis ex utraque parte caulis alternatim exorienti-
bus; ac filiquis longis, angustis, & penè teretibus,
olentibus muscra, aut Balsamum indigenum,
nigrisq. unde nomen. Calidis regionibus proue-
nit, humeribusq. Arboreas amplectitur, & prædi-
ctas filiquas verno tempore profert. Calidæ hæ,
sunt ordine tertio, addiq. solitæ Cacaoatl, &
Mecaxochitl. filiquæ binæ ex aqua resolutæ, &
potatæ urinam cient, menstrua euocant. cum
Mecaxochitl partum accelerant, ac secundas,
mortuinq. factum trahunt, ventriculum ca-
lescunt, & roborant, flatum discutunt, hu-
mores crudos concoquunt, atque attenuant,
cerebro vim addunt, & utero auxiliantur. Ad-
uersus venena frigida, gelidosq. venenatorum
ictus, eadem filiquæ dicuntur esse remedio.

Folium longum est uncias undecim, latum sex,
filiqua vero longa uncias sex, crassa digitum unum

FIGURE 2. Tlilxochitl, *Vanilla planifolia*, in Hernández's *Rerum Medicarum... Liber Secundum*. Aromata Promit, Rome 1651, p. 38.

huacal" (or a vessel) is that of a species of Araceae, e.g. *Philodendron* with dentate or lobed leaves as it is illustrated elsewhere in the Codex. (18v). For the synonymy of Nahuatl words see Díaz (1976) and Garibay (1996).

The genus *Vanilla* Plum. ex Mill. was described in 1754 (Gard. Dict. Abr. (ed.4), 3. 1754) based on Charles Plumier's name of 1702. Francisco Hernández de Toledo, Royal Physician, records tlilxochitl in his material medica *De rerum medicarum Novae Hispaniae Thesaurus*, precisely the edition by the Accademia dei Lincei in Rome 1628 and gives it the name *Araco aromatico* with a description and use. Clusius in 1602 calls it *Lobus largus aromaticus* in

Rariorum plantarum historia. Andrews, who described *V. planifolia* (Bot. Repository, for new, and rare plants 8: pl. 538. 1808) writes for the protologue and type: "the finest specimen in England and the only one that has blossomed, is in the choice collection of the Right Hon. Charles Greville, at Paddington, from which our drawing was taken. We are informed that it is native of the West Indies, and was introduced to this country by the Marquis of Blanford". All indicates that the Codex contains the earliest iconography of this orchid genus and species.

In Hernández' *Rerum medicarum... Tesoro Messicani*, Liber Secundum, Aromata Promit, on page 38 of the 1651 final edition, tlilxochitl is very accurately

illustrated, perhaps the second oldest depiction of the genus (Fig. 2).

ACKNOWLEDGEMENTS. My thanks to Mahmood Sasa who presented me with the 1996 Mexican facsimilar edition of the *Libellus*. Rebeca Brenes for help in the editing of the final version of this paper. Neal Smith and Carlos Ossenbach made insightful suggestions to the earlier version of this paper as did two anonymous reviewers.

LITERATURE CITED

- Anselmi, A. 2007. Il diario del viaggio in Spagna del Cardinale Francesco Barberini scritto da Cassiano dal Pozzo. Doce Calles, Madrid..
- Arévalo C., C. 1935. Bernardo de Cienfuegos y la botica española de su época. Estudios sobre la ciencia española del siglo XVII. Graf. Universal, Madrid, pp. 323-335.
- Borgia S., F. 1944. El primer colegio de América, Sta. Cruz de Tlatelolco, con un estudio del Códice de Tlatelolco. Historia de la literatura nahuatl. México, 2 vols.
- Breedlove, D.E. & R. Laughlin. 1993. The flowering of man: a Tzotzil botany of Zinacantán. Smithsonian Contributions to Anthropology, 35.
- Byland, B. 2000. An Aztec herbal: the classic codex of 1552. Dover.
- Díaz, J.L. 1976. Índice y sinonimia de las plantas medicinales de Mexico. Mon. Cient. I. Centro de Estudios Económicos y Sociología del Tercer Mundo.
- Emmart, E. 1935. Concerning the Badianus manuscript. An Aztec herbal Codex Barberini Latin 241. Smithsonian Institution.
- Durazo, Q., Humate, J., Somolinos, P., Lozoya, X., Viesca, C. 1991. El regreso del Códice de la Cruz-Badiano a México. Gaceta Médica Mexicana 127(1): 105-117.
- Emmart, E. (ed.) 1940. The Badianus manuscript (Codex Barberini, Latin 241). An Aztec Herbal of 1552. Johns Hopkins.
- Fernández, J. 1964. Miniaturas del Código de la Cruz-Badiano. Gaceta Médica Mexicana 94: 1179-1184.
- Gabrieli, G. 1880. Contributti alla storia della Accademia dei Lincei. Roma, 2 vols.
- Gabrieli, G. 1929. Iconografia botanica. Due codici iconografici di piante miniati nella Biblioteca Reale di Windsor. Recond. Della Reale Accad. Dei Lincei, ser. 6ª, X(10): 531-538.
- Garibay, M.A. 1996. Nombres nahuas en el Códice de la Cruz-Badiano. Sentido etimológico. Apéndice B. pp 223-234. *Libellus*... edición del Fondo de Cultura Económica, México.
- Gates, W. 1939. The de la Cruz-Badiano Aztec herbal. The Maya Society, Baltimore, Publications 22, 23.
- Goodman, D. 1990. Poder y penuria. Gobierno, Tecnología y Ciencia en la España de Felipe II. Alianza Universitaria, Madrid.
- Guerrini, L. 2008. The Accademia dei Lincei and the New World. Max Planck Inst. F. Wissenschaftsgeschichte. 348.
- Keen, B. 1999. The Aztec image in Western thought. Rutgers.
- Langenheim, J. 2003. Plant resins. Chemistry, evolution, ecology, ethnobotany. Timber Press. Portland.
- León Portilla, M. 2002. Bernardino de Sahagún. First Anthropologist. Oklahoma.
- Mason, ap. 2004. The lives of images. Reaction Books.
- Major, M.V. 1931. The Barberini Library. Library Review 3(4): 164-170.
- Martínez M, J. 1994. La Corte de Felipe II. Alianza Universitaria, Madrid. Pp. 73-105.
- Miranda, F. & J. Valdés. 1964. Comentarios botánicos del Códice de la Cruz- Badiano. Gaceta Médica Mexicana 94: 1185-1187.
- Miranda, F. & Valdés, J. 1996. Comentarios botánicos. Reimpresión del *Libellus*... Fondo de Cultura Económica, México. Pp. 107-148.
- Pincherle, A. 1952. La dignità dell'uomo e l'indigeno americano. Atti Cong. Int. di Studi Umanistici 1952, Roma.
- Reko, L. 1947. Nombres botánicos del Manuscrito Badiano. Bol. Soc. Bot. Méx. 5: 23-43.
- Rey B., M. 2004. Juntas de herbolarios y tertulias espagíricas: el círculo cortesano de Diego de Cortavila (1597-1657). Acta Hisp. Med. Scientia Hist. Illustranda 24: 243-267.
- Robertson, D. 1959. Mexican manuscript painting of the early colonial period. Metropolitan Schools, Yale.
- Sharp, F. 2005. Medical remedies: from the old to the new. ANZ J. of Surgery 75(5): 340-346.
- Somolinos D., G 1964. La cultura Azteca en el siglo XVI. Gaceta Médica de México 94:1165-1170.
- Somolinos D, G, 1996. Estudio histórico. En reimpresión del *Libellus*... Fondo de Cultura Económica, México. Pp. 165-187.
- Somolinos D., G. 1996. Bibliografía de copias, traslados y ediciones. En *Libellus*..., reimpresión de Fondo de Cultura económica, México. Pp. 217-222.
- Stolz, A.M. 1964. Descripción del Códice. Estudios y comentarios del *Libellus*... Instituto del Seguro Social, México. Pp. 229-236.
- Stross, B. 1997. Mesoamerican copal resins. U-Mut Maya 6: 177-186.

- Thorndike, L. 1929-30. Vatican Latin Manuscripts in the History of Science and Medicine. *Isis* 8: 53-102.
- Viesca, C. 1992. El *Libellus...* y su contexto histórico. Estudios actuales sobre el *Libellus...*. Secretaría de Salud, México.
- Zetina, S., Ruvalcaba J, Falcón T, Hernández E., González C., Arroyo E., López M. 2008. Painting syncretism: a non-destructive análisis of the Badiano Codex. 9th Intl. Congr. On NDA of Art, Jerusalem, Mayo 2008: 1-10.

A NEW *PHRAGMIPEDIUM* (ORCHIDACEAE) FROM COLOMBIA

WESLEY E. HIGGINS^{1–3,5} & PAULA VIVEROS⁴

¹Center for Tropical Plant Research and Conservation, Marie Selby Botanical Gardens
811 South Palm Avenue, Sarasota, FL 34236-7726 U.S.A.

²International Scientific Committee of *Lankesteriana*, Universidad de Costa Rica.

³Research Associate, Centro de Investigación en Orquídeas de los Andes “Ángel Andreetta”
Universidad Alfredo Pérez Guerrero, Ecuador.

⁴School of Forest Resources and Conservation, University of Florida, Gainesville, FL 32653, U.S.A.

⁵Corresponding author: whiggins@selby.org

ABSTRACT. A new species from Colombia in *Phragmipedium* section *Micropetalum* is described: *Phragmipedium manzurii*.

RESUMEN. Se describe una nueva especie de *Phragmipedium* sección *Micropetalum* para Colombia: *Phragmipedium manzurii*.

KEY WORDS: Orchidaceae, Cyripedioideae, Phragmipediaceae, Phragmipediinae, *Phragmipedium*, *Micropetalum*, Colombia, new species, taxonomy

Introduction. In April 2008 David Manzur sent photographs of a *Phragmipedium* for identification to the Orchid Identification Center. The images appeared distinctive from *Phragmipedium schlimii* thus necessitating examination of the specimen by a taxonomist. Since Manzur was unable to send a specimen due to governmental restrictions Paula Viveros traveled to Colombia to examine the plant. Viveros examined eight specimens and confirmed that they represented a new species.

David Manzur started collecting plants in Antioquia, Colombia, several years ago. At first he thought that they all corresponded to *Phragmipedium schlimii*, but he started noticing differences in floral structures and leaves that led him to suspect that they corresponded to different varieties or species. Consequently he started collecting phragmipediums from other regions in Colombia, growing them, and recording their variations. He keeps his living collections at his farm in Caldas, Colombia; the herbarium specimens are kept at Herbario Universidad de Caldas, FAUC.

Taxonomic treatment

Phragmipedium manzurii W.E. Higgins & P. Viveros, *sp. nov.*

TYPE: Colombia. Santander: ex hort. D. A. Manzur. June 2008, *D.A. Manzur 1501* (holotype: FAUC). FIG. 1—3.

Species haec *Phragmipedium fischeri* Braem & Mohr et *P. schlimii* (Linden & Rchb.f.) Rolfe similis, sed staminodio circulari breve emarginato viridiflavo differt, sepalis et petalisque subviridis, ellipticis; petalis complanatis subviolaceis, et labello albido intus violaceo notato, ad apicem inflato incurvato porcato differt.

Section *Micropetalum* (Hallier) Garay.

Plant caespitose, herbaceous, terrestrial. *Leaves* 6, basal distichous, blades linear, coriaceous, keeled beneath, acuminate, margin revolute, 29.5 to 36.6 cm long, 2.3 to 4 cm wide. *Inflorescence* erect, 12 to 27 cm tall. *Ovary* pubescent 4.8 to 5.8 cm long, subtended by an acute green floral bract. *Flowers* 3 successive, resupinate, 6 x 5.2 cm. *Sepals* yellow-green, elliptical,

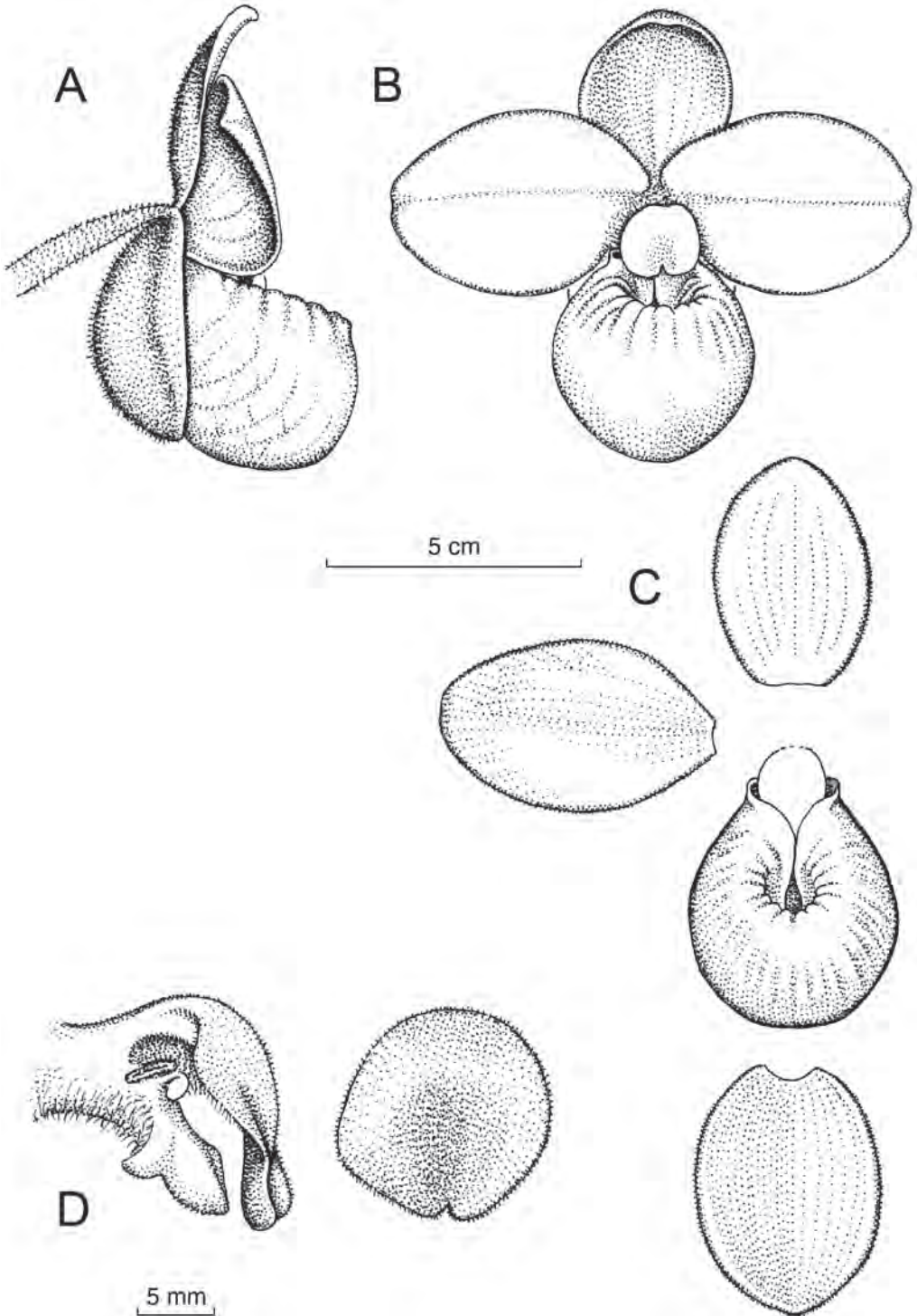


FIGURE 1. *Phragmipedium manzurii* W.E.Higgins & P.Viveros. **A.** Flower, lateral view. **B.** Flower, frontal view. **C.** Dissected flower. **D.** Staminode, frontal and lateral view. Drawing by Stig Dalström, based on *Manzur 1501* (FAUC).



FIGURE 2. *Phragmipedium manzurii* W.E.Higgins & P.Viveros. **A.** Flower, frontal view. **B.** Flower, lateral view. **C.** Dissected pouch. **D.** Dissected flower. Photos by D. A. Manzur.

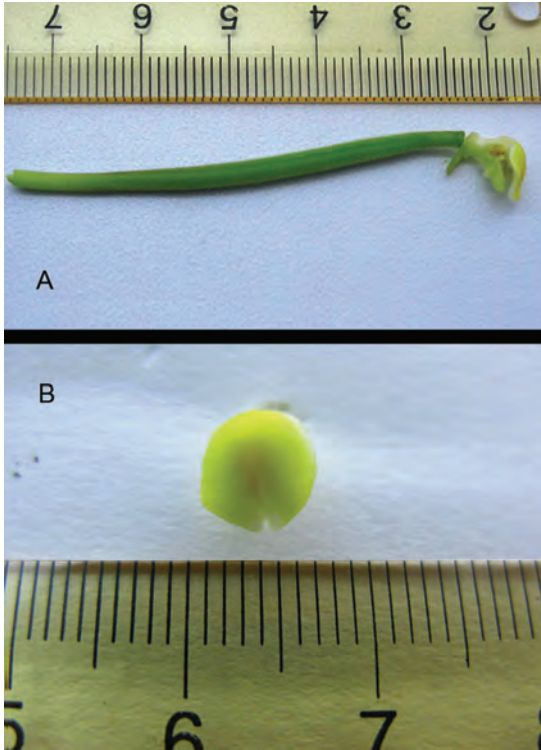


FIGURE 3. *Phragmipedium manzurii* W.E.Higgins & P.Viveros. **A.** Side view of ovary. **B.** Front view of staminode. Photos by D. A. Manzur.

somewhat concave, pubescent on reverse; dorsal sepal elliptical, 2 cm long, 1 to 1.5 cm wide; synsepal 1.8 to 2 cm long, 1.4 to 1.7 cm wide. *Petals* white, flushed with pale violet, elliptical, slightly recurved, hirsute pubescent, 2.2 to 2.8 cm long, 1.1 to 2 cm wide. *Lip* white flushed pale violet, yellow-green at base, with violet markings, saccate with the apex turned up in front and the margin infolded, opening marked with short violet ridges, interior marked with violet spots, central yellow/violet lines on interior, tomentose pubescent, 1.8 to 2.4 cm long, 1 to 1.7 cm wide. *Staminode* green-yellow, round, raised center, notched on bottom margin, tomentose pubescent, 0.6 to 0.8 cm long, 0.6 to 0.8 cm wide.

ETYMOLOGY: Named for David Angel Manzur, a retired professor of the Facultad de Agronomía, Universidad de Caldas, Manizales, Colombia. Manzur has been doing field research, observing, collecting and growing orchids for 20 years, with special interest in



FIGURE 4. Department of Santander, Colombia.

Miltoniopsis vexillaria varieties and *Phragmipedium*. He is a member of the Risaralda Orchid Society and has received two American Orchid Society awards: *Bollea coelestis* David Manzur La Aldea FCC/AOS and *Miltonia* David Manzur La Aldea AM/AOS. Prior to this description, one species had been described in his name: *Chodorhyncha manzurii* P.Ortiz. Professor Manzur has authored one orchid publication: *Miltoniopsis vexillaria* distribution and variation in Colombia [Orchids 74(1): 26-31. 2005].

ADDITIONAL SPECIMEN SEEN: June 2008, *D.A. Manzur 1507* (FAUC).

DISTRIBUTION. Reported from the Department of Santander, Colombia (Fig. 4).

ACKNOWLEDGMENTS. The authors thank David Manzur and Leon Trujillo for bringing this species to the attention of the Orchid Identification Center and Phillip Cribb for revision of the Latin diagnosis.

LISTADO DE ESPECIES DE LA FAMILIA ORCHIDACEAE PARA EL ESTADO SUCRE, VENEZUELA

CARLOS LEOPARDI^{1,2} & LUIS J. CUMANÁ¹

¹Herbario Isidro Ramón Bermúdez Romero, Departamento de Biología, Universidad de Oriente,
Núcleo de Sucre, Cumaná, Sucre, 6101 Apdo. 245, Venezuela.

²Autor para correspondencia: leopardiverde@gmail.com

RESUMEN. La familia Orchidaceae es uno de los grupos de Magnoliophyta de mayor distribución a nivel mundial, ocupan una amplia gama de nichos, desde el medio terrestre hasta las copas de los árboles (epífitas). Históricamente esta familia ha recibido mucha atención dada la belleza de las flores de algunos de sus miembros, lo que ha llevado con el tiempo a buscar el conocimiento, entre otras cosas, sobre su distribución; por lo que han aparecido listas de especies para varios lugares de América y el mundo. En Venezuela, exceptuando los tratamientos que a nivel general se ha dado a la familia, son escasos los estudios a nivel local y en particular en la cordillera de la costa; razón por la que en este trabajo se presenta una lista actualizada de las especies de Orchidaceae conocidas hasta el presente en la flora del estado Sucre. Para ello se revisaron entre los años 2006-2007 los herbarios VEN e IRBR, las bases de datos en línea de los herbarios K, MO, AMES, NY y F; aunado a ello, se realizaron exploraciones en 14 localidades del estado Sucre, distribuidas entre el extremo occidental de la Península de Araya hasta el extremo oriental de la Península de Paria, los alrededores de Cumaná, el Parque Nacional Mochima y parte del Macizo del Turimiquire. De lo anterior deriva una lista de 121 especies distribuidas en 63 géneros, los más importantes son: *Epidendrum* L. (16 spp.), *Habenaria* Willd. (8 spp.), *Pleurothallis* R. Br. s. l. (7 spp.), *Maxillaria* Ruiz & Pav. s. str. (4 spp.) y *Scaphyglottis* Poepp. & Endl. (4 spp.). Adicional a éstas, existen 12 especies, señaladas en la literatura, de las que seis cuentan con respaldo de colector y número de colección. Del total de las especies referidas para el estado Sucre, 15 son mencionadas en el Libro Rojo de la Flora Venezolana; de éstas, dos están en peligro crítico (*Cattleya gaskelliana* Rchb. f. y *Psychopsis papilio* (Lindl.) H.G. Jones), una en peligro, dos vulnerables y las restantes en la categoría menor riesgo.

ABSTRACT. The family Orchidaceae is one of the most widespread groups of Magnoliophyta, they occur in a broad range of habitats, from the terrestrial habit to the treetops (epiphytes). Historically, this family had received a great deal of attention because of the beauty of the flowers of some species, which has lead to study its distribution; as a consequence, lists of species have been published for various places of America and the world. In Venezuela, except for treatments, of the family on a general level, there are few studies of local areas, and very little on the coastal cordillera; for that reason, we offer an updated list of the species of Orchidaceae so far know in the flora of Sucre state. To achieve this, the herbaria VEN and IRBR were studied during 2006-2007, and the on-line database of herbaria K, MO, AMES, NY and F were consulted. Field exploration was undertaken in 14 localities in Sucre state, divided between the Peninsulas of Araya and Paria, around of Cumaná and the Macizo del Turimiquire. As results, we present a list of 121 species of 63 genera. The most important are: *Epidendrum* L. (16 spp.), *Habenaria* Willd. (8 spp.), *Pleurothallis* R. Br. s. l. (7 spp.), *Maxillaria* Ruiz & Pav. s. str. (4 spp.) y *Scaphyglottis* Poepp. & Endl. (4 spp.). Additionally, 12 species were mentioned in the literature, of which six have data (collector and collection number). Of the total of the species know from Sucre state, 15 was mentioned in the Red Book of the Venezuelan flora, two of these are in critic danger (*Cattleya gaskelliana* Rchb. f. y *Psychopsis papilio* (Lindl.) H.G. Jones), one in danger, two vulnerable, the rest are in the category minor risk.

PALABRAS CLAVE / KEY WORDS: Orchidaceae, lista de especies, species checklist, Sucre, Venezuela

La familia Orchidaceae es el grupo con la mayor diversidad entre las Magnoliophyta, con más de 19,000 especies (Judd *et al.* 1999). Esta familia se distribuye por todo el mundo, alcanzando su máxima diversidad en las regiones tropicales, especialmente en los andes americanos (Dressler 1981). Esta amplia distribución y diversidad se asocian a una alta plasticidad adaptativa que le ha permitido colonizar una variedad de nichos, desde el medio terrestre, incluyendo formas litófitas y rupícolas hasta especies de vida aérea (epífitas) en las copas de los árboles (Chase *et al.* 2003).

Históricamente, por la belleza de las flores de algunos de sus miembros, esta familia ha recibido gran atención; como muestra la publicación de monografías sobre el grupo durante los siglos XVIII--XXI (v. gr. Lindey 1830, Bateman 1874, Dressler 1981; Prigdeon *et al.* 2005); así, como la aparición de sociedades hortícolas que pagaban y pagan importantes sumas por estas plantas, lo que ha permitido financiar las expediciones de los llamados “cazadores de orquídeas”, como Schomburgk, Linden, entre otros, que visitaban las tierras americanas en busca de estas plantas (Texera 1991, Romero 1999).

Este interés histórico por las orquídeas, ha tenido gran influencia en la elaboración de listados de orquídeas u orquídeofloras para Brasil, Trinidad y Tobago, Chile, Guyana, Surinam, Guyana Francesa, Colombia, Cuba, Panamá, Costa Rica y Venezuela, entre otros (Cogniaux 1965, Schultes 1967, Lehnebach 2003, Funk *et al.* 2007, Huber *et al.* 1998); sin embargo, estos trabajos en su mayoría son de carácter general, siendo escasos los estudios para áreas específicas, como el elaborado en el Parque Nacional Manuel Antonio en Costa Rica (Populin 1998).

Venezuela no escapa a esta realidad, a nivel general los trabajos de mayor envergadura que se han realizado son los de Dunsterville y Garay (1959, 1961, 1965, 1966, 1972, 1976), Foldats (1969, 1970a,b,c,d) y Romero y Carnevali (2000); a nivel local, la zona que ha recibido la mayor atención ha sido Guayana, donde se han realizado una serie de estudios menores como el el reporte elaborado por Steyermark de las exploraciones para el Ptari-Tepuy, Roraima cerro Duida (Schweinfurth 1957), el informe sobre las orquídeas de Cerro Autana (Dunsterville 1975), la aclaratoria sobre el complejo de especies de *Epidendrum nocturnum* de la Guayana (Carnevali & Romero 1996) y otros

estudios mayores que llevaron a la publicación de la orquídeoflora de la zona (Carnevali *et al.* 2003).

En el nororiente de Venezuela, la familia Orchidaceae ha recibido poca atención, a pesar de la importancia de ésta en los resultados de las exploraciones botánicas como las realizadas por Steyermark al cerro Turimiquire y la región oriental adyacente (Schweinfurth 1957, Steyermark 1966) y a la Península de Paria (Steyermark & Agostini 1967), los resultados de Lárez (2003) para el Parque Nacional el Guácharo, entre otros.

En el estado Sucre, el interés sobre esta familia se ha incrementado en los últimos años, publicándose una lista preliminar de especies basada sólo en información bibliográfica (Leopardi & Véliz, 2006) y algunas listas específicas locales, como las presentadas para el Parque Nacional Mochima (Leopardi *et al.* 2007, Cumana, en prensa). El objetivo de este trabajo es mostrar la lista actualizada de especies de la familia Orchidaceae para el estado Sucre, basada en la revisión de herbarios y en trabajo de campo.

Metodología

El listado presentado es el producto de la revisión, entre los años 2006 y 2007, de los Herbarios Isidro Ramón Bermúdez Romero (IRBR) y del Herbario Nacional de Venezuela (VEN); así, como de las bases de datos disponibles en línea de los herbarios Royal Botanical Garden Herbarium (K) (K) (<http://www.kew.org/hercat>); Missouri Botanical Garden Herbarium (MO) (<http://www.mobot.org/mobot/research/herbarium.shtml>); Oakes Ames Orchid Herbarium (AMES) (http://asaweb.huh.harvard.edu:8080/databases/specimen_index.html); New York Botanical Garden Herbarium (NY) (<http://sciweb.nybg.org/science2/hcol/vasc/index.asp>); Field Museum of Natural History (F) (<http://emuweb.fieldmuseum.org/botany/detailed.php>); demás, de una serie de exploraciones realizadas en 14 localidades del estado Sucre, distribuidas de la siguiente forma: Península de Araya y adyacencias (Campoma, Cariaco, Guacarapo, Guayacán), Península de Paria (Río El Pilar, Yaguaraparo), alrededores de Cumaná (Parque Nacional Mochima, El Tacal, San Juan de Macarapana, Río Brito, Humo Negro, Cerro Imposible), Macizo del Turimiquire (Catuario, Las Pideras de Cocollar). En el apéndice I se muestra una selección de los ejemplares revisados y/o colectados.

La colección de las muestras siguió el protocolo tradicional para el procesamiento de material de herbario (Lindorf *et al.* 1999), tomando de uno a tres individuos (dependiendo de la abundancia); así mismo, en caso de que el material estuviese en fenofase reproductiva, porciones de las inflorescencias fueron conservadas en una mezcla de formol, ácido acético y etanol (FAA) en proporción 1:1:3; en caso de que el material estuviese en fenofase vegetativa se tomó una parte y se mantuvo en condiciones de vivero hasta alcanzar la floración, colectándose luego material para herborizar y conservándose algunas flores en FAA. El material colectado está depositado en IRBR.

El listado de especies presentado se ajusta en forma general al sistema propuesto por Chase *et al.* (2003) y sigue, en forma amplia, la sinonimia propuesta en *tropicos.org* (<http://www.tropicos.org>) y por Govaerts (2005). Algunos casos especiales *sensu stricto* son: *Cohniella* Pfitzer y *Lophiaris* Raf. Los Maxillarinae siguen el tratamiento sugerido por Blanco *et al.* (2007).

Resultados y discusión

La familia Orchidaceae, en el estado Sucre, está representada por 121 especies, de 63 géneros, los más numerosos son: *Epidendrum* (16 spp.), *Habenaria* (8 spp.), *Pleurothallis* s. l. (7 spp.), *Maxillaria* s. str. (4 spp.) y *Scaphyglottis* (4 spp.) (tabla 1). Al considerar la riqueza por zona, se encuentra que la más pobre es la Península de Araya y áreas adyacentes (11 spp.); mientras que, la zona más rica es la Península de Paria (83 spp.), seguida del macizo del Turimiquire (36 spp.) y los Alrededores de Cumaná (33 spp.).

Estos resultados se relacionan con lo que ha sido estimado para el país, siendo los géneros más numerosos a nivel nacional *Epidendrum* (162 spp.), *Pleurothallis* s.l. (125 spp.) y *Maxillaria* s. l. (100 spp.) (Huber *et al.* 1998, Carnevali *et al.* 2007). La coincidencia en la dominancia genérica puede asociarse a la diversidad de ambientes presentes en el estado Sucre: arbustales xerófilos, sabanas, manglares, bosques tropófilos, bosques húmedos, entre otros. También es notable que estos géneros alcancen su máxima diversidad en el estado en las vertientes de la Península de Paria y del Macizo del Turimiquire (tabla 1), que son las zonas más frescas y húmedas, lo que coincide con el hecho de que esta familia tiende a ser más diversa en zonas con características similares a la

andina, que es donde alcanza su máxima diversidad (Dressler 1981, Carnevali *et al.* 2007).

La pobreza de especies en la Península de Araya se debe, básicamente, a las escasas precipitaciones (son inferiores a 260 mm anuales) y a la acción del viento, que en las zonas de menores elevaciones, hacia la región occidental de la península, alcanza velocidad suficiente como para impedir el establecimiento no sólo de los representantes de esta familia, sino de casi todos los grupos vegetales (Cumana 1999)

Tres especies son endémicas para el estado Sucre (*Acianthera pariaënsis* (Carnevali & G. A. Romero) Carnevali & G. A. Romero, *Epidendrum dunstervilleorum* Foldats y *Masdevallia irapana* H. R. Sweet). Por otro lado, en el *Libro Rojo de la Flora Venezolana* (Llamozas *et al.* 2003), se mencionan 15 de las especies reportadas para el estado Sucre, distribuidas de la siguiente forma: *Cattleya gaskelliana* Rchb. f. y *Psychopsis papilio* (Lindl.) H. G. Jones son señaladas como especies en peligro crítico de extinción, *Chysis aurea* Lindl. como especie en peligro y *Encyclia cordigera* (Kunth) Dressler y *Huntleya lucida* (Rolfe) Rolfe como especies vulnerables, las siete especies restantes aparecen bajo la categoría de menor riesgo (tabla 1).

Adicionalmente, en los trabajos de Steyermark (1966), Steyermark y Agostini (1967) y Foldats (1969, 1970b,c,d), son referidas seis especies con colector y número de colección: *Cynoches lodigessii* Lindl (Moritz, 611); *Dichaea pendula* (Aubl.) Cogn. (J. Steyermark, 91932), *Epidendrum cardioglossum* Rchb. f. (J. Steyermark y cols. 62596), *Gomphichis costaricensis* (Schltr.) Ames (J. Steyermark y cols. 62517), *Liparis neuroglossa* Rchb. f. (J. Steyermark, 62645), *Oncidium bicolor* Lindl. (Dunsterville 378); sin embargo, estas *exsiccata* no fueron encontradas en los herbarios revisados.

Finalmente, otras seis especies son mencionadas, principalmente por Foldats (1970a, b, c, d), pero sin ningún soporte localizable, a saber: *Aspasia variegata* Lindl., *Brassia caudata* Lindl., *Epidendrum purpurascens* Focke, *Lockhartia acuta* (Lindl.) Rchb. f.), *L. oblongicallosa* Carnevali & G.A. Romero y *Pleurothallis testaeifolia* (Sw.) Lindl. Por otro lado, existe una serie de especies que han sido encontradas en la zona limítrofe con el estado Monagas (del lado de Monagas) que, potencialmente, también podrían

TABLA 1. Lista de especies de la familia Orchidaceae presentes en el estado Sucre, Venezuela.

ESPECIE	A ^a	P	C	T	DR ^b	L ^c
<i>Acianthera lanceana</i> (Lodd. ex Lindl.) Pridgeon & M. W. Chase	-	+	-	+	.	MR/ca
<i>Acianthera pariaënsis</i> (Carnevali & G. A. Romero) Carnevali & G. A. Romero	-	+	-	-	ES	.
<i>Beloglottis costaricensis</i> (Rchb. f.) Schltr.	-	+	-	-	.	.
<i>Brassavola cucullata</i> (L.) R. Br.	+	+	-	-	.	.
<i>Campylocentrum micranthum</i> (Lindl.) Rolfe	-	+	+	+	.	.
<i>Campylocentrum schneeianum</i> Foldats	-	+	-	-	EC	.
<i>Catasetum macrocarpum</i> Rich. ex Kunth	-	+	+	-	.	.
<i>Catasetum planiceps</i> Lindl.	-	+	+	-	.	.
<i>Cattleya gaskelliana</i> Rchb. f.	-	-	-	+	EO	CR
<i>Caularthron bicornutum</i> (Hook.) Raf.	+	+	-	-	.	.
<i>Caularthron bilamellatum</i> (Rchb. f.) R. E. Schult.	+	+	+	-	.	.
<i>Chysis aurea</i> Lindl.	-	+	-	-	.	EN
<i>Cohniella cebolleta</i> (Jacq.) Christenson	+	+	+	-	.	MR/ca
<i>Cyclopogon elatus</i> (Sw.) Schltr.	-	-	-	+	.	.
<i>Cyrtopodium willmorei</i> Knowles & Westc.	+	-	+	+	.	.
<i>Dichaea hystricina</i> Rchb. f.	-	-	-	-	.	.
<i>Dichaea muricata</i> (Sw.) Lindl.	-	-	-	-	.	.
<i>Dimerandra emarginata</i> (G. Mey.) Hoehne	+	+	+	-	.	.
<i>Elleanthus arpophyllostachys</i> Rchb. f.	-	+	-	-	EC	.
<i>Elleanthus furfuraceus</i> (Lindl.) Rchb.f.	-	-	-	+	.	.
<i>Encyclia cordigera</i> (Kunth) Dressler	+	-	+	+	.	VU
<i>Encyclia isochila</i> (Rchb. f.) Dodson	-	+	-	-	.	.
<i>Epidendrum anceps</i> Jacq.	-	+	-	+	.	.
<i>Epidendrum cermuum</i> Kunth	-	-	-	+	.	.
<i>Epidendrum ciliare</i> var. <i>squamatum</i> Schnee	+	-	+	-	RV	.
<i>Epidendrum coronatum</i> Ruiz & Pav.	-	-	-	+	.	MR/ca
<i>Epidendrum dunstervilleorum</i> Foldats	-	+	-	-	ES	.
<i>Epidendrum ferrugineum</i> Ruiz & Pav.	-	+	-	+	.	.
<i>Epidendrum miserrimum</i> Rchb. f.	-	+	-	-	.	.
<i>Epidendrum pseudoramosum</i> Schltr.	-	+	-	-	.	.
<i>Epidendrum purum</i> Lindl.	-	+	-	-	.	.
<i>Epidendrum ramosum</i> Jacq.	-	+	-	-	.	.
<i>Epidendrum rigidum</i> Jacq.	-	+	+	+	.	.
<i>Epidendrum rostratum</i> Garay & Dunst.	-	+	-	-	.	.
<i>Epidendrum secundum</i> Jacq.	-	+	-	+	.	.
<i>Epidendrum strobiliferum</i> Rchb. f.	-	+	-	-	.	.
<i>Epidendrum carpophorum</i> Barb. Rodr.	-	+	-	+	.	.
<i>Epidendrum vinctinum</i> Lindl.	-	+	-	-	.	MR/ca
<i>Eulophia alta</i> (L.) Fawc. & Rendle	-	+	-	-	.	.
<i>Gongora quinquenervis</i> Rchb. f.	-	-	+	+	.	.
<i>Govenia utriculata</i> (Sw.) Lindl.	-	-	+	+	.	.
<i>Habenaria alata</i> Hook.	-	-	+	-	.	MR/ca

ESPECIE	A ^a	P	C	T	DR ^b	L ^c
<i>Habenaria bractescens</i> Lindl.	-	-	+	-	.	.
<i>Habenaria entomantha</i> (Lex.) Lindl.
<i>Habenaria heptadactyla</i> Rchb. f.	-	-	+	-	.	.
<i>Habenaria monorrhiza</i> (Sw.) Rchb. f.	-	+	+	-	.	MR/ca
<i>Habenaria obtusa</i> Lindl.	-	-	+	-	.	.
<i>Habenaria petalodes</i> Lindl.	-	+	-	-	.	.
<i>Habenaria trifida</i> Kunth	-	-	+	-	.	.
<i>Heterotaxis discolor</i> (G. Lodd.) Ojeda & Carnevali	-	+	-	-	.	.
<i>Houlletia odoratissima</i> Linden ex Lindl.	-	+	-	-	.	.
<i>Huntleya lucida</i> (Rolfe) Rolfe	-	+	-	-	.	VU
<i>Isochilus linearis</i> (Jacq.) R. Br.	-	+	-	+	.	.
<i>Jacquiiniella globosa</i> (Jacq.) Schltr.	-	+	-	+	.	.
<i>Jacquiiniella teretifolia</i> (Sw.) Britton & Wilson	-	-	-	+	.	.
<i>Laelia undulata</i> (Lindl.) L. O. Williams	+	-	+	-	.	.
<i>Leochilus labiatus</i> (Sw.) Kuntze	-	-	-	+	.	.
<i>Lepanthes pariaënsis</i> Foldats	-	+	-	-	RV	.
<i>Lepanthes wagneri</i> Rchb. f.	-	+	-	-	.	.
<i>Lepanthopsis astrophora</i> (Rchb. f.) Garay	-	+	-	-	.	.
<i>Liparis nervosa</i> subsp. <i>nervosa</i> Thunb.	-	-	+	-	.	.
<i>Lophiaris lanceana</i> (Lindl.) Braem	+	+	+	-	.	MR/ca
<i>Lophiaris lurida</i> (Lindl.) Braem	+	+	+	+	.	.
<i>Macroclinium wulschlaegelium</i> (H. Focke) Dodson	-	+	-	-	.	.
<i>Masdevallia irapana</i> H. R. Sweet	-	+	-	-	ES	.
<i>Masdevallia kyponantha</i> H. R. Sweet	-	+	-	-	.	.
<i>Masdevallia lansbergii</i> Rchb. f.	-	+	-	-	.	.
<i>Maxillaria brachybulbon</i> Schltr.	-	+	-	-	.	.
<i>Maxillaria melina</i> Lindl.	-	+	-	-	.	.
<i>Maxillaria nasuta</i> Rchb. f.	-	+	-	-	.	.
<i>Maxillaria porrecta</i> Lindl.	-	+	-	+	.	.
<i>Microchilus paleaceus</i> (Schltr.) Omerod.	-	+	-	+	.	.
<i>Microchilus venezuelanus</i> (Garay & Dunst.) Ormerod.	-	+	-	-	RV	.
<i>Myoxanthus exasperatus</i> (Lindl.) Luer	-	-	-	+	.	.
<i>Notylia rhombilabia</i> C. Schweinf.
<i>Octomeria apiculata</i> (Lindl.) Kuntze	-	+	-	-	.	.
<i>Oeceoclades maculata</i> (Lindl.) Lindl.	-	+	+	+	.	.
<i>Oncidium klotzschianum</i> Rchb. f.	-	+	-	+	.	.
<i>Ornithocephalus bonplandii</i> Rchb. f.	-	-	+	-	.	.
<i>Ornithidium patulum</i> (C. Schweinf.) M. A. Blanco & Ojeda	-	-	-	+	.	.
<i>Otoglossum globuliferum</i> (Kunth) L. O. Williams & M. W. Chase	-	+	-	-	.	.
<i>Otoglossum scansor</i> (Rchb. f.) Carnevali & I. Ramírez	-	+	-	-	.	.
<i>Pachyphyllum pastii</i> Rchb. f.	-	-	-	+	.	.
<i>Platystele oxyglossa</i> (Schltr.) Garay	-	+	-	-	.	.
<i>Platystele stenostachya</i> (Rchb. f.) Garay	-	+	-	-	.	.
<i>Pleurothallis discoidea</i> Lindl.	-	+	-	-	.	.

TABLA 1. (continúa)

ESPECIE	A ^a	P	C	T	DR ^b	L ^c
<i>Pleurothallis macrophylla</i> Kunth	-	+	-	-	.	.
<i>Pleurothallis pruinosa</i> Lindl.	-	-	+	-	.	.
<i>Pleurothallis revoluta</i> (Ruíz & Pav.) Garay	-	+	-	-	.	.
<i>Pleurothallis ruscifolia</i> (Jacq.) R. Br.	-	+	-	-	.	.
<i>Pleurothallis</i> aff. <i>secunda</i> Poepp. & Endl.	-	-	+	-	.	.
<i>Polystachya foliosa</i> (Hook.) Rchb. f.	-	+	-	+	.	.
<i>Prosthechea cochleata</i> (L.) W. E. Higgins	-	-	-	+	.	MR/ca
<i>Prosthechea aemula</i> (Lindl.) W. E. Higgins	-	+	-	-	.	.
<i>Prosthechea livida</i> (Lindl.) W. E. Higgins	-	-	+	+	.	.
<i>Psilochilus modestus</i> Barb. Rodr.	-	+	-	-	.	.
<i>Psychopsis papilio</i> (Lindl.) H. G. Jones	-	-	+	-	.	CR
<i>Psymorchis glossomystax</i> (Rchb. f.) Dodson & Dressler	-	+	-	-	.	.
<i>Psymorchis pusilla</i> (L.) Dodson & Dressler	-	-	+	-	.	.
<i>Rhettinantha notylioglossa</i> (Rchb. f.) M. A. Blanco	-	+	-	-	.	.
<i>Rodriguezia lanceolata</i> Ruiz & Pav.	-	+	-	+	.	MR/ca
<i>Sauvetea</i> aff. <i>alpestris</i> (Lindl.) Szlach.	-	-	-	+	.	.
<i>Scaphosepalum breve</i> (Rchb.f.) Rolfe	-	+	-	-	.	.
<i>Scaphyglottis grandiflora</i> Ames & C. Schweinf.	-	+	-	-	.	.
<i>Scaphyglottis modesta</i> (Rchb. f.) Schltr.	-	+	-	-	.	.
<i>Scaphyglottis prolifera</i> Cogn.	-	-	-	+	.	.
<i>Scaphyglottis reflexa</i> Lindl.	-	+	-	-	.	.
<i>Sobralia</i> cf. <i>ciliata</i> (Presl) C. Schweinf. ex Foldats	-	+	-	+	.	.
<i>Sobralia</i> aff. <i>violacea</i> Linden ex Lindl.	-	-	+	-	.	.
<i>Stelis argentata</i> Lindl.	-	-	+	-	.	.
<i>Stelis papaquerensis</i> Rchb. f.	-	+	-	-	.	.
<i>Stelis tristyla</i> Lindl.	-	+	-	-	.	.
<i>Stenia pallida</i> Lindl.	-	+	-	-	.	.
<i>Trichosalpinx ciliaris</i> (Lindl.) Luer	-	+	-	-	.	.
<i>Trichosalpinx intricata</i> (Lindl.) Luer	-	+	-	-	.	.
<i>Triphora gentianoides</i> (Sw.) Nutt. ex Ames & Schltr.	-	+	-	-	.	.
<i>Trizeuxis falcata</i> Lindl.	-	+	+	+	.	.
<i>Vanilla pompona</i> Schiede	-	+	+	-	.	MR/pm
<i>Wulfschlaegelia calcarata</i> Benth.	-	+	-	-	.	.
<i>Xylobium pallidiflorum</i> (Hook.) G. Nicholson	-	+	-	-	.	.
Total de especies:	11	83	33	36		

^aA: Península de Araya y adyacencias; P: Península de Paria; C: alrededores de Cumaná; T: Macizo Montañoso del Turimiquire (sólo la sección que está en el estado Sucre).

^bDR: Especies de distribución restringida; ES: endémica estado Sucre; EC: endémica Cordillera de la Costa; EO: endémica Cordillera de la Costa, región oriental; RV: restringida a Venezuela.

^cL: estado de conservación según Llamozas *et al.* (2003); MR/ca: menor riesgo, casi amenazada; CR: peligro crítico; EN: en peligro; VU: vulnerable; MR/pm: menor riesgo, preocupación menor; .: dato no disponible.

estar en el estado Sucre, entre las que cabe destacar: *Acianthera rubroviridis* (Lindl.) Pridgeon & M.W. Chase, *Epidendrum subpurum* Rchb. f., *Ionopsis utricularioides* (Sw.) Lindl., *Mormodes buccinator* Lindl., entre otras.

AGRADECIMIENTOS. Los autores desean expresar su agradecimiento al Consejo de Investigación de la Universidad de Oriente (CI-2-010101-1224/05 y CI-2-0101-01-1374/07) y a PROVITA (2007-08) por el financiamiento otorgado. A la Dra Leyda Rodríguez (curadora de VEN) por el permitir la revisión de la colección de Orchidaceae allí depositada y por el préstamo de algunos de los ejemplares. A Carmen Malavé, Freddy Subero y Christian Marchán por toda la colaboración prestada durante el trabajo de campo. A José Imery y a los dos revisores anónimos por sus sugerencias y críticas al manuscrito. Al personal del IRBR por su colaboración durante la ejecución de este trabajo.

LITERATURA CITADA

- Bateman, J. 1874. A monograph of *Odontoglossum*. L. Reeve & Co., Londres.
- Blanco M., G. Carnevali, W. Whitten, R. Singer, S. Koehler, N. Williams, I. Ojeda, K. Neubig & L. Endara. 2007. Generic realignments in Maxillariinae (Orchidaceae). *Lankesteriana* 7: 515-537.
- Carnevali G. & G. A. Romero. 1996. Orchidaceae *Dunstervilleorum* VII: The *Epidendrum nocturnum* alliance in the Venezuelan Guayana and the Guianas. *Lindleyana* 11: 239-249.
- Carnevali G., I. Ramírez-Morillo, G. Romero-González, C. Vargas, & E. Foldats. 2003. Orchidaceae. Pp. 200-618 in: Steyermark, J. A., P.E. Berry & B.K. Holst (Gen. eds.). P.E. Berry, B.K. Holst & K. Yatskievych (vol. eds.). *Fl. Venez. Guayana*. Volume 7: Myrtaceae-Plumbaginaceae. Missouri Botanical Garden, St. Louis; Timber Press, Portland.
- Carnevali G., G.A. Romero, E. Noguera. & G. Gerlach. 2007. La familia Orchidaceae en Venezuela: diversidad y biogeografía. *Memorias XVII Congreso Venezolano de Botánica*: 21-23.
- Chase M., J. Freudenstein, K. Cameron & R. Barrett. 2003. DNA data and Orchidaceae systematics: a new phylogenetic classification. Pp. 69-89 in: Dixon, K., S. Kell, R. Barrett & P. Cribb (eds.). *Orchid conservation*. Natural History Publications. Kota Kinabalu.
- Cogniaux A. 1965. *Flora Brasiliensis*. Orchidaceae. Vol. 3. Verlag von J. Cramer, New York, Estados Unidos.
- Cumana L. 1999. Caracterización de las formaciones vegetales de la Península de Araya, estado Sucre, Venezuela. *Saber* 11: 7-16.
- Cumana L. 2008. Listado de las plantas vasculares del Parque Nacional Mochima, Venezuela. *Ernstia* 18: en prensa.
- Dressler R. 1981. *The Orchids: Natural History and Classification*. Harvard University Press. Cambridge, Estados Unidos.
- Dunsterville G. 1975. Orquídeas de la cima del cerro Autana. *Acta Bot. Venez.* 10: 251-262.
- Dunsterville G. & L. Garay. 1959. *Venezuelan Orchids Illustrated*. Vol. 1. André Deutsch Limited, Cambridge, Massachussetts.
- Dunsterville G. & L. Garay. 1961. *Venezuelan Orchids Illustrated*. Vol. 2. André Deutsch Limited, Cambridge, Massachussetts.
- Dunsterville G. & L. Garay. 1965. *Venezuelan Orchids Illustrated*. Vol. 3. André Deutsch Limited, Cambridge, Massachussetts.
- Dunsterville G. & L. Garay. 1966. *Venezuelan Orchids Illustrated*. Vol. 4. André Deutsch Limited, Cambridge, Massachussetts.
- Dunsterville G. & L. Garay. 1972. *Venezuelan Orchids Illustrated*. Vol. 5. André Deutsch Limited, Cambridge, Massachussetts.
- Dunsterville G. & L. Garay. 1976. *Venezuelan Orchids Illustrated*. Vol. 6. André Deutsch Limited, Cambridge, Massachussetts.
- Foldats E. 1969. *Flora de Venezuela*. Orchidaceae. Tomo XV. I. Parte. Editorial Instituto Botánico. Caracas, Venezuela.
- Foldats E. 1970a. *Flora de Venezuela*. Orchidaceae. Tomo XV. II Parte. Editorial Instituto Botánico. Caracas, Venezuela.
- Foldats E. 1970b. *Flora de Venezuela*. Orchidaceae. Tomo XV. III Parte. Editorial Instituto Botánico. Caracas, Venezuela.
- Foldats E. 1970c. *Flora de Venezuela*. Orchidaceae. Tomo XV. IV Parte. Editorial Instituto Botánico. Caracas, Venezuela.
- Foldats E. 1970d. *Flora de Venezuela*. Orchidaceae. Tomo XV. V Parte. Editorial Instituto Botánico. Caracas, Venezuela.
- Funk V., T. Hollowell, P. Berry, C. Kelloff & S. Alexander. 2007. Checklist of the plants of Guiana Shield (Venezuela: Amazonas, Bolívar, Delta Amacuro; Guyana, Surinam, French Guiana). *Contr. U.S. Natl. Herb.* 55: 1-584.
- Govaerts R., M. Campacci, D. Holland, P. Cribb, A. George, K. Kreuz & J. Wood. 2005. "World Checklist of Orchidaceae". The Board of Trustees of the Royal Botanic Gardens, Kew. <http://www.kew.org/wcps/monocots/>, consultado el 21/06/2008.

- Huber O., R. Duno, R. Riina, F. Stauffer, L. Pappaterra, A. Jiménez, S. Llamozas & G. Orsini. 1998. Estado actual del conocimiento de la flora de Venezuela. MARNR. Caracas.
- Judd W., C. Campbell, E. Kellogg & M. Stevens. 1999. *Plant Systematic: A Phylogenetic Approach*. Sinauer Associates. Massachusetts.
- Lárez A. 2003. Angiospermas del Parque Nacional El Guácharo, estados Monagas y Sucre. *Ernstia* 13: 1-28.
- Lehnebach C. 2003. Preliminary checklist of the orchids of Chile. *Bot. J. Linn. Soc.* 143: 449-451.
- Leopardi C. & J. Véliz. 2006. Lista preliminar de la familia Orchidaceae para el estado Sucre, Venezuela. *Saber* 18: 95-103.
- Leopardi C., J. Véliz. & L. Cumana. 2007. Orquideoflora preliminar del Parque Nacional Mochima, Venezuela. *Memorias XVII Congreso Venezolano de Botánica*: 763-766.
- Lindley J. 1830. *The genera and species of orchidaceous plants*. Ridgways. Londres, Inglaterra.
- Lindorf H., L. Parisca & P. Rodríguez. 1999. *Botánica, clasificación, estructura y reproducción*. Ediciones de la Biblioteca de la Universidad Central de Venezuela. Caracas, Venezuela.
- Llamozas S., R. Duno de Stefano, W. Meier, R. Riina, F. Stauffer, G. Aymard O. Huber, & R. Ortiz. 2003. Libro rojo de la flora venezolana. PROVITA – Fundación POLAR – Fundación Instituto Botánico de Venezuela “Dr. Tobías Lasser”. Caracas.
- Pridgeon A., P. Cribb, M. Chase, & F. Rasmussen. 2005. *Genera Orchidacearum: Epidendroideae*. Vol. 4. Oxford University Press, Oxford, Inglaterra.
- Pupulin F. 1998. Orchid florula of Parque Nacional Manuel Antonio, Quepos, Costa Rica. *Revista Biol. Trop.* 46 (4): 961-1031.
- Romero G. 1999. De viaje por las orquídeas. *Analítica*. <http://www.analitica.com/arte/1999.05/leer/pensar.htm>, consultado el 21/06/2008.
- Schweinfurth, C. 1957. Orchidaceae. *in*: J. Steyermark (ed.). *Contributions to the Flora the Venezuela*. *Field. Bot.* 28 (4): 845-871.
- Schultes R. 1967. Orchidaceae. Pp. 13-200 *in*: *Flora of Trinidad y Tobago*. Ministry of Agriculture, Industry and Commerce Trinidad and Tobago (ed.). Vol. 3, parte I. Government Printery Trinidad.
- Steyermark J. 1966. El Cerro Turimiquire y la región oriental adyacente. *Acta Bot. Venez.* 1: 104-168.
- Steyermark J. & G. Agostini. 1967. Exploración botánica del Cerro Patao y zonas adyacentes a Puerto Hierro, en la Península de Paria, Estado Sucre. *Acta Bot. Venez.* 2: 7-80.
- Texera Y. 1991. *La exploración botánica en Venezuela (1754-1950)*. Fondo editorial Acta Científica Venezolana. Caracas.

APÉNDICE I. SELECCIÓN DEL MATERIAL EXAMINADO

- VENEZUELA. **Sucre**. *Acianthera*, *A. lanceana*: municipio Montes, Las Piedras de Cocollar, 31-03-2007, *C. Leopardi et al.* 103 (IRBR). *A. pariaënsis*: municipio Valdez, Península de Paria, Cerro Patao, 19-07-1962, *J. Steyermark* y *G. Agostini* 91087 (VEN). *Beloglottis*, *B. costaricensis*: municipio Cajigal, Yaguaraparo, 18-02-2007, *C. Leopardi et al.* (IRBR). *Brassavola*, *B. cucullata*: municipio Cruz Salmerón Acosta, Guayacán, Península de Araya, 28-01-2006, *C. Leopardi* y *J. Véliz* 01 (IRBR). *Campylocentrum*, *C. micranthum*: municipio Cajigal, Yaguaraparo, 19-02-2007- *C. Leopardi* y *F. Subero* 99 (IRBR). *C. schneeanum*: municipio Mariño, Península de Paria, este de Cerro Humo, 24-02-1980, *J. Steyermark* y *R. Liesner* 121705 (VEN). *Catasetum*, *C. macrocarpum*: municipio Cajigal, Yaguaraparo, 18-02-2007, *C. Leopardi et al.* 76 (IRBR). *C. planiceps*: municipio Montes, Humo Negro, 12-10-2006, *C. Leopardi* y *J. Véliz* 49 (IRBR). *Cattleya*, *C. gaskelliana*: Entre Cerro El Diablo y La Trinidad, 1945, *J. Steyermark* 62765 (VEN). *Caularthron*, *C. bicornutum*: municipio Valdez, Península de Paria, noreste de Puerto Hierro, 05-09-1984, *Milliken et al.* 132 (VEN). *C. bilamellatum*: municipio Cajigal, Yaguaraparo, 17-02-2007, *C. Leopardi et al.* 68 (IRBR). *Chysis*, *C. aurea*: municipio Mariño, Península de Paria, Río Grande, 02-01-1981, *J. Steyermark* S/N (VEN). *Cohniella*, *C. cebolleta*: municipio Sucre, Vega grande, Parque Nacional Mochima, 22-01-1994, *N. Ortega* y *N. Medina* 70 (IRBR). *Cyclopogon*, *C. elatus*: municipio Montes, Las Piedras de Cocollar, 02-04-2007, *C. Leopardi et al.* 129 (IRBR). *Cyrtopodium*: *C. willmorei*: Sabanas entre Sucre y Monagas, 28-04-2007, *C. Leopardi* y *J. Véliz* 140 (IRBR). *Dichaea*, *D. hystrixina*: Sucre sin localidad exacta, S/F, *Sin colector* S/N. (IRBR). *D. latifolia* var *longa*: Sucre sin localidad exacta, S/F, *Sin colector* S/N. (IRBR). *Dimerandra*, *D. emarginata*: municipio Benítez, Río El Pilar, 06-05-2007, *C. Leopardi* y *C. Malavé* 141 (IRBR). *Elleanthus*, *E. arpophyllostachys*: municipio Mariño, Península de Paria, entre Los Pocitos y La Roma, 11-02-1966, *J. Steyermark* y *M. Rabe* 96345 (VEN). *E. furfuraceus*: municipio Montes, Las Piedras de Cocollar, 02-04-2007, *C. Leopardi et al.* 135 (IRBR). *Encyclia*, *E. cordigera*: municipio Cruz Salmerón Acosta, Península de Araya, Guarapo-Oturo, 15-12-1984, *M. y W. Lampe* 28 (IRBR). *E. isochila*: municipio Mariño, Península de Paria, Las Melenas, 01-12-1979, *J. Steyermark* y *R. Liesner* 120828 (VEN). *Epidendrum*, *E. anceps*: municipio Montes, Las Piedras de Cocollar, 01-04-2007, *C. Leopardi et al.* 121 (IRBR). *E. carpophorum*: municipio Montes, Macizo del Turimiquire, (25-31)-03-1995, *L. Cumana et al.* 6202 (IRBR). *E. cernuum*: municipio Montes, Cara norte del Cerro Turimiquire, cerca de la cumbre, (06-08)-05-1945, *J. Steyermark* 62596 (VEN). *E. ciliare* var. *Squamatum*: municipio Cruz Salmerón Acosta, Laguna de Chacopata, , 18-12-2006, *C. Leopardi* y *J. Véliz* 57 (IRBR). *E. coronatum*: municipio Benítez, Río El Pilar, Hacienda El Otro Lado, 06-05-2007, *C. Leopardi* y *C. Malavé* 151 (IRBR). *E. dunstervilleorum*: municipio Mariño, Península de Paria, Cerro Humo, 03-03-1966, *J. Steyermark* 94972 (VEN). *E. ferrugineum*: municipio Mariño, Península de Paria, cerca de Río Seco, 11-08-1967, *V. Carreño* S/N (VEN). *E. miserrimum*: municipio Mariño, Península de Paria, Cerro Humo, entre Los Pocitos y la Roma, 11-08-1966, *J. Steyermark* y *M. Rabe* 96347 (VEN). *E. pseudoramosum*: municipio Mariño, Cerro Humo , S/F, *J. Steyermark* y *M. Rabe* 96325 (VEN). *E. purum*: municipio Mariño, Península de Paria, Manacal, 20-02-1967, *V. Carreño* S/N (VEN). *E. ramosum*, Sucre, S/F, *J. Steyermark et al.* 121724 (MO, no visto). *E. rigidum*: municipio Cajigal, Río Grande, Yaguaraparo, 19-02-2007, *C. Leopardi* y *F. Subero* 92 (IRBR). *E. rostratum*: municipio Cajigal, Península de Paria, 21-02-1980, *J. Steyermark et al.* 121468 (VEN). *E. secundum*: municipio Montes, Río Totucual, El Guamal, macizo montañoso del Turimiquire, (03-06)-08-1993, *L. Cumana et al.* 5011 (IRBR). *E. strobiliferum*: municipio Benítez, Serranía La Paloma, 19-02-1980, *J. Steyermark et al.* 121379 (VEN). *E. vincentinum*: municipio Mariño, Península de Paria, Cerro de Humo, 01-03-1966, *J. Steyermark* 94828 (VEN). *Eulophia*, *E. alta*: municipio Arismendi, Península de Paria, entre Río Grande y Mejillones, 02-08-1961, *L. Aristeguieta* y *G. Agostini* 4792 (VEN). *Gongora*, *G. quinquenervis*: municipio Sucre, Alrededores de Los Altos de Santa Fe, feb-1994, *D. Hamenstein* 1112/92 (VEN). *Govenia*, *G. utriculata*: municipio Montes, Las Piedras de Cocollar, 03-04-2007, *C. Leopardi et al.* 136 (IRBR). *Habenaria*, *H. alata*: municipio Sucre, San Juan de Macarapana, 06-09-2006, *C. Leopardi* y *J. Véliz* 46 (IRBR). *H. bractescens*: municipio Montes, Cerro Grande, La Fragua, 28-09-1974, *W. Lampe* 18 (IRBR). *H. entomantha*: Sucre, sin localidad más exacta, S/C S/N (IRBR). *H. heptadactyla*: municipio Sucre, Bella Vista, Parque Nacional Mochima, 24-08-1990, *L. Cumana* y *J. Véliz* 4418 (IRBR). *H. monorrhiza*: municipio Sucre, La Guayuta (Altos de Santa Fe), 27-12-1990, *L. Cumana* y *P. Cabeza* 4581 (IRBR). *H. obtusa*: municipio Sucre, Bella Vista, Parque Nacional Mochima, 24-08-1990, *L. Cumana* y *J. Véliz* 4472 (IRBR). *H. petalodes*: municipio Mariño, Península de Paria, cumbre Las Estrellas, 30-11-1979, *J. Steyermark* y *R. Liesner* 120715 (VEN). *H. trifida*: municipio Sucre, Cerro imposible, 07-08-2000, *L. Cumana et al.* 6697 (IRBR). *Heterotaxis*, *H. discolor*: municipio Mariño, Mundo Nuevo, oeste de Cerro Humo, 07-08-1966,

- J. Steyermark* y *M. Rabe* 96146 (VEN). **Houlletia**, *H. odoratissima*: municipio Mariño, Península de Paria, Cerro Humo, 04-03-1966, *J. Steyermark* 95020 (VEN). **Huntleya**, *H. lucida*: municipio Valdez, Cerro Patao, norte de Puerto Hierro, S/F, *J. Steyermark* y *G. Agostini* 91387 (VEN). **Isochilus**, *I. linearis*: municipio Montes, Las Piedras de Cocollar, 02-04-2007, *C. Leopardi et al.* 134 (IRBR). **Jacquiiniella**, *J. globosa*: municipio Montes, Cocollar, 04-02-2007, *L. Cumana, et al.* 6978 (IRBR). *J. teretifolia*: municipio Montes, Cerro Turimiquire, 1945, *J. Steyermark* 62663 (VEN). **Laelia**, *L. undulata*: municipio Montes, Adyacencias de Cumanacoa, feb-2007, *R. Coronado S/N* (IRBR). **Leochilus**, *L. labiatus*: municipio Montes, Río Arriba, Las Piedras de Cocollar, 01-04-2007, *C. Leopardi et al.* 108 (IRBR). **Lepanthes**, *L. pariaënsis*: municipio Mariño, Península de Paria, cerca de La Tacarigua, 23-02-1979, *J. Steyermark et al.* 121640 (VEN). **Lepanthes**, *L. pectinata*: municipio Mariño, Península de Paria: Cerro de Humo, 24-02-1980, *J. Steyermark* y *M. Rabe* 96349 (VEN). *L. wagneri*: municipio Mariño, Península de Paria, Cerro Humo, mar-1966, *J. Steyermark* 94819 (VEN). **Lepanthopsis**, *L. astrophora*: municipio Mariño, Península de Paria, Las Melenas, 01-12-1979, *J. Steyermark* y *R. Liesner* 120926 (VEN). **Liparis**, *L. nervosa* subsp. *nervosa*: municipio Sucre, Altos de Santa Fe, 23-07-1990, *L. Cumana* 4133 (IRBR). **Lophiaris**, *L. lanceana*: municipio Benítez, Entre Guaratunos y Los Ajies, *J. Steyermark et al.* 121294 (VEN). *L. lurida*: municipio Mariño, La Montana, cerca Irapa, 23-05-1968, *Carreño S/N* (VEN). **Macroclinium**, *M. wulschlaegelianum*: municipio Mariño, Península de Paria, cercanías de Manacal, S/F, *J. Steyermark* y *R. Liesner* 120628 (VEN). **Masdevallia**, *M. irapana*: Sucre, Venezuela, 05-03-1966. *J. Steyermark* 95079 (AMES, no visto). *M. kyponantha*: municipio Mariño, Península de Paria, Cerro de Humo, 05-03-1966, *J. Steyermark* 95079 (VEN). *M. lansbergii*: entre municipios Mariño y Arismendi, Península de Paria, descendiendo a Las Melenas, feb-1980, *J. Steyermark et al.* 121757 (VEN). **Maxillaria**, *M. brachybulbon*: municipio Mariño, Península de Paria, Cerro de Río Arriba, 09-08-1966, *J. Steyermark* y *M. Rabe* 96206 (VEN). *M. melina*: municipio Cajigal, Península de Paria, 21-02-1980, *J. Steyermark et al.* 121475 (VEN). *M. nasuta*: municipio Valdez, Montaña de Falcón (camino a Los Chorros), Cristobal Colón, S/F, *F. Fernández* 307 (VEN). *M. porrecta*: municipio Mariño, Península de Paria, Cerro Humo, 04-04-1966, *J. Steyermark* 95029-A (VEN). **Microchilus**, *M. paleaceus*: municipio Montes, Las Piedras de Cocollar, 02-04-2007, *C. Leopardi et al.* 133 (IRBR). *M. venezuelanus*: municipio Mariño, Península de Paria, carretera a El Paujil, 20-02-1980, *J. Steyermark et al.* 342151-VEN. (VEN). **Myoxanthus**, *M. exasperatus*: municipio Montes, Turimiquire, (25-31)-03-1995, *L. Cumana et al.* 6151 (IRBR). **Notylia**, *N. rhombilabia*: Sucre, abr-1977, *Carreño S/N* (VEN). **Octomeria**, *O. apiculata*: municipio Valdez, Península de Paria, Cerro Patao, 19-07-1962, *J. Steyermark* y *G. Agostini* 91143 (VEN). **Oeceoclades**, *O. maculata*: municipio Benítez, Río El Pilar, Hacienda El Otro Lado, 06-05-2007, *C. Leopardi* y *C. Malavé* 152 (IRBR). **Oncidium**, *O. klotzschianum*: municipio Cajigal, Península de Paria, 21-02-1980, *J. Steyermark et al.* 121474 (VEN). **Ornithocephalus**, *O. bonplandii*: municipio Sucre, Altos de Santa Fé, 03-04-2007, *Leopardi* 63 (IRBR). **Ornitidium**, *O. patulum*: Entre la parte superior de Río Colorado y Cerro Turimiquire, S/F, *J. Steyermark* 62650 (VEN). **Otoglossum**, *O. globuliferum*: municipio Mariño, camino a Los Pocitos de Santa Isabel, Cerro Humo, 12-07-1972, *G. Morillo* 2591 (VEN). **Otoglossum**, *O. scansor*: municipios Mariño y Arismendi, Península de Paria, 22-02-1980, *J. Steyermark et al.* 121542 (VEN). **Pachyphyllum**, *P. pastii*: municipio Montes, Cerro Turimiquire, 06-05-1945, *J. Steyermark* 62568 (VEN). **Platystele**, *P. oxyglossa*: municipio Mariño, Península de Paria, Cerro Humo, 23-02-1980, *J. Steyermark et al.* 121692 (VEN). *Platystele stenostachya*: municipio Mariño, Península de Paria, Cerro de Humo, oeste de Santa Isabel, mar-1966, *J. Steyermark* 94831-A (VEN). **Pleurothallis**, *P. discoidea*: municipio Mariño, Península de Paria, oeste de Cerro Humo, 07-08-1966, *J. Steyermark* y *M. Rabe* 96419 (VEN). *P. macrophylla*: municipio Mariño, Los Pocitos de Santa Isabel, Cerro de Humo, 12-07-1972, *Morillo* 2610 (VEN). *P. pruinosa*: municipio Sucre, El Guayabito, (20-22)-11-1981, *G. Davidse* y *A. González* 19161 (VEN). *P. revoluta*: municipio Mariño, Península de Paria, cumbre de Las Estrellas, oeste de Manacal, 30-11-1979, *J. Steyermark* y *R. Liesner* 120815 (VEN). *P. ruscifolia*: municipio Mariño, Cerro de Humo, entre Los Pocitos y La Roma, 11-08-1966, *J. Steyermark* y *M. Rabe* 96330 (VEN). *P. aff. secunda*: municipio Montes, Macizo montañoso del Turimiquire, fila La Pesjua, (16-20)-03-1994, *L. Cumana et al.* 5860 (IRBR). *P. velaticaulis*, municipio Montes, Las Piedras de Cocollar, macizo montañoso del Turimiquire, 23-12-2007, *C. Leopardi* 156 (IRBR). **Polystachya**, *P. foliosa*: municipio Cajigal, Yaguaraparo, 19-02-2007, *C. Leopardi* y *F. Subero* 97 (IRBR). **Prostechea**, *P. cochleata*: municipio Montes, Río Totucual – El Guamal, macizo Turimiquire, (03-06)-08-1993, *L. Cumana et al.* 5576 (IRBR). *P. aemula*: municipio Benítez, Río El Pilar, 06-05-2007, *C. Leopardi* y *C. Malavé* 145 (IRBR). *P. livida*: municipio Sucre, Altos de Santa Fe, 21-05-2006, *C. Leopardi S/N* (IRBR). **Psilochilus**, *P. modestus*: municipio Mariño, Península de Paria, entre Manacal y La Cuchilla, 13-08-1966, *J. Steyermark* y *M. Rabe* 96415 (VEN). **Psychopsis**, *P. papilio*, municipio Sucre, Altos de Santa Fe, 22-01-2007, *C. Leopardi* 64. (IRBR). **Psygmorchis**, *P.*

glossomystax: municipio Sucre, Altos de Santa Fe, 22-01-2007, *C. Leopardi 61* (IRBR). *P. pusilla*: municipio Bolívar, Marigüitar, Río Frío, 20-02-1989, *L. Cumana y P. Cabeza 3560* (IRBR). ***Rhettinantha***, *R. notylioglossa*: municipio Valdez, Península de Paria, Cerro Patao, norte de Puerto Hierro, 19-07-1972, *J. Steyermark y G. Agostini 91144* (VEN). ***Rodriguezia***, *R. lanceolata*: municipio Benítez, Río El Pilar, Hacienda El Otro Lado, 06-05-2007, *C. Leopardi y C. Malavé 148* (IRBR). ***Sauvetrea***, *S. aff. alpestris*: municipio Montes, Macizo montañoso del Turimiquire, (25-31)-03-1995, *L. Cumana et al. 6180* (IRBR). ***Scaphosepalum***, *S. breve*: municipio Cajigal, Península de Paria, 21-02-1980, *J. Steyermark et al. 121477* (VEN). ***Scaphyglottis***, *S. grandiflora*: municipio Mariño, Península de Paria, Cerro Humo, entre El Paujil y El Brasil, 11-08-1966, *J. Steyermark y M. Rabe 96351* (VEN). *S. modesta*: municipio Valdez, Península de Paria, Cerro Patao, (25-26)-07-1962, *J. Steyermark y G. Agostini 91393* (VEN). *S. prolifera*: municipio Montes, Palomar, Periquitos-Turimiquire, 10-11-1996, *L. Cumana 6328* (IRBR). *S. reflexa*, municipio Arismendi, Península de Paria, entre La Tacarigua y las cabeceras del Río Tacarigua, 21-02-1980, *J. Steyermark et al. 121465* (VEN). ***Sobralia***, *S. cf. ciliata*: municipio Montes, El Guamal, fila La Pesjua, Macizo Montañoso del Turimiquire, (23-31)-03-1995, *L. Cumana et al. 6208* (IRBR). *S. aff. violacea*: municipio Sucre, Altos de Santa Fe, 22-01-2007, *Leopardi 66* (IRBR). ***Stelis***, *S. argentata*: municipio Sucre, El Guayabito, (20-22)-11-1981, *G. Davidse y A. González 19142* (VEN). *S. papaquerensis*: municipio Mariño, Península de Paria, camino de Los Pocitos de Santa Isabel a La Roma, 12-07-1972, *Dumont et al. VE-7642* (VEN). *S. tristyla*: municipio Mariño, Península de Paria, Las Melenas, 01-12-1979, *J. Steyermark y R. Liesner 120890* (VEN). ***Stenia***, *S. pallida*: municipio Mariño, Península de Paria, Cerro de Humo, 11-08-1966, *J. Steyermark y M. Rabe 96326-A* (VEN). ***Trichosalpinx***, *T. ciliaris*: municipio Cajigal, Península de Paria, entre El Paujil y El Brasil, 21-02-1980, *J. Steyermark et al. 121507* (VEN). *T. intricata*: municipios Mariño y Arismendi, Península de Paria, Las Melenas, 24-02-1980, *J. Steyermark et al. 121757* (VEN). ***Triphora***, *T. gentianoides*: municipio Valdez, Península de Paria, Cerro Patao, 20-07-1962, *J. Steyermark y G. Agostini 67582* (VEN). ***Trizeuxis***, *T. falcata*: municipio Cajigal, Yaguaraparo, 19-02-2007, *C. Leopardi y F. Subero 82* (IRBR). ***Vanilla***, *V. pompona*: municipio Sucre, Sabilar, nov-1984, *Cumana 2596* (IRBR). ***Wulschlaegelia***, *W. calcarata*: municipio Valdez, Península de Paria, Cerro Patao, (25-26)-07-1962, *J. Steyermark y G. Agostini 91334* (VEN). ***Xylobium***, *X. pallidiflorum*: municipio Benítez, Serranía de La Paloma, 19-02-1980, *J. Steyermark et al. 121345* (VEN).

LANKESTERIANA

VEGETATIVE ANATOMY OF CALYPSOEAE (ORCHIDACEAE)

WILLIAM LOUIS STERN¹ & BARBARA S. CARLSWARD^{2,3}

¹Department of Biological Sciences, Biscayne Bay Campus, MSB 357, Florida International University, North Miami, Florida 33181, USA

²Department of Biological Sciences, Eastern Illinois University, Charleston, Illinois 61920-3099, USA

³Corresponding author: bscarlsward@eiu.edu

ABSTRACT. Calypsoeae represent a small tribe of anatomically little-known orchids with a wide distribution in the Western Hemisphere. Leaves are present in all genera, except *Corallorhiza* and *Wulfschlaegelia* both of which are subterranean taxa. Stomata are abaxial (ad- and abaxial in *Aplectrum*) and tetracytic (anomocytic in *Calypso*). Fiber bundles are absent in leaves of all taxa examined except *Govenia tingens*. Stegmata are present in leaves of only *Cremastra* and *Govenia*. Roots are velamentous, except in filiform roots of *Wulfschlaegelia*. Vegetative anatomy supports a relationship between *Wulfschlaegelia* and *Corallorhiza* but does not support the grouping of winter-leaved *Aplectrum* and *Tipularia* nor proposed groupings of genera based on pollinarium features.

ADDITIONAL KEYWORDS: Leaf, stem, root, fiber bundle, velamen, stegmata

Introduction

Calypsoeae (Camus) Dressler [Corallorhizinae in Dressler (1981) except *Calypso*] is a small tribe consisting of approximately 12 genera and 62 species (Freudenstein 2005). Plants are terrestrial, mostly cormous and/or rhizomatous, leafless and rootless in some genera, and usually mycorrhizal. Several of these genera are monotypic or oligotypic, *Govenia* being the richest with about 30 species. Plants are distributed widely from Europe, northern Asia, and North America to tropical Central America and the Caribbean, Brazil, and Argentina. Calypsoeae are absent from Africa, Australia, and islands of the East Indies and Pacific Ocean. *Yuania australis*, a New Zealand endemic, was renamed *Danhatchia australis* by Garay and Christenson, and placed in Cranichideae (Freudenstein 2005).

Little is known of the anatomy of the groups and except for *Corallorhiza* (Carlsward & Stern 2008), *Wulfschlaegelia* (Stern 1999), and to a certain extent *Yuania* (Campbell 1970), only brief mention is made of anatomy for *Aplectrum* by Holm (1904), Solereder & Meyer (1930), Porembski & Barthlott (1988); for *Calypso* by Holm (1904), Møller & Rasmussen (1984), Porembski & Barthlott (1988); for *Corallorhiza* by

Johow (1885), Solereder & Meyer (1930), Møller & Rasmussen (1984); *Govenia* by Pridgeon, Stern & Benzing (1983), Porembski & Barthlott (1988); for *Oreorchis* by Porembski & Barthlott (1988); for *Tipularia* by Holm (1904), Solereder & Meyer (1930), Porembski & Barthlott (1988); and for *Wulfschlaegelia* by Johow (1885), Solereder & Meyer (1930).

The rhizome of *Yuania australis* is covered with scale leaves, but the plant lacks expanded, chlorophyllous leaves (Campbell 1970) as do *Corallorhiza* and *Wulfschlaegelia*. The rhizome has short conical projections bearing long hairs, resembling *Corallorhiza* and *Cremastra*. There is a parenchymatous cortex bounded internally by an endodermis with Casparian strips. Vascular tissue consists of two to six collateral bundles embedded in parenchyma. Among these genera, the only anatomical features of any substantive value are the foliar stegmata in *Cremastra* and *Govenia* reported in this study and the spiranthosomes in cortical parenchyma cells from fusiform roots of *Wulfschlaegelia*, noted by Stern (1999). Other characters occur widely in Orchidaceae.

Two groups of Calypsoeae have been identified based upon the origin of the stalk supporting the pollinia and molecular data (Freudenstein 2005).

Pollinia in *Aplectrum*, *Cremastra*, *Corallorhiza*, *Govenia*, and *Oreorchis* are attached to a stalk (stipe) derived from the apex of the rostellum, i.e., a hamulus. Pollinia in *Calypso*, *Yoania*, and possibly *Changnienia*, are regular, i.e., the stalk is derived from tissues of the anther bed on the column. There is no stalk supporting the pollinia of *Wulfschlaegelia*. Along with *Tipularia*, the last three genera also have spurred lips. Winter leaves appear in *Aplectrum* and *Tipularia*, genera that occur in deciduous woodlands, and depend upon sunlight reaching leaves during winter. This feature may also be indicative of a close relationship between these two genera (Freudenstein 2005).

Material and methods

We had available for study representatives of seven of the 12 genera included in Calypsoeae by Freudenstein (2005). *Corallorhiza* and *Wulfschlaegelia* are treated in two other publications (Stern 1999, Carlsward & Stern 2008). Binomials and authorities, abbreviated according to Brummitt and Powell (1992), representing these genera appear in Table 1, along with organs available for study. Methods and descriptive conventions have appeared in recently published papers (e.g., Stern & Carlsward 2006), and we have followed similar procedures here. "Periclinal" and "anticlinal" have been used as shorthand for "periclinally orientated" and "anticlinally orientated." Plant parts were preserved in FAA (70% ethanol-glacial acetic acid-commercial formalin, 9.0:0.5:0.5) and stored in 70% ethanol. Transverse and longitudinal

sections of leaves and transverse sections of stems and roots were cut unembedded as thinly as possible with a Reichert sliding microtome, stained in Heidenhain's iron-alum hematoxylin, and counter-stained with safranin. Leaf scrapings followed Cutler's method (Cutler 1978) and were stained with safranin. Sections and scrapings were mounted on glass slides with Canada balsam. Observations were made using a Nikon Optiphot microscope, and photographs were taken with a PixeraPro 150es digital camera attached to a Zeiss Axioskop 40 microscope. Measurements of the lengths and widths of ten guard-cell pairs were made, and these are given in Table 2.

Anatomy results

LEAF — *Surface*: HAIRS absent in *Aplectrum*, *Cremastra*, and *Govenia tingens*. In *Calypso* two-celled thin-walled hairs ad- and abaxial, the base embedded among cells in a nest of small epidermal cells; adaxial: basal cell clear, apical cell bulbous, darkly staining (Fig. 1A); abaxial: basal cell much shorter than blunt-tipped darkly staining, elongated apical cell (Fig. 1B). Hairs ad- and abaxial, two-celled in *Govenia superba*, thin-walled arising from a cluster of small epidermal cells; apical cell blunt-tipped. *Tipularia* has two-celled (?) hairs on both leaf surfaces arising from a group of small epidermal cells. Hair bases embedded among epidermal cells. STOMATA abaxial, except ad- and abaxial in *Aplectrum*. Occasionally a few stomata may appear adaxially on leaves in taxa that normally bear abaxial stomata. Stomatal apparatus is

TABLE 1. Species of Calypsoeae studied. L, leaf; S, stem; R, root; Rh, rhizome, C, corm.

Taxon	Collector/Voucher	Parts available
<i>Aplectrum hyemale</i> (Muhl. ex Willd.) Nutt.	B. Carlsward s.n./SEL	L, S, R, Rh, C
<i>Calypso bulbosa</i> (L.) Oakes	R. Halse 7141/OSC	L, S, R, C
<i>Corallorhiza maculata</i> (Raf.) Raf.	K. Chambers 5597/OSC	Rh
<i>C. odontorhiza</i> (Willd.) Nutt.	M. W. Morris & R. Carter 4098/FLAS	Rh
<i>C. wisteriana</i> Conrad	M. W. & M. S. Morris 4102/FLAS	Rh
<i>Cremastra appendiculata</i> (D. Don) Makino	R. Determann s.n./SEL	L, S, R, Rh, C
<i>Govenia superba</i> (La Llave & Lex.) Lindl.	Hort./SEL	L, S, R, C
<i>G. tingens</i> Poepp. & Endl.	W. M. Whitten 91284/FLAS	L, S, R, C
<i>Tipularia discolor</i> (Pursh) Nutt.	W. L. Stern s.n./FLAS	L, S, R, C
<i>Wulfschlaegelia aphylla</i> (Sw.) Rchb.f.	R. L. Dressler 4940/FLAS	S, R
<i>W. calcarata</i> Benth.	R. L. Dressler 4646/FLAS	S, R
<i>W. calcarata</i> Benth.	M. G. Born 41/U	S, R

TABLE 2. Stomatal dimensions (μm)

Taxon	Average		Range	
	Length	Width	Length	Width
<i>Aplectrum hyemale</i> ad.	45	40	42-47	35-45
<i>Aplectrum hyemale</i> ab.	46	39	31-52	32-42
<i>Calypso bulbosa</i>	50	45	42-55	40-50
<i>Cremastra appendiculata</i>	42	35	37-47	27-37
<i>Govenia superba</i>	59	48	50-80	42-50
<i>Govenia tingens</i>	62	52	57-67	47-62
<i>Tipularia discolor</i>	58	45	50-62	37-50

basically tetracytic in *Aplectrum*, *Cremastra*, *Govenia*, and *Tipularia* with a few anomocytic configurations. Lateral cells of the stomatal apparatus in *G. tingens* often elongated serpent-like to intruded between adjoining epidermal cells (Fig. 1C); in *Tipularia* lateral

cells and sometimes apical cells protrude among other epidermal cells. In *Calypso*, stomatal apparatuses entirely anomocytic (Fig. 1D). Guard cells typically reniform and stomata parallel the long axis of the guard-cell pair. Average stomatal lengths range from

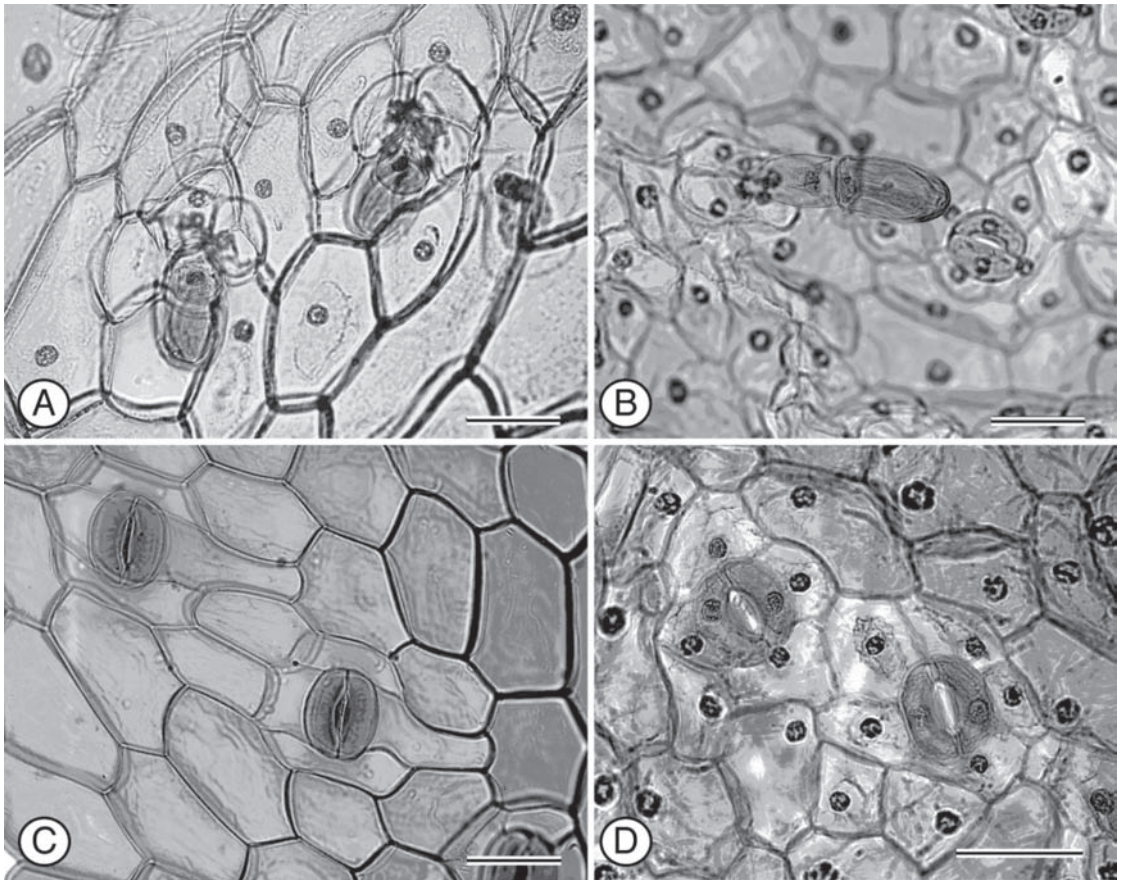


FIGURE 1. Leaf scrapings. Scale bars = 50 μm . A. *Calypso bulbosa*. Adaxial: hairs two-celled, basal cell clear, shorter than dark-staining, bulbous apical cell. B. *Calypso bulbosa*. Abaxial: hairs two-celled, basal cell clear, shorter than dark-staining elongated apical cell. C. *Govenia tingens*. Lateral cells of tetracytic stomatal apparatuses intrude among adjacent epidermal cells. D. *Calypso bulbosa*. Anomocytic stomatal apparatuses.

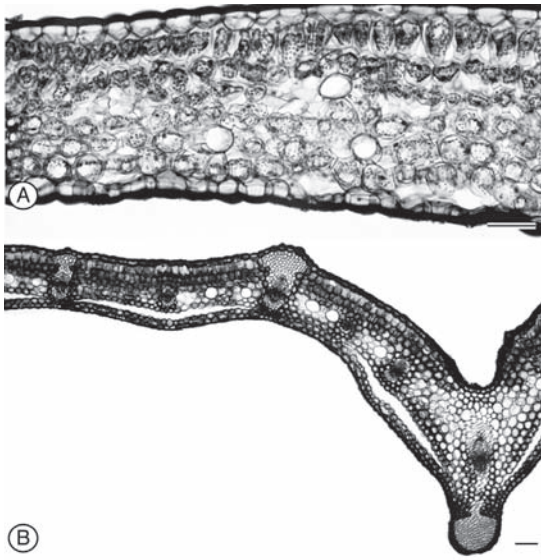


FIGURE 2. T-S leaf. Scale bars = 100 μ m. A. *Tipularia discolor* with chlorophyllous, upright hypodermal cells and spongy mesophyll as in a eudicotyledonous leaf. B. *Aplectrum hyemale*. T-S leaf showing pronounced abaxial mid-vein sclerenchyma, xylem sclerenchyma clusters resulting in adaxial surface ribbing, and crystal idioblasts.

42 μ m in *Cremastra* to 62 μ m in *Govenia tingens* and widths from 39 μ m in *Aplectrum* to 52 μ m in *Govenia tingens*. Epidermal cells polygonal on both surfaces; abaxial cells in *Calypso* may be elongated; walls straight-sided or curvilinear.

Section: CUTICLE smooth, somewhat granulose in *Calypso*; 2.5 μ m to less than 2.5 μ m thick. Epidermal cells mostly isodiametric to periclinal in *Govenia* and to a certain extent in *Tipularia*. STOMATA superficial; substomatal chambers large in *Tipularia*, *Govenia*, and *Calypso*; moderate in *Aplectrum* and *Cremastra*. Stomatal ledges usually poorly defined in section; outer ledges apparent in *Aplectrum*, *Calypso*, *Cremastra*, *Govenia*, and *Tipularia* but most pronounced in *Aplectrum*. Inner ledges obscure but apiculate in *G. tingens* and *Tipularia*. FIBER BUNDLES absent throughout, except in *G. tingens*. HYPODERMIS uniseriate adaxially, cells globose or inflated, sparsely provided with chloroplasts in *Aplectrum*; biseriate adaxially in *Tipularia*, outer layer of more or less inflated upright cells (Fig. 2A), inner layer cells isodiametric;

cells of both layers rich in chloroplasts. Hypodermis absent in *Calypso*, *Cremastra*, and *Govenia*. MESOPHYLL homogeneous, 4-7 cells wide, cells thin-walled, mostly oval and circular with small triangular and polyhedral intercellular spaces; in *Tipularia*, cells and associated intercellular spaces are organized as in a eudicotyledon (Fig. 2A). Raphide-bearing idioblasts circular in TS (Fig. 2B), saccate, blunt-ended in LS. VASCULAR BUNDLES collateral in a single series. In larger vascular bundles of *Aplectrum*, *Cremastra*, and *Govenia* both xylem and phloem subtended by patches of thin-walled sclerenchyma. On the xylem side in *Aplectrum* and *Govenia*, these produce bulges (TS) resulting in ridges on the adaxial leaf surface (Fig. 2B) but not on the phloem side. Midvein in *Aplectrum*, *Cremastra*, and *Govenia* is subtended opposite phloem by a massive cluster of sclerenchyma cells creating a pronounced keel (Fig. 2B). Vascular bundles in *Calypso* not associated with sclerenchyma; in *Tipularia* sclerenchyma is associated only with the xylem. STEGMATA absent from *Aplectrum*, *Calypso*, and *Tipularia* but present in *Cremastra* and *Govenia*. Conical, rough-surfaced silica bodies in stegmata occur along sclerenchyma opposite xylem and phloem in *Cremastra*, along phloem sclerenchyma only in *Govenia*, and associated with fiber bundles in *G. tingens*. Bundle sheath cells circular, thin-walled, and chloroplast-bearing in all taxa; chloroplasts do not occur in some bundle sheath cells of *Calypso*.

STEM — Subterranean storage, perennating, and connective organs (rhizomes) several in Calypsoeae, as noted by Freudenstein (2005), and represented in our research materials. These organs correspond to cauline structure in that vascular bundles, containing adnate strands of xylem and phloem, are associated in a usually parenchymatous matrix. They are arranged in different configurations in contrast with root morphology where conductive tissues are typically concentrated in a central vascular cylinder. There are a rhizome and corm in *Aplectrum* and *Cremastra* and a corm in *Calypso*, *Govenia*, and *Tipularia*. The organizational pattern of each organ is described separately for each taxon.

Aplectrum rhizome — HAIRS none. STOMATA present, superficial, substomatal chamber large.

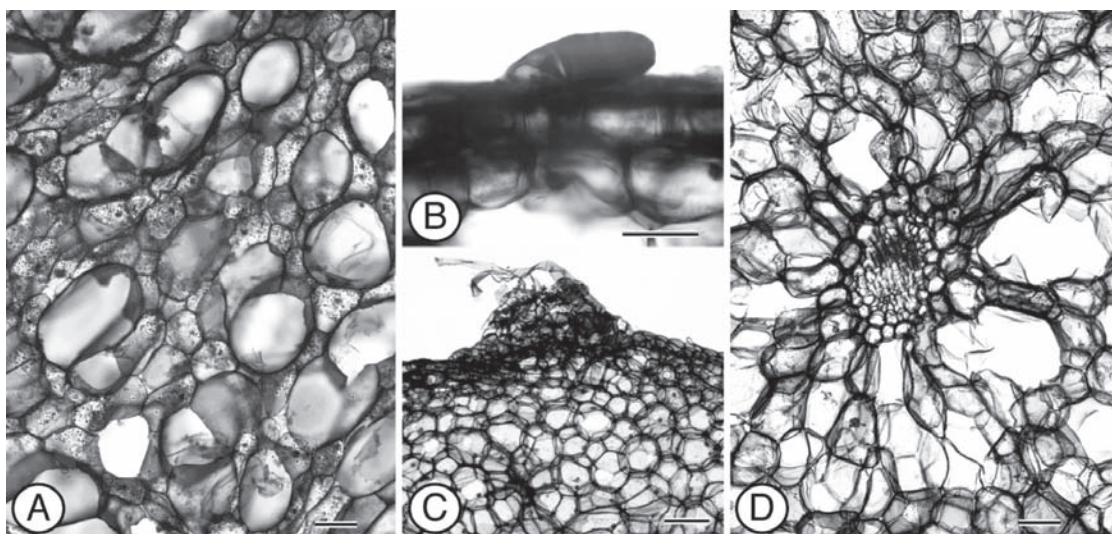


FIGURE 3. T-S underground stem. A. *Aplectrum hyemale* corm with starch grains in smaller, nucleated, assimilatory cells and larger enucleate, water-storage cells under polarized light. Scale bar = 100 μ m. B. *Calypso bulbosa* corm bearing two-celled hairs. Scale bar = 50 μ m. C. *Cremastra appendiculata* rhizome with excrescences bearing tufts of unicellular hairs. Scale bar = 100 μ m. D. *Cremastra appendiculata* corm, vascular bundles surrounded by an endodermis. Scale bar = 100 μ m.

CUTICLE smooth to rugose, 2.5 μ m thick. EPIDERMAL CELLS mostly isodiametric, subtended by a uniseriate HYPODERMIS in some areas; cells larger than epidermal cells but smaller than ground tissue cells. CORTEX none. ENDODERMIS discontinuous around the vascular cylinder; cells isodiametric, entirely thin-walled, lacking intercellular spaces; there are possibly Casparian strips. Presence of a PERICYCLE is questionable. GROUND TISSUE cells thin-walled, circular, oval, and variably shaped; cruciate starch grains in assimilatory cells; thin-walled, circular; enucleate water-storage cells scattered about, intercellular spaces triangular (Fig. 3A). Twenty-five to 30 widely separated VASCULAR BUNDLES distributed within the endodermis surrounded by a parenchymatous matrix of thin-walled, nucleated, small angular cells lacking intercellular spaces. SCLERENCHYMA and STEGMATA absent.

Aplectrum corm — HAIRS and STOMATA none. CUTICLE absent. EPIDERMAL CELLS isodiametric. CORTEX two or three cells wide; cells variably shaped. ENDODERMIS and PERICYCLE absent. GROUND TISSUE with numerous, circular, and elliptical, large enucleate water-storage cells surrounded by much

smaller, variably shaped, numerous assimilatory cells with cruciate starch grains. Intercellular spaces triangular. VASCULAR BUNDLES many, collateral, widely scattered; xylem unitary, binary, trinary in each bundle. SCLERENCHYMA and STEGMATA none.

Calypso corm — HAIRS two-celled, thick-walled, apical cell clavate, darkly-staining (Fig. 3B). STOMATA absent. CUTICLE smooth, 5.0 μ m thick. EPIDERMAL CELLS squarish, isodiametric. HYPODERMIS uniseriate, cells tending toward periclinal. CORTEX, ENDODERMIS, PERICYCLE absent. GROUND TISSUE cells with thick and thin walls, oval, angular and circular; larger, enucleate water-storage cells and smaller, nucleated assimilatory cells lacking starch grains; intercellular spaces few. VASCULAR BUNDLES many, collateral, widely scattered. Xylem arcuate in some bundles, phloem centered in the arms of the arc. SCLERENCHYMA and STEGMATA none.

Cremastra rhizome — HAIRS emerge as tufts of unicellular strands from raised, truncate, pyramidal, multicellular cushions along the periphery of the stem (Fig. 3C). STOMATA and CUTICLE indistinguishable. EPIDERMAL CELLS squarish, isodiametric.

CORTEX many cells wide; cells crowded, various, angular, oval, circular, irregular; walls thickish; water-storage cells circular, empty. Cruciate starch grains in assimilatory cells. ENDODERMAL CELLS surrounding vascular bundles, entirely thin-walled, rectangular, square, some roundish, isodiametric, with Casparian strips (Fig. 3D). PERICYCLE discontinuous, cells like endodermal cells without Casparian strips. GROUND TISSUE of oval and angular thin- and thick-walled parenchyma cells. VASCULAR TISSUE organized as an irregular series of discontinuous arcs in which collateral vascular bundles are interspersed. SCLERENCHYMA and STEGMATA absent.

Cremastra corm — HAIRS and STOMATA absent. CUTICLE none. EPIDERMAL CELLS periclinal. ENDODERMAL CELLS angular, thin-walled, surrounding each vascular bundle. GROUND TISSUE with larger, almost circular, empty, water-storage cells and smaller, thin-walled, oval and variously shaped, assimilatory cells containing cruciate starch grains; intercellular spaces tiny, triangular, and various. VASCULAR BUNDLES many, collateral, scattered. SCLERENCHYMA and STEGMATA absent.

Govenia superba corm — HAIRS and CUTICLE absent. STOMATA present in *G. tingens*, subtended by small substomatal chambers. EPIDERMAL CELLS isodiametric. CORTEX, ENDODERMIS, PERICYCLE none. GROUND TISSUE: Large numbers of wide, circular, thin-walled water-storage cells surrounded by much smaller, thin-walled, oval, rectangular, square, and variously shaped assimilatory cells lacking starch grains. VASCULAR BUNDLES collateral, many, scattered. SCLERENCHYMA and STEGMATA absent.

Tipularia corm — HAIRS, STOMATA, and CUTICLE absent. EPIDERMAL CELLS isodiametric. CORTEX, ENDODERMIS, and PERICYCLE none. GROUND TISSUE of larger, circular, thick-walled water-storage cells and much smaller, irregularly shaped assimilatory cells with cruciate starch grains. Intercellular spaces absent. VASCULAR BUNDLES collateral, many, scattered. SCLERENCHYMA and STEGMATA absent.

ROOT — VELAMEN one cell layer wide in *Aplectrum* (Fig. 4A) and *Govenia*, one or two cell layers wide in *Cremastra*, two cell layers wide in *Calypso* (Fig. 4B), four cell layers wide in *Tipularia* (Fig. 4C). Cells thin-walled without secondary thickenings, isodiametric in *Aplectrum*, *Govenia*, *Cremastra*, and *Tipularia*; epivelamen cells periclinal, endovelamen cells isodiametric in *Calypso*. Unicellular hairs present in all taxa. TILOSOMES absent. EXODERMAL CELLS square and polygonal to anticlinal, thin-walled throughout; passage cells intermittent. CORTEX up to 10 cells wide in *Aplectrum*, 8-10 cells wide in *Calypso*, 7 cells wide in *Cremastra*, 7-9 cells wide in *Govenia*, and 7 or 8 cells wide in *Tipularia*; cells thin-walled. Hyphae, dead cell masses, or clots, and pelotons occur in cortices of all taxa (Fig. 4D) except *Cremastra* and *Govenia tingens*. ENDODERMAL CELLS isodiametric, rectangular in *Cremastra*, periclinal in *Govenia tingens*, entirely thin-walled, Casparian strips in *Aplectrum* and *Tipularia*. PERICYCLE CELLS thin-walled throughout, mostly isodiametric, smaller than endodermal cells. VASCULAR CYLINDER 9-arch in *Aplectrum*, 3-arch in *Calypso* (Fig. 4D), 5-arch in *Cremastra*, 6-arch in *Govenia*, 4-arch in *Tipularia*. Xylem in short rays; cells clustered in *Govenia*; several intramedullary xylem clusters in *Aplectrum*; xylem alternates with groups of phloem cells. Vascular tissue embedded in thin-walled sclerenchyma or thick-walled parenchyma. PITH parenchymatous, sometimes with thick walls in *Aplectrum*; cells polygonal, intercellular spaces absent.

Discussion

Aplectrum stands alone among Calypsoeae, owing to its combination of amphistomatal leaves, lack of foliar hairs, and absence of stigmata. *Calypso*, too, is unique with its exclusively anomocytic stomatal apparatuses, absence of vascular bundle sclerenchyma and lack of stigmata. *Corallorhiza* and *Wulfschlaegelia* are characterized by their leaflessness and subterranean habit. *Govenia tingens* lacks foliar hairs and is the only taxon studied with foliar fiber bundles lined with stigmata. *Wulfschlaegelia* has roots of two distinct kinds, fusiform and filiform. The latter lack a velamen. *Cremastra* lacks hairs on leaves but

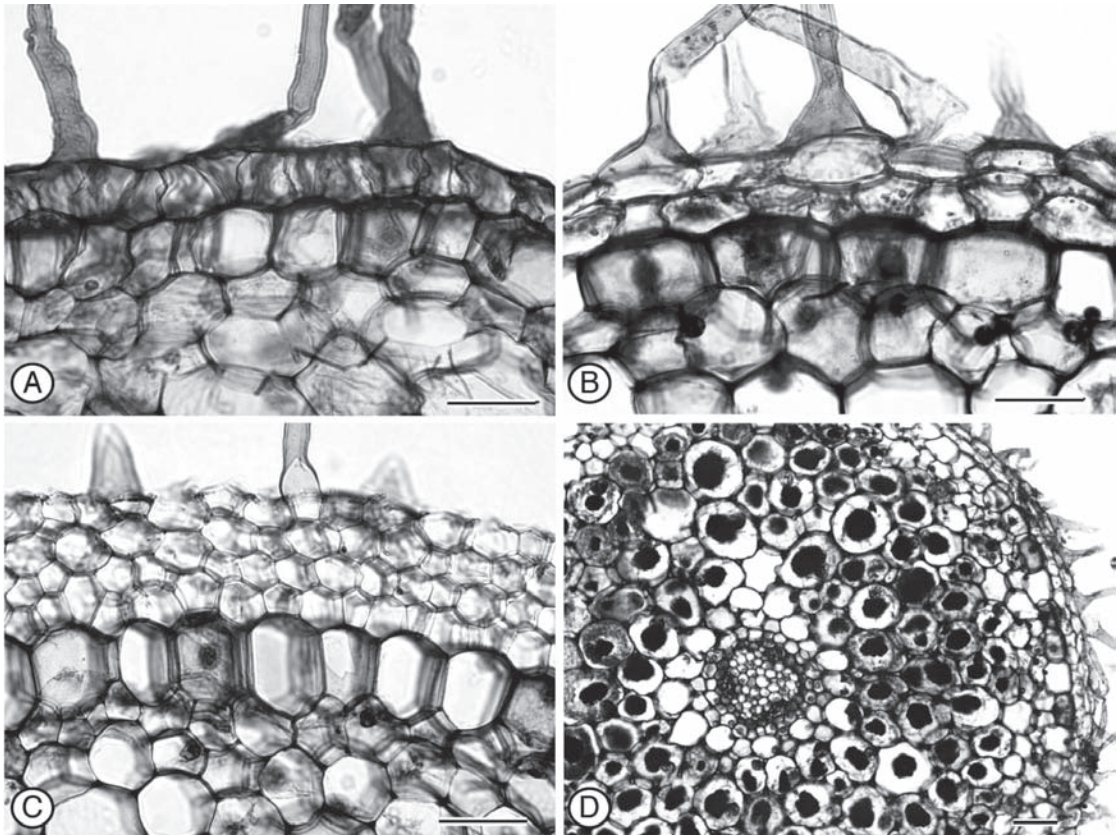


FIGURE 4. T-S root. A. *Aplectrum hyemale* with one-cell wide velamen. B. *Calypso bulbosa* with two-cell-wide velamen. C. *Tipularia discolor* with four-cell-wide velamen. Scale bars = 50 μm . D. *Calypso bulbosa*. T-S root, cortical cells with hyphal pelotons and dead hyphal masses. Triarch vascular cylinder. Scale bar = 100 μm .

has tufts of unicellular hairs that arise from cushions along the rhizome.

Cremastra, *Govenia*, and *Tipularia* have abaxial tetracytic stomata; *Calypso* has mostly abaxial, and a few adaxial anomocytic stomatal apparatuses. Foliar hairs are present on both surfaces in *Calypso*, *Govenia superba*, and *Tipularia*. A foliar hypodermis occurs in *Aplectrum* and *Tipularia*. Sclerenchyma appears along both xylem and phloem sides of vascular bundles in *Aplectrum*, *Cremastra*, and *Govenia*, but only on the xylem side in *Tipularia*. *Govenia* and *Tipularia* have the largest stomatal dimensions; measurements for the other taxa are substantially smaller (Table 2).

Freudenstein (2005) suggested that the appearance of winter leaves in *Aplectrum* and *Tipularia* may be evidence of a close relationship between these two genera. Indeed, among the taxa studied, only these

two are represented by a foliar hypodermis consisting of enlarged, thin-walled, globose or expanded cells with chloroplasts. Evert (2006) observed that cells of the inner layer (s) of a multiple epidermis (i.e., a hypodermis) commonly contain few or no chloroplasts. Indeed, the cells of hypodermises sometimes appear to lack contents entirely, especially when they serve as water-storage cells. In the cases of winter leaves of *Aplectrum* and *Tipularia*, however, the hypodermal cells are chlorophyllous, especially in *Tipularia*. The hypotheses that establish two groups of genera in Calypsoeae, based upon origins of the pollen stipes and presence of spurred lips, cannot be substantiated by vegetative anatomy. Dressler's Wulfschlaegeliaceae (1980) and Lindley's Corallorhizidae (1853) are groupings more congruent with our findings.

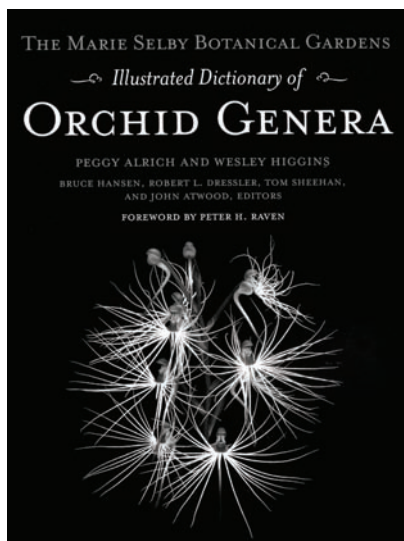
ACKNOWLEDGEMENTS. The authors thank Kenton L. Chambers, Oregon State University, for the superb specimen of *Calypso bulbosa* that he provided for our research. For various facilities and use of research equipment, we acknowledge with appreciation George Bowes and the Department of Botany, University of Florida. David Lee, formerly of Florida International University, provided laboratory space for the early phases of this research. The Kampong of the National Tropical Botanical Garden in Coconut Grove, Florida, provided laboratory room. Finally, we'd like to thank Alec Pridgeon, an anonymous reviewer, and J. Richard Abbott for their help with the manuscript.

LITERATURE CITED

- Brummitt, R. K. & C. E. Powell. 1992. *Authors of plant names*. Royal Botanic Gardens, Kew.
- Campbell, E. O. 1970. The fungal association of *Yuania australis*. *Trans. Roy. Soc. New Zealand* 12: 5-12.
- Carlsward, B. S. & W. L. Stern. 2008. *Corallorhiza*, a rootless, leafless terrestrial. *Orchid Rev.* 116: 334-339.
- Cutler, D. F. 1978. *Applied plant anatomy*. Longman Group Ltd., London.
- Dressler, R. L. 1980. Orchídeas huérfanas I. *Wulfschlaegelia* una nueva tribu Wulfschlaegeliaceae. *Orquídea (Méx.)* 7: 277-282.
- Dressler, R. L. 1981. *The orchids: natural history and classification*. Harvard University Press, Cambridge, Massachusetts.
- Evert, R. F. 2006. *Esau's plant anatomy*. John Wiley & Sons, Hoboken, New Jersey.
- Freudenstein, J. V. 2005. Tribe Calypsoeae. In: A. M. Pridgeon, P. J. Cribb, M. W. Chase, & F. Rasmussen [eds.], *Genera Orchidacearum. Volume 4. Epidendroideae (Part one)*. Oxford University Press, Oxford.
- Holm, T. 1904. The root structure of North American Orchideae. *Amer. J. Sc.*, series 4 18: 197-212.
- Johow, F. 1885. Die chlorophyllfreien Humusbewohner West-Indians, biologisch-morphologisch dargestellt. *Jahrb. Wissensch. Bot.* 16: 415-449.
- Lindley, J. 1853. *The vegetable kingdom*. Bradbury & Evans, London.
- Møller, J. D. & H. Rasmussen. 1984. Stegmata in Orchidales: character state distribution and polarity. *Bot. J. Linn. Soc.* 89: 53-76.
- Poremski, S. & W. Barthlott. 1988. Velamen radicum micromorphology and classification of Orchidaceae. *Nordic J. Bot.* 8: 117-137.
- Pridgeon, A. M., W. L. Stern & D. H. Benzing. 1983. Tilosomes in roots of Orchidaceae: morphology and systematic occurrence. *Amer. J. Bot.* 70: 1365-1377.
- Solereider, H. & F. J. Meyer. 1930. *Systematische Anatomie der Monokotyledonen. VI. Scitamineae-Microspermae*. Verlag von Gebrüder Bornträger, Berlin.
- Stern, W. L. 1999. Comparative vegetative anatomy of two saprophytic orchids from tropical America: *Wulfschlaegelia* and *Uleiorchis*. *Lindleyana* 14: 136-146.
- Stern, W. L. & B. S. Carlsward. 2006. Comparative vegetative anatomy and systematics of Oncidiinae (Maxillareae, Orchidaceae). *Bot. J. Linn. Soc.* 152: 91-107.

BOOK REVIEW

Alrich, P. & W.E. Higgins. 2008. **The Marie Selby Botanical Garden Illustrated Dictionary of Orchid Genera**. Comstock Publishing Association.



As I am listed as one of the editors of this dictionary, I should, perhaps, be disqualified as a reviewer. In my defense, I reviewed an early version of the manuscript, and it has clearly grown and evolved a great deal since I last checked over the list of names.

The authors estimate that there are about 850 accepted generic names treated here, but synonyms, orthographic variants, and names published before 1753 bring the *Dictionary* to more than three times that number. The casual reader might prefer a shorter treatment of the 850 or so valid and accepted names. Some names published before 1753 and never used again are of merely historical interest (if that). However, our understanding of orchid classification is constantly changing with the growth of molecular systematics (analysis of DNA) and continuing study using various other techniques. No one can say which of the validly published names we now consider synonyms may eventually prove to represent distinct groups in need of their own names. By including every generic orchid name or variant ever published (as nearly as is humanly possible), the authors have produced a book that will continue to be useful for many years.

To aid the reader, the validly published names that represent currently accepted genera (from *Aa* to *Zygostates*) are dark green, while paler green is used for validly published names that are not currently in use, and dark purple represents “superfluous” names, orthographic variants are shown in lilac, names published before 1753 are printed in brown, and the few names that (may) represent fossil orchid genera are shown in blue. Further the currently accepted or validly published names are each illustrated by a colored image of a flower.

The *Dictionary* includes an informative profile of the family Orchidaceae by D. H. Benzing, a list of selected references and a list of orchid taxonomists, from Ackerman to Zollinger, a very useful list of book/periodical abbreviations, a brief summary of nomenclatural rules, and a glossary.

The *Dictionary* is attractive and informative, and should continue to be very useful for many years to come.

Robert L. Dressler
Lankester Botanical Garden

INDEX OF NEW TAXA AND COMBINATIONS PUBLISHED IN LANKESTERIANA, VOL. 1—8

BASIDIOMYCOTA

SEPTOBASIDIACEAE

<i>Septobasidium alni</i> Torrend var. <i>brasiliense</i> Couch, var. nov.	4(1): 77. 2004.
<i>Septobasidium alni</i> Torrend var. <i>squamosum</i> Couch, var. nov.	4(1): 77. 2004.
<i>Septobasidium alveomarginatum</i> Couch, sp. nov.	4(1): 77. 2004.
<i>Septobasidium apiculatum</i> Couch, sp. nov.	4(1): 77. 2004.
<i>Septobasidium boedijnii</i> Couch, sp. nov.	4(1): 78. 2004.
<i>Septobasidium boedijnii</i> Couch, sp. nov.	4(1): 78. 2004.
<i>Septobasidium burtii</i> Lloyd var. <i>acerinum</i> Couch, var. nov.	4(1): 78. 2004.
<i>Septobasidium burtii</i> Lloyd var. <i>acerinum</i> Couch, var. nov.	4(1): 78. 2004.
<i>Septobasidium carestianum</i> Bres. var. <i>natalense</i> Couch, var. nov.	4(1): 78. 2004.
<i>Septobasidium carestianum</i> Bres. var. <i>natalense</i> Couch, var. nov.	4(1): 78. 2004.
<i>Septobasidium cervicolor</i> Couch, sp. nov.	4(1): 78. 2004.
<i>Septobasidium cervicolor</i> Couch, sp. nov.	4(1): 78. 2004.
<i>Septobasidium cokeri</i> Couch, sp. nov.	4(1): 80. 2004.
<i>Septobasidium conidiophorum</i> Couch, sp. nov.	4(1): 80. 2004.
<i>Septobasidium cremeum</i> Couch, sp. nov.	4(1): 80. 2004.
<i>Septobasidium crustaceum</i> Couch, sp. nov.	4(1): 80. 2004.
<i>Septobasidium cupressi</i> Couch, sp. nov.	4(1): 81. 2004.
<i>Septobasidium elatostemae</i> Couch, sp. nov.	4(1): 81. 2004.
<i>Septobasidium ficicolum</i> Pat. ex Couch, sp. nov.	4(1): 81. 2004.
<i>Septobasidium filiforme</i> Couch, sp. nov.	4(1): 81. 2004.
<i>Septobasidium formosense</i> Couch, sp. nov.	4(1): 82. 2004.
<i>Septobasidium fragile</i> Couch, sp. nov.	4(1): 82. 2004.
<i>Septobasidium fusco-cinereum</i> Bresadola ex Couch, sp. nov.	4(1): 82. 2004.
<i>Septobasidium fuscum</i> Couch, sp. nov.	4(1): 82. 2004.
<i>Septobasidium grandispinosum</i> Couch, sp. nov.	4(1): 82. 2004.
<i>Septobasidium grandisporum</i> Couch, sp. nov.	4(1): 83. 2004.
<i>Septobasidium griseopurpureum</i> Couch, sp. nov.	4(1): 83. 2004.
<i>Septobasidium griseum</i> Couch, sp. nov.	4(1): 83. 2004.
<i>Septobasidium hakgalanum</i> Couch & Petch, sp. nov.	4(1): 83. 2004.
<i>Septobasidium hesleri</i> Couch, sp. nov.	4(1): 84. 2004.
<i>Septobasidium heveae</i> Couch, sp. nov.	4(1): 84. 2004.
<i>Septobasidium indigophorum</i> Couch, sp. nov.	4(1): 84. 2004.
<i>Septobasidium irregulare</i> Couch, sp. nov.	4(1): 84. 2004.
<i>Septobasidium lacunosum</i> Couch, sp. nov.	4(1): 84. 2004.
<i>Septobasidium lagerheimii</i> Couch, sp. nov.	4(1): 84. 2004.
<i>Septobasidium lepidosaphis</i> Couch, sp. nov.	4(1): 84. 2004.
<i>Septobasidium leprosum</i> Couch, sp. nov.	4(1): 84. 2004.

<i>Septobasidium lilacinoalbum</i> Couch, <i>sp. nov.</i>	4(1): 86. 2004.
<i>Septobasidium linderi</i> Couch, <i>sp. nov.</i>	4(1): 86. 2004.
<i>Septobasidium macadamiae</i> Couch, <i>sp. nov.</i>	4(1): 86. 2004.
<i>Septobasidium mariani</i> (Bres. ex Sacc.) Bres. var. <i>japonicum</i> Couch, <i>var. nov.</i>	4(1): 86. 2004.
<i>Septobasidium molle</i> Couch, <i>sp. nov.</i>	4(1): 87. 2004.
<i>Septobasidium muelleri</i> Couch, <i>sp. nov.</i>	4(1): 87. 2004.
<i>Septobasidium myrsinae</i> Couch, <i>sp. nov.</i>	4(1): 87. 2004.
<i>Septobasidium natalense</i> Couch, <i>sp. nov.</i>	4(1): 87. 2004.
<i>Septobasidium pachydermum</i> Couch, <i>sp. nov.</i>	4(1): 88. 2004.
<i>Septobasidium pallidum</i> Couch, <i>sp. nov. sp. nov.</i>	4(1): 88. 2004.
<i>Septobasidium peckii</i> Couch, <i>sp. nov.</i>	4(1): 88. 2004.
<i>Septobasidium perforatum</i> Couch, <i>sp. nov.</i>	4(1): 88. 2004.
<i>Septobasidium petchii</i> Couch, <i>sp. nov.</i>	4(1): 89. 2004.
<i>Septobasidium philippinense</i> Couch, <i>sp. nov.</i>	4(1): 89. 2004.
<i>Septobasidium piperis</i> P. Henn. ex Couch, <i>sp. nov.</i>	4(1): 89. 2004.
<i>Septobasidium prunophilum</i> Couch, <i>sp. nov.</i>	4(1): 89. 2004.
<i>Septobasidium punctatum</i> Couch, <i>sp. nov.</i>	4(1): 90. 2004.
<i>Septobasidium reikingii</i> Pat. ex Couch, <i>sp. nov.</i>	4(1): 90. 2004.
<i>Septobasidium rickii</i> Couch, <i>sp. nov.</i>	4(1): 90. 2004.
<i>Septobasidium rimulosum</i> Petch & Couch, <i>sp. nov.</i>	4(1): 90. 2004.
<i>Septobasidium rugulosum</i> Couch, <i>sp. nov.</i>	4(1): 90. 2004.
<i>Septobasidium sabalis</i> Couch, <i>sp. nov.</i>	4(1): 90. 2004.
<i>Septobasidium sabalis-minoris</i> Couch, <i>sp. nov.</i>	4(1): 90. 2004.
<i>Septobasidium scabiosum</i> Couch & Petch, <i>sp. nov.</i>	4(1): 90. 2004.
<i>Septobasidium schizostachyi</i> Couch, <i>sp. nov.</i>	4(1): 91. 2004.
<i>Septobasidium sclerotioides</i> Couch, <i>sp. nov.</i>	4(1): 92. 2004.
<i>Septobasidium separans</i> Couch, <i>sp. nov.</i>	4(1): 92. 2004.
<i>Septobasidium simmondsii</i> Couch, <i>sp. nov.</i>	4(1): 92. 2004.
<i>Septobasidium sinense</i> Couch, <i>sp. nov.</i>	4(1): 92. 2004.
<i>Septobasidium sinuosum</i> Couch, <i>sp. nov.</i>	4(1): 93. 2004.
<i>Septobasidium stevensonii</i> Couch, <i>sp. nov.</i>	4(1): 93. 2004.
<i>Septobasidium stratosum</i> Couch, <i>sp. nov.</i>	4(1): 93. 2004.
<i>Septobasidium subcarbonaceum</i> (Berk. & Br.) Couch, <i>comb. nov.</i>	4(1): 93. 2004.
<i>Septobasidium sydowii</i> Couch, <i>sp. nov.</i>	4(1): 94. 2004.
<i>Septobasidium taxodii</i> Couch, <i>sp. nov.</i>	4(1): 94. 2004.
<i>Septobasidium tenue</i> Couch, <i>sp. nov.</i>	4(1): 94. 2004.
<i>Septobasidium tomentosum</i> Couch, <i>sp. nov.</i>	4(1): 94. 2004.
<i>Septobasidium ugandae</i> Couch, <i>sp. nov.</i>	4(1): 95. 2004.
<i>Septobasidium verrucosum</i> Couch, <i>sp. nov.</i>	4(1): 95. 2004.
<i>Septobasidium westonii</i> Couch, <i>sp. nov.</i>	4(1): 95. 2004.

LYCOPHYTA

LYCOPODIACEAE

<i>Huperzia oellgaardii</i> A. Rojas, <i>sp. nov.</i>	5(2): 110. 2005.
---	------------------

PTERYDOPHYTA

BLECHNACEAE

Blechnum fuscusquamosum A. Rojas, **sp. nov.** 5(1): 49. 2005.

CYATHEACEAE

Cnemidaria chiricana (Maxon) R.M. Tryon var. *contigua* (Underw. ex Maxon) A. Rojas, **var. nov.** 5(3): 191. 2005.

Cyathea povedae A. Rojas, **sp. nov.** 5(3): 192. 2005.

Cyathea x *smithiana* A. Rojas. **nothosp. nov.** 5(3): 195. 2005.

DRYOPTERIDACEAE

Polybotrya aureisquama A. Rojas, **sp. nov.** 7(3): 558. 2007.

Polybotrya insularis A. Rojas, **sp. nov.** 7(3): 560. 2007.

Tectaria dressleri A. Rojas, **sp. nov.** 6(1): 15. 2006.

Tectaria x *chaconiana* A. Rojas, **nothosp. nov.** 4(2): 149. 2004.

GRAMMITIDACEAE

Enterosora bishopii A. Rojas, **sp. nov.** 6(1): 9. 2006.

Enterosora enterosoroides (H. Christ) A. Rojas, **comb. nov.** 6(1): 11. 2006.

Lellingeria brenesii A. Rojas, **sp. nov.** 7(3): 553. 2007.

Lellingeria pinnata A. Rojas, **sp. nov.** 6(3): 95. 2006.

Terpsichore glandulifera A. Rojas, **sp. nov.** 6(3): 96. 2006.

HYMENOPHYLLACEAE

Hymenophyllum talamancaum A. Rojas, **sp. nov.** 4(2): 143. 2004.

LOMARIOPSIDACEAE

Elaphoglossum lenticulatum A. Rojas, **sp. nov.** 5(3): 185. 2005.

LYCOPODIACEAE

Huperzia oellgaardii A. Rojas, **sp. nov.** 5(2): 110. 2005.

POLYPODIACEAE

Campyloneurum gracile A. Rojas, **sp. nov.** 5(1): 41. 2005.

SCHIZAEACEAE

Anetium citrifolium (L.) Splitg. var. *pendulum* (Leprieur in Fée) L.D. Gómez, **var. nov.** 6(1): 6. 2006.

SPERMATOPHYTA

ACANTHACEAE

Justicia chaconii Gómez-Laur, **sp. nov.** 6(3): 155. 2006.

APOCYNACEAE

Allotoonia woodsoniana (Monac.) J.F. Morales & J.K. Williams, **comb. nov.** 5(2): 119. 2005.

ASTERACEAE

Neomirandea pendulissima Al. Rodr, **sp. nov.** 5(3): 207. 2005.

CANELLACEAE

Pleodendron costaricense N. Zamora, Hammel & R. Aguilar, **sp. nov.** 5(3): 211. 2005.

DICHAPETALACEAE

- Dichapetalum inopinatum* Al. Rodr. & Kriebel, **sp. nov.** 5(2): 127. 2005.
Dichapetalum reliquum Kriebel & Al. Rodr, **sp. nov.** 5(2): 135. 2005.

FABACEAE-CAESALPINIACEAE

- Swartzia maquenqueana* N. Zamora & D. Solano, **sp. nov.** 6(3): 133. 2006.

GESNERIACEAE

- Drymonia glandulosa* Kriebel, **sp. nov.** 5(1): 81. 2005.
Drymonia tomentulifera Kriebel, **sp. nov.** 6(2): 44. 2006.

LAMIACEAE

- Ruyschia moralesii* Hammel, **sp. nov.** 6(2): 75. 2006.

LAURACEAE

- Licaria leonis* Gómez-Laur. & Estrada, **sp. nov.** 3: 5. 2002.

LENTIBULARIACEAE

- Utricularia uxoris* Gómez-Laur., **sp. nov.** 5(2): 137. 2005.

MARCGRAVIACEAE

- Marcgravia glandulosomarginata* Hammel, **sp. nov.** 6(2): 73. 2006.
Schwartzia tarrazuensis Hammel, **sp. nov.** 6(2): 76. 2006.

MELIACEAE

- Guarea adenophylla* Al. Rodr., **sp. nov.** 6(3): 102. 2006.
Guarea aguilarii Al. Rodr., **sp. nov.** 6(3): 103. 2006.
Guarea ciliata Al. Rodr., **sp. nov.** 6(3): 105. 2006.
Guarea constricta Al. Rodr., **sp. nov.** 6(3): 106. 2006.
Guarea corticosa Al. Rodr., **sp. nov.** 6(3): 107. 2006.
Guarea inesiana Al. Rodr., **sp. nov.** 6(3): 109. 2006.
Guarea macrocalyx Al. Rodr., **sp. nov.** 6(3): 110. 2006.
Guarea montana Al. Rodr., **sp. nov.** 6(3): 111. 2006.
Guarea pilosa Al. Rodr., **sp. nov.** 6(3): 113. 2006.
Guarea tafae-malekui Al. Rodr., **sp. nov.** 6(3): 115. 2006.

MORACEAE

- Ficus lasiosyce* J. A. González & Poveda, **sp. nov.** 8: 13. 2003.

MYRTACEAE

- Eugenia earthiana* P.E. Sánchez, **sp. nov.** 4(3): 179. 2004.
Plinia cuspidata Gómez-Laur. & Valverde, **sp. nov.** 3: 11. 2002.

ORCHIDACEAE

- Acianthera aberrans* Pupulin & Bogarín, **comb. nov.** 8(2): 53. 2008.
Aetheorhyncha Dressler, **gen. nov.** 5(2): 94. 2005.
Aetheorhyncha andreetae (Jenny) Dressler, **comb. nov.** 5(2): 95. 2005.
Benzingia caudata (Ackerman) Dressler, **comb. nov.** 5(2): 93. 2005.

<i>Benzingia cornuta</i> (Garay) Dressler, comb. nov.	5(2): 93. 2005.
<i>Benzingia estradae</i> (Dodson) Dodson, comb. nov.	5(2): 93. 2005.
<i>Benzingia hajekii</i> (D.E. Benn. & Christenson) Dressler, comb. nov.	5(2): 93. 2005.
<i>Benzingia jarae</i> (D.E. Benn. & Christenson) Dressler, comb. nov.	5(2): 93. 2005.
<i>Benzingia palorae</i> (Dodson & Hirtz) Dressler, comb. nov.	5(2): 93. 2005.
<i>Benzingia reichenbachiana</i> (Schltr.) Dressler, comb. nov.	5(2): 93. 2005.
<i>Camaridium alfaroi</i> (Ames & C. Schweinf.) M. A. Blanco, comb. nov.	7(3): 519. 2007.
<i>Camaridium allenii</i> (L. O. Williams) M. A. Blanco, comb. nov.	7(3): 519. 2007.
<i>Camaridium amabile</i> (J. T. Atwood) M. A. Blanco, comb. nov.	7(3): 519. 2007.
<i>Camaridium ampliflorum</i> (C. Schweinf.) M. A. Blanco, comb. nov.	7(3): 519. 2007.
<i>Camaridium anceps</i> (Rchb.f.) M. A. Blanco, comb. nov.	7(3): 519. 2007.
<i>Camaridium atratum</i> (Lex.) M. A. Blanco, comb. nov.	7(3): 519. 2007.
<i>Camaridium aurantiacum</i> (Schltr.) M. A. Blanco, comb. nov.	7(3): 519. 2007.
<i>Camaridium bomboizense</i> (Dodson) M. A. Blanco, comb. nov.	7(3): 519. 2007.
<i>Camaridium brevilabium</i> (Ames & Correll) M. A. Blanco, comb. nov.	7(3): 519. 2007.
<i>Camaridium burgeri</i> (J. T. Atwood) M. A. Blanco, comb. nov.	7(3): 519. 2007.
<i>Camaridium campanulatum</i> (C. Schweinf.) M. A. Blanco, comb. nov.	7(3): 520. 2007.
<i>Camaridium carinulatum</i> (Rchb. f.) M.A. Blanco, comb. nov.	8(1): 15. 2008.
<i>Camaridium cedralense</i> (J. T. Atwood & Mora-Ret.) M. A. Blanco, comb. nov.	7(3): 520. 2007.
<i>Camaridium cucullatum</i> (Lindl.) M. A. Blanco, comb. nov.	7(3): 520. 2007.
<i>Camaridium densum</i> (Lindl.) M. A. Blanco, comb. nov.	7(3): 520. 2007.
<i>Camaridium falcatum</i> (Ames & Correll) M. A. Blanco, comb. nov.	7(3): 520. 2007.
<i>Camaridium fragrans</i> (J. T. Atwood) M. A. Blanco, comb. nov.	7(3): 520. 2007.
<i>Camaridium gomezianum</i> (J. T. Atwood) M. A. Blanco, comb. nov.	7(3): 520. 2007.
<i>Camaridium grisebachianum</i> (Nir & Dod) M. A. Blanco, comb. nov.	7(3): 520. 2007.
<i>Camaridium haberi</i> (J. T. Atwood) M. A. Blanco, comb. nov.	7(3): 520. 2007.
<i>Camaridium hagsaterianum</i> (Soto Arenas) M. A. Blanco, comb. nov.	7(3): 520. 2007.
<i>Camaridium horichii</i> (Senghas) M. A. Blanco, comb. nov.	7(3): 520. 2007.
<i>Camaridium inauditum</i> (Rchb.f.) M. A. Blanco, comb. nov.	7(3): 520. 2007.
<i>Camaridium insolitum</i> (Dressler) M. A. Blanco, comb. nov.	7(3): 520. 2007.
<i>Camaridium lankesteri</i> (Ames) M. A. Blanco, comb. nov.	7(3): 520. 2007.
<i>Camaridium longicolumna</i> (J. T. Atwood) M. A. Blanco, comb. nov.	7(3): 520. 2007.
<i>Camaridium lutheri</i> (J. T. Atwood) M. A. Blanco, comb. nov.	7(3): 520. 2007.
<i>Camaridium meleagris</i> (Lindl.) M. A. Blanco, comb. nov.	7(3): 520. 2007.
<i>Camaridium micranthum</i> M. A. Blanco, nom. nov.	7(3): 520. 2007.
<i>Camaridium microphyton</i> (Schltr.) M. A. Blanco, comb. nov.	7(3): 520. 2007.
<i>Camaridium mombachoense</i> (A. H. Heller ex J. T. Atwood) M. A. Blanco, comb. nov.	7(3): 520. 2007.
<i>Camaridium monteverdense</i> (J. T. Atwood & G. Barboza) M. A. Blanco, comb. nov.	7(3): 521. 2007.
<i>Camaridium neglectum</i> (Schltr.) M. A. Blanco, comb. nov.	7(3): 521. 2007.
<i>Camaridium obscurum</i> (Linden & Rchb.f.) M. A. Blanco, comb. nov.	7(3): 521. 2007.
<i>Camaridium oestlundianum</i> (L. O. Williams) M. A. Blanco, comb. nov.	7(3): 521. 2007.
<i>Camaridium paleatum</i> (Rchb.f.) M. A. Blanco, comb. nov.	7(3): 521. 2007.
<i>Camaridium praestans</i> (Rchb.f.) M. A. Blanco, comb. nov.	7(3): 521. 2007.

<i>Camaridium pygmaeum</i> M. A. Blanco, nom. nov.	7(3): 521. 2007.
<i>Camaridium ramonense</i> (Schltr.) M. A. Blanco, comb. nov.	7(3): 521. 2007.
<i>Camaridium rhombeum</i> (Lindl.) M. A. Blanco, comb. nov.	7(3): 521. 2007.
<i>Camaridium scalariforme</i> (J. T. Atwood) M. A. Blanco, comb. nov.	7(3): 521. 2007.
<i>Camaridium sigmoideum</i> (C. Schweinf.) M. A. Blanco, comb. nov.	7(3): 521. 2007.
<i>Camaridium soconuscanum</i> (Breedlove & D. Mally) M. A. Blanco, comb. nov.	7(3): 521. 2007.
<i>Camaridium standleyi</i> M. A. Blanco, nom. nov.	7(3): 521. 2007.
<i>Camaridium stenophyllum</i> (Schltr.) M. A. Blanco, comb. nov.	7(3): 521. 2007.
<i>Camaridium strumatum</i> (Endres & Rchb.f.) M. A. Blanco, comb. nov.	7(3): 521. 2007.
<i>Camaridium suaveolens</i> (Barringer) M. A. Blanco, comb. nov.	7(3): 521. 2007.
<i>Camaridium synsepalum</i> (J. T. Atwood) M. A. Blanco, comb. nov.	7(3): 521. 2007.
<i>Camaridium tigrinum</i> (C. Schweinf.) M. A. Blanco, comb. nov.	7(3): 521. 2007.
<i>Camaridium tricarinatum</i> (J. T. Atwood) M. A. Blanco, comb. nov.	7(3): 522. 2007.
<i>Camaridium tuberculare</i> (J. T. Atwood) M. A. Blanco, comb. nov.	7(3): 522. 2007.
<i>Camaridium tutae</i> (J. T. Atwood) M. A. Blanco, comb. nov.	7(3): 522. 2007.
<i>Camaridium vaginale</i> (Rchb.f.) M. A. Blanco, comb. nov.	7(3): 522. 2007.
<i>Camaridium valerioi</i> (Ames & C. Schweinf.) M. A. Blanco, comb. nov.	7(3): 522. 2007.
<i>Camaridium vittariifolium</i> (L. O. Williams) M. A. Blanco, comb. nov.	7(3): 522. 2007.
<i>Chondroscaphe endresii</i> (Schltr.) Dressler, comb. nov.	3: 28. 2002.
<i>Christensonella cepula</i> (Rchb.f.) S. Koehler, comb. nov.	7(3): 522. 2007.
<i>Christensonella neowiedii</i> (Rchb.f.) S. Koehler, comb. nov.	7(3): 522. 2007.
<i>Christensonella pacholskii</i> (Christenson) S. Koehler, comb. nov.	7(3): 522. 2007.
<i>Christensonella squamata</i> (Barb. Rodr.) Carnevali, comb. nov.	7(3): 523. 2007.
<i>Coryanthes kaiseriana</i> G. Gerlach, sp. nov.	8: 23. 2003.
<i>Coryanthes maduroana</i> G. Gerlach, sp. nov.	4(1): 70. 2004.
<i>Cryptocentrum</i> Benth. subgenus <i>Anthosiphon</i> (Schltr.) Carnevali, comb. et stat. nov.	7(3): 543. 2007.
<i>Dendrophyllax monteaverdi</i> (Rchb.f.) Ackerman & Nir, comb. nov.	4(1): 53. 2004.
<i>Dichaea elliptica</i> Dressler & Folsom, sp. nov.	3: 25. 2002.
<i>Echinella vittata</i> (Pupulin & M.A. Blanco) Pupulin, comb. nov.	4: 17. 2002.
<i>Echinorhyncha antonii</i> (Ortiz) Dressler, comb. nov.	5(2): 94. 2005.
<i>Echinorhyncha</i> Dressler, gen. nov.	5(2): 94. 2005.
<i>Echinorhyncha ecuadorensis</i> (Dodson) Dressler, comb. nov.	5(2): 94. 2005.
<i>Echinorhyncha litensis</i> (Dodson) Dressler, comb. nov.	5(2): 94. 2005.
<i>Echinorhyncha vollesii</i> (Gerlach, Neudecker & Seeger) Dressler, comb. nov.	5(2): 94. 2005.
<i>Echinosepala vittata</i> (Pupulin & M.A. Blanco) C.O. Murales & N. Villal., comb. nov.	4(3): 202. 2004.
<i>Elleanthus ligularis</i> Dressler & Bogarín, sp. nov.	7(3): 539. 2007.
<i>Encyclia cajalbanensis</i> Mújica, Bocourt & Pupulin, sp. nov.	4(3): 211. 2004.
<i>Encyclia monteverdensis</i> M. A. Díaz & Ackerman, sp. nov.	4(1): 50. 2004.
<i>Epidendrum cancanae</i> (P.Ortiz) Hágsater, comb. nov.	5(1): 73. 2005.
<i>Epidendrum fuscinum</i> (Dressler) Hágsater, comb. nov.	5(1): 73. 2005.
<i>Epidendrum macdougalli</i> (Hágsater) Hágsater, comb. nov.	5(1): 74. 2005.
<i>Epidendrum misasii</i> Hágsater, nom. nov.	5(1): 74. 2005.
<i>Epidendrum montis-narae</i> Pupulin & L. Sánchez S., sp. nov.	1: 7. 2001.

<i>Epidendrum paruimense</i> G. A. Romero & Carnevali, sp. nov.	4(3): 229. 2004.
<i>Epidendrum parviexasperatum</i> (Hágsater) Hágsater, comb. nov.	5(1): 74. 2005.
<i>Epidendrum stolidium</i> Hágsater, nom. nov.	5(1): 74. 2005.
<i>Epidendrum x monteverdense</i> (Pupulin & Hágsater) Hágsater, comb. nov.	5(1): 74. 2005.
<i>Epidendrum zunigae</i> Hágsater, Karremans & Bogarín, sp. nov.	8(2): 63. 2008.
<i>Euryblema</i> Dressler, gen. nov.	5(2): 94. 2005.
<i>Euryblema anatonum</i> (Dressler) Dressler, comb. nov.	5(2): 94. 2005.
<i>Euryblema andreae</i> (Ortiz) Dressler, comb. nov.	5(2): 94. 2005.
<i>Govenia viaria</i> Dressler, sp. nov.	3: 26. 2002.
<i>Guarianthe</i> Dressler & W.E. Higgins, gen. nov.	7: 37. 2003.
<i>Guarianthe aurantiaca</i> (Bateman ex Lindl.) Dressler & W.E. Higgins, comb. nov.	7: 38. 2003.
<i>Guarianthe bowringiana</i> (Veitch) Dressler & W.E. Higgins, comb. nov.	7: 38. 2003.
<i>Guarianthe patinii</i> (Cogn.) Dressler & W.E. Higgins, comb. nov.	7: 38. 2003.
<i>Guarianthe skinneri</i> (Bateman) Dressler & W.E. Higgins, comb. nov.	7: 38. 2003.
<i>Inti</i> M. A. Blanco, gen. nov.	7(3): 524. 2007.
<i>Inti bicalloso</i> (Rchb.f.) M. A. Blanco, comb. nov.	7(3): 524. 2007.
<i>Inti chartacifolia</i> (Ames & C. Schweinf.) M. A. Blanco, comb. nov.	7(3): 524. 2007.
<i>Ixyophora</i> Dressler, gen. nov.	5(2): 95. 2005.
<i>Ixyophora aurantiaca</i> (Senghas & Gerlach) Dressler, comb. nov.	5(2): 95. 2005.
<i>Ixyophora carinata</i> (Ortiz) Dressler, comb. nov.	5(2): 95. 2005.
<i>Ixyophora viridisepala</i> (Senghas) Dressler, comb. nov.	5(2): 95. 2005.
<i>Lankesterella glandula</i> Ackerman, sp. nov.	4(1): 49. 2004.
<i>Lepanthes gerardensis</i> M.A. Blanco, sp. nov.	8: 19. 2003.
<i>Lycaste bruncana</i> Bogarín, sp. nov.	7(3): 543. 2007.
<i>Malaxis brevis</i> Dressler, sp. nov.	4(1): 97. 2004.
<i>Malaxis insperata</i> Dressler, sp. nov.	4(1): 97. 2004.
<i>Malaxis rostratula</i> Dressler, sp. nov.	4(1): 97. 2004.
<i>Malaxis triangularis</i> Dressler, sp. nov.	4(1): 97. 2004.
<i>Mapinguari</i> Carnevali & R. Singer, gen. nov.	7(3): 525. 2007.
<i>Mapinguari auyantepuiensis</i> (Foldats) Carnevali & R. Singer, comb. nov.	7(3): 525. 2007.
<i>Mapinguari desvauxianus</i> (Rchb.f.) Carnevali & R. Singer, comb. nov.	7(3): 525. 2007.
<i>Mapinguari foldatsianus</i> (Carnevali & I. Ramírez) Carnevali & R. Singer, comb. nov.	7(3): 525. 2007.
<i>Mapinguari longipetiolatus</i> (Ames & C. Schweinf.) Carnevali & R. Singer, comb. nov.	7(3): 525. 2007.
<i>Masdevallia vilcabambensis</i> L. Valenz. & Suclli, sp. nov.	8(1): 17. 2008.
<i>Maxillariella</i> M. A. Blanco & Carnevali, gen. nov.	7(3): 527. 2007.
<i>Maxillariella acervata</i> (Rchb.f.) M. A. Blanco & Carnevali, comb. nov.	7(3): 528. 2007.
<i>Maxillariella alba</i> (Hook.f.) M. A. Blanco & Carnevali, comb. nov.	7(3): 528. 2007.
<i>Maxillariella anceps</i> (Ames & C. Schweinf.) M. A. Blanco & Carnevali, comb. nov.	7(3): 528. 2007.
<i>Maxillariella appendiculoides</i> (C. Schweinf.) M. A. Blanco & Carnevali, comb. nov.	7(3): 528. 2007.
<i>Maxillariella arbuscula</i> (Lindl.) M. A. Blanco & Carnevali, comb. nov.	7(3): 528. 2007.
<i>Maxillariella brevifolia</i> (Lindl.) M. A. Blanco & Carnevali, comb. nov.	7(3): 528. 2007.
<i>Maxillariella caespitifica</i> (Rchb.f.) M. A. Blanco & Carnevali, comb. nov.	7(3): 528. 2007.
<i>Maxillariella cassapensis</i> (Rchb.f.) M. A. Blanco & Carnevali, comb. nov.	7(3): 528. 2007.

<i>Maxillariella caucana</i> (Schltr.) M. A. Blanco & Carnevali, comb. nov.	7(3): 528. 2007.
<i>Maxillariella cobanensis</i> (Schltr.) M. A. Blanco & Carnevali, comb. nov.	7(3): 528. 2007.
<i>Maxillariella costaricensis</i> (Schltr.) M. A. Blanco & Carnevali, comb. nov.	7(3): 528. 2007.
<i>Maxillariella curtipes</i> (Hook.) M. A. Blanco & Carnevali, comb. nov.	7(3): 528. 2007.
<i>Maxillariella densifolia</i> (Poepp. & Endl.) M. A. Blanco & Carnevali, comb. nov.	7(3): 528. 2007.
<i>Maxillariella diuturna</i> (Ames & C. Schweinf.) M. A. Blanco & Carnevali, comb. nov.	7(3): 528. 2007.
<i>Maxillariella elatior</i> (Rchb.f.) M. A. Blanco & Carnevali, comb. nov.	7(3): 528. 2007.
<i>Maxillariella estradae</i> (Dodson) M. A. Blanco & Carnevali, comb. nov.	7(3): 528. 2007.
<i>Maxillariella funicaulis</i> (C. Schweinf.) M. A. Blanco & Carnevali, comb. nov.	7(3): 528. 2007.
<i>Maxillariella graminifolia</i> (Kunth) M. A. Blanco & Carnevali, comb. nov.	7(3): 528. 2007.
<i>Maxillariella guareimensis</i> (Rchb.f.) M. A. Blanco & Carnevali, comb. nov.	7(3): 528. 2007.
<i>Maxillariella houtteana</i> (Rchb.f.) M. A. Blanco & Carnevali, comb. nov.	7(3): 528. 2007.
<i>Maxillariella infausta</i> (Rchb.f.) M. A. Blanco & Carnevali, comb. nov.	7(3): 529. 2007.
<i>Maxillariella lawrenceana</i> (Rolfe) M. A. Blanco & Carnevali, comb. nov.	7(3): 529. 2007.
<i>Maxillariella linearifolia</i> (Ames & C. Schweinf.) M. A. Blanco & Carnevali, comb. nov.	7(3): 529. 2007.
<i>Maxillariella longibracteata</i> (Lindl.) M. A. Blanco & Carnevali, comb. nov.	7(3): 529. 2007.
<i>Maxillariella luteorubra</i> (F. Lehm. & Kraenzl.) M. A. Blanco & Carnevali, comb. nov.	7(3): 529. 2007.
<i>Maxillariella mexicana</i> (J. T. Atwood) M. A. Blanco & Carnevali, comb. nov.	7(3): 529. 2007.
<i>Maxillariella microdendron</i> (Schltr.) M. A. Blanco & Carnevali, comb. nov.	7(3): 529. 2007.
<i>Maxillariella nitidula</i> (Rchb.f.) M. A. Blanco & Carnevali, comb. nov.	7(3): 529. 2007.
<i>Maxillariella oreocharis</i> (Schltr.) M. A. Blanco & Carnevali, comb. nov.	7(3): 529. 2007.
<i>Maxillariella pardalina</i> (Garay) M. A. Blanco & Carnevali, comb. nov.	7(3): 529. 2007.
<i>Maxillariella pastensis</i> (Rchb.f.) M. A. Blanco & Carnevali, comb. nov.	7(3): 529. 2007.
<i>Maxillariella ponerantha</i> (Rchb.f.) M. A. Blanco & Carnevali, comb. nov.	7(3): 529. 2007.
<i>Maxillariella procurrens</i> (Lindl.) M. A. Blanco & Carnevali, comb. nov.	7(3): 529. 2007.
<i>Maxillariella prolifera</i> (Sw.) M. A. Blanco & Carnevali, comb. nov.	7(3): 529. 2007.
<i>Maxillariella purpurata</i> (Lindl.) M. A. Blanco & Carnevali, comb. nov.	7(3): 529. 2007.
<i>Maxillariella robusta</i> (Barb. Rodr.) M. A. Blanco & Carnevali, comb. nov.	7(3): 529. 2007.
<i>Maxillariella sanguinea</i> (Rolfe) M. A. Blanco & Carnevali, comb. nov.	7(3): 529. 2007.
<i>Maxillariella spilotantha</i> (Rchb.f.) M. A. Blanco & Carnevali, comb. nov.	7(3): 529. 2007.
<i>Maxillariella stenophylla</i> (Rchb.f.) M. A. Blanco & Carnevali, comb. nov.	7(3): 530. 2007.
<i>Maxillariella stictantha</i> (Schltr.) M. A. Blanco & Carnevali, comb. nov.	7(3): 530. 2007.
<i>Maxillariella tenuifolia</i> (Lindl.) M. A. Blanco & Carnevali, comb. nov.	7(3): 530. 2007.
<i>Maxillariella tuerckheimii</i> (Schltr.) M. A. Blanco & Carnevali, comb. nov.	7(3): 530. 2007.
<i>Maxillariella variabilis</i> (Bateman ex Lindl.) M. A. Blanco & Carnevali, comb. nov.	7(3): 530. 2007.
<i>Maxillariella vinosa</i> (Rolfe) M. A. Blanco & Carnevali, comb. nov.	7(3): 530. 2007.
<i>Maxillariella vulcanica</i> (F. Lehm. & Kraenzl.) M. A. Blanco & Carnevali, comb. nov.	7(3): 530. 2007.
<i>Maxillariella xucatanensis</i> (Carnevali & R. Jiménez) M. A. Blanco & Carnevali, comb. nov.	7(3): 530. 2007.
<i>Maxillariella xanthorhoda</i> (Schltr.) M. A. Blanco & Carnevali, comb. nov.	7(3): 530. 2007.
<i>Mormolyca acutifolia</i> (Lindl.) M. A. Blanco, comb. nov.	7(3): 531. 2007.
<i>Mormolyca aureoglobula</i> (Christenson) M. A. Blanco, comb. nov.	7(3): 531. 2007.
<i>Mormolyca chacoensis</i> (Dodson) M. A. Blanco, comb. nov.	7(3): 531. 2007.
<i>Mormolyca cleistogama</i> (Brieger & Illg) M. A. Blanco, comb. nov.	7(3): 531. 2007.

<i>Mormolyca dressleriana</i> (Carnevali & J. T. Atwood) M. A. Blanco, comb. nov.	7(3): 531. 2007.
<i>Mormolyca hedwigiae</i> (Hamer & Dodson) M. A. Blanco, comb. nov.	7(3): 531. 2007.
<i>Mormolyca lehmanii</i> (Rolfe) M. A. Blanco, comb. nov.	7(3): 531. 2007.
<i>Mormolyca moralesii</i> (Carnevali & J. T. Atwood) M. A. Blanco, comb. nov.	7(3): 531. 2007.
<i>Mormolyca pudica</i> (Carnevali & Tapia-Muñoz) M. A. Blanco, comb. nov.	7(3): 531. 2007.
<i>Mormolyca richii</i> (Dodson) M. A. Blanco, comb. nov.	7(3): 531. 2007.
<i>Mormolyca rufescens</i> (Lindl.) M. A. Blanco, comb. nov.	7(3): 531. 2007.
<i>Mormolyca sanantonioensis</i> (Christenson) M. A. Blanco, comb. nov.	7(3): 531. 2007.
<i>Mormolyca schlimii</i> (Linden & Rchb.f.) M. A. Blanco, comb. nov.	7(3): 531. 2007.
<i>Mormolyca sotoana</i> (Carnevali & Gómez-Juárez) M. A. Blanco, comb. nov.	7(3): 531. 2007.
<i>Mormolyca suarezorum</i> (Dodson) M. A. Blanco, comb. nov.	7(3): 531. 2007.
<i>Mormolyca tenuibulba</i> (Christenson) M. A. Blanco, comb. nov.	7(3): 531. 2007.
<i>Myoxanthus vittatus</i> Pupulin & M.A. Blanco, sp. nov.	2: 16. 2001.
<i>Oerstedella x monteverdensis</i> Pupulin & Hágsater, sp. nov.	8: 32. 2003.
<i>Oncidium zelenkoanum</i> Dressler & Pupulin, sp. nov.	8: 37. 2003.
<i>Ornithidium adendrobium</i> (Rchb.f.) M. A. Blanco & Ojeda, comb. nov.	7(3): 532. 2007.
<i>Ornithidium affine</i> (Poepp. & Endl.) M. A. Blanco & Ojeda, comb. nov.	7(3): 532. 2007.
<i>Ornithidium cachacoense</i> (J. T. Atwood) M. A. Blanco & Ojeda, comb. nov.	7(3): 532. 2007.
<i>Ornithidium canarense</i> (J. T. Atwood) M. A. Blanco & Ojeda, comb. nov.	7(3): 532. 2007.
<i>Ornithidium condorense</i> (J. T. Atwood) M. A. Blanco & Ojeda, comb. nov.	7(3): 532. 2007.
<i>Ornithidium fasciculatum</i> (C. Schweinf.) M.A. Blanco & I. Ojeda, comb. nov.	8(1): 15. 2008.
<i>Ornithidium fimbriatilobum</i> (Carnevali & G. A. Romero) M. A. Blanco & Ojeda, comb. nov.	7(3): 532. 2007.
<i>Ornithidium gualaquicense</i> (Dodson) M. A. Blanco & Ojeda, comb. nov.	7(3): 532. 2007.
<i>Ornithidium haemathodes</i> (Ruiz & Pav.) M. A. Blanco & Ojeda, comb. nov.	7(3): 532. 2007.
<i>Ornithidium lasallei</i> (Foldats) M. A. Blanco & Ojeda, comb. nov.	7(3): 532. 2007.
<i>Ornithidium machinazense</i> (D. E. Benn. & Christenson) M. A. Blanco, comb. nov.	7(3): 532. 2007.
<i>Ornithidium maldonadoense</i> (J. T. Atwood) M. A. Blanco & Ojeda, comb. nov.	7(3): 532. 2007.
<i>Ornithidium minutiflorum</i> (D. E. Benn. & Christenson) M. A. Blanco & Ojeda, comb. nov.	7(3): 533. 2007.
<i>Ornithidium nicaraguense</i> (Hamer & Garay) M. A. Blanco & Ojeda, comb. nov.	7(3): 533. 2007.
<i>Ornithidium oxapampense</i> (J. T. Atwood) M. A. Blanco & Ojeda, comb. nov.	7(3): 533. 2007.
<i>Ornithidium patellum</i> (J. T. Atwood) M. A. Blanco & Ojeda, comb. nov.	7(3): 533. 2007.
<i>Ornithidium patulum</i> (C. Schweinf.) M. A. Blanco & Ojeda, comb. nov.	7(3): 533. 2007.
<i>Ornithidium pseudonubigenum</i> (J. T. Atwood) M. A. Blanco & Ojeda, comb. nov.	7(3): 533. 2007.
<i>Ornithidium pustulosum</i> (J. T. Atwood) M. A. Blanco & Ojeda, comb. nov.	7(3): 533. 2007.
<i>Ornithidium rauhii</i> (D. E. Benn. & Christenson) M. A. Blanco & Ojeda, comb. nov.	7(3): 533. 2007.
<i>Ornithidium repens</i> (L. O. Williams) M. A. Blanco & Ojeda, comb. nov.	7(3): 533. 2007.
<i>Ornithidium rigidum</i> (Barb. Rodr.) M. A. Blanco & Ojeda, comb. nov.	7(3): 533. 2007.
<i>Ornithidium scandens</i> (D. E. Benn. & Christenson) M. A. Blanco & Ojeda, comb. nov.	7(3): 533. 2007.
<i>Ornithidium scullianum</i> (J. T. Atwood) M. A. Blanco & Ojeda, comb. nov.	7(3): 533. 2007.
<i>Ornithidium sillarense</i> (Dodson & Vásquez) M. A. Blanco & Ojeda, comb. nov.	7(3): 533. 2007.
<i>Ornithidium simplex</i> (J. T. Atwood) M. A. Blanco & Ojeda, comb. nov.	7(3): 533. 2007.
<i>Palmorchis eidae</i> Dressler, sp. nov.	3: 26. 2002.
<i>Paphinia vermiculifera</i> G. Gerlach & Dressler, sp. nov.	8: 27. 2003.

<i>Pescatorea ecuadorana</i> (Dodson) Dressler, comb. nov.	5(2): 95. 2005.
<i>Pescatorea hemixantha</i> (Rchb.f.) Dressler, comb. nov.	5(2): 95. 2005.
<i>Pescatorea hirtzii</i> (Waldvogel) Dressler, comb. nov.	5(2): 95. 2005.
<i>Pescatorea lalindei</i> (Linden) Dressler, comb. nov.	5(2): 95. 2005.
<i>Pescatorea lawrenceana</i> (Rchb.f.) Dressler, comb. nov.	5(2): 95. 2005.
<i>Pescatorea pulvinaris</i> (Rchb.f.) Dressler, comb. nov.	5(2): 95. 2005.
<i>Pescatorea violacea</i> (Lindl.) Dressler, comb. nov.	5(2): 95. 2005.
<i>Phragmipedium andreettae</i> P.J.Cribb & Pupulin, sp. nov.	6(1): 1. 2006.
<i>Phragmipedium manzurii</i> W.E. Higgins & P. Viveros, sp. nov.	8(3): 89. 2008.
<i>Pleurothallis grammata</i> Dressler, nom. nov.	3: 28. 2002.
<i>Polycycnis blancoi</i> G. Gerlach, sp. nov.	4(1): 67. 2004.
<i>Prosthechea micropus</i> (Rchb.f.) W.E. Higgins, comb. nov.	4(3): 223. 2004.
<i>Prosthechea tardiflora</i> Mora-Retana ex Pupulin, sp. nov.	3: 23. 2002.
<i>Rhetinantha</i> M. A. Blanco, gen. nov.	7(3): 534. 2007.
<i>Rhetinantha aciantha</i> (Rchb.f.) M. A. Blanco, comb. nov.	7(3): 534. 2007.
<i>Rhetinantha acuminata</i> (Lindl.) M. A. Blanco, comb. nov.	7(3): 534. 2007.
<i>Rhetinantha cerifera</i> (Barb. Rodr.) M. A. Blanco, comb. nov.	7(3): 534. 2007.
<i>Rhetinantha divaricata</i> (Barb. Rodr.) M. A. Blanco, comb. nov.	7(3): 534. 2007.
<i>Rhetinantha encycloides</i> (J. T. Atwood & Dodson) M. A. Blanco, comb. nov.	7(3): 534. 2007.
<i>Rhetinantha friedrichsthalii</i> (Rchb.f.) M. A. Blanco, comb. nov.	7(3): 534. 2007.
<i>Rhetinantha mariaisabeliae</i> (J. T. Atwood) M. A. Blanco, comb. nov.	7(3): 534. 2007.
<i>Rhetinantha monacensis</i> (Kraenzl.) M. A. Blanco, comb. nov.	7(3): 534. 2007.
<i>Rhetinantha neilii</i> (Dodson) M. A. Blanco, comb. nov.	7(3): 534. 2007.
<i>Rhetinantha notyloglossa</i> (Rchb.f.) M. A. Blanco, comb. nov.	7(3): 535. 2007.
<i>Rhetinantha ophioidens</i> (J. T. Atwood) M. A. Blanco, comb. nov.	7(3): 535. 2007.
<i>Rhetinantha pastorellii</i> (D. E. Benn. & Christenson) M. A. Blanco, comb. nov.	7(3): 535. 2007.
<i>Rhetinantha schistostele</i> (Schltr.) M. A. Blanco, comb. nov.	7(3): 535. 2007.
<i>Rhetinantha scorpioidea</i> (Kraenzl.) M. A. Blanco, comb. nov.	7(3): 535. 2007.
<i>Rhetinantha witsenioides</i> (Schltr.) M. A. Blanco, comb. nov.	7(3): 535. 2007.
<i>Sauvetea bomboizensis</i> (Dodson) M. A. Blanco, comb. nov.	7(3): 535. 2007.
<i>Sauvetea bomboizensis</i> (Dodson) M.A. Blanco, comb. nov.	8(1): 15. 2008.
<i>Sauvetea chicana</i> (Dodson) M. A. Blanco, comb. nov.	7(3): 535. 2007.
<i>Sauvetea cornuta</i> (C. Schweinf.) M. A. Blanco, comb. nov.	7(3): 535. 2007.
<i>Sauvetea laevilabris</i> (Lindl.) M. A. Blanco, comb. nov.	7(3): 535. 2007.
<i>Sauvetea machupicchuensis</i> (Christenson) M. A. Blanco, comb. nov.	7(3): 535. 2007.
<i>Sauvetea napoensis</i> (Dodson) M. A. Blanco, comb. nov.	7(3): 535. 2007.
<i>Sauvetea sessilis</i> (Lindl.) M. A. Blanco, comb. nov. comb. nov.	7(3): 535. 2007.
<i>Sauvetea trigona</i> subsp. <i>amaroensis</i> (D. E. Benn. & Christenson) M. A. Blanco, comb. nov.	7(3): 535. 2007.
<i>Scaphyglottis bidentata</i> (Lindl.) Dressler, comb. nov.	3: 28. 2002.
<i>Scaphyglottis cuniculata</i> (Schltr.) Dressler, comb. nov.	3: 28. 2002.
<i>Scaphyglottis imbricata</i> (Lindl.) Dressler, comb. nov.	3: 28. 2002.
<i>Sobralia gloriana</i> Dressler, sp. nov.	5: 11. 2002.
<i>Sobralia nutans</i> Dressler, sp. nov.	5: 13. 2002.

<i>Sobralia mariannae</i> Dressler, <i>sp. nov.</i>	5: 13. 2002.
<i>Sobralia crispissima</i> Dressler, <i>sp. nov.</i>	5: 10. 2002.
<i>Sobralia quinata</i> Dressler, <i>sp. nov.</i>	6: 27. 2003.
<i>Solenidium portillae</i> Dalström & Whitten, <i>sp. nov.</i>	6: 1. 2003.
<i>Stanhopea confusa</i> G.Gerlach & Beeche, <i>sp. nov.</i>	4(3): 217. 2004.
<i>Stanhopea manriquei</i> Jenny & Nauray, <i>sp. nov.</i>	4(2): 109. 2004.
<i>Stanhopea naurayi</i> Jenny, <i>sp. nov.</i>	5(1): 77. 2005.
<i>Stelis megachlamys</i> (Schltr.) Pupulin, <i>nom. nov.</i>	4: 74. 2002.
<i>Stellilabium erratum</i> Dressler, <i>sp. nov.</i>	2: 11. 2001.
<i>Stellilabium smaragdinum</i> Pupulin & M.A. Blanco, <i>sp. nov.</i>	5: 28. 2002.
<i>Stenia falcata</i> (Ackerman) Dressler, <i>comb. nov.</i>	5(2): 93. 2005.
<i>Stenotyla</i> Dressler, <i>gen. nov.</i>	5(2): 96. 2005.
<i>Stenotyla lankesteriana</i> (Pupulin) Dressler, <i>comb. nov.</i>	5(2): 96. 2005.
<i>Stenotyla lendyana</i> (Rchb.f.) Dressler, <i>comb. nov.</i>	5(2): 96. 2005.
<i>Stenotyla picta</i> (Rchb.f.) Dressler, <i>comb. nov.</i>	5(2): 96. 2005.
<i>Telipogon acicularis</i> (Dressler) N.H. Williams & Dressler, <i>comb. nov.</i>	5(3): 168. 2005.
<i>Telipogon alexii</i> N.H. Williams & Dressler, <i>nom. nov.</i>	5(3): 170. 2005.
<i>Telipogon alticola</i> (Dodson & R. Escobar) N.H. Williams & Dressler, <i>comb. nov.</i>	5(3): 168. 2005.
<i>Telipogon anacristinae</i> (Pupulin) N.H. Williams & Dressler, <i>comb. nov.</i>	5(3): 168. 2005.
<i>Telipogon andinus</i> (L.O. Williams) N.H. Williams & Dressler, <i>comb. nov.</i>	5(3): 168. 2005.
<i>Telipogon barbozae</i> (J.T. Atwood & Dressler) N.H. Williams & Dressler, <i>comb. nov.</i>	5(3): 169. 2005.
<i>Telipogon bennettii</i> (Dodson & R. Escobar) N.H. Williams & Dressler, <i>comb. nov.</i>	5(3): 169. 2005.
<i>Telipogon bergoldii</i> (Garay & Dunst.) N.H. Williams & Dressler, <i>comb. nov.</i>	5(3): 169. 2005.
<i>Telipogon boliviensis</i> (R. Vásquez & Dodson) N.H. Williams & Dressler, <i>comb. nov.</i>	5(3): 169. 2005.
<i>Telipogon boylei</i> (J.T. Atwood) N.H. Williams & Dressler, <i>comb. nov.</i>	5(3): 169. 2005.
<i>Telipogon bullpenensis</i> (J.T. Atwood) N.H. Williams & Dressler, <i>comb. nov.</i>	5(3): 169. 2005.
<i>Telipogon butchii</i> N.H. Williams & Dressler, <i>nom. nov.</i>	5(3): 169. 2005.
<i>Telipogon calueri</i> N.H. Williams & Dressler, <i>nom. nov.</i>	5(3): 170. 2005.
<i>Telipogon campbelliorum</i> (J.T. Atwood) N.H. Williams & Dressler, <i>comb. nov.</i>	5(3): 169. 2005.
<i>Telipogon distantiflorus</i> (Ames & C. Schweinf.) N.H. Williams & Dressler, <i>comb. nov.</i>	5(3): 169. 2005.
<i>Telipogon embreei</i> N.H. Williams & Dressler, <i>nom. nov.</i>	5(3): 170. 2005.
<i>Telipogon erratus</i> (Dressler) N.H. Williams & Dressler, <i>comb. nov.</i>	5(3): 169. 2005.
<i>Telipogon fortuneae</i> (Dressler) N.H. Williams & Dressler, <i>comb. nov.</i>	5(3): 169. 2005.
<i>Telipogon helleri</i> (L.O. Williams) N.H. Williams & Dressler, <i>comb. nov.</i>	5(3): 170. 2005.
<i>Telipogon hystrix</i> (Dodson) N.H. Williams & Dressler, <i>comb. nov.</i>	5(3): 170. 2005.
<i>Telipogon ibischii</i> (R. Vásquez) N.H. Williams & Dressler, <i>comb. nov.</i>	5(3): 170. 2005.
<i>Telipogon jostii</i> (Dodson) N.H. Williams & Dressler, <i>comb. nov.</i>	5(3): 170. 2005.
<i>Telipogon microglossus</i> (Schltr.) N.H. Williams & Dressler, <i>comb. nov.</i>	5(3): 170. 2005.
<i>Telipogon monteverdensis</i> (J.T. Atwood) N.H. Williams & Dressler, <i>comb. nov.</i>	5(3): 170. 2005.
<i>Telipogon morganiae</i> (Dodson) N.H. Williams & Dressler, <i>comb. nov.</i>	5(3): 170. 2005.
<i>Telipogon morii</i> (Dressler) N.H. Williams & Dressler, <i>comb. nov.</i>	5(3): 170. 2005.
<i>Telipogon niri</i> Ackerman, <i>sp. nov.</i>	4(1): 48. 2004.
<i>Telipogon ortizii</i> N.H. Williams & Dressler, <i>nom. nov.</i>	5(3): 169. 2005.

<i>Telipogon pampatamboensis</i> (Dodson & R. Vásquez) N.H. Williams & Dressler, comb. nov.	5(3): 170. 2005.
<i>Telipogon perlobatus</i> (Senghas) N.H. Williams & Dressler, comb. nov.	5(3): 170. 2005.
<i>Telipogon pseudobulbosus</i> (D.E. Benn. & Christenson) N.H. Williams & Dressler, comb. nov.	5(3): 71. 2005.
<i>Telipogon reventadorensis</i> N.H. Williams & Dressler, nom. nov.	5(3): 171. 2005.
<i>Telipogon roberti</i> N.H. Williams & Dressler, nom. nov.	5(3): 171. 2005.
<i>Telipogon selbyanus</i> N.H. Williams & Dressler, nom. nov.	5(3): 171. 2005.
<i>Telipogon smaragdinus</i> (Pupulin & M.A. Blanco) N.H. Williams & Dressler, comb. nov.	5(3): 171. 2005.
<i>Telipogon tanii</i> (Dodson) N.H. Williams & Dressler, comb. nov.	5(3): 171. 2005.
<i>Telipogon tsipiriensis</i> (Pupulin) N.H. Williams & Dressler, comb. nov.	5(3): 171. 2005.
<i>Trichopilia x ramonensis</i> J. García & Mora-Ret. ex C.O. Murales, nothosp. nov.	5: 18. 2002.
<i>Warczewiczella guianensis</i> (Lafontaine, Gerlach & Senghas) Dressler, comb. nov.	5(2): 96. 2005.
<i>Warczewiczella lobata</i> (Garay) Dressler, comb. nov.	5(2): 96. 2005.
<i>Warczewiczella palatina</i> (Senghas) Dressler, comb. nov.	5(2): 96. 2005.

RHAMNACEAE

<i>Krugiodendron acuminatum</i> J. A. González & Poveda, sp. nov.	8: 16. 2003.
--	--------------

RUBIACEAE

<i>Hoffmannia stephaniae</i> L.A. González & Poveda, sp. nov.	4(3): 183. 2004.
--	------------------

RUTACEAE

<i>Amyris magnifolia</i> Gómez-Laur. & Q. Jiménez, sp. nov.	6: 5. 2003.
--	-------------

SCROPHULARIACEAE

<i>Gibsoniothamnus ficticius</i> J. F. Morales, sp. nov.	4(1): 2. 2004.
---	----------------

STERCULIACEAE

<i>Byttneria osaënsis</i> Cristóbal, sp. nov.	4(3): 175. 2004.
--	------------------

SYMPLOCACEAE

<i>Symplocos retusa</i> Kriebel, sp. nov.	4(1): 57. 2004.
<i>Symplocos striata</i> Kriebel & N. Zamora, sp. nov.	4(3): 171. 2004.