



Orchidaceae from Viruá National Park, Roraima, Brazilian Amazon

EDLLEY PESSOA¹, FÁBIO DE BARROS² & MARCCUS ALVES³

¹Programa de Pós-Graduação em Biologia Vegetal, Departamento de Botânica, Universidade Federal de Pernambuco, CEP: 50670-901, Recife, Pernambuco, Brazil; e-mail: edlley_max@hotmail.com

²Instituto de Botânica, Núcleo de Pesquisa Orquidário do Estado de São Paulo, CEP 04301-902, São Paulo, São Paulo, Brazil; e-mail: fdebarros@terra.com.br

³Departamento de Botânica, Universidade Federal de Pernambuco, CEP: 50670-901, Recife, Pernambuco, Brazil; e-mail: alves.marccus@gmail.com

Abstract

Viruá National Park is located on the Guyana Shield, an area known for its high levels of biodiversity and endemism. Furthermore, the Brazilian portion of the Guyana Shield is very poorly known, so that floristic studies are needed to know the local distribution of the species. The aim of this study is to survey the species of Orchidaceae from Viruá National Park, Roraima State, Brazil. Orchidaceae are represented in the study area by 67 species and 45 genera. *Epidendrum* L. (9 spp.) and *Catasetum* Rich. ex Kunth (5 spp.) are the most diverse genera. These species comprise about 25% of the species and about 50% of the genera cited for the state of Roraima, northern Brazil, and include 19 new species records for the state. The dense forest (“*terra-firme*” and flooded forests) is more diverse (56 spp.) than the “*campinarana*” vegetation (13 spp.), and both share only a single species. Descriptions, illustrations, ecological comments, geographical distribution and an identification key are provided.

Keywords: Amazon, Diversity, Flora, Monocots, Orchidaceae, Taxonomy

Introduction

The most conspicuous plant formation in northern South America is the Amazon Forest, which is the biggest continuous forest in the world (Mittermeier *et al.* 2003). According to Silva *et al.* (2005), it is a mosaic of vegetation types, and eight centers of endemism can be recognized, delimited by the main rivers.

The “Guiana Endemism Center” is one of them and is distinguished by its high levels of biodiversity and endemism (Funk & Hollowell 2007). Some of the world’s richest ecosystems are found there, like the Table-top mountains (“*Tepui*”) vegetation (Berry 1995), the Amazonian “*Campinaranas*” and the Venezuelan “*Gran Sabannah*” (Sarmiento 1983).

In a recently published checklist of the Guiana Shield (Brazilian side excluded), Orchidaceae are cited as the second most diverse family in number of species (Funk & Hollowell 2007). The Brazilian side of the Guiana Shield is poorly known and not well collected (Hopkins 2007).

Orchidaceae is one of the largest families of plants with about 24,500 species (Dressler 2005). Barros *et al.* (2012) cited around 2,500 species and 240 genera for Brazil, where the Atlantic Forest (ca. 1,400 species) and the Amazon Forest (765 species) are the richest ecosystems.

The aim of this study is to provide a survey of Orchidaceae species of Viruá National Park, located on the Brazilian side of the Guiana Shield, including descriptions, illustrations, an identification key, and comments on ecology and geographical distribution of the species.

Methods

The study area comprises Viruá National Park, located in the south-central Roraima state in Brazil (municipality of

References

- Barbosa Rodrigues, J. (1882) *Genera et species orchidearum novarum II*. Sebastianópolis, Rio de Janeiro, 208 pp.
<http://dx.doi.org/10.5962/bhl.title.585>
- Barbosa Rodrigues, J. (1891) *Genera et species orchidearum novarum. Vellozia* 2: 115–133.
<http://dx.doi.org/10.5962/bhl.title.585>
- Barros, F. (2002) Notas taxonômicas para espécies brasileiras dos gêneros *Epidendrum* e *Heterotaxis* (Orchidaceae). *Hoehnea* 29(2): 109–113.
- Barros, F. (2002) Notas nomenclaturais em Pleurothallidinae (Orchidaceae), principalmente brasileiras. *Bradea* 8: 293–297.
- Barros, F., Vinhos, F., Rodrigues, V.T., Barberena, F.F.V.A., Fraga, C.N. & Pessoa, E.M. (2012) *Orchidaceae*. In: *Lista de Espécies da Flora do Brasil*. Jardim Botânico do Rio de Janeiro, Rio de Janeiro. Available from: <http://floradobrasil.jbrj.gov.br/2012/FB000179>.
- Berry, P.E., Holst, B.K. & Yatskievych, K. (1995) *Flora of the Venezuelan Guayana*, vol. 1. Introduction. Missouri Botanical Garden Press, St Louis, 421pp.
- Blanco, M.A., Carnevali, G., Whitten, W.M., Singer, R.B., Koehler, S., Williams, N.H., Ojeda, I., Neubig, K.M. & Endara, L. (2007) Generic Realignments in Maxillariinae (Orchidaceae). *Lankesteriana* 7(3): 515–537.
<http://dx.doi.org/10.15517/lank.vi.7935>
- Braem, G.J. (1993) Studies in the Oncidiinae. *Schlechteriana* 4: 8–29.
- Braga, P.I.S. (1977) Aspectos biológicos das Orchidaceae de uma campina da Amazônia Central. *Acta Amazônica* 7(2): 1–89.
- Brown, R. (1822) *Macradenia Lutescens*. *Botanical Register* 8: 612.
- Cardoso, A.L.R., Ilkiu-Borges, A.I. & Suemitsu, C. (1996) Flora Orquidológica da Ilha Combu, Município de Acará – Pará. *Boletim do Museu Paraense Emílio Goeldi, série botânica* 12(2): 231–238.
- Carnevali, G., Ramírez-Morillo, I.M., Romero-González, G.A., Vargas, C.A. & Foldats, E. (2003) Orchidaceae. In: Berry, P.E., Yatskievych, K. & Holts, B.K. (Eds.) *Flora of the Venezuelan Guayana*. vol. 7. Missouri Botanical Garden, Saint Louis, pp. 200–618.
<http://dx.doi.org/10.1093/aob/mcp067>
- Chase, M.W., Williams, N.H., Faria, A.D., Neubig, K.M., Amaral, M.C.E. & Whitten, W.M. (2009) Floral convergence in Oncidiinae (Cymbidieae; Orchidaceae): an expanded concept of *Gomesa* and a new genus *Nohawilliamsia*. *Annals of Botany* 104: 387–402.
- Christenson, E.A. (1999) The return of *Cohniella* (Orchidaceae-Oncidiinae). *Lindleyana* 14(4): 176–177.
- Cogniaux, C.A. (1910) *Symbolae Antillanae seu Fundamenta Florae Indiae Occidentalis VI*. Lipsiae Fratres Borntreager, Berlin, 618 pp.
- Dressler, R.L. (2005) How many orchid species? *Selbyana* 26: 155–158.
- Dunsterville, G.C.K. & Garay, L.A. (1959) *Venezuelan Orchids Illustrated*, vol. 1. London: Andre Deutsch, London. 447 pp.
- Dunsterville, G.C.K. & Garay, L.A. (1961) *Venezuelan Orchids Illustrated*, vol. 2. London: Andre Deutsch, London. 360 pp.
- Dunsterville, G.C.K. & Garay, L.A. (1965) *Venezuelan Orchids Illustrated*, vol. 3. London: Andre Deutsch, London. 348 pp.
- Dunsterville, G.C.K. & Garay, L.A. (1976) *Venezuelan Orchids Illustrated*, vol. 6. London: Andre Deutsch, London. 344 pp.
- Dunsterville, G.C.K. & Garay, L.A. (1972) *Venezuelan Orchids Illustrated*, vol. 5. London: Andre Deutsch, London. 334 pp.
- Dunsterville, G.C.K. & Garay, L.A. (1966) *Venezuelan Orchids Illustrated*, vol. 4. London: Andre Deutsch, London. 463 pp.
- Focke, H.C. (1849) *Tijdschrift voor de Wisen Natuurkundige Wetenschappen* 2: 199–200.
- Focke, H.C. (1851) *Tijdschrift voor de Wisen Natuurkundige Wetenschappen* 4: 45–72.
- Funk, V.A. & Hollowell, T. (2007) Introduction. In: Funk, V.A., Hollowell, T., Kelloff, C. & Alexander, S.N. (Eds.) Checklist of the Plants of the Guiana Shield (Venezuela: Amazonas, Bolivar, Delta Amacuro; Guiana, Suriname, Guiana Francesa). *Contributions from the United States National Herbarium* 55: 1–584.
- Gama, J.R.V., Souza, A.L., Martins, S.V. & Souza, D.R. (2005) Comparação entre Florestas de Várzea e de Terra Firme no Estado do Pará. *Revista Árvore* 29(4): 607–616.
<http://dx.doi.org/10.1590/s0100-67622005000400013>
- Garay, L.A. (1977) Systematics of the Physurinae (Orchidaceae) in the New World. *Bradea* 2(28): 191–208.
- Garay, L.A. (1958) Studies in American Orchids IV. *Botanical Museum Leaflets* 18: 168–218.
- Garay, L.A. & Sweet, H.R. (1974) Orchidaceae In: Howard, R.A. (Ed.) *Flora of the Lesser Antilles, Leeward and Windward Islands*. Arnold Arboretum, Harvard University, Jamaica plains, Massachusetts. pp. 1–235
- Gonçalves, E. & Lorenzi, H. (2007) *Morfologia Vegetal – organografia e dicionário Ilustrado de morfologia das plantas vasculares*. Instituto Plantarum, Nova Odessa, 415 pp.
- Govaerts, R., Pfahl, J., Campacci, M.A., Holland Baptista, D., Tigges, H., Shaw, J., Cribb, P., George, A., Kreuz, K. & Wood, J. (2012) *World Checklist of Orchidaceae*. The Board of Trustees of the Royal Botanic Gardens, Kew. Available from: <http://apps.kew.org/wesp/> (accessed 9 August 2012).
- Harris, J. & Harris, M. (2001) *Plant identification terminology - An illustrated glossary*. 2 ed. Spring Lake Publishing, Payson, 260 pp.

- Higgins, W.E. (1998) A reconsideration of the genus *Prosthechea* (Orchidaceae). *Phytologia* 82(5): 370–383.
- Hoehne, F.C. (1910) *Relatório da Comissão de Linhas Telegráficas Estratégicas de Mato Grosso ao Amazonas* 5(1): 30.
- Hoehne, F.C. (1934) Contribuições para o conhecimento da flora orchidológica brasileira III. *Boletim de Agricultura* 34: 600–638.
- Hooker, W.J. (1825) *Exotic Flora* II. Printed for William Blackwood, Edinburgh, 142 pp.
- Hooker, W.J. (1834) *Curtis's Botanical Magazine* 61. Printed by Edward Couchman, London, 3332 pp.
- Hooker, W.J. (1839) Descriptions of two New Orchideous Plants. *Annals of Natural History* 2(11): 329–331.
- Hooker, W.J. (1840) *Curtis's Botanical Magazine* 67. printed by Edward Couchman, London, 3796 pp.
- Hopkins, M.J.G. (2007) Modelling the known and unknown plant biodiversity of the Amazon Basin. *Journal of Biogeography* 34: 1400–1411.
<http://dx.doi.org/10.1111/j.1365-2699.2007.01737.x>
- Jacquin, N.J.V. (1760) *Enumeratio Systematica Plantarum, quas in insulis Caribaeis*. Theodorum Haak, Leiden, pp. 29–30.
- Jacquin, N.J.V. (1763) *Selectarum Stirpium Americanarum Historia*. Typis Josephi Kurtzbock, Viennae, 138 pp.
- Kubitzki, K. (1989) The ecogeographical differentiation of Amazonian inundation forests. *Plant Systematics and Evolution* 162: 285–304.
<http://dx.doi.org/10.1007/bf00936922>
- Kunth, K.S. (1816) *Cymbium violaceum*. In: Humboldt, F.W.H., Bonpland, A.J.A. & Kunth, K.S. (Eds.) *Nova Genera et Species Plantarum* 1: 341.
- Kunth, K.S. (1822) *Synopsis Plantarum* I. Paris. pp. 330–331.
- Leopardi, C. (2010) Orquideoflora de un sector de serranía de la cuchilla, Municipio Caripe, Estado Monagas, Venezuela. *Lankesteriana* 9(3): 541–555.
<http://dx.doi.org/10.15517/lank.v0i0.12117>
- Lindley, J. (1824) *Brassia caudata*. *Botanical Register* 10: 832.
- Lindley, J. (1824) *Camaridium ochroleucum*. *Botanical Register* 10: 844.
- Lindley, J. (1834) *Monachanthus discolor*. *Edwards's Botanical Register* 20: 1735.
- Lindley, J. (1835) *Agraecum micranthum*. *Edwards's Botanical Register* 21: 1772.
- Lindley, J. (1836) *Aspasia variegata*. *Edwards's Botanical Register* 22: 1907.
- Lindley, J. (1836) *Brassavola martiana*. *Edwards's Botanical Register* 22: 1914.
- Lindley, J. (1837) *Oncidium lunatum*. *Edwards's Botanical Register* 23: 1929.
- Lindley, J. (1837) *Maxillaria uncatata*. *Edwards's Botanical Register* 23: 1986.
- Lindley, J. (1838) *Vanilla bicolor*. *Edwards's Botanical Register* 24: 37.
- Lindley, J. (1838) *Trigonidium acuminatum*. *Edwards's Botanical Register* 24: 74.
- Lindley, J. (1839) *Catasetum longifolium*. *Edwards's Botanical Register* 25: 94.
- Lindley, J. (1840) *Catasetum x roseoalbum*. *Edwards's Botanical Register* 26: 61.
- Lindley, J. (1840) *Catasetum saccatum*. *Edwards's Botanical Register* 26: 76.
- Lindley, J. (1840) *The Genera and Species of Orchidaceous Plants*. Ridgeway, London. 565 pp.
- Lindley, J. (1840) *Sertum Orchidaceum*. James, Ridgeway, London, 37 pp.
- Lindley, J. (1840) *Ornithocephalus ciliatus*. *Annals of the Natural History* 4: 383.
- Lindley, J. (1841) *Epidendrum viviparum*. *Edwards's Botanical Register* 27: 10.
- Lindley, J. (1842) *Oncidium nanum*. *Edwards's Botanical Register* 28: 37.
- Lindley, J. (1842) *Pleurothallis pruinosa*. *Edwards's Botanical Register* 28: 75–76.
- Lindley, J. (1843) *Trichocentrum recurvum*. *Edwards's Botanical Register* 29: 29.
- Lindley, J. (1844) *Catasetum discolor*. *Edwards's Botanical Register* 30: 34.
- Lindley, J. (1853) *Acacallis* In: Lindley, J. *Folia Orchidacea*. London.
- Lindley, J. (1859) *Pleurothallis* In: Lindley, J. *Folia Orchidacea*. London, 23 pp.
- Linnaeus, C.V. (1759) *Systema Naturae*. Editio Decima, reformata. Vol. II. Impensis Direct. Laurentii Salvii, Holmiae, 1246 pp.
- Linnaeus, C.V. (1763) *Species Plantarum*, Editio Secunda. Laurentii Salvii, Stockholm, 1347 pp.
- Luer, C.A. (1983) *Trichosalpinx*, A new genus in the Pleurothallidinae. *Phytologia* 54(5): 395.
- Mansfeld, R. (1928) Orchidaceae Amazonicae Huebnerianae. *Notizblatt des Botanischen Gartens und Museums zu Berlin-Dahlem* 10(94): 378–382.
<http://dx.doi.org/10.2307/3994794>
- Meyer, G. (1818) *Primitiae Florae Essequiboensis*. H. Dieterich, Gittingen, 259 pp.
- Mittermeier, R.A., Mittermeier, C.G., Brooks, T.M., Pilgrim, J.D., Konstant, W.R., Fonseca, G.A.B. & Kormos, C. (2003) Wilderness and biodiversity conservation. *PNAS* 100(18): 10309–10313.
<http://dx.doi.org/10.1073/pnas.1732458100>

- Mori, S.A., Mattos-Silva, L.A., Lisboa, G. & Coradin, L. (1985) *Manual de Manejo do Herbário Fanerogâmico*. 2ª ed. CEPLAC/CEPEC, Ilhéus, 104 pp.
- Pabst, G.F.J. (1956) Additamenta ad Orchideologiam Brasiliensem –III. *Orquidea* 18(5): 7.
- Pabst, G.F.J. (1964) *Pleurothallis egleri*. *Anais do 14º Congresso da Sociedade Botânica do Brasil*: 14.
- Pabst, G.F.J. (1969) Orquídeas Novas na região Amazônica. *Boletim do Instituto Nacional de Pesquisas da Amazônia* 31: 1–5.
- Pabst, G.F.J. & Dungs, F. (1975) *Orchidaceae Brasilienses*. vol. 1. Kurt Schmiersow, Hildesheim, 408 pp.
- Pabst, G.F.J. & Dungs, F. (1977) *Orchidaceae Brasilienses*. vol. 2. Kurt Schmiersow, Hildesheim, 418 pp.
- Pessoa, E. & Alves, M. (2012) *Lockhartia viruensis* (Orchidaceae-Oncidiinae), a new species from Roraima state, Brazilian Amazonia region. *Brittonia* 64(2): 162–164.
<http://dx.doi.org/10.1007/s12228-011-9218-9>
- Pessoa, E., Barros, F. & Alves, M. (2013). Novelties in Orchidaceae from Brazil. *Checklist* 9(4): 823–825.
- Poeppig, E.F. & Endlicher, S.F.L. (1838) *Nova Genera ac Species Plantarum*, vol. 2. Lipsiae, Sumptibus Frierici Hofmeister, 17 pp.
- Prance, G.T.A. (1980) Terminologia dos tipos de florestas amazônicas sujeitas a inundação. *Acta Amazônica* 10(3): 495–504.
- Pridgeon, A.M. & Chase, M.W. (2001) A phylogenetic reclassification of Pleurothallidinae (Orchidaceae). *Lindleyana* 16: 235–271.
- Rafinesque, C.S. (1837) *Flora Telluriana* II. Phyladelphia, 41 pp.
- Reichenbach, H.G. (1849) Orchideiograpsiche Beitrage. *Linnaea* 22: 846–858.
- Reichenbach, H.G. (1856) Stipulae Orchidaceae reichenbachianae intra “Folia” Lindleyana intraaxillares. *Bonplandia* 4: 323.
- Reichenbach, H.G. (1859) Orchidaceae Splitgerberianae Surinamensis. *Nederlandsch Kruidkundig Archief. Verslangen en Mededelingen der Nederlandsche Botanische Vereeniging* 4: 333.
- Reichenbach, H.G. (1860) *Schomburgkia gloriosa*. *Hamburger garten-und Blumenzeitung* 16: 178.
- Reichenbach, H.G. (1863) Orchides. In: Mueller, C. (Ed.) *Annales Botanices Systematicae* 6: 167–933.
- Reichenbach, H.G. (1865) *Xenia Orchidacea* 2. Leipzig, 91 pp.
- Reichenbach, H.G. (1869) *Beitrage zu einer Orchideenkunde Central-Amerika's*. Blochmann & Sohn., Dresden, 4 pp.
- Reichenbach, H.G. (1872) *Dichaea picta*. In: Saunders, W.W. (Ed.) *Refugium botanicum* 2: 84.
- Richard, L.C.M. & Kunth, K.S. (1822) *Catasetum*. In: Kunth, K.S. (Ed.) *Synopsis Plantarum* I. Paris, pp. 330–331.
- Rolfe, R.A. (1889) *Cattleya violacea*. *The Gardeners Chronicle & Agricultural Gazette* 5: 802.
- Rolfe, R.A. (1895) Vanillas of Commerce. *Bulletin of Miscellaneous Information Kew* 1895(104): 178.
- Rolfe, R.A. (1903) The genus *Campylocentrum*. *Orchid Review* 11: 245–247.
- Ruiz, H.L. & Pavón, J.A. (1798) *Systema Vegetabilium Florae Peruvianaee et Chilensis* I. Tipografia G. de Sancha, Madrid. pp. 242–243.
- Sarmiento, G. (1983) The savannas of tropical America. In: Bourlie' re, F. (Ed.) *Tropical Savannas*. Elsevier, Amsterdam, pp. 245–288.
- Schaefer, C.E.G.R., Mendonça, B.A.F. & Fernandes, E. (2009) *Geoambientes e paisagens do Parque Nacional do Viruá, RR: Esboço de Integração da Geomorfologia, Climatologia, Solos, Hidrologia e Ecologia*. Diagnóstico Ambiental do Parque Nacional do Viruá: Relatório Temático de Meio Físico. ICMBio, Boa Vista, 59 pp.
- Schlechter, F.R.R. (1914) *Die Orchideen*. Paul Parey, Berlin, 836pp.
- Schlechter, F.R.R. (1918) *Otostylis brachystalix*. *Orchids. Monatsschrift der deutschen Gesellschaft fur Orchideenkunde* 12: 40.
- Schlechter, F.R.R. (1925) *Polystachya stenophylla*. *Beihefte zum Botanischen centralblatt* 42(2): 113.
- Schlechter, F.R.R. (1926) *Cleistes tenuis*. *Arquivos de Botânica do Estado de São Paulo* 1: 180.
- Silva, J.M.C., Rylands, A.B. & Fonseca, G.A.B. (2005) O destino das áreas de endemismo da Amazônia. *Megadiversidade* 1(1): 124–131.
- Szlachetko, D.L., Mytnik-Ejsmont, J., Górnjak, M. & Śmiszek, M. (2006) Genera et species Orchidaliium. 15. Maxillarieae. *Polish Botanical Journal* 51(1): 57–59.
- Swartz, O. (1788) *Nova genera et species plantarum Prodromus descriptionum vegetabilium maximam partem incognitorum quae sub itinere in Indiam occidentalem annis*. Bibliopoliis Acad. M. Swederi, Stockholm, 138 pp.
<http://dx.doi.org/10.5962/bhl.title.4400>
- Thiers, B. (2012) *Index Herbariorum*: A global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. Available from: <http://sweetgum.nybg.org/ih/>.
- Thunberg, C.P. (1784) *Systema Vegetabilium X*. J.C. Dieterich, Gottingen, 814 pp.
- Vellozo, J.M.C. (1831) *Florae Fluminensis Icones* 9. Icones, Typographia Nationalis, Flumine Januario, 27 pp.
- Veloso, H.P. (1992) Sistema fitogeográfico. In: *Manual técnico da vegetação brasileira*. Instituto Brasileiro de Geografia e Estatística, Rio de Janeiro, pp. 9–38.
- Williams, L.O. (1941) The validity of the Genus *Schomburgkia*. *Drawiniana* 5: 74–77.
- Worbes, M. (1997) The forest ecosystem of the floodplains. In: Junk, W.J. (Ed.) *The central Amazon floodplain. ecology of a pulsing system*. Ecological Studies 126. Springer Verlag, Heidelberg, pp. 223–266.
http://dx.doi.org/10.1007/978-3-662-03416-3_11