

A Hawk Moths fauna of southern Maranhão state, Brazil, with description of a new species of *Orecta* ROTHSCHILD & JORDAN, 1903 and the female of *Nyceryx mielkei* HAXAIRE, 2009 (Lepidoptera: Sphingidae)

Carlos G. C. MIELKE and Jean HAXAIRE

Carlos G. C. MIELKE, Caixa postal 1206, 84.145-000 Carambeí, Paraná, Brazil; cmielke1@uol.com.br

Jean HAXAIRE, Le Roc, F-47 310 Laplume, France; jeanhaxaire@sfr.fr

Abstract: A list of 48 Sphingidae species (Lepidoptera) from southern Maranhão, Brazil, is presented placed in three subfamilies: Sphinginae (8), Smerinthinae (3), Macroglossinae (37). The female of *Nyceryx mielkei* HAXAIRE, 2009 is described and figured for the first time. *Orecta comus* sp. n. is described and compared to the similar species, *O. lycidas* (BOISDUVAL, [1875]), differing mainly in the width of the marginal band on the forewing underside and male genitalia. The male holotype is deposited in the Col. Padre Jesus S. MOURE, Departamento de Zoologia, Universidade Federal do Paraná, Curitiba, Paraná, Brazil.

Key words: fauna survey, taxonomy, Sphingidae, Neotropical.

Zur Schwärmerfauna aus dem südlichen Bundesstaat Maranhão, Brasilien, mit Beschreibung einer neuen *Orecta* ROTHSCHILD & JORDAN, 1903 und des Weibchens von *Nyceryx mielkei* HAXAIRE, 2009 (Lepidoptera, Sphingidae)

Zusammenfassung: Eine Artenliste der Sphingidae (Lepidoptera) aus dem südlichen Maranhão, Brasilien, wird vorgestellt. 48 Arten aus drei Unterfamilien werden aufgeführt: Sphinginae (8), Smerinthinae (3), Macroglossinae (37). Das Weibchen von *Nyceryx mielkei* HAXAIRE 2009 wird erstmals beschrieben und abgebildet. *Orecta comus* sp. n. wird beschrieben und verglichen mit der ähnlichen Art *O. lycidas* (BOISDUVAL, [1875]), die sich vor allem durch die Streifenbreite auf der Ventralseite der Vorderflügel und in den männlichen Genitalien unterscheidet. Der männliche Holotyp wird in der Sammlung Padre Jesus S. MOURE, Departamento de Zoologia, Universidade Federal do Paraná, Curitiba, Paraná, Brasilien, hinterlegt.

Introduction

Due to their importance as pollinators and pollen vectors, the Sphingidae faunas of various regions of Brazil have been surveyed by several authors: north (MOTTA et al. 1991, 1998, MOTTA & ANDREAZZE 2001, MOTTA & XAVIER-FILHO 2005), northeast (DUARTE jr. et al. 2001, DARRAULT & SCHLINDWEIN 2002, GUSMÃO et al. 2003, GUSMÃO & CREÃO-DUARTE 2004a, b, DUARTE jr. & SCHLINDWEIN 2005a, b, 2008, CRUZ-NETO et al. 2011), southeast (OITICICA FILHO 1942, DUARTE et al. 2008, MARTIN et al. 2011) and south (LAROCA & C. MIELKE, 1975, LAROCA et al. 1989, MARINONI et al. 1999, CORSEUIL et al. 2001, SPECHT et al. 2008, SIEWERT & SILVA 2010). KITCHING & CADIOU (2000) highlighted the importance of species surveys as contributions to the local biodiversity assessments and for elucidating their biogeographical relationships.

Despite the Cerrado (Brazilian savanna) covering about 25% of the area of Brazil, no species list has been pub-

lished for this biome, the majority of the work having been carried out in the Atlantic rainforest, which ranges from the NE to S regions, the Amazon and a little in the Caatinga, an exclusive NE Brazilian biome. Southern Maranhão (the area treated in the present study), one of the states that belongs to Northeast region and located in the Cerrado area, has been revealed to be an interesting area of endemism with several species of Lepidoptera (Saturniidae, Sphingidae, Nymphalidae) described that are unknown from other localities (BECKER 2001, LEMAIRE & C. MIELKE 2001, HAXAIRE 2009, MOREIRA & C. MIELKE 2010). FERRO et al. (2010) have already highlighted the lack of records of Arctiinae (Lepidoptera, Erebidae) in this biome, suggesting little collecting effort, a reason why new species of otherwise well-known groups have been discovered.

The main purpose of the present study, focused on the Sphingidae fauna of two localities where collecting has been carried out for over 10 years (southern Serra do Penitente, Balsas) and 2 years (Retiro, Feira Nova do Maranhão), is to compare their biodiversity with previously published data. Also, as a result of this inventory, a new species of *Orecta* ROTHSCHILD & JORDAN, 1903 and the female of *Nyceryx mielkei* HAXAIRE, 2009 are described and figured.

Abbreviations

BC	Specimens with mtDNA barcode (and ID number of BOLD or GenBank).
BMNH	The Natural History Museum, London, U. K.
CJH	Coll. Jean HAXAIRE, Laplume, France.
COM	Coll. Olaf H. H. MIELKE, Curitiba, Paraná, Brazil.
DZUP (DZ)	Coll. Padre Jesus S. MOURE, Departamento de Zoologia, Universidade Federal do Paraná, Curitiba, Paraná, Brazil.
FW	Forewing.
GP	Genitalia preparation number.
HT	Holotype.
HW	Hindwing.
MZSP	Museu de Zoologia, Universidade de São Paulo, São Paulo, São Paulo, Brazil.
PT	Paratype.

Material and methods

The two collecting localities in Maranhão, Brazil (Fig. 1) are as follows:

Balsas (BLS) Co.: Serra do Penitente, Nova Holanda Farm, 8°47'30" S, 46°21'58" W, 450 m a.s.l. The pri-

mary vegetation is light to medium cerrado with gallery forest. There are two well-defined seasons, wet and dry, the former lasting from mid-October until early April, with an estimated average temperature of 25°C and rainfall of 1300 mm. According to KÖPPEN'S (1948) climate classification, it is Aw (tropical wet and dry or savanna climate with an extended dry season during winter). The site is in the Balsas River Basin, a tributary of the Parnaíba River.

Feira Nova do Maranhão (FNM) Co.: Retiro, 7°0'31" S, 46°26'41" W, 480 m a.s.l. The general data is as the previous locality. The site is in the the Farinha River Basin, a tributary of the Tocantins River, itself a tributary of the Amazon River (Amazon River Basin), and lies about 200 km (straight line) N from the previous locality.

Collecting was carried out mostly during the wet season using the standard method for collecting at light at night with a 250 W mercury-vapor light source and a white sheet.

All specimens were identified by comparison with holotypes, specimens in collections and published revisions. We would highlight the atomization by EITSCHBERGER (2006) of the genus *Cocytius* HÜBNER, 1819 into four separate genera, in contrast to its unity and monophyly as shown by KITCHING (2002), followed by treating the con-

tinental populations of *Cocytius duponchel* (POEY, 1832) as *Amphonyx rivularis* BUTLER, 1875.

The inventory is presented in Table 1. Names are listed in alphabetical order within their respective subfamilies and tribes. In addition to the locality records, information is given about each species' frequency at light traps based on the number of individuals observed in the field. Also, a depository (see abbreviations) is mentioned for at least one voucher specimen.

The BOLD ID is given for all mtDNA barcoded specimens of the examined material of *Orecta*. Whenever available, a GenBank code is shown with priority over BOLD codes. The depository of each specimen is given followed by the abbreviation (see list above) followed, when available, by the voucher number.

Description of the female of *Nyceryx mielkei*

Examined specimen (1 ♀): Brazil, Maranhão: Feira Nova do Maranhão, Retiro, 7°0'31" S, 46°26'41" W, 480 m, 15.-17. xi. 2012, C. MIELKE leg. (DZ 15.538). – Figs. 2a, 2b.

♀. FW length: 20 mm; wingspan 46 mm. Wing pattern as in the ♂ (see HAXAIRE 2009: 12), FW apex rounded rather than pointed as in the ♂. The distal central projection of the abdomen is absent, as in the ♀♀ of the other species of the group. As the species is clearly defined, the genitalia have not been prepared to preserve the unique specimen.

Description of the new species

Orecta comus HAXAIRE & C. MIELKE, sp. n.

Figs. 3a, 3b, 4a, 4b, 5a, 5b, 6a, 6b, 9, 10.

Holotype ♂ with the following labels: /Holotypus, *Orecta comus* HAXAIRE & C. MIELKE det. 2013/ Brasil – MA [Maranhão], Feira Nova do Maranhão, Retiro, 480 m, 24.-31. xii. 2011, 7°0'31" S, 46°26'41" W, C. MIELKE leg./ DZ[UP] 15.538/ génitalia n° 513, Sphingidae, Jean HAXAIRE/. – Figs. 3a, 3b.

Paratypes (in total 27 ♂♂, 2 ♀♀): all Brazil: Maranhão: 2 ♂♂, Balsas, Serra do Penitente, 500 m, 22. x. 2001, C. MIELKE leg. (COM 54.264 [BC-JX216481], 54.306 [BC-JX216482]). 1 ♀, Balsas, Serra do Penitente, 480 m, 1.-7. xi. 2009, C. MIELKE leg. (CJH [BC-Hax5021]). 20 ♂♂, same data as the holotype (CJH). 2 ♂♂, 1 ♀, same locality as the holotype, 10. xii. 2011 (CJH). 2 ♂♂, same data as the holotype (MZSP; BMNH). – Goiás: 1 ♂, Goiás, Vianópolis, Ponte Punda, 7. x. 1966, N. TANGERINI leg. (DZ 11.642).

Etymology. It is named for another of John MILTON'S poems, although BOISDUVAL did not give evidence that the species-group name *lycidas* was after MILTON'S poem.

♂ (Figs. 3a, 3b, 5a, 5b, 6a, 6b). FW length: 34–41 mm; wingspan 75–85 mm. Head olive-brown or pale olive-green dorsally, labial palpi dark yellow. Thorax as the head dorsally with two latero-posterior dark olive-brownish, finely white-edged tegulae. First abdominal segment of the same colour as the tegulae; the remaining segments dorsally of the same colour as the head, lightly suffused with white scales. Thorax and abdomen olive-yellowish ventrally. FW elongate, apex pointed, pronounced and slightly falcate; outer margin concave,

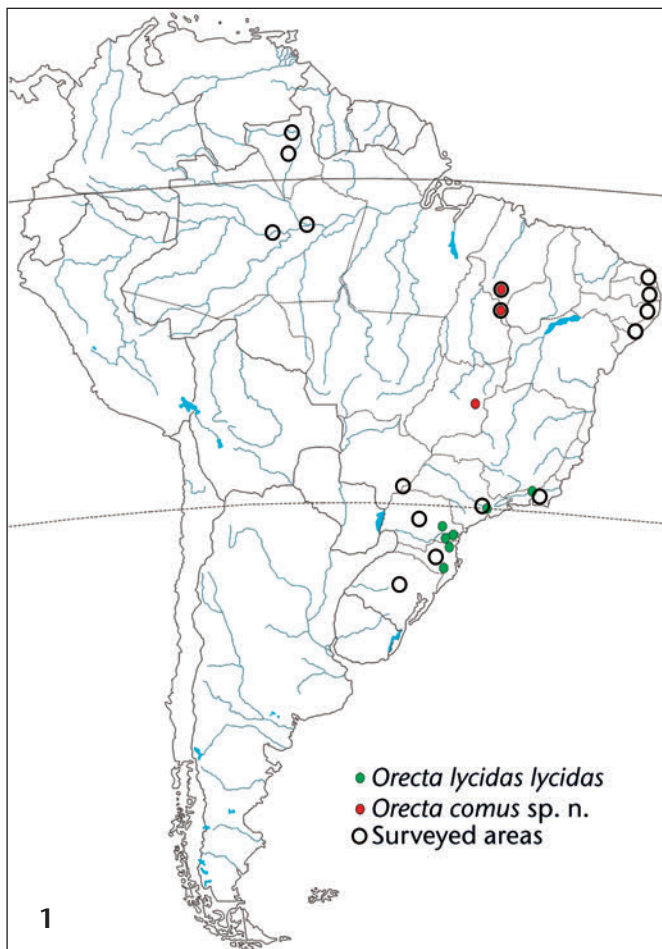


Fig. 1 (map): Areas within Brazil surveyed for Sphingidae and the localities of *Orecta lycidas lycidas* and *Orecta comus* sp. n.

inner margin convex proximally and concave distally with an acute tornus. FW dorsal ground colour olive-brownish or pale olive-brownish. Ante- and postmedial lines sometimes distinct. Basal area marked by three dark olive-brownish spots with fine white edging: the basal is a dot; the larger subbasal spot is rectangular, sometimes slightly compressed laterally, rounded anteriorly, starting just below the discal cell, ending on the inner margin; and an elongated or rounded tiny dot, distal to the former, but sometimes absent (two thirds of the examined specimens). Median area slightly darker distally, slightly suffused with white scales; stigma diffuse, dark brown. Postmedian area clearly suffused by white scales with two dark olive-brownish spots: a rectangular subapical patch in the costal margin, enlarged at the base, ending at R_4 ; and an irregular patch, marked on the inner margin by sinusoidal white lines. Marginal area slightly darker, anteriorly lighter. HW elongated, apex acute; costal margin four fifths slightly convex at base, downward curved to the apex; outer margin straight, slightly dentate proximally, then concave to a produced anal angle; anal margin straight, then concave in its distal third. Ground colour reddish-orange, with a triangular grayish anal area bearing two light cream dots, distally larger and submarginally some dark green-olivish dots lined, linked, and edged with white, followed by a light olive margin. Ventrally, FW with basomedian area dark yellow, yellowish-orange posteriorly; antemedial line absent, postmedial sometimes distinct; stigma marked; postmedian area light or pale olive, darker apically, and with a brown spot at inner margin, as on the dorsal side. Marginal band light gray, concave, and narrow. HW light olive-brownish suffused with scattered white scales, postmedial line slightly marked followed by two more parallel lines distally; anal angle with a grayish spot submarginally which bears two light-gray spots and a dark reddish spot marginally.

♂ **genitalia** (Figs. 9, 10). Uncus simple, finger-like, slightly curved downwards. Gnathos a transverse plate, slightly bilobed. Valve simple, rounded apically and not elongated (Fig. 10); harpe triangular. Saccus triangular, slightly projected anteriorly.

♀ (Figs. 4a, 4b). FW length: 49–51 mm; wingspan 103–107 mm. Wing patterns as in the ♂; FW broader, apex less pointed, and the convex outer margin on both wings.

Diagnosis

Orecta comus sp. n. is quite similar to *Orecta lycidas lycidas* (BOISDUVAL, [1875]) (Figs. 7a, 7b, 8a, 8b), including wingspan, with 75–85 mm for the former (average ca. 81 mm) and 70–84 mm (average ca. 80 mm) for the latter, but can be differentiated by the following characters: narrower FW and apex more pronounced; paler and less contrasting markings on the FW; basal tiny dot much reduced or absent in the majority of examined specimens (in *O. l. lycidas*, it is always present and conspicuous); white scales on the abdomen scarcely observed (in *O. l.*

lycidas, they are frequent); narrower marginal band on the FW underside; and finally, the harpe is triangular or subtriangular and uncus slightly more downcurved (in *O. l. lycidas*, the harpe is hook or spine-like, Figs. 11, 12).

Remarks

O. comus sp. n. seems to be represented by two distinct phenotypes based on the FW, head and thorax ground colour, with no intermediate variation known. The pale olive-green variation is based on the only 2 ♂♂ collected at Balsas Co., while the olive-brown form was only collected at Feira Nova do Maranhão Co. The barcode region of the mitochondrial Cytochrome-c Oxydase I gene (COI) was amplified with the primer set Lep-F1/Lep-R1 targeting a 658 bp fragment (HEBERT et al. 2004) for both populations, revealing an exact similarity of both populations.

Ethology and geographical distribution

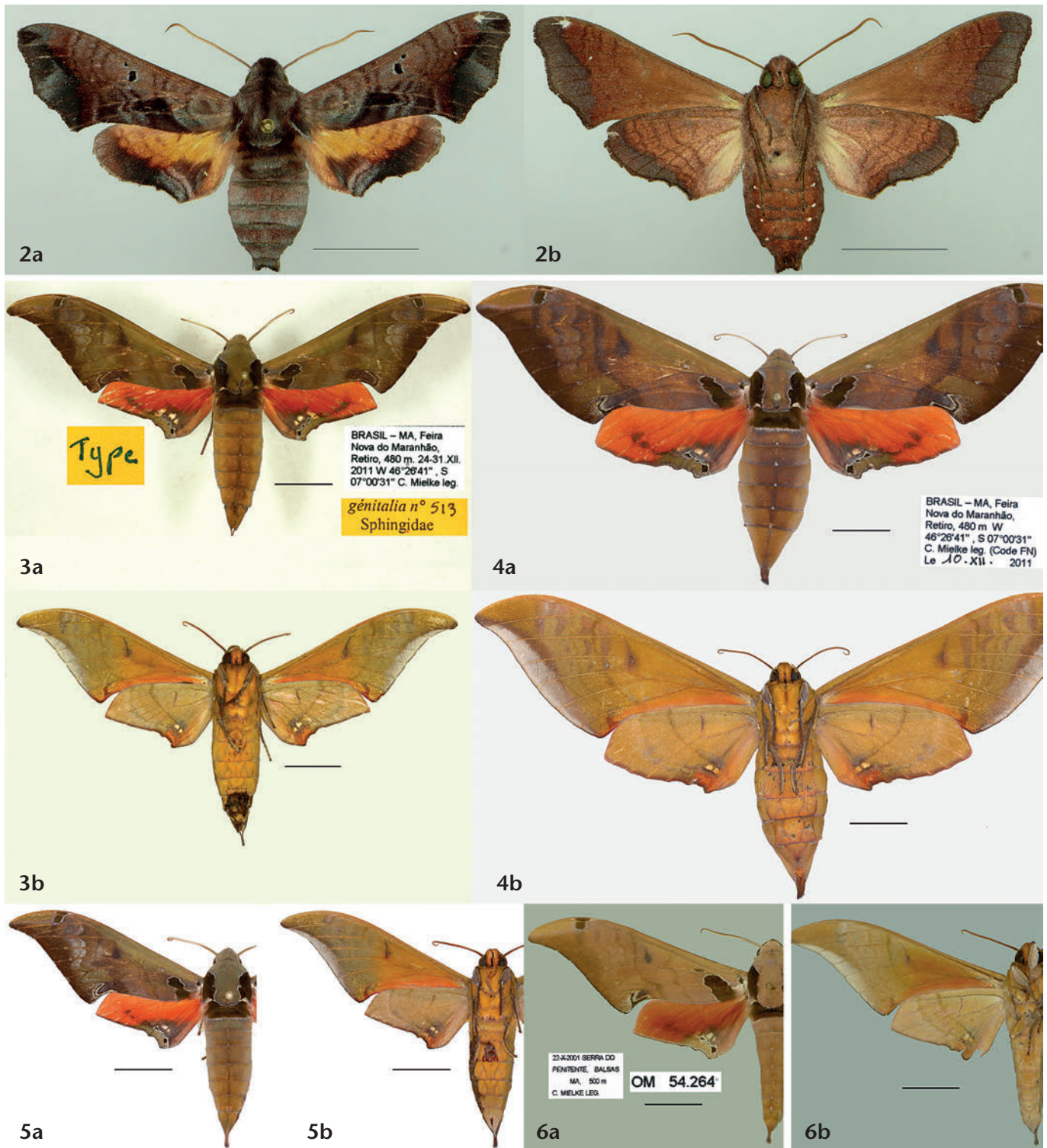
O. comus sp. n. is known from Maranhão (Fig. 1) and Goiás, NE and Central Brazil, respectively. Both sexes are attracted to light just after dusk for a few minutes, as they do in the related species, *O. lycidas lycidas*. In its type locality, two light traps were run simultaneously, 200 m from each other, but only the one placed at the border of the plateau overlooking a gallery forest attracted the species. ♂♂ were also observed flying towards the light trap close to the ground through the vegetation.

Examined material of *O. lycidas lycidas*. In total 31 ♂♂, 8 ♀♀, all Brazil, **Rio de Janeiro:** 2 ♂♂, 1 ♀, Rio de Janeiro, Petrópolis, Parque São Vicente, 920 m, 3.–8. i. 1962, 23. i. 1963, GAGARIN leg. (DZ 11.636, 11.637, 11.639). 1 ♂, Rio de Janeiro, Petrópolis, 10. xi. 1963, GAGARIN leg. (DZ 11.638). — **São Paulo:** 1 ♂, São Paulo, Salesópolis, Boracéia, 800 m, 5. ix. 1941 (DZ 11.640). — **Paraná:** 1 ♂, São José dos Pinhais, Estr. Castelhanos, 700 m, 22. ix. 1997, C. MIELKE leg. (COM 45.677). 1 ♀, Campo do Tenente, 900 m, 24. ii. 1968, O. MIELKE & MOURE leg. (DZ 11.635). — **Santa Catarina:** 22 ♂♂, 5 ♀♀, São Bento do Sul, Rio Vermelho, 700–800 m (CJH). 2 ♂♂, São Bento do Sul, Rio Vermelho, 850 m, 24. viii. 1973, 12. i. 1974, RANK leg. (DZ 11.631, 11.633). 1 ♀, São Bento do Sul, Rio Vermelho, 1. 1963 (DZ 11.632). 1 ♂, Corupá, 21. i. 1966, O. MIELKE leg. (DZ 11.641). 1 ♂, Urubici, Serra do Panelão, 1250 m (CJH).

Sphingidae survey

Of the 210 Sphingidae species listed for Brazil (DUARTE et al. 2008), 48 species (about 23%) are here recorded for southern Maranhão (Table 1) with the following species diversity by subfamily: Sphinginae (8), Smerinthinae (3), Macroglossinae (37).

In spite of collecting at dusk in flowers was not carried out, few species were accidentally attracted to lights, as *Pachygonidia caliginosa* (BOISDUVAL, 1870), *Aleuron* spp., and *Unzela japix japix* (CRAMER, 1776), otherwise more taxa could be likely registered. *P. caliginosa* (collected at dawn), *Perigonia leucopus* ROTHSCCHILD & JORDAN, 1910 (collected at dusk), and *Phryxus caicus* HÜBNER, [1819] are represented by unique specimens. *Eumorphia adamsi* (ROTHSCCHILD & JORDAN, 1903), *Isognathus allamandae*



mentalis, despite their wide distributions, were unexpectedly registered at only one of the localities. In addition, despite being located in the Amazon Basin, and considering its supposed higher diversity, only *Aleuron iphis* (WALKER, 1856), *X. anubus* and *X. porcus continentalis* were recorded exclusively at FNM.

The diversity found in the present study shares an average of 40% with those surveys carried out in the Atlantic rainforest, rising to 48% if the S-SE part of this biome is excluded. Considering southern Brazilian lists, this average decreases to 36%. The Caatinga, with 65% of shared species, has the closest diversity with the present

study area. Approximately, the same proportion as the NE Atlantic rainforest was found for the Amazon fauna (about 40%).

Thus, the Sphingidae fauna surveyed in southern Maranhão seems to be, in spite being in the Cerrado, closer to the Caatinga fauna than to any other biome, sharing from 50 to 79% of the species. It makes sense due to its geographical proximity. *Perigonia leucopus*, *Eumorphia adamsi*, *Manduca manducoides*, *O. comus* sp. n. and *Nycteryx mielkei* appear to be endemic to the Cerrado, the last being endemic to the area treated in the present study.

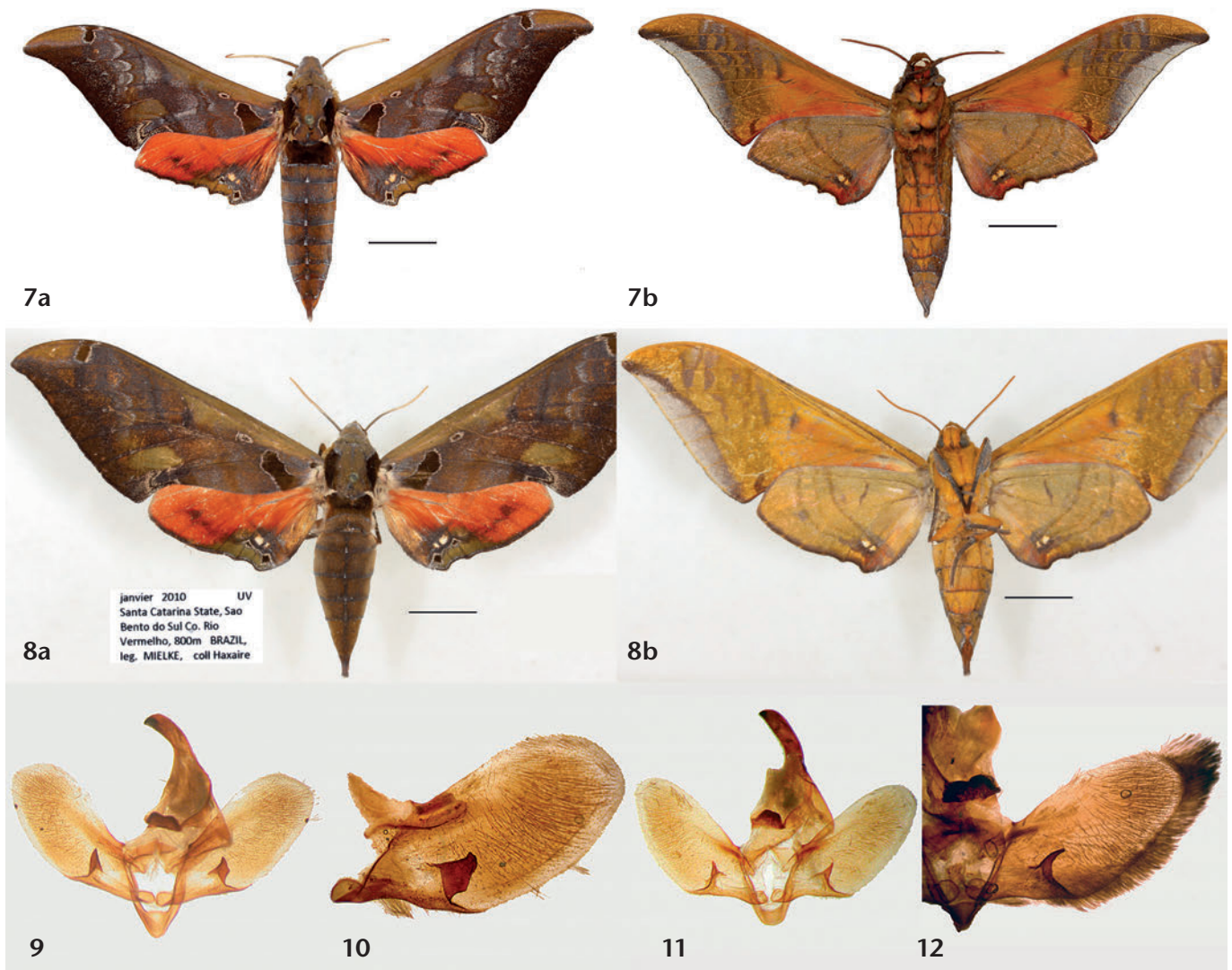


Fig. 2: *Nyceryx mielkei*. ♀ dorsal (2a), ventral (2b). — Scale bars: 1 cm (scale for *Nyceryx mielkei* different from that for *Orecta* spp.). — Figs. 3–6: *Orecta comus* sp. n. HT ♂ dorsal (3a), ventral (3b); PT ♀ dorsal (4a), ventral (4b); PT ♂ dorsal (5a), ventral (5b); PT ♂ dorsal (6a), ventral (6b). — Figs. 7–8: *Orecta lycidas lycidas*. ♂ dorsal (7a), ventral (7b); ♀ dorsal (8a), ventral (8b). — Scale bars for all *Orecta* specimens: 1 cm. — ♂ genitalia (without scale bar). — Figs. 9–10: *Orecta comus* sp. n., PT ventral view, GP JH #500 (9); HT (GP JH #513) valve (10). — Figs. 11–12: *Orecta lycidas lycidas*, ventral view, GP JH #501 (11); valve, GP JH #514 (12).

Acknowledgements

We thank Dr. Mirna M. CASAGRANDE and Dr. Olaf H. H. MIELKE (Curitiba, Brazil) for access and loan of specimens from DZUP. Dr. Ian J. KITCHING (London, U.K.) for reviewing not only the manuscript with helpful comments, but also the English version. Finally, we are grateful to Dr. Wolfgang A. NÄSSIG (Frankfurt am Main, Germany) for his comments and helpful suggestions.

References

- BECKER, V. O., & CAMARGO, A. J. A. (2001): Three new species of Saturniidae (Lepidoptera) from Central Brazil. — *Revista Brasileira de Zoologia*, Curitiba, 18 (1): 163–170.
- CORSEUIL, E., SPECHT, A., & LANG, C. (2001): Esfingídeos (Lepidoptera, Sphingidae) ocorrentes no Centro de Pesquisa e Conservação da Natureza PróMata. — *Divulgação do Museu de Ciências Tecnológicas — UBEA/PUCRS*, Porto Alegre, 6: 95–108.
- CRUZ-NETO, O., MACHADO, I. C., DUARTE jr., J. A., & LOPES, A. V. (2011): Synchronous phenology of hawkmoths (Sphingidae) and *Inga* species (Fabaceae-Mimosoideae): implications for the restoration of the Atlantic Forest of northeastern Brazil. — *Biodiversity and Conservation*, Madrid, 20: 751–765.
- DARRAULT, R. O., & SCHLINDWEIN, C. (2002): Esfingídeos (Lepidoptera, Sphingidae) no Tabuleiro Paraibano, nordeste do Brasil: abundância, riqueza e relação com plantas esfingófilas. — *Revista Brasileira de Zoologia*, Curitiba, 19 (2): 429–443.
- DUARTE jr., J. A., MOTTA, C. S., & VARELA-FREIRE, A. A. (2001): Sphingidae (Lepidoptera) da Estação Ecológica do Seridó, Serra Negra do Norte, Rio Grande do Norte, Brasil. — *Entomologia y Vectores*, Rio de Janeiro, 8 (3): 341–347.
- , & SCHLINDWEIN, C. (2005a): Riqueza, abundância e sazonalidade de Sphingidae (Lepidoptera) num fragmento de Mata Atlântica de Pernambuco, Brasil. — *Revista Brasileira de Zoologia*, Curitiba, 22 (3): 662–666.
- , & — (2005b): The highly seasonal hawkmoth fauna (Lepidoptera Sphingidae) of the caatinga of Northeast Brazil: a case study in the state of Rio Grande do Norte. — *Journal of the Lepidopterists' Society*, New Haven, 59 (4): 212–218.
- , & — (2008): Hawkmoth fauna of a Northern Atlantic rain forest remnant (Sphingidae). — *Journal of the Lepidopterists' Society*, New Haven, 62 (2): 71–79.

- DUARTE, M., CARLIN, L. F., & MARCONATO, G. (2008): Light-attracted hawkmoths (Lepidoptera: Sphingidae) of Boracéia, municipality of Salesópolis, state of São Paulo, Brazil. — Check List, Campinas, 4 (2): 123–136.
- EITSCHBERGER, U. (2006): Revision der Gattungen *Amphimoea* ROTHSCHILD & JORDAN, 1903, *Cocytius* auct. (nec HÜBNER, [1819]) und *Neococytius* HODGES, 1971 mit der Neugliederung der Gattung *Cocytius* auct. (Lepidoptera, Sphingidae). — Neue Entomologische Nachrichten, Markt-leuthen, 59: 171–288.
- FERRO, V. G., MELO, A. S., & DINIZ, I. R. (2010): Richness of tiger moths (Lepidoptera: Arctiidae) in the Brazilian Cerrado: how much do we know? — Zoologia, Curitiba, 27 (5): 725–731.
- GUSMÃO, M. A. B., & CREÃO-DUARTE, A. J. (2004a): Diversidade e análise faunística de Sphingidae (Lepidoptera) em área de brejo e caatinga no Estado da Paraíba, Brasil. — Revista Brasileira de Zoologia, Curitiba, 21 (3): 491–498.
- , & —— (2004b): Diversidade e análise faunística de Sphingidae (Insecta, Lepidoptera) na Mata do Pau-Ferro, Areia, Paraíba, Brasil, com vista ao monitoramento. — Pp. 179–199 in: PÔRTO, K. C., CABRAL, J. J. P., & TABARELLI, M. (ed.), Brejos de altitude em Pernambuco e Paraíba: história natural, ecologia e conservação. — Brasília (Ministério do Meio Ambiente), 324 pp.
- , & MOTTA, C. S. (2003): Sphingidae (Lepidoptera) em ecossistema de caatinga, estado da Paraíba, Brasil. — Entomologia y Vectores, Rio de Janeiro, 10 (3): 367–377.
- HAXAIRE, J. (2009): Deux nouvelles espèces de sphinx brésiliens (Lepidoptera, Sphingidae). — The European Entomologist, Příbram, 2 (1/2): 7–17.
- HEBERT, P. D. N., PENTON, E. H., BURNS, J. M., JANZEN, D. H., & HALLWACHS, W. (2004): Ten species in one: DNA barcoding reveals cryptic species in the neotropical skipper butterfly *Astraptes fulgerator*. — Proceedings of the National Academy of Sciences of the United States of America, Washington, 101: 14812–14817.
- KITCHING, I. J. (2002): The phylogenetic relationships of Morgan's Sphinx *Xanthopan morgani* (WALKER), the tribe Acherontiini, and allied long-tongued hawkmoths (Lepidoptera: Sphingidae, Sphinginae). — Zoological Journal of the Linnean Society, London, 135: 471–527.
- , & CADIOU, J.-M. (2000): Hawkmoths of the world: An annotated and illustrated revisionary checklist (Lepidoptera: Sphingidae). — Ithaca (The Natural History Museum, London, & Cornell University Pr.), 226 pp.
- KÖPPEN, W. (1948): Climatología: con un estudio de los climas de la tierra. — Fondo de Cultura Económica, Ciudad México, 478 pp.
- LAROCA, S., BECKER, V. O., & ZANELLA, F. C. V. (1989): Diversidade, abundância relativa e fenologia de Sphingidae (Lepidoptera) na Serra do Mar (Quatro Barras, PA), sul do Brasil. — Acta Biológica Paranaense, Curitiba, 18: 13–53.
- LEMAIRE, C., & MIELKE, C. (2001): A new *Kentroleuca* DRAUDT, 1929 from the Cerrado region of Brazil (Lepidoptera: Saturniidae, Hemileucinae). — Nachrichten des Entomologischen Vereins Apollo, Frankfurt am Main, N.F. 22 (2): 85–87.
- LAROCA, S., & MIELKE, O. H. H. (1975): Ensaio sobre ecologia de comunidade em Sphingidae da Serra do Mar, Paraná, Brasil (Lepidoptera). — Revista Brasileira de Biologia, Rio de Janeiro, 35 (1): 1–19.
- MARINONI, R. C., DUTRA, R. R. C., & MIELKE, O. H. H. (1999): Levantamento da fauna entomológica no Estado do Paraná. IV. Sphingidae (Lepidoptera). Diversidade alfa e estrutura de comunidade. — Revista Brasileira de Zoologia, Curitiba, 16 (supl. 2): 223–240.
- MOREIRA G., & MIELKE, C. (2010): A new species of *Neruda* TURNER, 1976 from northeast Brazil (Lepidoptera: Nymphalidae, Heliconiinae, Heliconiini). — Nachrichten des Entomologischen Vereins Apollo, Frankfurt am Main, N.F. 31 (1/2): 85–91.
- MOTTA, C. S., AGUILERA-PERALTA, F. J., & ANDREAZZE, R. (1998): Aspectos da esfingofauna (Lepidoptera, Sphingidae) em área de terra firme, no estado do Amazonas, Brasil. — Acta Amazônica, Manaus, 28 (1): 75–92.
- , & ANDREAZZE, R. (2001): Esfingofauna (Lepidoptera: Sphingidae) do Parque Nacional do Jaú e arredores, Amazonas, Brasil. — Acta Amazônica, Manaus, 31 (4): 643–654.
- , FERREIRA, R. L. M., & AGUIAR, N. O. (1991): Sobre a esfingofauna da Ilha de Maracá e da Serra da Pacaraima, Roraima (Lepidoptera, Sphingidae). — Acta Amazônica, Manaus, 21 (4): 319–324.
- , & XAVIER-FILHO, F. F. (2005): Esfingídeos (Lepidoptera, Sphingidae) do município de Beruri, Amazonas, Brasil. — Acta Amazônica, Manaus, 35 (4): 457–462.
- MARTIN, A., SOARES, A., & BIZARRO, J. (2011): Guia dos Sphingidae da Serra dos Orgaos, Sudeste do Brasil — A guide to the hawkmoths of the Serra dos Orgaos, south-eastern Brazil. — Eynsham, Oxford (United Kingdom) (Information Press), 143 pp, figs.
- OTICICA FILHO, J. (1942): Sphingidae capturados em Porto Cabral (margem paulista do rio Paraná), com notas sobre nomenclatura. — Papéis Avulsos do Departamento de Zoologia, São Paulo, 2 (5): 97–102.
- SPECHT, A., BENEDETTI, A. J., & CORSEUIL, E. (2008): Esfingídeos (Lepidoptera, Sphingidae) registrados no Rio Grande do Sul. — Biociências, Porto Alegre, 16 (1): 15–18.
- SIEWERT, R., & SILVA, E. J. E. (2010): Contribution to the knowledge of the hawkmoths fauna in the state of Santa Catarina, Brazil (Lepidoptera: Sphingidae). — Nachrichten des Entomologischen Vereins Apollo, Frankfurt am Main, N.F. 31 (1/2): 63–66.

Received: 25. VII. 2013

ZOBODAT - www.zobodat.at

Zoologisch-Botanische Datenbank/Zoological-Botanical Database

Digitale Literatur/Digital Literature

Zeitschrift/Journal: [Nachrichten des Entomologischen Vereins Apollo](#)

Jahr/Year: 2013

Band/Volume: [34](#)

Autor(en)/Author(s): Mielke Carlos G. C., Haxaire Jean

Artikel/Article: [A Hawk Moths fauna of southern Maranhão state, Brazil, with description of a new species of *Orecta* Rothschild & Jordan, 1903 and the female of *Nyceryx mielkei* Haxaire, 2009 \(Lepidoptera: Sphingidae\) 109-116](#)