Two new *Periga* Walker, 1855 from southern Brazil (Lepidoptera: Saturniidae, Hemileucinae, Hemileucini)

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Abstract: Two new *Periga* Walker, 1855 from southern Brazil are described: *Periga* ***campestre*** **sp. n.** from Paraná state and *Periga* ***elyi*** **sp. n.** from Rio Grande do Sul state. Both belong to *circumstans* species-group. Percentage differences of the partial COI mitochondrial gene sequences (DNA barcode) are presented for all species. Both male holotypes are deposited in Col. Padre Jesus S. Moure, Departamento de Zoologia, Universidade Federal do Paraná, Curitiba, Paraná, Brazil.

Key words: Distribution, taxonomy, new species, Neotropical.

Zwei neue Periga Walker, 1855 aus dem südlichen Brasilien (Lepidoptera: Saturniidae, Hemileucinae, Hemileucini)

Zusammenfassung: Zwei neue *Periga* Walker, 1855 aus dem südlichen Brasilien werden beschrieben: *Periga* ***campestre*** **sp. n.** von Bundesstaat Paraná und *Periga* ***elyi*** **sp. n.** von Bundesstaat Rio Grande do Sul. Beide gehören zur Artengruppe von *P. circumstans*. Die prozentualen Unterschiede zwischen den COI-Gensequenzen (mtDNA-Barcode) werden für alle Arten (soweit untersucht) aus der Gruppe dargestellt. Die beiden männlichen Holotypen sind in der coll. Padre Jesus S. Moure, Institut für Zoologie, Bundesuniversität Paraná, Curitiba, Paraná, Brasilien, hinterlegt.

Introduction

Recently, some *Periga* Walker, 1855 species have been described (Brechlin & Meister 2013, C. Mielke et al. 2013) from Brazil which has incredibly raised the diversity of this genus.

In the following, two *Periga* species from southern Brazil are described: *P. campestre* sp. n. from Paraná state and *P. elyi* sp. n. from Rio Grande do Sul state. Both belong to the species-group of *Periga circumstans* Walker, 1855 according to Lemaire (2002), together with the recently described species: *P. acuta* C. Mielke & Meister, 2013, *P. alticola* C. Mielke & Santos, 2013, *P. caraca* Rougerie & Santos, 2013, *P. circaustralis* Brechlin & Meister, 2013, *P. circleopoldina* Brechlin & Meister, 2013, *P. circpotensis* Brechlin & Meister, 2013, *P. drechseli* Brechlin & Meister, 2013, *P. foersteri* Brechlin & Meister, 2013, *P. fusca* Brechlin & Meister, 2013, *P. fuscbahiana* Brechlin & Meister, 2013, *P. fuscleopoldina* Brechlin & Meister, 2013, *P. pulchra* C. Mielke & Brechlin, 2013, and *P. wandana* Brechlin & Meister, 2013.

All taxa studied, except *P. wandana,* were sampled for DNA extraction and the analysis follows C. Mielke et al. (2013) with 18 terminals. Confidence values at each node of the tree were estimated using bootstrap re-sampling with 1000 replications. Specimen and sequence data are stored in the Barcode of Life Data Systems (BOLD, www.boldsystems.org) in public projects.

Abbreviations

BC	Specimens with a mtDNA barcode, followed by ID number of BOLD and/or [in square brackets] GenBank access number.
CGCM	Coll. Carlos G. C. Mielke, Curitiba, Brazil.
DZUP (DZ)	Coll. Padre Jesus S. Moure, Departamento de Zoologia, Universidade Federal do Paraná, Curitiba, Paraná, Brazil.
[BC-]EvS	[Barcode no.] coll. E. van Schayck, Wetter (NRW), Germany.
[BC-]FMP	[Barcode no.] coll. F. Meister, Prenzlau, Germany.
FW	Forewing.
HT	Holotype.
HW	Hind wing.
MECB	Museu de Entomologia "Ceslau M. Biezanko", Faculdade de Agronomia, Universidade Federal de Pelotas, Pelotas, Rio Grande do Sul, Brazil.
[BC-]RBP	[Barcode no.] coll. R. Brechlin, Pasewalk, Germany.
SMFL	Senckenberg-Museum, Lepidoptera collection, Frankfurt am Main, Germany.
PT	Paratype.

Periga campestre C. Mielke & Siewert, sp. n.

Figs. 1a, 1b, 2, 3a, 3b, 7a–d.

Holotype ♂ with the following labels (separated by transverse bars): /Holotypus, *P. campestre* C. Mielke & Siewert det. 2014/ Brasil — PR [Paraná], Tibagi, Guartelá, 960 m, 20. i. 2012, C. Mielke leg./ DZ[UP] 15.524/ [ex] coll. C. Mielke 25.393/ BC-CGCM [BC-JX216379]/. Donated by the senior author and deposited in DZUP. — Figs. 1a, 1b.

Paratypes (in total 2 ♂♂, 1 ♀), all Brazil, **Paraná:** 1 ♂, same data as HT (CGCM 25.585 [BC-JX216380]); 1 ♀, Carambeí, 25. ii. 1999, C. Mielke leg. (CGCM 1.357 [BC-JX216337]); 1 ♂, Palmeira, Vieiras, 800 m, 19. iii. 2010, C. Mielke leg. (SMFL, ex-CGCM 23.256 [BC-HQ972104]).

Etymology: The name is a reference to its region of occurrence, Campos Gerais, in Paraná state.

♂ (Figs. 1a, 1b, 2). FW length: 25–26 mm; wingspan 46–48 mm. Antenna (ca. 41 segments) bipectinate, last 8–10 segments with a ventral protuberance; rami yellowish-brown, inner side as long as outer side, downcurved, arising from the base of the segment. Frons and labial palpi coloured as antenna, the latter dark brown dorsally. Thorax dark orange to light salmon dorsally, ventrally pale yellowish-brown. Legs coloured as thorax, tibia and tarsus with few light carmine scales. FW elongated, apex not acute, outer margin straight to slightly convex; dorsal ground colour as the thorax, throughout sprinkled with dark gray dots, without differentiation among

ante, median, and postmedian areas, the latter with submarginal band irregular, light grayish-brown; ante and postmedial lines dark gray, the latter preapical, straight, and proximally bordered with pale yellow; distal margin of discal cell marked with two light gray spots surrounded by dark gray slightly connected by a narrow dark gray streak with a tiny white dot midway. HW coloured as the FW, anterior area lighter; antemedial line slightly marked, postmedial line bordered by pale yellow proximally; anal angle not pronounced. Ventral side coloured as thorax, FW with postmedial line preapical; HW as FW with two dark gray tiny discal spots. Abdomen coloured as the thorax.

♂ **genitalia** (Figs. 7a–d). Tegumen projected posteriorly; uncus bifid posteriorly, curved downward with a process enlarged and well sclerotized apically; valva simple, rounded apically; anterior projection of saccus tongue-shaped; phallus with a bulbus ejaculatorius and vesica half as long as the sclerotised shaft, the latter armed with a small cornutus.

♀ (Figs. 3a, 3b). FW length: 32 mm; wingspan 57 mm. Antenna (ca. 41 segments) filiform, last 10 segments with a ventral protuberance; rami dark yellowish. Frons gray. Labial palp dark gray. Thorax gray, ventrally light brownish-gray. Legs coloured as thorax, tibia and tarsus dark gray. FW elongated, apex not acute, slightly pronounced, outer margin convex, dorsal ground colour as thorax, sprinkled by dark gray dots, without differentiation among ante, median, and postmedian areas, submarginal band darker; ante and postmedial lines dark gray, the latter almost apical and proximally bordered in light yellow; two tiny light gray discal spots surrounded by dark gray slightly connected by a narrow streak. HW coloured as the FW, postmedial line dark gray partially bordered with light gray proximally. Ventral side coloured as thorax; FW postmedial line preapical, submarginal band slightly darker; HW coloured as the FW with one tiny discal black spot. Abdomen coloured as thorax.

Diagnosis

P. campestre sp. n. resembles several species of the species-group of *P. circumstans*. *P. alticola* differs by its longer FW (27–29 mm), the shorter vesica (one third to one fifth of the phallus shaft length) and the less projected tegumen posteriorly. *P. caraca* differs by the apical postmedial line and the uncus projected downward. *P. foersteri* differs by its longer FW (28 mm), the shorter vesica (one eighth of the phallus shaft length), the valva shape, and the darker antemedial and postmedial lines. *P. drechseli* differs by FW postmedial line not bordered with yellow and the shorter vesica (one fifth to one sixth of the phallus shaft length). *P. fuscbahiana* differs by its longer FW (27–30 mm), the much darker ground colour, and the FW acute apex. *P. fuscleopoldina* is the most similar species, specially the ♂ genitalia, in spite of its darker ground colour, but differs by the FW postmedial line bordered by light gray proximally and wider valva.

Ethology and geographical distribution

P. campestre sp. n. is only known from the Campos Gerais region in Paraná state (Fig. 9). All material examined was attracted to UV lights. It is sympatric to *P. acuta* only.

Periga elyi C. Mielke & Siewert, sp. n.

Figs. 4a, 4b, 5, 6, 8a–c.

Holotype ♂ with the following labels (separated by transverse bars): /Holotypus, *P. elyi* C. Mielke & Siewert det. 2014/ Brasil – RS [Rio Grande do Sul], Morro Redondo, 17. ii. 2009, Siewert R. R. [leg.]/ DZ[UP] 15.531/coll. C. Mielke 24.875/ BC-CGCM [BC-JX216382]/. Deposited in DZUP. — Figs. 4a, 4b.

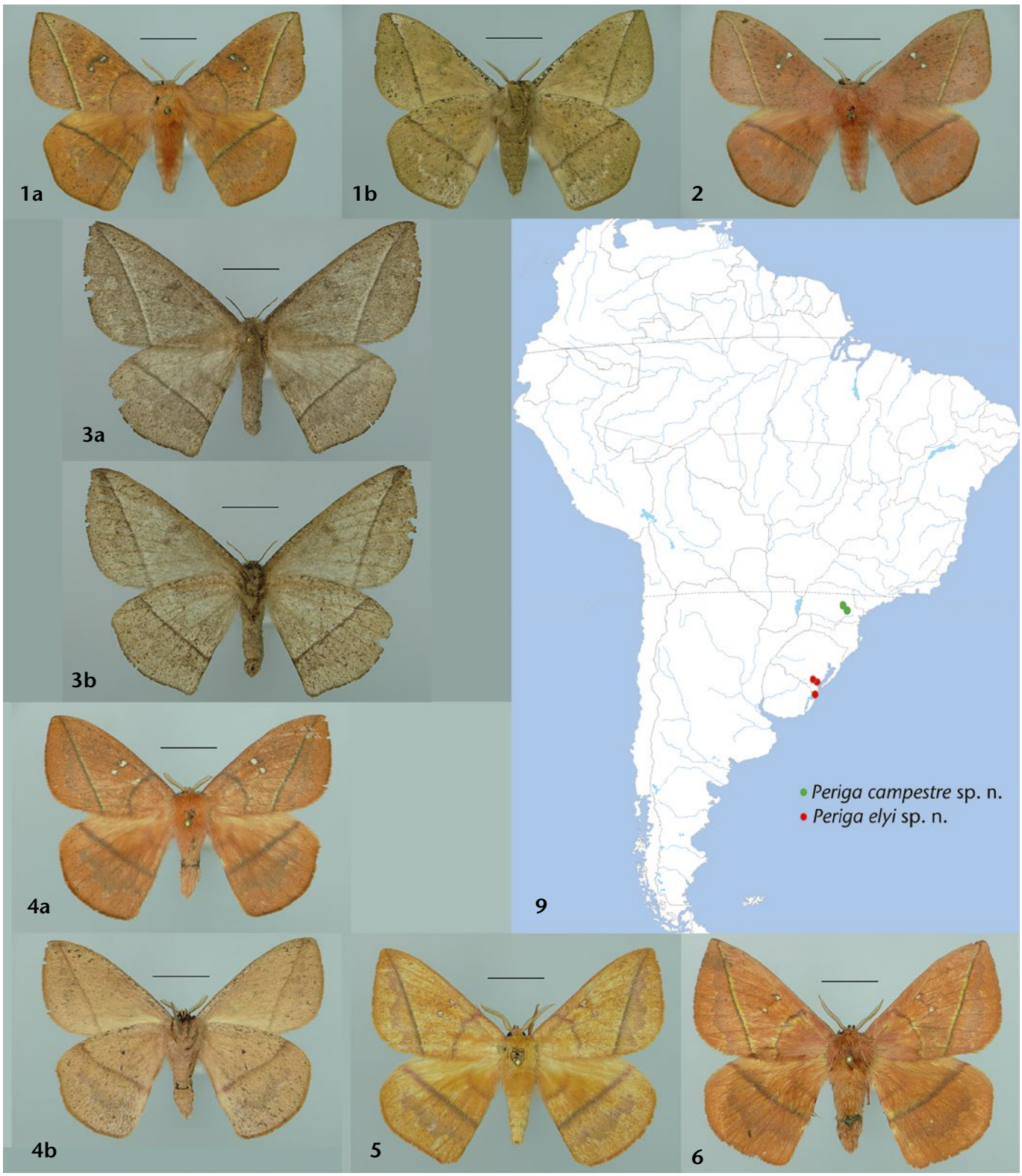
Paratypes (in total 4 ♂♂), all Brazil, **Rio Grande do Sul:** 2 ♂♂, same locality and collector as HT, ii. 2010 (CGCM 25.019 [BC-JX216377]; MECB [BC-JX216378; ex-CGCM 25.131]); 1 ♂, Pelotas, ii. 1970, T. Rosskot leg. (SMFL, ex-CGCM 18.571); 1 ♂, Taim, 16. i. 1989, V. O. Becker leg. (CGCM 11.416).

Etymology: The name is after Dr. Eduardo José Ely e Silva who supported the research developed by the junior author.

♂ (Figs. 4a, 4b, 5, 6). FW length: 26–28 mm; wingspan 48–50 mm. Antenna (ca. 47–50 segments) bipectinate, last 8–10 segments with a ventral protuberance; rami pale yellow, inner side as long as outer side, downcurved, arising from the base of the segment. Frons pale yellow, generally with carmine scales. Labial palp dorsally dark brown, ventrally as frons. Thorax dorsally from pale yellow to reddish-orange, ventrally pale yellow with carmine scales. Legs coloured as thorax, tibia and tarsus carmine dorsally. FW slightly elongated, apex not acute and not pronounced, outer margin convex to slightly convex; dorsal ground colour as the thorax dorsally without differentiation among ante, median, and postmedian areas, the latter with submarginal band slightly darker; ante and postmedial lines gray, the former sometimes partially bordered with yellow distally, the latter preapical, straight, and clearly bordered with yellow or pale yellow proximally; two prominent whitish discal spots surrounded by dark gray, connected by a narrow dark gray streak with or without a tiny white dot midway. HW coloured as FW; antemedial line slightly marked, postmedial line gray. Ventral side ground colour as thorax; FW with postmedial line preapical, marginal band lighter; HW as the FW, two tiny discal spots, anal angle whitish. Abdomen as thorax.

♂ **genitalia** (Figs. 8a–c). Tegumen projected posteriorly; uncus bifid posteriorly, curved downward with a process enlarged and well sclerotized apically; valva simple, rounded apically with internal margin arcuate (as in *P. pulchra*); anterior projection of saccus subtriangular or triangular; phallus with a bulbus ejaculatorius half and vesica one fifth as long as the sclerotised shaft, vesica without cornutus.

♀: unknown.



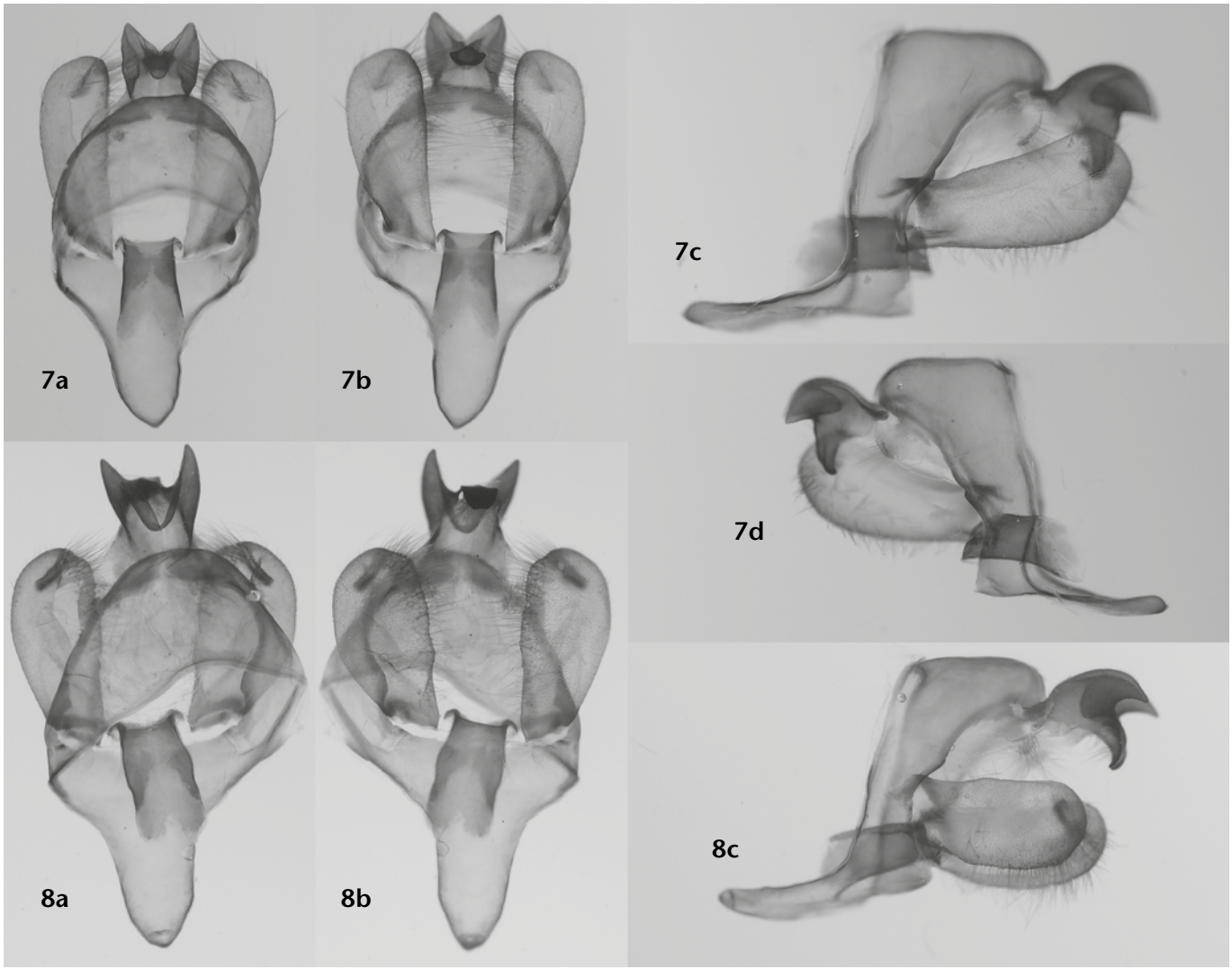
Figs. 1–3: *Periga campestre* sp. n. HT ♂ dorsal (**1a**), ventral (**1b**); PT ♂ dorsal (**2**); PT ♀ dorsal (**3a**), ventral (**3b**). — **Figs. 4-6:** *Periga elyi* sp. n. HT ♂ dorsal (**4a**), ventral (**4b**); PT ♂ dorsal (**5**); PT ♂ dorsal (**6**). — Scales: 1 cm, i.e. approximately natural size. — **Fig. 9:** Distribution of *Periga campestre* sp. n. and *Periga elyi* sp. n. within Brazil.

Diagnosis

P. elyi sp. n. cannot be confused to any other species of the species-group of *P. circumstans*, except *P. pulchra*. It differs from the latter by its smaller size (55 mm wingspan average for *P. pulchra*), and the gray postmedial line in the HW never bordered by yellow proximally. The ♂ genitalia are very similar to *P. pulchra*, but tend to a less sclerotized uncus and a shorter valvae; vesica constant in length while variable in *P. pulchra*.

Figs. 7–8: ♂ genitalia of new species of *Periga* (without scale bar, not to identical scales). — **Figs. 7:** *Periga campestre* sp. n., HT: posterior view (**7a**), ventral view (**7b**), left lateral view (**7c**), right lateral view with valva removed (**7d**). — **Figs. 8:** *Periga elyi* sp. n., HT: posterior (**8a**), ventral (**8b**), left lateral (**8c**).

Fig. 10: Unrooted bestscore ML tree for all *Periga* species dealt with in this work; bootstrap values are given at each node, and terminals are identified by their sample-ID code referring to the public records in the Barcode of Life Datasystems (BOLD) and GenBank access number when available between brackets.



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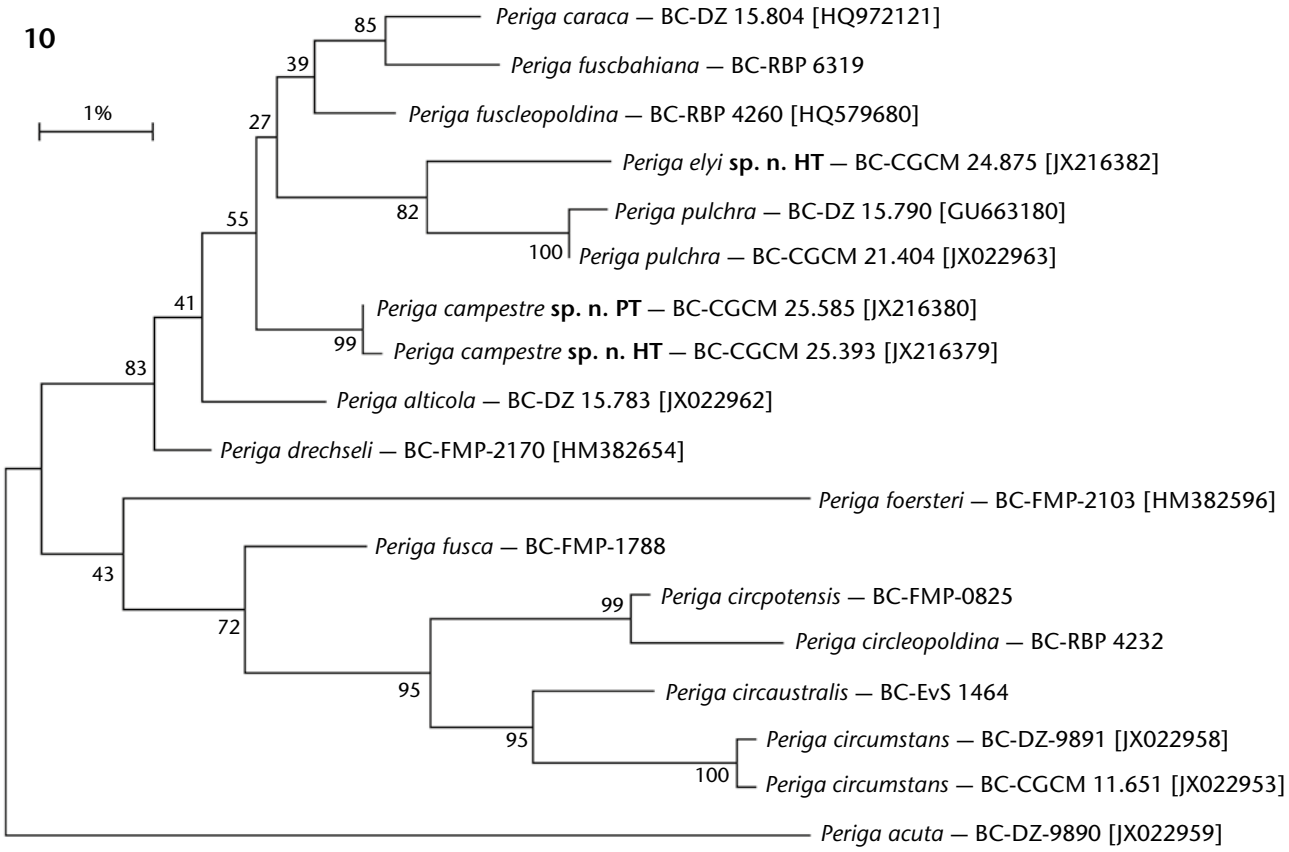

Table 1: Minimum p-distance (%) between DNA barcodes of the studied species. Maximum intraspecific variation is given in the diagonal (number of records within parentheses). — * = Barcode of HT available and included.

%		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
P. alticola	1	0 (5)	–	–	–	–	–	–	–	–	–	–	–	–	–	–
P. acuta	2	8.8	0.3 (6)	–	–	–	–	–	–	–	–	–	–	–	–	–
*P. caraca**	3	3.0	8.8	0 (1)	–	–	–	–	–	–	–	–	–	–	–	–
P. campestre sp. n.	4	2.8	10.2	2.8	0.3 (4)	–	–	–	–	–	–	–	–	–	–	–
*P. circautralis**	5	6.8	10.1	8.2	7.3	0 (1)	–	–	–	–	–	–	–	–	–	–
P. circumstans	6	7.8	10.3	8.6	7.8	3.0	0,5 (9)	–	–	–	–	–	–	–	–	–
*P. circleopoldina**	7	8.2	10.4	8.7	8.4	5.1	5.6	0 (1)	–	–	–	–	–	–	–	–
*P. cirpotensis**	8	7.3	9.9	8.0	7.7	4.0	4.8	1.4	0 (1)	–	–	–	–	–	–	–
*P. drechseli**	9	1.9	8.5	3.2	2.5	5.9	7.0	7.3	6.5	0 (1)	–	–	–	–	–	–
P. elyi sp. n.	10	4.6	10.1	4.8	3.8	7.5	7.7	7.5	7.5	4.0	0 (3)	–	–	–	–	–
*P. foersteri**	11	8.0	12.5	8.2	8.2	8.8	9.3	10.9	10.6	7.7	8.2	0 (1)	–	–	–	–
*P. fusca**	12	5.3	9.7	6.3	5.3	4.6	5.8	4.9	4.4	4.1	5.1	8.1	0 (1)	–	–	–
*P. fuscbahiana**	13	3.5	9.7	1.9	2.8	7.9	8.2	7.7	7.0	3.2	3.8	7.8	5.6	0 (1)	–	–
*P. fuscleopoldina**	14	2.4	9.3	2.2	2.2	7.9	8.1	9.1	8.1	2.5	3.6	8.1	5.1	2.4	0 (1)	–
P. pulchra	15	4.3	10.2	4.5	3.8	8.5	7.8	8.9	8.7	4.0	3.0	9.2	5.8	4.1	2.9	0,8 (10)

Ethology and geographical distribution

P. elyi sp. n. is only known from the extreme southeastern Brazil at low altitudes (Fig. 9) and it is the most austral record of the genus within Brazil so far. The ♂♂ from Morro Redondo municipality were attracted to UV lights. It is not sympatric to any other *Periga* species.

Remarks

The Hemileucinae revision by Lemaire (2002) divided *Periga* into four groups, based on the structure of the uncus, with two species remaining unassigned to these groups. After Lemaire (2002), the *circumstans* species-group, one of the four, consisted of four species (*P. circumstans, P. falcata* (Walker, 1855), *P. insidiosa* (Lemaire, 1972), and *P. spatulata* (Lemaire, 1973)). According to recent publications, including the present, this group has been revealed to be a compound of cryptic species (Brechlin & Meister 2013, C. Mielke et al. 2013). Unfortunately, the species described by Brechlin & Meister (2013) lack many details on the morphology which makes the comparison difficult. Their pressed genitalia photos not only distort the shape, but also hide important characters.

Regarding internal relationships according to the phylogenetic hypothesis proposed by the shown tree (Fig. 10), *P. elyi* sp. n. is placed as a sister of *P. pulchra* supported by the same branch, what corroborates the morphology examined. *P. campestre* sp. n. is on the same way placed as a sister group of the clade compound by *P. fuscleopoldina*, *P. caraca*, *P. fuscbahiana*, and a clade compound by the former two species (*P. elyi* sp. n. and *P. pulchra*). That makes sense based on the morphology, especially the genitalia of *P. fuscleopoldina* which are similar. Distances between DNA barcodes of the treated species are shown in Table 1.

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References

Brechlin, R., & Meister, F. (2013): Neue Taxa der Gattung *Periga* Walker, 1855 (Lepidoptera: Saturniidae). — Entomo-Satsphingia, Entomologische Beiträge, Pasewalk, **6** (2): 26–75.

Lemaire, C. [with contributions by F. Bénéluz & N. Tangerini] (2002): The Saturniidae of America. Les Saturniidae Americains (= Attacidae), vol. **4**, Hemileucinae. — Keltern (Goecke & Evers); part A: [1]–688, part B: [689]–1388; part C: 143 pp., col. pls. 1–126, ES1–ES14, 143 pp. without pagination.

Mielke, C. G. C., Santos, F. L., Meister, F., Brechlin, R., & Rougerie, R. (2013): Four new *Periga* Walker, 1855 (Lepidoptera: Saturniidae, Hemileucinae, Hemileucini) from southeastern and southern Brazil. — The European Entomologist, Příbram, **4** (3): 121–140.

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