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Revalidation of *Pedaliodes lithochalcis* BUTLER & DRUCE, description of a new species from Peru and Bolivia and of a new subspecies of *P. napaea* BATES from Honduras
(Lepidoptera: Nymphalidae: Satyrinae)

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ABSTRACT. *Pedaliodes lithochalcis*, occurring in Costa Rica and Panama, has been considered for more than a century a junior synonym of *P. dejecta* from Guatemala. It is reinstated here as a valid species. It is shown that the two species belong to different groups of species with sympatric representatives throughout Central America and the Andes characterized by common characters of adult morphology, particularly the male genitalia. *Pedaliodes lithochalcis* is closely related to *P. napaea* whose new subspecies, *P. napaea naksi* n. ssp., is described from the Celaque massif in Honduras. It is the first cloud forest Satyrinae butterfly described from this country. *Pedaliodes dejecta* is related to another Mesoamerican species, *P. ereiba*, and to *P. pomponia* from Ecuador and to a new species, *P. peregrina* n. sp., from Peru and Bolivia.

Key words: entomology, taxonomy, Andes, Celaque, Costa Rica, Guatemala, male genitalia, *Pedaliodes*, Pronophilina, taxonomy

INTRODUCTION

The subtribe Pronophilina (Nymphalidae, Satyrinae) is a species-rich group of neotropical montane butterflies with its centre of diversity in the Andes (PYRCZ 2004; VILORIA et al. 2010). Despite recent advances, its systematics and faunistics remain far from being fully explored. Each year several new species are described from the mountainous areas of Peru, Ecuador, Colombia and Venezuela. In comparison to the Andes, the mountains of Central America are considered well known. The last new species of

Pronophilina described from Central America was *Eretris suzannae* DEVRIES (DEVRIES 1980), whereas nearly 100 species have been described from Peru alone during the last decade (PYRCZ 2004; PYRCZ et al. 2008a, 2008b). Central America is also relatively species-poor with only approximately 30 species of Pronophilina distributed between Panama and Mexico, compared to more than 200 occurring in Colombia (PYRCZ & RODRIGUEZ 2007) and more than 300 in Peru (PYRCZ 2010).

One common species of Pronophilina found in Panama and Costa Rica is known under the name *Pedaliodes dejecta* BATES (1865) (DEVRIES 1987), described from Guatemala. Another species of *Pedaliodes*, *P. lithochalcis* BUTLER & DRUCE (1872), was described a few years later from Costa Rica, and sunk as the synonym of *P. dejecta* shortly afterwards by GODMAN & SALVIN [1881]. Its status remained unchallenged, including by authors who subsequently revised the taxonomy of the genus *Pedaliodes*, particularly THIEME (1905), FORSTER (1964) and VILORIA (2008), or monographed local faunas, specifically DEVRIES (1987). The subtribe Pronophilina is renowned for high endemism, and considering that the two names were based on specimens coming from geographically widely separated mountainous areas showing little faunal similarity, a morphological study of the types of *P. lithochalcis* and *P. dejecta* was carried out in order to confirm or reject their synonymy. During this research a population of a related species, *P. napaea* BATES (1865), was discovered in Honduras, and a new species reported from Peru and Bolivia was found to be closely allied to *P. dejecta*. The two are described herein.

MATERIAL AND METHODS

Collecting of Pronophilina was carried out with entomological nets and Van-Someren Rydon baited traps. Type and comparative material was examined in major European and American public and private collections. Male genitalia were dissected according to standard procedures by soaking in a warm 10% KOH solution, preserved in glycerol, and examined, alongside other morphological microstructures, under an Olympus SZX9 stereomicroscope. Adults were photographed with an Olympus E-500 digital camera, and colour plates were composed using Adobe PhotoShop 7.0. The following abbreviations and collection acronyms are used:

FW: forewing;

HW: hindwing;

V: ventral surface;

D: dorsal surface;

BMNH: Natural History Museum, London, UK (formerly British Museum (Natural History));

HMNH: Hungarian Museum of Natural History, Budapest, Hungary;

MHNAD: Museo de Historia Natural Alcide d'Oribigny, Cochabamba, Bolivia;

MIIZ: Muzeum i Instytut Zoologii Polskiej Akademii Nauk, Warsaw, Poland;

MUSM: Museo de Historia Natural, Universidad Nacional Mayor de San Marcos, Lima, Peru;

MZAH: Museo de Zoología Alfonso Herrera, Universidad Nacional de México, México, México;

MZUJ: Muzeum Zoologiczne Uniwersytetu Jagiellońskiego, Kraków, Poland;

PBF: collection of Pierre Boyer, Le Puy Sainte Réparate, France;

TWP: collection of Tomasz Wilhelm Pyrcz, Warsaw, Poland (to be integrated into MZUJ);

YGCB: collection of Yuvinka Gareca, Santa Cruz, Bolivia;

ZSBS: Zoologische Staatssammlung, München, Germany;

ZHMB: Zoologische Museum, Humboldt Universität, Berlin, Germany.

SYSTEMATIC OVERVIEW

Pedaliodes dejecta (BATES)

(Figs. 1, 2, 18, 19)

Pronophila dejecta BATES, 1865: 179.

Pronophila dejecta BATES; HERRICH-SCHAFFER 1865: 66; RILEY & GABRIEL 1924: 17.

Pedaliodes dejecta (BATES); BUTLER 1867: 267; KIRBY 1871: 104 (as a synonym of *P. pisonia* HEWITSON); SCUDDER 1875: 242; GODMAN & SALVIN [1881]: 103-104, pl. 9, fig. 4 (as a synonym of *P. pisonia* HEWITSON); WEYMER 1890: 20; THIEME 1905: 45, 72, 74; FORSTER 1964: 166, fig. 223 (male genitalia); ADAMS & BERNARD 1981: 362; ADAMS 1986: 285; DEVRIES 1987: 281-282, pl. 49, fig. 11; D'ABRERA 1988: 852, fig.; VILORIA 1994: 528; VILORIA & PYRCZ 1994: 350; 1995: 584, 585; SANTIN 1998: 960; VILORIA et al. 2001: 40; LAMAS et al. 2004: 211; HEREDIA & VILORIA 2004: 85.

Pedaliodes pisonia (HEWITSON) form *dejecta* (BATES); WEYMER 1912: 254, pl. 54, row a.

Pedaliodes pisonia (HEWITSON) var. *dejecta* (BATES); GAEDE 1931: 499.

Type locality: River Polochic Valley, Guatemala.

MATERIAL EXAMINED

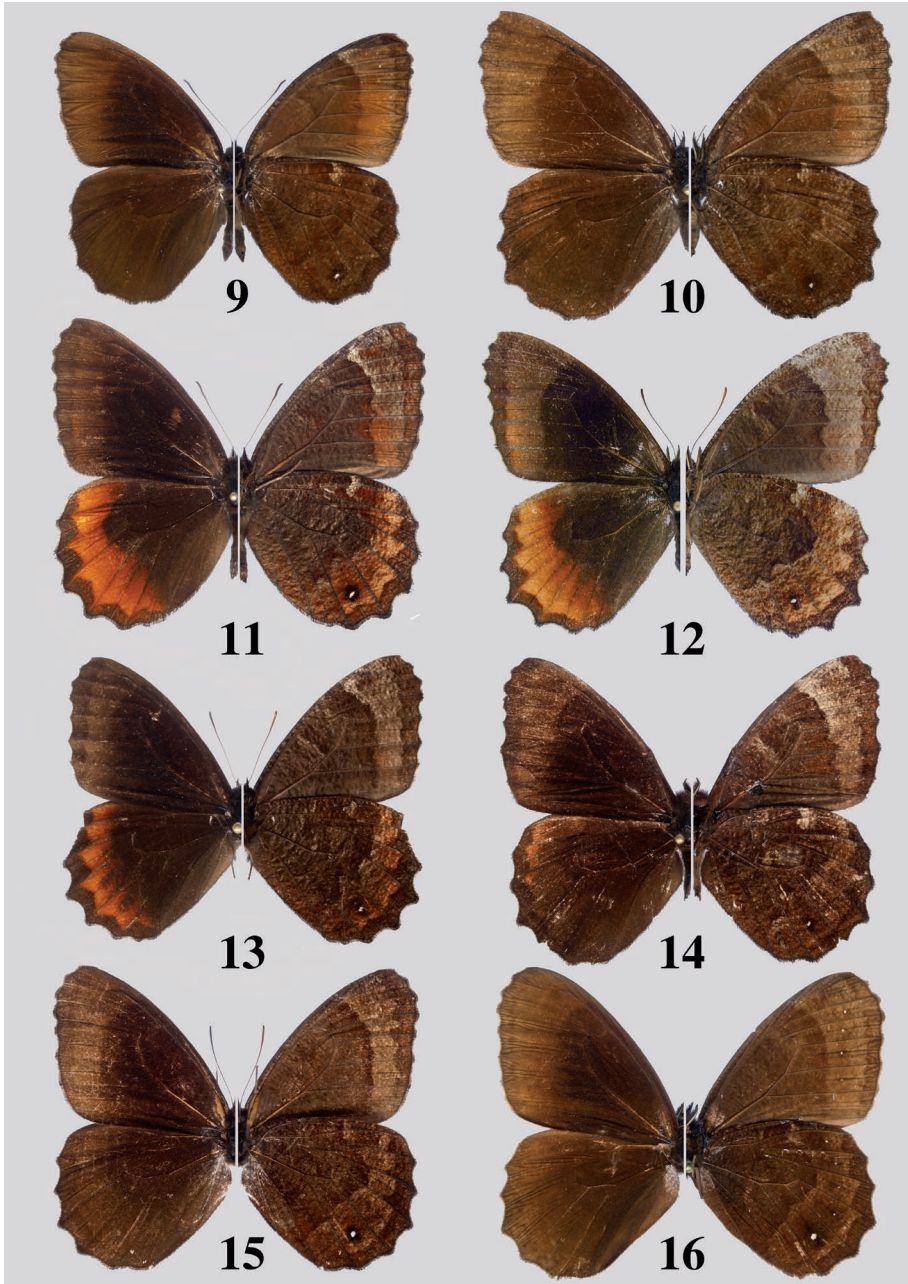
GUATEMALA: 1 male: R. Polochic Valley, F. D. G. & O. S., G-S, BMNH type No. Rh. 3962 [LECTOTYPE of *Pronophila dejecta* BATES, herein designated]; 1 male, Volcán Sta. Ines, 4000-5000 ft., November, Schaus & Barnes Coll.; 1 male, Palin, 4000-5000 ft., October, JB; 2 males, Volcan de Atitlán, 25-3500 ft., Champion, G-S [BMNH]; 1 male: Guatemala, Suchitepequez, Los Tarrales, Volcan Atitlán versant sud, 1800-2000 m, 18.X.2005, Pierre Boyer leg., [PBF]; 1 male: Prov. Suchitepequez, Reserva Los Tarrales, Vesubio- Atitlán, 1850-1900 m, 21.X.2005, T. Pyrcz leg., prep. genit. 04/07.XI.2005, T. Pyrcz; 2 males: same data but 1300-1400 m; 1 male: same data but 02.X.2005; 2 males and 1 female: same data but 1400-1450 m, 18.X.2005; 1 male: same data but 1300 m, 29.IX.2009 [MZUJ].

REDESCRIPTION

MALE (Fig. 1): Head: Eyes chocolate brown, densely hairy; labial palpi two times the length of head, covered dorsally and ventrally with hairy dark brown scales; antennae to 2/3 the length of costa, dark brown, russet at the base of each segment, club slightly thicker than shaft, formed gradually, ventrally black. Thorax: dorsally and ventrally black, hairy, legs covered with medium brown scales. Abdomen: dorsally



1, 2. *Pedaliodes dejecta* : 1 – male, Atitlán, 2 – female, Atitlán. 3-5. *P. peregrina*: 3 – paratype male, Sillar Alto, 4 – holotype male, Pampa Hermosa, 5 – paratype female, Pampa Hermosa. 6 – *P. ereiba ereiba* male, Muzo, 7, 8. *P. pomponia*: 7 – male, Río Hollín, 8 – female, Guarumales



9, 10. *Pedaliodes lithochalcis*: 9 – male, Costa Rica, 10 – female, Costa Rica. 11-13. *P. napaea napaea*: 11 – male, Las Georginas, 12 – female, Las Georginas, 13 – male, Las Georginas. 14. *P. napaea naksi*, holotype male, Cerro Celaque. 15, 16. *P. circumducta* ssp.: 15 – male, Xicotepec, 16 – male, La Esperanza

black, ventrally medium brown. Wings: FW apex blunt, outer margin straight; HW oval with slightly undulated outer margin. FWD blackish brown, uniform, lustrous, androconial patch entering discal cell, extending along basal one-third the length of veins M2, Cu1 and Cu2, and 1A-2A (Fig. 18); fringes short, alternately brown and milky white. HWD blackish brown, uniform, basal area hairy. FWV dull, dark brown; a slightly lighter postmedian-submarginal band enclosed between a diffuse dark brown basal, narrow very slightly undulated band and a similar distal submarginal band; some lighter chestnut and milky yellow subapical scaling; in some individuals a minute subapical whitish spot. HWV chocolate brown; a slightly lighter postmedian-submarginal band, with the basal edge compressed at M1-M2, with a short, diffused whitish costal streak; a small whitish dot in tornal area of Cu1-1A; anal area slightly suffused with reddish scales. **Male genitalia** (Fig. 19): As illustrated.

FEMALE (Fig. 2): Sexual dimorphism slight. The female differs only in the larger size (FW length: 31.5 mm) and lighter colour, pale brown, on both dorsal and ventral surface.

COMMENTS

BATES (1865), in original descriptive paper, referred to sex (male) but did not specify whether he examined one or more specimens. Therefore, the designation of the lectotype is justified. *Pedaliodes dejecta* is known to date from Guatemala only, but possibly also occurs in Honduras, San Salvador and extreme southern Chiapas in Mexico. Reports from Mexico have not been confirmed and could be misidentifications of *P. circumducta* (LAMAS et al. 2004). *P. dejecta* is found in lower montane forests below 1800 m and generally at around 1400-1600 m. Therefore, its elevational range does not overlap, at least in Guatemala, with *P. napaea* which is found at considerably higher elevations, invariably above 2000 m, and most commonly at 2400-2600 m. *P. dejecta* is rather uncommon, and we never found several individuals in the same spot. It is apparently restricted to very humid, but not necessarily undisturbed areas, and it flies always in association with *Chusquea* bamboos.

Pedaliodes ereiba ereiba (C. FELDER & R. FELDER)

(Figs. 8, 20)

Pronophila ereiba C. FELDER & R. FELDER, 1867: 469. Syntype (male) in BMNH [examined].

Pedaliodes manis (C. FELDER & R. FELDER) var. *ereiba* (C. FELDER & R. FELDER); BUTLER 1868: 174; KIRBY 1871: 104.

Pedaliodes ereiba (C. FELDER & R. FELDER); BUTLER 1873: 221; THIEME 1905: 73, 75-76; WEYMER 1912: 262, pl. 55, tow f; KRUGER 1924: 24, 27; GAEDE 1931: 490; ADAMS 1986: 285-286; D'ABRERA 1988: 865; PYRCZ 1999: 356; VILORIA et al. 2001: 40; LAMAS et al. 2004: 211.

Pronophila pasicrates HEWITSON [1874]: pl. 29, figs. 51, 59 [Type locality: N. Granada]; KIRBY 1879: 115; GODMAN & SALVIN [1881]: 105; THIEME 1905: 126-127; WEYMER 1912: 262 (synonymy given); RILEY & GABRIEL 1924: 43.

Pedaliodes pasicrates (HEWITSON); KIRBY 1877: 710; LAMAS et al. 2004: 211 (as a synonym).

Type locality: Bogotá, Nova Granada (Colombia).

MATERIAL EXAMINED

COLOMBIA: 1 male, Bogotá, Lindig, Felder Colln., RB [LECTOTYPE of *Pronophila ereiba* C. & R. Felder, herein designated]; 1 male, Bogotá, J. Corder, (genit. vial No. Rh. 4114), JB; 1 male, Bogotá, (genit. prep. ALV120-96), RB; 1 male, Env. de Bogotá, 1918, Frère Apollinaire-Marie, OC; 1 male N. Granada, HC, BMNH type No. Rh. 4018 [LECTOTYPE of *Pronophila pasicrates* Hewitson, herein designated] [BMNH]; 1 male, Bogotá, A-VI, Nolcken [ZMHB]; 1 male: Muzo, 02.VIII.1914, 1200 m, prep. genit. 02/01.03.2011 J. Lorenc [MIZPAN].

COMMENTS

ADAMS (1986) stated that *Pedaliodes ereiba* is closely related to *P. pomponia* and *P. pisonia* (HEWITSON). As we show in this study, *P. ereiba* and *P. pomponia* are indeed very closely related allopatric species, but *P. pisonia* belongs to another group of species which includes *P. lithochalcis* and *P. napaea*. KRÜGER (1924) reported *P. ereiba* from Muzo, but ADAMS (1986) did not collect it during his research and there seem to be no recent records of this rare Colombian species which appears to be limited to the Eastern Cordillera. **Male genitalia:** (Fig. 20): As illustrated.

Pedaliodes ereiba cremera GODMAN & SALVIN

Pedaliodes cremera GODMAN & SALVIN, 1878: 267.

Pedaliodes cremona [sic] GODMAN & SALVIN [1881]: pl. 9, figs. 3, 4.

Pedaliodes cremera GODMAN & SALVIN; GODMAN & SALVIN [1881]: 105; THIEME 1905: 127; RILEY & GABRIEL 1924: 16; VILORIA et al. 2001: 40; LAMAS et al. 2004: 211.

Pedaliodes ereiba (C. FELDER & R. FELDER) form *cremera* GODMAN & SALVIN; WEYMER 1912: 262.

Pedaliodes ereiba (C. FELDER & R. FELDER) var. *cremera* GODMAN & SALVIN; GAEDE 1931: 490.

Pedaliodes ereiba cremera GODMAN & SALVIN; DEVRIES 1987: 282, pl. 49, fig. 19; D'ABRERA 1988: 865, fig.; SANTIN 1998: 960.

Type locality: Irazú, Costa Rica.

MATERIAL EXAMINED

COSTA RICA: 1 female: Irazú, 6-7000 ft., H. Rogers, G-S, BMNH type No. Rh. 4019 [LECTOTYPE of *Pedaliodes cremera* GODMAN & SALVIN, herein designated]; 1 female, Costa Rica, Coll. A. G. M. Gillott, Brit. Mus. 1939-353; 1 male, Carrillo, Underwood, (genit. prep. ALV119-96), JB [BMNH].

COMMENTS

P. ereiba cremera is found in Panama and Costa Rica. DE VRIES (1987) comments that *P. ereiba cremera* in Costa Rica is encountered as solitary specimens in association with abundant *Chusquea*, from 1600-2500 m. This range, however, seems to be inaccurate, since recent data show that *P. ereiba cremera* occurs between 800-1600 m (INBiO data base). Considering its elevational preferences, and the fact that the nominate subspecies flies in the northern Andes, it is likely that *P. ereiba* will be found as well in the Darién range of the Colombia – Panama border, whose cloud forests have

barely been sampled for butterflies.

***Pedaliodes pomponia* (HEWITSON)**

(Figs. 6, 7, 21)

Pronophila pomponia HEWITSON, 1869a: 33-34.

Pedaliodes pomponia (HEWITSON); KIRBY 1871: 645; 1877: 709; THIEME 1905: 73, 76-77; WEYMER 1912: 254; GAEDE 1931: 501; FORSTER 1964: 166, fig. 225 (male genitalia); ADAMS & BERNARD 1981: 362; ADAMS 1986: 285; D'ABRERA 1988: 852, figs.; VILORIA et al. 2001: 40 LAMAS et al. 2004: 213.

Pronophila pomponia HEWITSON; HEWITSON 1872: pl. 28, figs. 43, 44; KIRBY 1879: 115; RILEY & GABRIEL 1924: 47.

Type locality: [Pishcourco], Ecuador.

MATERIAL EXAMINED

ECUADOR: 1 male: Ecuador: HC, BMNH type No. Rh. 3967 [LECTOTYPE of *Pronophila pomponia* HEWITSON, herein designated]; 1 male and 2 females: Ecuador, HC [PARALECTOTYPES of *P. pomponia* Hew., herein designated]; 2 males: E. Ecuador, Río Pastaza, El Topo, 4200 feet, M. G. Palmer, (1 Rhop. slide No. 29547), JB; 2 males: E. Ecuador, Río Pastaza, La Victoria, 3500 feet, M. G. Palmer, JB; 1 male: E. Ecuador, Río Pastaza, Alpayacu, 3600 feet, M. G. Palmer, JB; 1 male: Río Verde, Buckley, G-S; 7 males, Equateur Or., de Baños a Canelos, IX-X.1894, M. de Mathan, (1 genit. prep. ALV261-97), OC; 1 male: Baños, 1895, R. P. Irenée Blanc, OC; 1 male: Baños, Zuray, 1000 m, 13-ii-[19]36, Brit. Mus. 1969-293; 1 male: Env. d'Ambato, R. P. Irenée Blanc, OC; 1 male: Prov. de Bolívar, Balzapampa, XI.1893/II.1894, OC; 1 male: same data, III/IV.1894; 2 males: Zamora, 3-4000 ft., (O. T. Baron), RB; 1 male: Quito, Ex Grose Smith 1910, JB; 3 males, Sta. Inez [*sic*], Buckley, G-S [BMNH]; 1 male: Ecuador; 2 males: Ecuador, 1899-1900, Haensch; 1 male [?] Santa Ines, Rosario, Östl. d. Anden, 1250 m, 9.XII.1899 [ZMHB]; 1 male: Santa Inés, R. Haensch S., Coll. v. Rosen, (präparat Nr. SA356); 1 male and 1 female: Napo, Tena, ca. 450 m, VIII.1956, J. Forster [ZSBS]; 6 males: Tungurahua, Colonia Azuay, près de Río Negro, S 01° 22', W 78° 12', 1600 m, 27.VII.2010, Pierre Boyer leg.; 2 males: Morona Santiago, Macas vers Nueve de Octubre, 1600 m, IX.1999, Euclides Aldaz leg.; 1 female: Morona Santiago, Guarumales, Hidropaute, S 02° 34', W 78° 30', 1700 m, 10.VIII.2010, P. Boyer leg.; 1 male: same data but 18-20.I.2011 [PBF]; 4 males: Tungurahua, Colonia Azuay près du Río Negro, 1600 m, 29.VII.2010, S 01°22', W 78°12', P. Boyer leg.; 1 male: Napo, Río Hollín, 1300 m, 06.VI.1999, T. Pyrcz leg.; 1 male: coll. Velez América, 25.V.1912, vide No. 863-029.1955, localitas ac datum dubiosa; 1 male: Morona-Santiago, arriba de Macas, Loma Tigrillo, 1800-1900 m, VIII.2002, I. Aldaz leg. [MZUJ].

COMMENTS

P. pomponia is reported currently only from the eastern slopes of the Andes in central and southern Ecuador. Its presence in southern Colombia (Nariño) and northern Peru (Cajamarca) is very likely. It occurs in low elevation cloud forests. Although some old specimen labels indicate elevations below 1000 m, this is considered unreliable.

Recent specimens were collected at 1300 – 1800 m. It is very similar to *P. ereiba* in all respects except that the FWD lighter postmedian area is pale yellow instead of reddish. **Male genitalia** (Fig. 21): As illustrated.

***Pedaliodes peregrina* VILORIA & PYRCZ n. sp.**

(Figs. 3, 4, 5, 22)

Type locality: Peru, Junín, Chanchamayo, Pampa Hermosa.

ETYMOLOGY

The name of this species is an allusion to the fact that it was discovered in several, dispersed Andean localities which in a way implies its “peregrine” nature.

MATERIAL EXAMINED

PERU: HOLOTYPE male: Junín, Chanchamayo, Pampa Hermosa, 1350-1400 m, 07.V.2003, T. Pyrcz leg., MZUJ to be deposited in MUSM; PARATYPES (81 males and 3 females): 1 male, Prov. Huánuco, Cushi, 1000 m, (W. Hoffmanns), RB; 1 male: Chanchamayo, (Schunke), RB [BMNH]; 3 males and 2 females: Junín, Pampa Hermosa, 25km nord de San Ramón, 1200-1400 m, 28.I.2003, P. Boyer leg.; 1 male: Junín, Pampa Hermosa, 30km nord de San Ramon, 1100-1300 m, 27-30.XI.2003, P. Boyer leg.; 1 male: Junín, Pampa Hermosa, 25km nord de San Ramón, 1200-1400 m, 12.VII.2003, O. Duviols leg.; 1 male: Junín, Pampa Hermosa, 25km nord de San Ramón, 1200-1400 m, 9-12.VII.2003, O. Duviols leg., [PBF]; 1 male: Junín, Chanchamayo, Pampa Hermosa, 1350-1400 m, 07.V.2003, T. Pyrcz leg., (prep. genit. 01/21.01.2011 A. Zubek); 1 male: same data but 31.V.2002, T. Pyrcz leg., (prep. genit. 04/11.01.2003, T. Pyrcz); 3 males: same data but 02.II.2003 (1 male: prep. genit. 08/12.01.2011, A. Zubek); 2 males: ex. Staudinger & Bang-Haas, no locality; 1 female: Junín, Pampa Hermosa, 25km nord de San Ramón, 1200-1400 m, 28.I.2003, P. Boyer leg. [MZUJ]; **BOLIVIA:** 1 male: Coroico, V.1899, ex coll. Ed Brabant 1920, (prep. genit. ALV274-97), JB; 1 male: Yungas de La Paz, 3000 m (unreliable), RB; 1 male: Charaplaya, 65°W/6°S, 1300 m, VI.[19]01, Simons [BMNH]; 24 males: Depto. Cochabamba, Prov. Carrasco, Villa Tunari – Locotal, Sillar Alto, S17°08'/W65°42', 1400-1500 m, 12-17.II.2009, T. Pyrcz & Y. Gareca leg., (1 male: prep. genit. 09/11.01.2001, A. Zubek) [MZUJ]; 23 males: Chapare, Yendo a Locotal, 1350-1500 m, 12-17.II.2009, Y. Gareca & T. Pyrcz leg., [MHNAD]; 2 males: same data [YGSB]; 12 males: same locality, 13-14.III.2009, Y. Gareca leg.; 1 male: same data but 1900 m [YGCB].

DIAGNOSIS

This species resembles closely several other all brown congeners occurring in central Peru and Bolivia. It differs from *P. exanima* (ERSCHOFF, 1875) in the slightly darker chocolate brown, instead of grey brown, upperside, and the rounded FW with blunt apex, which is somewhat more elongated in *P. exanima* with a subacute apex. The lack of any HWV red suffusion discriminates the new species from *P. manis* and *P. montagna* (ADAMS & BERNARD 1981). The most similar species is *P. balnearia*

(PYRCZ & VILORIA 1999), which, however, occurs at higher elevations, is bigger and even darker, blackish brown on the upperside. Of these, only *P. manis* is syntopic with *P. peregrina*. We consider that its closest relative is however the Colombian *P. ereiba*, based on male genitalia, wing shape and androconia similarity. *P. ereiba* differs in having a large brick red patch on the FWD. Separate specific status of *P. peregrina* and *P. ereiba* is proposed considered conspicuous colour pattern difference and wide geographic disjunction.

DESCRIPTION

MALE (3, 4): Head: Eyes chocolate brown, covered with dense and short hair; antennae reaching two-fifths the length of costa, dorsally chocolate brown, ventrally chestnut, some sparse white scales on basal segments, club formed gradually, slightly thicker than shaft; labial palpi two times the length of head ventrally covered with long dark brown hairy scales, with a line of short lateral milky white scales on the outer dorsal edge. Thorax: dorsally black, covered with black and russet hair, ventrally black, legs with femora dark brown, tarsi and tibiae covered with milky white and chestnut scales, Abdomen: dorsally and laterally blackish brown, ventrally beige. Wings: FW (length: 28-32mm, mean: 30.9mm, n=31) apex blunt, outer margin straight; HW oval with slightly undulated outer margin. FWD blackish, lustrous, a shade lighter towards apical one-fourth; androconial patch entering discal cell, extending along basal one-third the length of veins M2, Cu1 and Cu2, and 1A-2A; fringes short, alternately brown and milky white. HWD blackish, uniform, basal area hairy. FWV lustrous, blackish brown; a slightly lighter postmedian-submarginal band enclosed between a diffuse lighter, pale chestnut basal, narrow very slightly undulated edge and a dark brown submarginal line nearly parallel to outer margin; marginal area chocolate brown; a series of minute, milky white, four or five subapical dots. HWV blackish brown with a delicate, milky white ripple-like pattern covering the entire wing surface; a very slightly lighter postmedian-submarginal band, with the basal edge compressed at M1-M2; a series of minute, milky white submarginal dots, one in each cell, somewhat more prominent in tornal area of Cu1-1A. **Male genitalia** (Fig. 22): As illustrated.

FEMALE (Fig. 5): Differs little from the male, except for the slightly lighter brown colour of the upperside and a somewhat more noticeable lighter FWD outer one-third, and a faint brick red suffusion of the FWV outer one third between Cu1 and tornus.

COMMENTS

P. peregrina is known from central Peru (Huánuco, Junín) and Bolivia (La Paz, Cochabamba). There seem therefore to be a wide disjunction in the range of this species. However, the elevations at which *P. peregrina* occurs, 1100-1600 m, are very little sampled in Peru and particularly devastated by anthropogenic activity, logging and grazing. Nonetheless, the species has not been found so far in the Kosñipata valley (Cuzco) where low elevation cloud forests are well preserved and have been quite well sampled. The specimens from central Peru and Bolivia present some minor morphological differences insufficient for taxonomic recognition.

***Pedaliodes lithochalcis* BUTLER & DRUCE, stat. reinst.**

(Figs. 9, 10, 23)

Pedaliodes lithochalcis BUTLER & DRUCE, 1872: 100; 1874: 338; KIRBY 1877: 709; GODMAN & SALVIN [1881]: 103-104 (as a synonym of *P. dejecta*); THIEME 1905: 72, 74; WEYMER 1912: 254 (as a synonym); RILEY & GABRIEL 1924: 32; LAMAS et al. 2004: 211 (as a synonym).

Type locality: Cartago, Costa Rica.

MATERIAL EXAMINED

COSTA RICA: 1 male: Costa Rica, van Patten, Druce Coll., G-S, BMNH type No. Rh. 3963 [LECTOTYPE of *Pedaliodes lithochalcis* Butler & Druce, herein designated]; 1 male: Costa Rica, Salvin, HC; 3 males and 1 female: Cost. Rica, Ex Grose Smith 1910, JB; 1 male: Costa Rica, RB; 1 male: Costa Rica, CF; 1 male: Costa Rica, iv-'99, CB; 8 males, 1 female: R. Sucio, H. Rogers, (1 genit. prep. ALV115-96), G-S; 1 male and 1 female: Cartago, Ex Grose Smith 1910, JB; 5 males: Azahar de Cartago, (Underwood), RB; 4 males and 1 female: Mt. Poas, [1 male May, 1 male April], RB; 1 female, Irazú, 6-7000 ft., H. Rogers, G-S; 1 female: Costa Rica, van Patten, Druce Coll, G-S [BMNH]; 1 male: Irazú, 6-7000 ft., H. Rogers [ZMHB]; 2 males: Prov. Cartago, Volcán Turrialba, Road from Santa Cruz, 1950-2000 m, 13.VI.2007, K. Casner, [TWP]; **PANAMA:** 1 male: Chiriquí, Zolin, RB; 1 male: Volcano de Chiriquí, 5-9000 ft. (Watson), RB; 4 males: V. de Chiriquí, 4000-6000 ft., Champion, G-S; 2 males: Chiriquí, Ex Grose Smith 1910, JB; 1 male and 1 female: Chiriquí, 1895, Donckier, Ex Coll. Dognin 1921, (Rhop. slide No. 29546), JB; 4 males: Chiriquí, Arcé, G-S; 1 male: 3 females, V. de Chiriquí, 25-4000 ft., Champion, G-S; 1 female: same data, 8000 ft.; 1 male: El Volcan Chiriquí, Potrero seco, 30.I.[19]48, R. E. Ellison; 1 male: El Volcan Chiriquí, Cerro Punto, 6000 ft., 22.VIII.[19]47, R. E. Ellison, Brit. Mus. 1948-478 [BMNH]; 1 male: Chiriquí, Staudinger; 1 male and 1 female: Chiriquí, Ribbe; 4 males: Chiriquí Vulkan, ,95, Trötsch; 1 male: Chiriquí Vulkan, ,86, Tr.; 1 female: Chiriquí, ,74, coll. Möschl. [ZMHB]; 1 male: Chiriquí, Coll. v. Rosen, (präparat Nr. SA375) [ZSBS]; 5 males and 1 female: Chiriquí, ex. Staudinger & Bang-Haas [MZUJ].

REDESCRIPTION

MALE (9, 10): Head: Eyes chocolate brown, densely hairy; labial palpi two times the length of head, dorsally and laterally covered with brown hairy scales, laterally with milky white scales; antennae reaching two-thirds the length of costa, dorsally brown, ventrally orange brown, with some whitish scales on basal half, club formed gradually, slightly thicker than shaft. Thorax: dorsally black, covered with brown and russet hair, ventrally dark brown, legs with femora covered with brown, tibiae and tarsi with milky white scales. Abdomen: dorsally covered with dark brown, ventrally lighter beige and milky white scales. Wings: FW apex subacute, outer margin straight; HW oval with slightly undulated outer margin. FWD dark brown, uniform, lustrous, androconial patch large widely entering discal cell, extending along half the length of veins M2, Cu1 and Cu2, and 1A-2A; fringes short, alternately brown and milky white.

HWD dark brown, uniform, basal area hairy. FWV lustrous, chestnut; a lighter post-median-submarginal band with a milky white, diffuse costal edge, distally edged by a narrow very slightly undulated submarginal band; outer anal one third with a shining orange overcast; in some individuals between one and three minute subapical milky white spots. HWV medium to dark brown; a slightly lighter postmedian-submarginal band, with the basal edge compressed at M1-M2, with a short, diffused whitish costal streak, in some specimens extending as a diffuse whitish edge extending to anal margin; a small whitish ocellus circled with dark brown in tornal area of Cu1-1A. **Male genitalia** (Fig. 23): As illustrated.

COMMENTS

All previous reports of *Pedaliodes dejecta* from Panama and Costa Rica refer to *Pedaliodes lithochalcis*. This species is common in these two countries where it occurs on both the Pacific and Caribbean slopes most commonly in association with lower montane forests (DEVRIES 1987). It apparently has a particularly wide altitudinal range, extending from 800-2300 m which is probably due to its tolerance of disturbed habitats and the ability of penetrating secondary and drier areas at higher elevations. Other sources indicate that its elevational spread is even wider, from 800-2900 m (INBiO data base).

Pedaliodes napaea napaea BATES

(Figs. 11, 12, 13, 17, 24)

Pronophila napaea BATES, 1865: 179.

Pronophila naepaea [sic] BATES; HERRICH-SCHAFFER 1865: 66; RILEY & GABRIEL 1924: 38.

Pedaliodes napaea (BATES); BUTLER 1867: 267; 1868: 179; KIRBY 1871: 106; SCUDDER 1875: 243; GODMAN & SALVIN [1881]: 104, pl. 9, figs. 2, 3; THIEME 1905: 129; WEYMER 1912: 262; GAEDE 1931: 492; FORSTER 1964: 174, fig. 269 (male genitalia); DE LA MAZA 1987: 169, 198, 199, pl. 23, fig. 1; D'ABRERA 1988: 864-865, fig.; VILORIA 1994: 528; VILORIA & PYRCZ 1994: 350; VILORIA et al. 2001: 40; LAMAS et al. 2004: 212.

Type locality: [San Gerónimo], Central Valleys, Guatemala.

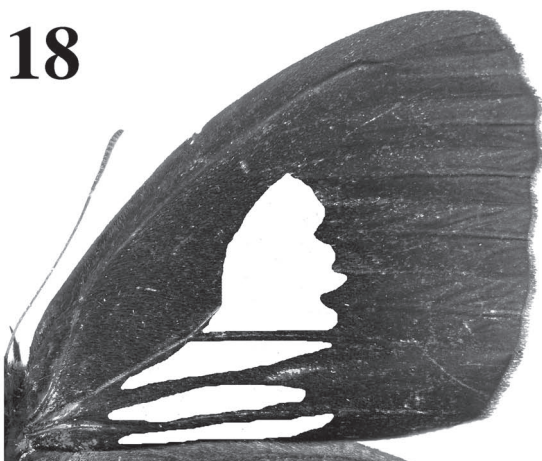
MATERIAL EXAMINED

GUATEMALA: 1 male, Centr. Valleys, F. D. G. & O. S.; Godman & Salvin coll., BMNH type No. Rh. 4023 [LECTOTYPE of *Pronophila napaea* Bates, herein designated]; 1 male, Volcan Sta. Maria, 4000-5000 ft., April, Schaus & Barnes coll., JB; 1 male, same data, february, (Rhop. vial No. 4092); 1 male, V. de Sta. Maria, Pacific slopes, Richardson, G-S; 2 males, Geronimo, 3000 ft., Champion, G-S; 4 males, Cerro Zunil, 4-5000 ft., Champion, G-S; 1 male, Calderas, Champion, G-S [BMNH]; 3 males, 2 females: Guatemala, Quezaltenango, Las Georginas, 6 à 8 km sud est de Zunil, 2300-2400 m, 14-16.X.2005, Pierre Boyer leg., [PBF]; 4 males: Quetzaltenango, Zunil, Las Georginas, 2400-2450 m, 16.X.2005, T. Pyrcz leg.; 2 males: same data but 14.X.2005; 2 males: same data but 15.X.2005; 1 male: same data 07.XI.2005 [MZUJ]; **MEXICO:** 1 male, Chiapas, San Carlos, 17.IX.1969, Robert Wind, A. C. Allyn, Acc. 1968-22, pres.

by L. D. Miller, Brit. Mus. 1979-104; 1 female, Chiapas, Mt. Huitepec, cloud forest, 15/21.VI.1975, P. Hubbell, A. C. Allyn Acc. 1976-11, pres. by L. D. Miller, Brit. Mus. 1979-104 [BMNH]; 1 male and 1 female: Chiapas, Unión Juárez, Chiquihuite, 2150 m, 08.VI.1990, A. Luis leg.; 4 males and 2 females: same data, 11.VI.1990; 3 males: same data, 11-viii-1990 [MZAH].

COMMENTS

Pedaliodes napaea napaea is recognized from all other sympatric congeners and allied allopatric species by the wide orange patch on the HWD, somewhat variable within populations but covering always at least the distal one-fourth but not reaching



17, 18. Androconia: 17 – *Pedaliodes napaea napaea*, Las Georginas; 18 – *P. dejecta*, Atitlán

the outer margin. It is found in Guatemala and in southern Mexico (Chiapas). It occurs in mid elevation cloud forest above 2000 m, and most commonly at 2400-2600 m. **Male genitalia** (Fig. 24): As illustrated.

***Pedaliodes napaea naksi* PYRCZ, n. ssp.**

(Fig. 14)

Type locality: Cerro Celaque, Honduras.

ETYMOLOGY

This species is dedicated to Przemysław NAKS, its discoverer, a botanist from the Institute of Botany of the Jagiellonian University in Kraków.

MATERIAL EXAMINED

HONDURAS: HOLOTYPE (male): Prov. Lempira, Cerro Celaque, N14°32'38"/W88°40'25", 2550-2750, 29.II.2008, P. Naks leg. [MZUJ].

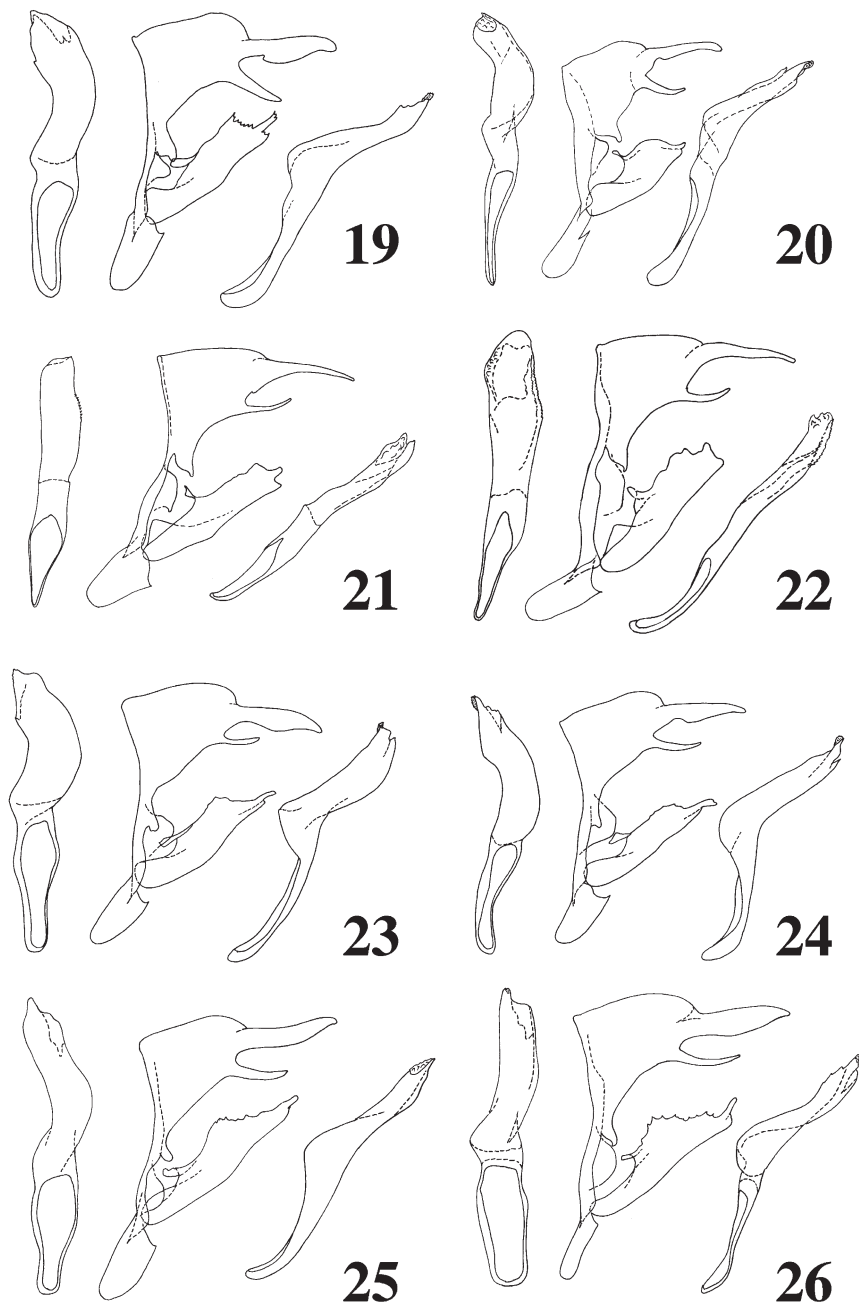
DIAGNOSIS

Compared to nominate *P. napaea* the rusty suffusion of the HWD is restricted to subapical area; the milky white suffusion of the FWD postdiscal area is heavier; the HWV submarginal white dot is less conspicuous.

DESCRIPTION

MALE (Fig. 14): **Head:** Eyes medium brown, densely hairy; labial palpi two times the length of head, covered ventrally with long chocolate brown and dorsally with short milky white hairy scales. **Thorax:** Dorsally black, covered with sparse brown and russet hair, ventrally covered with dense brown hair, legs covered with beige scales. **Abdomen:** Black, dorsally covered with brown, ventrally with beige hairy scales. **Wings:** FW (length: 27.5 mm) apex subacute, outer margin straight; HW oval with slightly undulated outer margin. FWD dark brown, with a slightly lighter area extending from postmedian to submarginal line, androconial patch large widely entering discal cell, extending along to postmedian area along veins M2, Cu1 and to submarginal area along Cu2 and 1A-2A; fringes short, alternately brown and milky white. HWD lustrous, chocolate brown, basal area hairy; a diffuse submarginal brick red band, some 2 mm wide, extending from apex to cell M2-M3. FWV dull chocolate brown liberally covered with ripple-like pattern, except a lighter postmedian - submarginal band some 4 mm wide on the costa, gradually narrowing towards tornus where 2 mm wide, suffused with milky white scaling progressively more densely towards subapical area basally, edged basally and distally with dark brown. HWV chocolate brown, same as on the FWV; a very slightly lighter postmedian - submarginal band, compressed at M1-M2, with a short, faint milky white costal streak; a small whitish ocellus circled with dark brown in tornal area of Cu1-1A. **Male genitalia:** Not examined (the abdomen of the holotype was damaged during transportation).

FEMALE: So far unknown.



19-26. Male genitalia: 19 – *Pedaliodes dejecta*, Atitlán; 20 – *P. ereiba ereiba*, Muzo; 21 – *P. pomponia*, Colonia Azuaya; 22 – *P. peregrina*, Pampa Hermosa; 23 – *P. napaea napaea*, Las Georginas; 24 – *P. lithochalcis*, Costa Rica; 25 – *P. circumducta* ssp., La Esperanza; 26 – *P. circumducta* ssp., Xicotepec

COMMENTS

This subspecies is known so far only from the unique specimen. It was obtained during a Polish botanist expedition to the Celaque massif in south-central Honduras. It is morphologically very well differentiated from all examined specimens of the nominate subspecies from Guatemala and southern Mexico. The type locality of *naksi* is a geographically well isolated from the region where nominate *P. napaea* occurs which further sustains its separate subspecific status. It is worth pointing out the fact that *P. napaea naksi* is the first taxon of cloud forest Satyrinae butterfly described from Honduras and possibly endemic to this country.

***Pedaliodes circumducta* THIEME**

(Figs. 15, 16, 25, 26)

Pedaliodes circumducta THIEME, 1905: 45, 73, 74-75, pl. 3, fig. 23; VILORIA et al. 2001: 40; LAMAS et al. 2004: 211.

Pedaliodes pisonia (HEWITON) form *circumducta* THIEME; WEYMER 1912: 254.

Pedaliodes pisonia (HEWITON) var. *circumducta* THIEME; GAEDE 1931: 499.

Pedaliodes dejecta circumducta THIEME; D'ABRERA 1988: 852, fig.

Pedaliodes circumducta [*sic*] THIEME; LUIS, VARGAS & LORENTE 1991: 33, 92.

Type locality: Mexico.

MATERIAL EXAMINED

MEXICO: 1 male, Veracruz, San Bartolo, 5000 ft., FDG, G-S; 1 male, Mexico, 1914, pres. by Prof. M. Draudt, (genit. prep. ALV114-96), JB; 1 female [with male abdomen glued in], Yucatán [plus some illegible words], Felder Colln., RB [BMNH]; 1 male, Veracruz, Teocelo, Cascada Teocelo, 1100 m, 14.V.1983, G. Lamas [MUSM]; 1 male, Mexico Hegeirisch, Coll. Sommer, Lectotype of *Pedaliodes circumducta* Thieme, designated by G. Lamas, 1994 [ZMHB]; 1 male, Oaxaca, Mpio. Comalteque, Vista Hermosa, 1450 m, 2-x-1972 [ZSBS]; 1 male: Mexique, Oaxaca, Metates, 700 m ?, 2006?; 1 male : Mexique, Oaxaca, Puerto Antonio (Comaltepec), 1200 m, 02.X1.1980, Welling leg., [PB]; 1 male: Puebla, Xicotepec de Juarez, VI-VIII.2000, ex coll. M. Dottax; 1 male: same data but 07.VIII.2002; 1 male: same data but 01.VIII.2002; 1 male: same data but 03.VIII.2002, prep. genit. 01/20.04.2009, T. Pyrcz; 1 female: Oaxaca, La Esperanza, III.2000, 1500 m, ex coll. TWP; 1 male: same data, prep. genit. 02/20.04.2009, T. Pyrcz; 1 female: Oaxaca, Metatez, VIII.1985, 1500 m, ex coll. TWP [MZUJ].

COMMENTS

P. circumducta was described from an unspecified locality in Mexico. The male lectotype, simply labeled as "Mexico" and deposited at the ZMHB, was designated by LAMAS (1994). This renders the unambiguous identification of this taxon difficult, especially since specimens superficially closely resembling the lectotype are found throughout the southern and central Mexican states of Oaxaca, Chiapas, Veracruz, Puebla and Guerrero. It is beyond any doubt that several new taxa related to *P. cir-*

circumducta can be identified in Mexico at either specific or subspecific level because, as evidenced here, beneath the superficial similarity of colour patterns, are important differences in the genitalia. This issue is being studied currently (LLORENTE & VILORIA, unpubl.) and it is beyond the scope of this paper to investigate in depth the differentiation of *P. circumducta* in Mexico. Compared to *P. napaea*, all the examined specimens of *P. circumducta* are characterized by the lack of any reddish scaling on the HWD. In Mexico *P. circumducta* occurs from 1400-2500 m (Llorente-Bousquets, unpubl.). **Male genitalia** (Fig. 25, 26): As illustrated.

DISCUSSION

Several of the species of *Pedaliodes* discussed here have been commonly confused in the past because of their overall similar underside colour patterns and all brown uppersides. This concerns in particular *P. dejecta* and *P. lithochalcis*, considered synonymous for more than a century, even though, apart from obvious morphological differences, the two species are not even sympatric. Moreover, in Costa Rica and Panama, *P. lithochalcis* is frequently confused with another mostly uniform brown species, *P. manis* C. FELDER & R. FELDER (DEVRIES 1987). In Guatemala and in Chiapas, the brightly red marked *P. napaea* cannot be confused with *P. dejecta*. However farther to the north, in Mexico (Oaxaca, Veracruz, Guerrero, Puebla) there still exist unsolved cases of confusion between the all brown *P. circumducta* and the local populations of *P. dejecta*. In the Andes, *P. peregrina*, which is all brown, can be again easily mistaken for *P. manis*, *P. montagna* and *P. pisonia*.

The most reliable and straightforward method of separating similarly patterned species of all brown *Pedaliodes* is by comparing their androconia and subsequently their male genitalia, as pointed out in numerous papers dealing with the complex taxonomy of this genus (ADAMS 1986; PYRCZ 2004; VILORIA et al. 2010). Androconia are taxonomically reliable when sympatric species are compared because they play an important role in specific recognition mechanisms and the specific isolation system. PYRCZ & WOJTUSIAK (2002) point out that the closely related and barely distinguishable otherwise *P. manis* and *P. montagna* can be separated by comparing their male androconia. The importance of male androconia has been stressed out elsewhere for west Colombian and north Peruvian sibling species (PYRCZ & WOJTUSIAK 1999; PYRCZ 2004). However, on a geographic scale, androconia of polytypic species and closely related allopatric species can vary to such a degree that they are not useful as synapomorphic characters. On the other hand, the male genitalia are more stable a character on an evolutionary and geographic scale and provide extremely useful characters for phylogenetic inference.

The latter is the case in the species studied herein, which segregate into two groups recognized mostly by their male genitalia. The most diagnostic character is their valvae. Elongated and slender valvae with an irregular dorsal surface without any prominent process, and a narrow extremity extending into a prominent long tip-like process aligned with the long axis of the valvae, in some species slightly pointing upwards, characterize the Mesoamerican species *P. lithochalcis*, *P. napaea* and *P. circumducta*. In South

America such valvae are found in *P. pisonia* and *P. roraimae* STRAND, and several other species including *P. zingara* VILORIA & HEREDIA and *P. phrasiclea* (HEWITSON). The other Mesoamerican species discussed here, *P. dejecta* and *P. ereiba cremera*, present more compact and stout valvae with a wide extremity bearing several processes, and usually one prominent tooth-like process dorsal pointing upside or curved inside. Such valvae characterize also *P. ereiba ereiba*, *P. pomponia* and *P. peregrina*.

Other genital characters also allow separation of the so-called “dejecta” and “lithochalcis” groups. In particular, the former has a moderately contorted aedeagus with no cornuti, a stout uncus, and moderately thin subunci, whereas the latter has an aedeagus with numerous apical cornuti, slender uncus and subunci. These characters are, however, also found in other species of *Pedaliodes* and are not exclusive to either group. Additionally, the species of the “dejecta group” are characterized by the blunt FW apex; HWD uniform brown; HWV without any prominent ocellus at tornus. The “lithochalcis group” is characterized by the subacute FW apex; hindwing underside with a white ocellus circled with black and red at tornus. The FW androconial patch is generally larger in the “dejecta group” and extends considerably along veins Cu2 and 1A.

The members of the “dejecta group” are confined to lower elevations than the “lithochalcis group”. They are found at 1200 – 1800 m. On the other hand, the species of the “lithochalcis group” have a considerably wider altitudinal range, and can be found below 1000 m but also up to 3000 m. There is also an ecological distinction between the two groups. All the species of “dejecta group” are restricted to extremely humid areas, whereas the members of “lithochalcis group” are less habitat specific and are commonly found in disturbed and somewhat drier habitats. This is particularly the case for *P. lithochalcis*, as pointed out by DEVRIES (1987), *P. pisonia* in the Andes of Venezuela and *P. circumducta* in Mexico.

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