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Systematics, bionomics and zoogeography of high Andean pedalioidines;
 Part 10: Revisional notes on *Pedaliodes tyro* THIEME with the
 description of new allied taxa from central and southern Peru
 (Lepidoptera: Nymphalidae: Satyrinae)

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ABSTRACT. Eight new taxa related to *Pedaliodes tyro* THIEME are described, including six species and two subspecies. It is demonstrated that the designation of the lectotype of *Pedaliodes tyro* from Marcapata is incorrect, and that the true type locality is Limbani. *P. tyro* is redescribed and redefined.

Key words: entomology, taxonomy, Satyrinae, *Pedaliodes*, new taxa, redescription, Andes.

INTRODUCTION

Pedaliodes BUTLER (Nymphalidae, Satyrinae, Satyrini) is the most speciose genus of the Neotropical butterflies with at least 200 currently recognised species (LAMAS et al. 2004). This large number of taxa often does not translate into morphological diversity, especially the wing colour patterns. Several basic elements are found in almost every single taxon. For example, the hindwing underside, in the absence of other prominent colour patterns, usually possess a yellow, orange or reddish triangular or elongate anal wedge and a usually short costal streak. There are dozens of species with these markings, often several sympatric, and their correct identification requires more thorough morphological study, including the comparing of male androconial

patches, and especially male genitalia, which brings many important anatomical features. The study of genitalic structures started to be applied as a standard taxonomic procedure after the First World War, therefore the authors of descriptive papers prior to this period, although experienced and skillfull naturalists, were methodologically constrained. Other important data allowing to set apart superficially similar species are on ecological preferences, especially their altitudinal distribution patterns. Early students of Andean butterfly faunas were largely basing on material purchased from local collectors that were not bearing altitudinal data at all, but even the naturalists who collected themselves in the Andes were rarely attaching any much attention on such information as the exact collecting elevation above sea level. Furthermore, the descriptions of species were often based on few specimens per taxon not allowing any insight into individual variation, which as we know can be extremely important in the genus *Pedaliodes*. Hence, many identification errors, and often specimens belonging to more than one species, as later appeared, were considered as representing the very same taxon. Some misidentifications caused particularly harsh taxonomic problems to sort out, for subsequent students of the genus *Pedaliodes*. One of such difficult cases concerns the taxon described by THIEME (1905) as *Pedaliodes tyro*.

MATERIALS AND METHODS

Type material was examined in BMNH, ZMHB, MUSM and MZUJ. Additional material was examined in other major collections. Male genitalia were dissected according to standard procedure, 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 version 7 software. The following abbreviations and collection codens were 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;

MBLI: collection of Maurizio BOLLINO, Lecce, Italy;

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

MZUJ: Muzeum Zoologiczne Uniwersytetu Jagiellońskiego, Kraków, Poland;

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

SMTD: Staatliche Museum für Tierkunde, Dresden, Germany;

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

SYSTEMATIC OVERVIEW

Pedaliodes tyro THIEME, 1905 stat. rev.
Pedaliodes sophismata PYRCZ 2004
Pedaliodes sophismata reductissima PYRCZ n. ssp.
Pedaliodes ackeryi PYRCZ et VILORIA n. sp.
Pedaliodes melvillei VILORIA et LAMAS n. sp.
Pedaliodes ampayana LAMAS, VILORIA et PYRCZ n. sp.
Pedaliodes ampayana chanka PYRCZ n. ssp.
Pedaliodes arena PYRCZ n. sp.
Pedaliodes diuna PYRCZ et BOYER n. sp.
Pedaliodes brea PYRCZ et BOYER n. sp.

***Pedaliodes tyro* THIEME, stat. rev.**

(Figs. 1, 2, 3, 4, 5, 25, 26)

[*Pedaliodes paneis* var. HEWITSON, 1862: 8, pl. 4, fig. 26; THIEME, 1905: 100 (synonymy given)].
 [*Pedaliodes paneis* var. HEWITSON, 1868: pl. 4, fig. 27; THIEME, 1905: 100 (synonymy given)].
Pedaliodes tyro THIEME, 1905: 100-101; PYRCZ, 2004: 552; LAMAS et al., 2004: 213.
Pedaliodes paneis (HEWITSON) form *tyro* THIEME; WEYMER, 1912: 258, pl. 54, row f.
Pedaliodes paneis (HEWITSON) var. *tyro* THIEME; GAEDE, 1931: 493.
 [*Pedaliodes tyro* THIEME; FORSTER, 1964: 167, 169, fig. 235 (male genitalia) (misidentification of *P. ferratilis* BUTLER)].

Type locality: Limbani, Puno; [Pasco, Huancabamba; Cuzco, Marcapata].

MATERIAL EXAMINED

PERU: 2 ♂♂: Vallée de Limbani, Aquele, Puno, 2400-2700 m, XI.2004, J. Bottger leg.; 2 ♂♂: Limbani vers Carcel Punco Km 4, Sandia, 3000 m, 16.X.2004, P. Boyer leg. [TWP]; 20 ♂♂: Vallée du Río Sina, San Antonio de Putina, Puno, 2700-3100 m, 12.X.2004, P. Boyer leg.; 1 ♂: Sandia vers Juliaca Km 13, Puno, 3000 m, 15.X.2004, P. Boyer leg. [TWP]; 6 ♂♂ and 3 ♀♀: Vallée du Río Sina, San Antonio de Putina, Puno, 2700-3100 m, 12.X.2004, P. Boyer leg.; 2 ♂♂ and 1 ♀: Sina, San Antonio de Putina, Puno, 3400 m, 12.X.2004, P. Boyer leg.; 1 ♂ and 1 ♀: Phara, chemin de La Mina, Sandia, Puno, 3400-3600 m, 19.X.2004, P. Boyer leg.; 1 ♂: Carcel Punco, Agualanes, 8 km nord de Limbani, Sandia, Puno, 2400-2700 m, 16.X.2004, P. Boyer leg.; 1 ♂: Ollachea vers Macusani km 3, Carabaya, Puno, 2800m, 21.X.2004, P. Boyer leg.; 1 ♀: Sandia vers Juliaca km 13, Puno, 3000 m, 15.X.2004, P. Boyer leg. [PBF].

DIAGNOSIS

Most similar to *P. sophismata* PYRCZ, *P. ackeryi* n. sp. and *P. cledonia* THIEME (Fig. 23). *P. sophismata* differs in the HWV ground colour, dark or blackish brown, without any reddish shade characteristic of *P. tyro*. HWV wedge is variable in the two species but in *P. tyro* it never breaks into a series of spots, contrary to *P. sophismata* and *P. cledonia*, and its basal margin is curved distally, whereas in *P. sophismata* it is either

perpendicular to outer margin or curved basally. *P. tyro* has only one yellow submarginal dot in HWV Cu1-Cu2, whereas *P. sophismata* has either one or two. *P. cledonia* is smaller, has more oblong wings, the HWV anal wedge has a reddish-brown suffusion, in most individuals rich yellow in *P. tyro* and *P. sophismata* (except *P. sophismata reductissima* n. ssp.). *P. ackeryi* is considerably larger, its HWV yellow anal wedge presents no individual variation and is always triangular, some specimens have a row of FWV submarginal whitish dots, never apparent in *P. tyro* or other related species.

REDESCRIPTION

MALE (Figs. 1, 3, 4): Head: frons with a short tuft of dark brown hair; eyes chocolate brown, hairy; labial palpi twice the length of head, grey covered with chocolate brown hair; antennae reaching two-fifths the length of costa, slender, with the club formed gradually, subcylindrical twice as thick as shaft, orange brown, terminal segments dark brown. Thorax: dorsally and ventrally blackish brown, legs femore dark brown, tibiae and tarsi light brown. Abdomen: dorsally blackish brown, ventrally dull, light brown. Wings: FW length 26-29 mm (mean: 27.5 mm, n=4 (only individuals from Limbani)); apex subacute, outer margin straight, very slightly truncated from apex to vein M2. HW outer margin scalloped. FWD dark brown, lustrous, a shade lighter in outer half; androconial patch large, rectangular, widely entering discal cell; fringes alternately dark brown and whitish. HWD dark brown, lustrous, hairy in basal area and along anal margin; an orange suffusion along anal margin, variable, small but well marked, or faint barely visible; fringes brown and milky white from apex to vein M3. FWV medium brown, lustrous; a faint postdical streak made of sparse milky white scales, extending from costa to vein M2; subapical, apical and marginal area to vein Cu1 finely suffused with whitish and chocolate brown scales; marginal area reddish brown from costa to vein Cu1. HWV chocolate brown with reddish shade, and a fine ripple pattern; a rich yellow roughly triangular anal wedge reaching into cell Cu1-Cu2 with a distal incision at vein Cu2, suffused with brown scales; a tiny submarginal dot in cell Cu1-Cu2; a barely noticeable blackish brown sinuate submarginal line, parallel to outer margin. **Male genitalia** (Figs. 25, 26): Uncus gently arched, the length of tegumen; subunci slender and short, one-third the length of uncus; saccus wide and rather shallow, conical, aligned to vinculum; valvae approximately the same width in median half, with a smooth or slightly irregular dorsal surface and a short, pyramid-shaped process; aedeagus slightly longer than valva+saccus, strongly contorted and flattened dorso-ventrally, proximal opening one-third the length of aedeagus, small apical tip.

FEMALE (Figs. 2, 5): Differs from the male in the slightly lighter dorsal brown, and particularly the intense beige and sandy overcast of HWV. FW length: 28 mm.

REMARKS

THIEME (1905) confused under the name *Pedaliodes tyro* three separate species. PYRCZ (2004) only partly explained this issue. He correctly established that the female syntype of THIEME coming from Huancabamba (Pasco) in central Peru is not conspecific with the males syntypes from Limbani (Puno) and Marcapata (Cuzco). PYRCZ (*op. cit.*) associated it with a new species, *P. sophismata* PYRCZ, described based on specimens

from northern Peru (Amazonas). PYRCZ (*op. cit.*) examined four males from Marcapata in the BMNH collected by OCKENDEN and concluded that they undoubtedly correspond with the specimens referred to by THIEME. These specimens were labelled by VILORIA (unpublished) as lectotype and paralectotypes of *P. tyro*. Hence, PYRCZ (*op. cit.*) considered them as representing *bona fide P. tyro*. However, subsequent sampling in southern Peru and taxonomic research put in doubt the choice of the lectotype from among the Marcapata specimens. First of all, THIEME (*op. cit.*) states clearly that the specimens from his personal collection (an indefinite number) are all from Limbani. Therefore, the lectotype should be selected from among the Limbani syntypes. Unfortunately, these are apparently lost, alongside many other specimens from the THIEME collection. All the efforts of tracking it down in several museums in Germany were so far unsuccessful. Fortunately, our recent sampling in Limbani brought a rich material, including several individuals corresponding exactly with the description of *P. tyro*. Although *P. tyro* was not illustrated, THIEME (*op. cit.*) describes its colour pattern as tallying exactly the illustration of HEWITSON (1862), which actually corresponds with *P. sophismata*! Even though the Limbani specimens resemble superficially those from Marcapata, there are consistent differences. The first one is considerably smaller size: FW length 26-29 mm (Limbani), 29-32 mm (Marcapata). Secondly, the HWV of Limbani specimens are chocolate brown with a reddish sheen (mentioned by THIEME), while those from Marcapata are dark brown. Marcapata specimens often possess a straight row of four FWD submarginal minute yellowish dots, never apparent in Limbani. Moreover, the specimens from Limbani were all collected at considerably lower elevations, at 2400-2700 m, than in Marcapata (3150 m). Reassuming, we conclude that the specimens examined by Thieme coming from Marcapata and Limbani represent two, specifically distinct taxa. The Limbani population has to be considered as *bona fide Pedaliodes tyro*. The specimens from Marcapata, although correctly identified as syntypes, belong to a separate species which is described below. *P. tyro* occurs South in the valley of Río Sina, on the Peru-Bolivia border. The local population slightly differs from the specimens found in Limbani. In half of examined individuals from Sina the HWV anal wedge extends as an elongated band to veins M1/M2, never so in the Limbani population. HWV ground colour has a marked reddish shade, invariably more intense than in the nominate. The yellow costal streak is always present. We refrain from attributing it a subspecific status because available comparison material of *P. tyro* from the typical locality is not sufficient as to evaluate its infrasubspecific variability. The same applies to the Ollachea population. Curiously, so far *P. tyro* has not been found in Bolivia, where it certainly occurs.

***Pedaliodes ackeryi* PYRCZ et VILORIA n. sp.**

(Figs. 11, 12, 27)

Type locality: Quebrada Huallayoc, Marcapata, Cuzco, Peru.

Material examined

PERU: HOLOTYPE ♂: Cuzco, Ocongate-Marcapata, Puente Huallayoc, 3100-3150 m, 14-16.II.2005, T. Pycrz leg. [**MUSM**]; PARATYPES: (81 ♂♂ and 8 ♀♀): 68

♂♂ and 4 ♀♀: same data as the holotype, 55 [MZUJ], 10 [MUSM], 3 [MBLI]; 1 ♂: Cuzco, Acjanaco-Pillcopata, below Abra Acjanaco, 3400-3450 m, 26.V.2003, T. Pyrcz leg. [TWP]; 7 ♂♂ and 3 ♀♀: Cuzco, Puente Huayllayoc, Marcapata vers Ocongate km 4, Quispicanchi, 3100 m, 14.II.2005, P. Boyer leg.; 5 ♂♂ and 1 ♀: Cuzco, Acjanaco vers Boca Manu km 2 à 6, 3400-3470 m, 22.V.2003, P. Boyer leg. [PBF].

DIAGNOSIS

Larger than any closely related congener (*P. tyro*, *P. melvillei* n. sp., *P. ampayana* n. sp.), also recognised by the row of minute FWD submarginal whitish or yellowish dots and distinctively scalloped HW margin. About the size of the sympatric *P. pheres* THIEME, which differs immediately by the smoother HW margin and the lack of HWV submarginal dots.

DESCRIPTION

MALE (Fig. 11): Head: frons with a short tuft of dark brown hair; eyes chocolate brown, hairy; labial palpi twice the length of head, grey covered with chocolate brown hair; antennae reaching two-fifths the length of costa, slender, with the club formed gradually, subcylindrical twice as thick as shaft, orange brown, terminal segments dark brown. Thorax: dorsally and ventrally blackish brown, legs light brown. Abdomen: dorsally blackish brown, ventrally dull, light brown. Wings: FW length 29-32 mm (mean: 30 mm, n=63); apex subacute, outer margin very slightly concave and slightly truncated from apex to vein M2, and delicately wavy particularly towards apex; HW outer margin markedly scalloped. FWD dark brown with a chesnut sheen, lustrous; in a few examined individuals a lighter postdiscal sheen and a straight row of four minute light brown submarginal dots from M1-M2 to Cu1-Cu2; androconial patch large, rectangular, widely entering discal cell (slightly larger in the Acjanaco individuals); fringes alternately dark brown and some milky white between the veins towards apex. HWD uniform dark brown with a chesnut sheen, lustrous, hairy in basal half; in a few examined individuals a faint submarginal yellowish dot in Cu1-Cu2 and faint brick red scaling along anal margin near tornus; fringes brown and milky white from apex to vein M3. FWV: dark brown and lustrous in basal half; a faint postdiscal streak made of sparse milky white scales, gradually narrowing from costa to vein M2, in some examined individuals extending as a whitish line to Cu2; a row of minute whitish submarginal dots from M1-M2 to Cu1-Cu2; subapical, apical and marginal areas chocolate brown; a fine blackish brown submarginal line. HWV: dark brown, with a chocolate shade towards outer half and a delicate ripple-like pattern; a wide yellow anal wedge, slightly variable in size and shape, in most individuals as a triangle with an irregular inner edge, generally indented on vein Cu2, extending onto vein Cu1, in most individuals suffused with brown scales; some whitish postmedian scaling forming a barely noticeable short costal streak; a minute but always present yellow submarginal dot in Cu1-Cu2, in some individuals a second, tiny dot in M3-Cu1; a barely noticeable blackish brown sinuate submarginal line, parallel to outer margin. **Male genitalia** (Fig. 27): Uncus gently arched, the length of tegumen; subunci slender, about one-third the length of uncus; saccus wide and moderately deep, aligned to vinculum; valvae approximately the same

width in median half, dorsal surface smooth from base to a short, teeth-like dorsal process, then slightly serrate to blunt apex pointing upwards; aedeagus slightly longer than valva+saccus, strongly contorted, flattened dorso-ventrally, proximal opening two-fifths the length of valva, a small apical tip.

FEMALE (Fig. 12): FW length 28-31 mm (mean: 29.5 mm, n=8); FW and HWD markedly lighter than in the male, medium brown, with a diffused postmedian lighter band and in most examined individuals a straight row of four submarginal dots in M1-M2 to Cu1-Cu2; FWV ground colour also lighter, medium brown with a discrete postdiscal whitish streak and a row of submarginal dots as on the upperside; HWV medium brown with a noticeably lighter postmedian to submarginal band; anal wedge with a whitish area along vein Cu2.

ETYMOLOGY

This species is dedicated to Phil ACKERY, eminent British entomologist and long time curator of the Lepidoptera collection at the Natural History Museum (formerly BMNH), London, in gratitude for his patience and professionalism in assisting the many lepidopterists visiting the museum over the years, including these authors.

REMARKS

P. ackeryi is known from two parallel valleys in the department of Cuzco, Marcapata and Kosñipata, both affluents of the Madre de Dios. It occurs in the uppermost cloud forest at around 3200 m. It is the dominant species of *Pedaliodes* at this elevation, followed by *P. pheres*.

Pedaliodes melvillei VILORIA et LAMAS n. sp.

(Figs. 9, 10, 28)

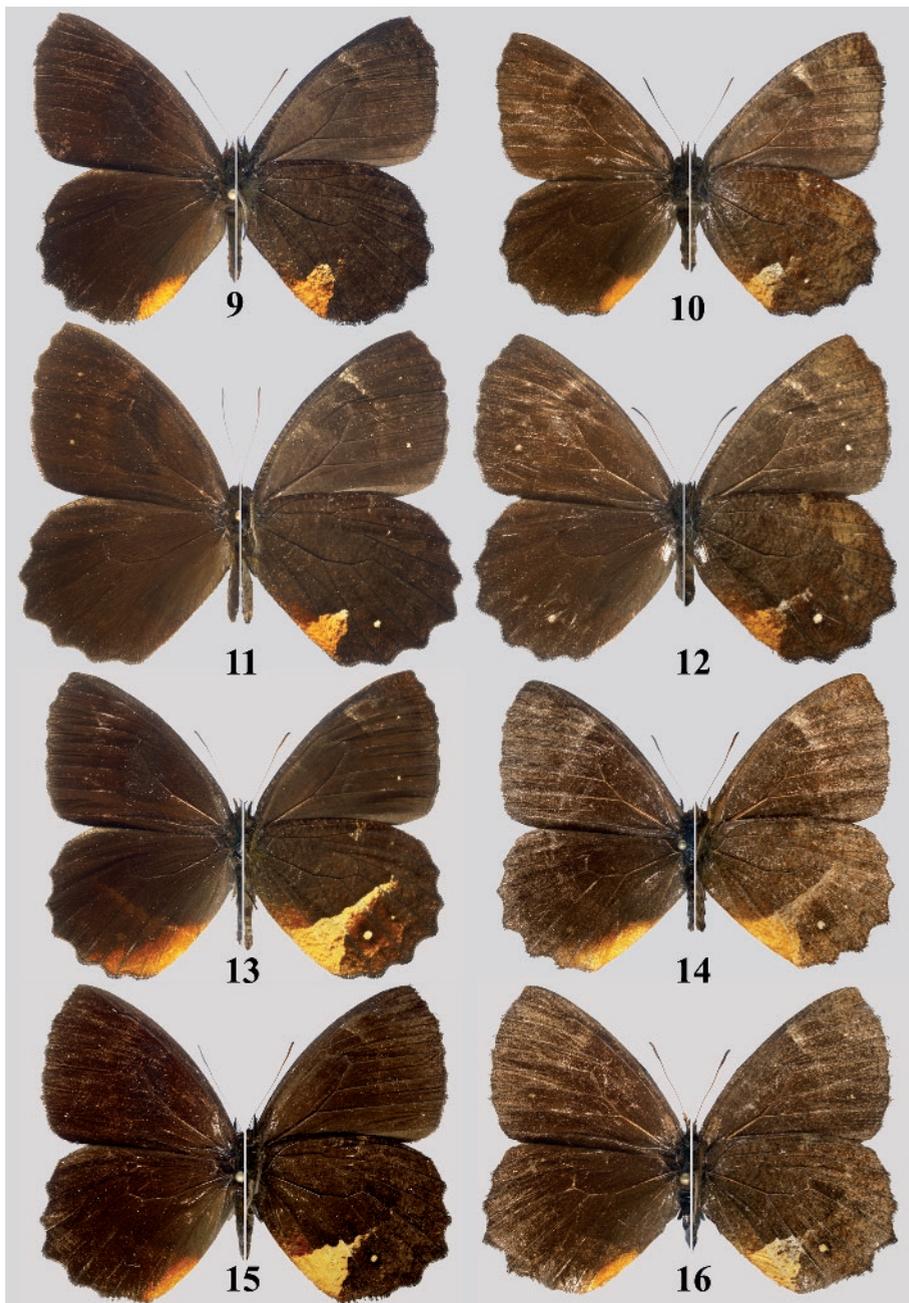
Type locality: Quebrada San Luis, vía Abra Malaga – Alfamayo, Cuzco, Peru.

MATERIAL EXAMINED

PERU: HOLOTYPE ♂: Cuzco, Quebrada San Luis, 2950 m, 1305/7223, 22.II.1996, G. Lamas leg. [MUSM]; PARATYPES (93 ♂♂ and 7 ♀♀): 3 ♂♂: same data (1 genit. prep. ALV363-97); 5 ♂♂, same data but 21.II.1996; 1 ♂: same data but 25.II.1996; 4 ♂♂, same data but 26.II.1996 (1 genit. prep. ALV376-97); 1 ♀: Cuzco, 14 km E Alfamayo, Río Santa María, 2500 m, 07.X.1981, G. Lamas *et al.*; 1 ♂: same data, 08.X.1981; 1 ♀: Cuzco, Alfamayo, 2400 m, 1304/7224, 22.II.1996, A. Brower; 1 ♂: 150 km de Cuzco a Quillabamba, CU, 3100 m, 09.VI.1978, L. Skog [MUSM]; 4 ♂♂: Ollantaytambo-Alfamayo, Qda. San Luis, 3000-3050 m, 13.V.2003, T. Pyrez leg.; 1 ♂: same data but 3050-3100 m; 8 ♂♂ and 1 ♀: same data but 3200-3250 m; 4 ♂♂: same data but 3450-3500 m; 8 ♂♂: same data but 3500-3550 m; 2 ♂♂: same data but 14.V.2003, 3000-3050 m; 2 ♂♂: same data but 3200-3250 m; 1 ♂: same data but 3400-3450 m; 1 ♂: same data but 3450-3500 m; 2 ♂♂: same data but 18.V.2003, 3050-3100 m; 4 ♂♂: same data but 3200-3250 m; 1 ♂: same data but 3250-3300 m; 5 ♂♂: same data but 3300-3350 m; 3 ♂♂: same data but 3450-3500 m; 1 ♂: same data but 20.V.2003, 3200-



1-8. Adults (dorsum (left), venter (right)): 1. *Pedaliodes tyro* male (Limbani); 2. *P. tyro* female (Limbani); 3. *P. tyro* male (Sina); 4. *P. tyro* male (Sina); 5. *P. tyro* female (Sina); 6. *P. sophismata sophismata* female, Paratype (Pomacochas); 7. *P. s. sophismata* male, Paratype (Pomacochas); 8. *P. s. sophismata* male, Paratype (Pomacochas)



9-16. Adults (dorsum (left), venter (right)): 9. *Pedaliodes melvillei* male, Holotype (Qda. San Luis); 10. *P. melvillei* female, Paratype (Qda. San Luis); 11. *P. ackeryi* male, Holotype (Huayalloc); 12. *P. ackeryi* female, Paratype (Huayalloc); 13. *P. ampayana ampayana* male, Paratype (Ampay); 14. *P. a. ampayana* female, Paratype (Ampay); 15. *P. a. chanka* male, Holotype (Cotahuacho); 16. *P. a. chanka* female, Paratype (Cotahuacho)

3250 m; 1 ♂: same data but 3300-3350 m; 7 ♂♂: same data but III.2006, 2900-3000 m, J. Bottger *leg.*; 2 ♂♂: same data but 3500-3600 m; 4 ♂♂: Cuzco, Ollantay-Alfamayo, above Carrizales, 3200-3250 m, IV.2005, J. Bottger *leg.*, TWP; 2 ♂♂: same data but 3300-3400 m, TWP [TWP]; 2 ♂♂: same data but 22.II.2005, 3200-3250 m [MBLI]; 5 ♂♂: Cuzco, Abra Malaga vers Quillabamba, 3200-3400 m, 18.V.2003, P.Boyer *leg.*; 1 ♂: Cuzco, Quebrada San Luis, via a Quillabamba, 3000-3200 m, 14.V.2003, P. Boyer *leg.*; 2 ♂♂: same data but 3400-3500 m, 14.V.2003, P. Boyer *leg.*; 1 ♂: same data but 2600-2800 m, 14.V.2003, P. Boyer *leg.*; 1 ♂: same data but 3000-3500 m, 13.V.2003, P. Boyer *leg.*; 1 ♂ and 2 ♀♀: same data but 3300 m, 26.II.2005, P. Boyer *leg.*; 1 ♂: same data but 3400-3500 m, 26.II.2005, P. Boyer *leg.*; 1 ♂: same data but 3200 m, 26.II.2005, P. Boyer *leg.*; 1 ♀: same data but 3000-3400 m, 22.II.2005, P. Boyer *leg.*; 1 ♀: same data but 3300-3400 m, 16.V.2005, P. Boyer *leg.* [PBF].

DIAGNOSIS

Most similar to *P. ackeryi* and *P. arena* in that the HWV anal wedge is invariably triangular and subject to very little individual variation, contrary to *P. sophismata* and *P. tyro*, differing from *P. arena* by its rich yellow colour suffused to different degree with orange scaling, in this respect similar to *P. ackeryi*, which is however considerably larger and has a row of tiny FWV submarginal whitish or yellowish dots.

DESCRIPTION

MALE (Fig. 9): Head: frons with a tuft of short dark brown hair; eyes chocolate brown, hairy; labial palpi twice the length of head, covered with dark brown hair; antennae reaching two-fifths the length of costa, slender, with the club formed gradually, subcylindrical twice as thick as shaft, dorsally brown, ventrally orange brown, terminal segments dark brown. Thorax: dorsally and ventrally blackish brown, legs tibiae chocolate brown, femore and tarsi light brown. Abdomen: dorsally blackish brown, ventrally medium brown. Wings: FW length: 24-28mm (mean 26,3mm, n=13); apex subacute, outer margin straight, very slightly truncated from apex to vein M2; HW outer margin undulated. FWD uniform dark chocolate brown, lustrous; androconial patch large, rectangular, entering discal cell; fringes alternately dark brown and whitish. HWD uniform dark chocolate brown, lustrous, hairy in basal one-third, a narrow orange suffusion from mid anal margin to tornus; fringes dark brown, alternately whitish from apex to vein M1. FWV: medium brown, lustrous; a faint postdical streak made of sparse milky white scales, in some individuals extending as a fine line to cell M2-M3, and as a lighter shade to vein Cu2; same lighter brown, milky white and chocolate brown scaling in subapical and apical area and along outer margin producing a delicate ripple pattern; a faint dark brown submarginal line parallel to outer margin from costa to vein Cu2; apical area suffused with chocolate-brown and a few rufous scales. HWV: dark brown, with a chocolate shade and a delicate ripple-like pattern; a rufous anal suffusion noticeable in some individuals; a wide yellow anal wedge, slightly variable in size and shape, in most individuals as a triangle with an irregular inner edge, generally indented on vein Cu2, extending onto vein Cu1, in most individuals suffused with brown scales; some whitish postmedian scaling forming a barely noticeable short costal streak; a slightly

lighter brown submarginal band, in some specimens with a steely sheen, gradually narrowing from anal wedge to apical area; a minute yellow submarginal dot in Cu1-Cu2, in some individuals absent. **Male genitalia** (Fig. 28): Uncus the length of tegumen, very gently arched; subunci slender, one-third the length of uncus; saccus aligned to vinculum, moderately deep and wide; valvae about the same width in median half, dorsal surface slightly irregular, dorsal process short and pointed, apex blunt; aedeagus slightly longer than valva+saccus, strongly contorted and flattened dorso-ventrally, with a short apical tip, proximal opening one-third the length of aedeagus.

FEMALE (Fig. 10): FW length: 27-30 mm (mean: 28.1 mm, n=7); lighter and duller brown on the upperside, considerably lighter on the underside, with a conspicuous ripple pattern on the HW, and occasionally a brick red postmedian suffusion on the FW between veins M3 and Cu2.

ETYMOLOGY

Pedaliodes melvillei is named after the American adventurer and writer Herman MELVILLE, a prolific author who is better known for his masterpiece *Moby Dick*. In his youth, MELVILLE visited Peru as a crew member of a whaling ship. This experience is reflected in "The Town Ho's story" (1851), the first published part of his celebrated novel.

REMARKS

This species is known so far only from the valley of Lucumayo, right affluent of the Urubamba in the department of Cuzco. It is one of the co-dominant species of the *Pedaliodes* community at around 3000-3200 m.

Pedaliodes sophismata PYRCZ

(Figs. 6, 7, 8, 29)

Pedaliodes sophismata PYRCZ, 2004: 550-551, figs. 89 (male), 90 (male), 91 (female), 169 (male genitalia), 190 (androconia).

Type locality: Molinopampa – Granada, Amazonas, Peru.

MATERIAL EXAMINED

PERU: HOLOTYPE ♂: Amazonas, Molinopampa – Granada, 3015 m, 26.VIII.1998, T. Pyrcz & J. Wojtusiak *leg.*, MUSM; ALLOTYPE ♀: Amazonas, Molinopampa – Granada, 2965m, 27.VIII.1998, T. Pyrcz & J. Wojtusiak *leg.*; 1 ♂: Peru, Amazonas, Molinopampa – Granada, 2915 m, 29.VI.1998, T. Pyrcz & J. Wojtusiak *leg.*; 2 ♂♂: same data but 2815 m; 2 ♂♂: same data but 2965 m; 2 ♂♂: same data but 2765 m; 1 ♂: same data but 2815 m, 01.VII.1998; 3 ♂♂: same data but 3015 m; 1 ♂: same data but 3115 m; 1 ♂: same data but 2715 m, 03.VII.1998; 1 ♂: same data but 2815 m; 3 ♂♂: same data but 3105 m; 1 ♂: same data but 3065 m; 2 ♂♂: same data but 3165 m; 1 ♂: same data but 3115 m, 04.VII.1998; 1 ♂: same data but 3165 m; 2 ♂♂: same data but 3215 m; 1 ♂: same data but 2965 m, 05.VII.1998; 2 ♂♂: same

data but 3165 m; 1 ♂: same data but 3215 m; 1 ♂: same data but 2715 m, 06.VII.1998; 1 ♂: same data but 2815 m; 1 ♂: same data but 3065 m; 3 ♂♂: same data but 3115 m; 1 ♂: same data but 3215 m; 1 ♂: same data but 3165 m, 01.VIII.1998; 1 ♂: same data but 2965 m, 06.VIII.1998; 3 ♂♂: same data but 2915 m, 23.VIII.1998; 3 ♂♂: same data but 2765 m, 26.VIII.1998; 1 ♂: same data but 2815 m; 5 ♂♂: same data but 2915 m; 4 ♂♂: same data but 2965; 5 ♂♂: same data but 3015 m; 4 ♂♂: same data but 3065 m; 2 ♂♂: same data but 3115m, TWP; 2 ♂♂: same data but 3165m, TWP; 1 ♂: same data but 3215 m; 3 ♂♂: same data but 2915 m; 1 ♂: same data but 2815 m, 29.VIII.1998; 1 ♂: same data but 2715 m, 30.VIII.1998; 2 ♂♂: same data but 2815 m; 1 ♂: same data but 2915 m; 7 ♂♂: same data but 3015 m; 1 ♂: same data but 3065 m; 1 ♂: same data but 3115 m; 1 ♂: same data but 3215 m; 4 ♂♂: same data but 3100-3250 m, III.2003, M. Tafur *leg.* [TWP]; 72 ♂♂: same data but 3100-3250 m, IX.2002, B. Calderón *leg.*, 4 [BHNH], 4 [MZUJ], 10 [MUSM], 3 [SMTD], 50 [TWP]; 5 ♀♀: same data [TWP]; 2 ♂♂: Pomacochas, Qda. El Chido, 2600-2800m, I.2003, M. Tafur *leg.* [TWP] (all PARATYPES); 40 ♂♂ and 1 ♀: Milpo-Iccho, Huancabamba, Pasco, 3000-3200 m, IV.2006, J. Bottger *leg.*; 2 ♂♂: Illich, Siccha-Ocopata, Junín, 3000-3050 m, 17.VIII.2002, T. & J. Pyrcz *leg.*; 2 ♂♂: Qda. Mansha, Cachiycu-Casca, Junín, 3450-3500 m, 02-03.III.2003, T. Pyrcz *leg.*; 2 ♂♂: same data, 2550-2600 m, 18.VIII.2002, T. & J. Pyrcz *leg.*; 9 ♂♂ and 1 ♀: Carpish, Acomayo-Tingo María, Huánuco, 2700-2800 m, 25-27.VII.2002, T. & C. Pyrcz [TWP].

DESCRIPTION

(Partly quoted from PYRCZ, 2004): MALE (Figs. 7, 8): FW length: 25-28mm (mean: 26,7mm, n= 88), outer margin straight, slightly truncate from apex to vein M1; fringes dark-brown, short; androconial patch as illustrated (Fig. 190). HW outer margin slightly undulated; fringes dark-brown, short. FWD uniform dark-brown, lustrous. HWD uniform dark-brown, lustrous; anal area suffused in about fifty per cent of examined specimens with sparse brick red or orange scales. FWV almost uniform dull dark-brown; in some specimens a faint pale yellow postdiscal costal streak; apical and submarginal area covered with faint ripple pattern made up of darker brown and pale yellow scales. HWV chocolate brown liberally dusted with faint, pale yellow scales forming a delicate ripple pattern; faint median pale yellow costal streak apparent in some specimens; postdiscal area a shade lighter than the rest of the wing; submarginal yellow dot in cell Cu1-Cu2; extremely variable rusty yellow (rarely brick red) anal wedge dusted with brown scales, in the less patterned specimens shaped as a triangle reaching vein Cu2, in some extending as a row of patches as far as vein M2, in others as a gradually narrowing band with a straight inner edge extending to vein M3 or M2. **Male genitalia** (Fig. 29): Uncus slightly longer than tegumen; subunci thin, shorter than half the length of uncus; valvae with a blunt distal extremity and a stout but short dorsal process; saccus short, cylindrical; aedeagus slightly contorted.

FEMALE (Fig. 6): FWD and HWD similar to the male but lighter brown. FWV and HWV beige; in the most patterned individuals a FW whitish postdiscal band from costa to vein M3 and a faint whitish costal streak on the HW.

REMARKS

P. sophismata is widely distributed in northern and central Peru. The nominotypical subspecies was described from the highlands of Chachapoyas (Amazonas), however the individuals found in the valleys of Huallaga (Huánuco) and Chanchamayo (Junín, Pasco) do not present any distinctive features. *P. sophismata* is the dominant species of the *Pedaliodes* community in mid to high elevation cloud forest (PYRCZ 2004). In northern Peru it occurs to timberline at 3200-3300 m, but in central Peru it is replaced at higher elevations by a related, new species described below. *P. sophismata* is replaced allopatrically in southern Peru by its close relatives, *P. ampayana* n. sp., and *P. melvillei* n. sp. Junín.

***Pedaliodes sophismata reductissima* PYRCZ et BOYER n. ssp.**

(Figs. 22, 23, 30)

Type locality: Km 64, carretera Satipo – Mariposa, Junín, Peru.

MATERIAL EXAMINED

PERU: HOLOTYPE ♂: Junín, Satipo – Mariposa Km 64, 2600 m, 2-12.XI.2006, P. Boyer leg. [MUSM]; PARATYPES (17 ♂♂ and 2 ♀♀): 9 ♂♂: same data as the holotype [TWP]; 7 ♂♂: Junín, route Satipo vers Concepción, via Mariposa km 68, 2700 m, 02-12.XI.2006, P. Boyer leg.; 1 ♂ and 2 ♀♀: Junín, route Satipo vers Concepción, via Mariposa km 64, 2600 m, 2-12.XI.2006, P. Boyer leg. [PBF].

DESCRIPTION

MALE (Figs. 22): Head: frons with a short tuft of dark brown hair; eyes dark brown, hairy; labial palpi twice the length of head, covered with grey brown hair; antennae reaching two-fifths the length of costa, slender, with the club formed gradually, subcylindrical twice as thick as shaft, dorsally dark orange brown, ventrally lighter, terminal segments darker brown. Thorax: dorsally and ventrally blackish brown, legs dark brown. Abdomen: dorsally blackish brown, ventrally lighter and duller. Wings: FW length: 26-27 mm (mean: 26.7 mm, n=18), apex subacute, outer margin slightly concave, very slightly truncated from apex to vein M2; HW outer margin slightly undulated. FWD uniform blackish brown, lustrous; androconial patch small, compact, marginally entering discal cell; fringes alternately blackish brown and whitish between the veins. HWD uniform blackish brown, lustrous, hairy in basal one-third and along anal margin; fringes brown, with some whitish scales from apex to vein M3. FWV: dark brown, lustrous in median half; a faint (barely noticeable in older individuals) postdical streak made of sparse whitish scales, extending from costa to vein M2, basally edged with blackish brown; subapical, apical and marginal areas suffused with light brown and blackish brown scales producing a fine ripple pattern; apical area dusted with chocolate brown. HWV: dark chocolate brown, with a fine ripple pattern, somewhat more noticeable in basal and submarginal areas; a narrow, 2-3 mm wide, yellow or orange wedge heavily suffused with brown scales, showing little individual variation, in most individuals extending to vein Cu2, in some reaching into cell Cu1-Cu2 as a

narrow line or spot; a small but always present milky white submarginal dot in Cu1-Cu2, a shade lighter, faint submarginal band with a steely sheen. **Male genitalia** (Fig. 30): Very closely resemble the nominotypical (as illustrated in PYRCZ, 2004), except for the wider proximal ending of aedeagus, a feature which can be subject to quite important individual variation; the apical part of valvae is robust and blunt, whereas in the individuals from Pomacochas (Fig. 29) it is flattened and acute, also the dorsal process in the Pomacochas specimens is sharper and has a wider base. This may be due to the fact that Pomacochas population is geographically slightly isolated from the typical Molinopampa population, and might have developed some distinctive anatomical characters, thus its separate subspecific status may eventually be taken under consideration.

FEMALE: (Fig. 23): Sexual dimorphism slight. FW length 27 mm (mean: 27 mm, n=2). FW and HWD lighter than in the male, chocolate brown. FWD with a lighter postdiscal sheen. FWV with a lighter distal half, and a faint rufous suffusion above Cu2, extending distally towards distal and anal margins, slightly entering the cell; anal wedge pale yellow-orangey dusted with brown with a tiny whitish area along vein Cu2.

ETYMOLOGY

The epithet of this subspecies is an allusion to the extreme reduction of its HWV yellow anal wedge, which is the most prominent colour pattern character of the nominate *P. sophismata*.

REMARKS

P. sophismata reductissima is the southernmost population known so far. It differs from the nominotypical primarily in the very small HWV anal wedge, reaching only to vein Cu2, and exceptionally to M3, whereas in all examined individuals of the *P. sophismata sophismata*, although fairly variable it often extends to vein M2. It is known so far exclusively from the type locality, where it occurs parapatrically below the related species described below.

Pedaliodes arena PYRCZ n. sp.

(Figs. 17, 18, 31)

Type locality: Quebrada Mansha, vía Cachiyacu – Casca, Junín, Peru.

MATERIAL EXAMINED

PERU: HOLOTYPE ♂: Junín, Cachiyacu-Casca, Qda. Mansha, 3450-3500 m, T. Pyrcz leg. [MUSM]; PARATYPES: (82 ♂♂ and 13 ♀♀): 57 ♂♂ and 7 ♀♀: Pasco, Huancabamba, Milpo-Iccho, above 3000 m, IV.2006, J. Bottger leg., 17 [MUSM], 37 [TWP], 3 [MBLI]; 6 ♂♂: Pasco, no exact locality, III-IV.2006, J. Bottger leg.; 7 ♂♂: Junín, Cachiyacu-Casca, Qda. Mansha, Junín, 3450-3500 m, 02-03.III.2003, T. Pyrcz leg.; 1 ♀: Junín, Siccha-Ocopata, Illich, 3000-3050 m, 17.VIII.2002, T. & J. Pyrcz leg., TWP [TWP]; 1 ♂: Iccho au dessus de Milpo, Huancabamba, Pasco, 3100-3200 m, 03.XI.2004, P. Boyer leg. [TWP]; 1 ♂: Junín, Quebrada Mansha, route de Cashiyacu



17-24. Adults (dorsum (left), venter (right)): 17. *Pedaliodes arena* male, Holotype (Qda. Mansha); 18. *P. arena* female, Paratype (Milpo-Iccho); 19. *P. diuna* male, Holotype (Milpo); 20. *P. diuna* female, Paratype (Milpo); 21. *P. sophismata reductissima* male, Holotype (Satipo-Mariposa); 22. *P. s. reductissima* female, Paratype (Satipo-Mariposa); 23. *P. cledonia* male (Chuspipata); 24. *P. brea* male, Holotype (Satipo-Mariposa)

à Casca, 3400 m, 26.I.2003, P. Boyer *leg.*; 2 ♂♂: same data but 03.II.2003, T. Pyrcz *leg.*; 1 ♂: Palcamayo, Pasco, 1900-2300 m [unreliable], 09.XII.2003, P. Boyer *leg.*; 5 ♂♂: Ichco, au dessus de Milpo, Huancabamba, Pasco, 3100-3300 m, 03.XI.2004, P. Boyer *leg.*; 1 ♂: Huanchón vers Paucartambo km 4 à 6, Pasco, 3100 m, 26.X.2004, P. Boyer *leg.*; 1 ♂: Milpo, Huancabamba, Pasco, 3000-3400 m, IX.2006, J. Bottger *leg.*; 2 ♀♀: Cueva Blanca, Milpo and above, Huancabamba, Pasco, 2600-3300 m, X-XI.2005, J. Bottger *leg.*; 2 ♀♀: Milpo, Huancabamba, Pasco, 3000-3400 m, IX.2006, J. Bottger *leg.*; 1 ♀: Milpo, Huancabamba, Pasco, 3000-3400 m, XI.2006, J. Bottger *leg.* [PBF].

DIAGNOSIS

Recognised from the allied *P. sophismata* and *P. ampayana chanka* n. ssp. by the lighter, sandy yellow colour of the HWV anal wedge never suffused with darker, brown, reddish or orange scaling. Also closely similar to *P. diuna* n. sp., whose anal wedge extends as a sinuate line to HW median area.

DESCRIPTION

MALE (Fig. 17): Head: frons with a tuft of dark brown hair; eyes chocolate brown, hairy; labial palpi twice the length of head, covered with grey brown hair; antennae reaching two-fifths the length of costa, slender, with the club formed gradually, subcylindrical twice as thick as shaft, crimson red brown, terminal segments darker brown. Thorax: dorsally and ventrally blackish brown, legs medium brown. Abdomen: dorsally blackish brown, ventrally dull brown. Wings: FW length: 26.5-30 mm (mean: 29.6 mm, n=61), apex subacute, outer margin straight, slightly truncated from apex to vein M2; HW outer margin scalloped. FWD uniform blackish brown, lustrous; androconial patch rectangular, medium sized, entering discal cell; fringes alternately dark brown and whitish between the veins. HWD uniform blackish brown, lustrous, hairy in basal one-third and along anal margin, a small orange suffusion from mid anal margin to tornus; fringes brown, with some whitish scales from apex to vein M3. FWV: fuscous, lustrous in median half, a shade lighter in outer one-third; a faint barely noticeable postdiscal streak made of sparse milky white scales, gradually narrowing from costa to vein M2; a faint sinuate blackish brown submarginal line from costa to cell M3-Cu1; apical area suffused with chocolate brown scales. HWV: fuscous, slightly darker than on the FW, almost uniform; a wide sandy yellow anal wedge, somewhat variable in size and shape, in most individuals as a triangle with the inner edge indented at vein Cu2, in others extending as a narrow sinuate line or a series of spots towards vein Cu1 or M3, in an extremely well marked form as far as vein M1; a well marked yellow submarginal dot in Cu1-Cu2, in some individuals a second, smaller dot in M3-Cu1; a barely noticeable blackish brown sinuate submarginal line, parallel to outer margin. **Male genitalia** (Fig. 31): Uncus slender, delicately curved downwards, as long as tegumen; subunci thin, approximately half the length of uncus; saccus moderately deep, flattened, at 45° degree to vinculum; valvae considerably wider in median than in basal part, with a low dorsal hump and a rather short dorsal process pointing apically, and a pointed apex; aedeagus the length of valvae+saccus, strongly contorted in the middle, with a small apical crest, flattened dorso-ventrally.

FEMALE (Fig. 18): FW length: 26-29 mm (mean: 27.8 mm, n=6). Differs from the male in the lighter brown FW and HWD, with a faint but noticeable postdiscal whitish streak, and considerably lighter chocolate brown HWV suffused with dark brown ripple pattern.

ETYMOLOGY

The epithet of this species, *arena*, sand, is an allusion to the characteristic colour of its HWV anal wedge, which distinguishes it from other related species.

REMARKS

P. arena occurs in the central Peruvian Andes in the departments of Junín and Pasco. All known individuals were collected on the left bank of the Río Chanchamayo, which probably constitutes its southern distribution limit, since to the south-east occurs the closely related *P. brea* n. sp. To the north-west its range limit is probably the valley of Huallaga, for *P. arena* was never collected in the Carpish area, however admittedly the elevations at which it occurs have been barely sampled. *P. arena* is parapatric above its widespread relative *P. sophismata* PYRCZ. The two have overlapping altitudinal ranges at around 3000 m, however below 2800 m and above 3200 m only one of them is found. *P. arena* is one of the most abundant species of *Pedaliodes* above 3000 m alongside *P. franzi* PYRCZ.

Pedaliodes brea PYRCZ et BOYER n. sp.

(Figs. 24, 32)

Type locality: Puente Carrizales, vía Satipo – La Concepción, Junín, Peru.

MATERIAL EXAMINED

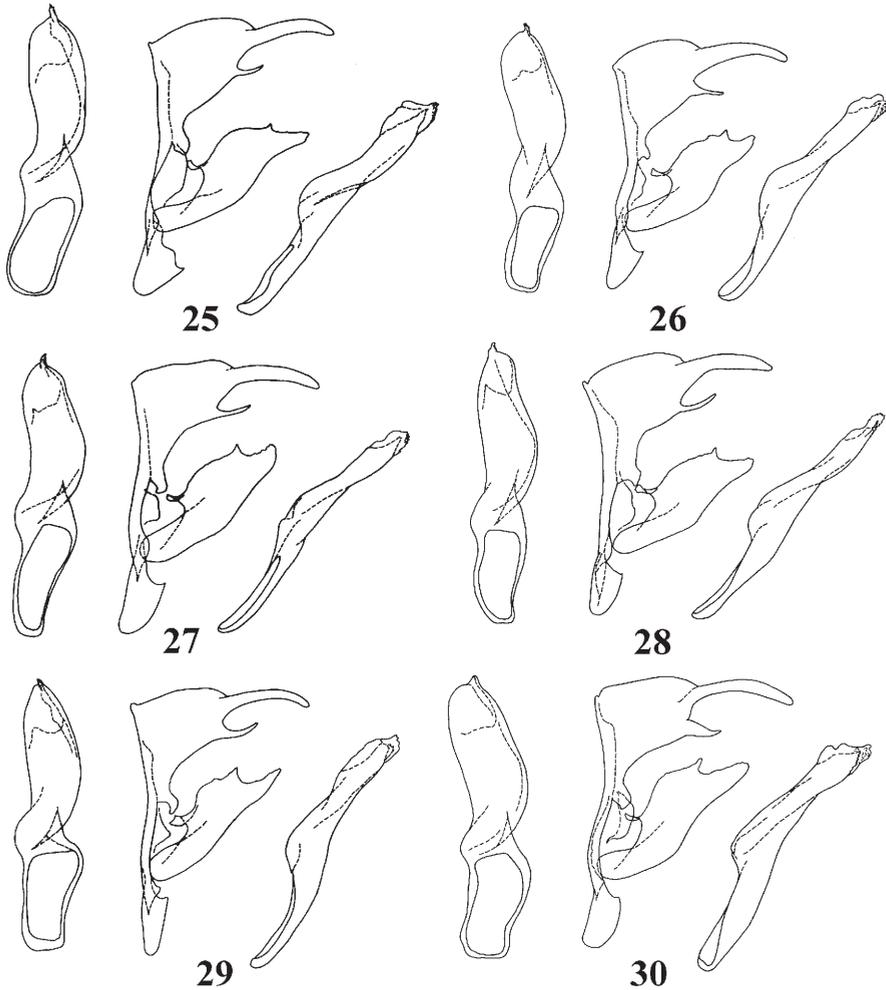
PERU: HOLOTYPE ♂: Junín, Satipo – La Concepción, Puente Carrizales Km 77, 3300-3350 m, 12.XI.2006, P. Boyer leg. [MUSM]; PARATYPES (18 ♂♂ and 4 ♀): 7 ♂♂: same data as the holotype [TWP]; 6 ♂♂ and 1 ♀: Junín, Puente Carrizales, Satipo vers Concepcion km77, 3300-3350 m, 12.XI.2006, P. Boyer leg.; 5 ♂♂ and 1 ♀: Junín, Puente Carrizales, Satipo vers Concepción km 66 à 70, 2700-2900 m, 12.XI.2006, P. Boyer leg.; 1 ♀: Junín, Puente Carrizales, Satipo vers Concepción km 70, 2900 m, 12.XI.2006, P. Boyer leg.; 1 ♀: Junín, Puente Carrizales, Satipo vers Concepción km 68, 2700 m, 12.XI.2006, P. Boyer leg. [PBF].

DIAGNOSIS

Compared to the related *P. arena* n. sp. and *P. ampayana chanka* n. ssp. it differs in the absence of any orange HWD anal patch and the heavy dark overcast of the HWV anal wedge. It is also superficially similar to a number of mostly black sympatric, but only loosely related species of *Pedaliodes*, including two undescribed (PYRCZ, MS), and the sympatric *P. sophismata reductissima*, which is slightly smaller and always has some orange or yellowish HWV anal scaling forming a diffused wedge.

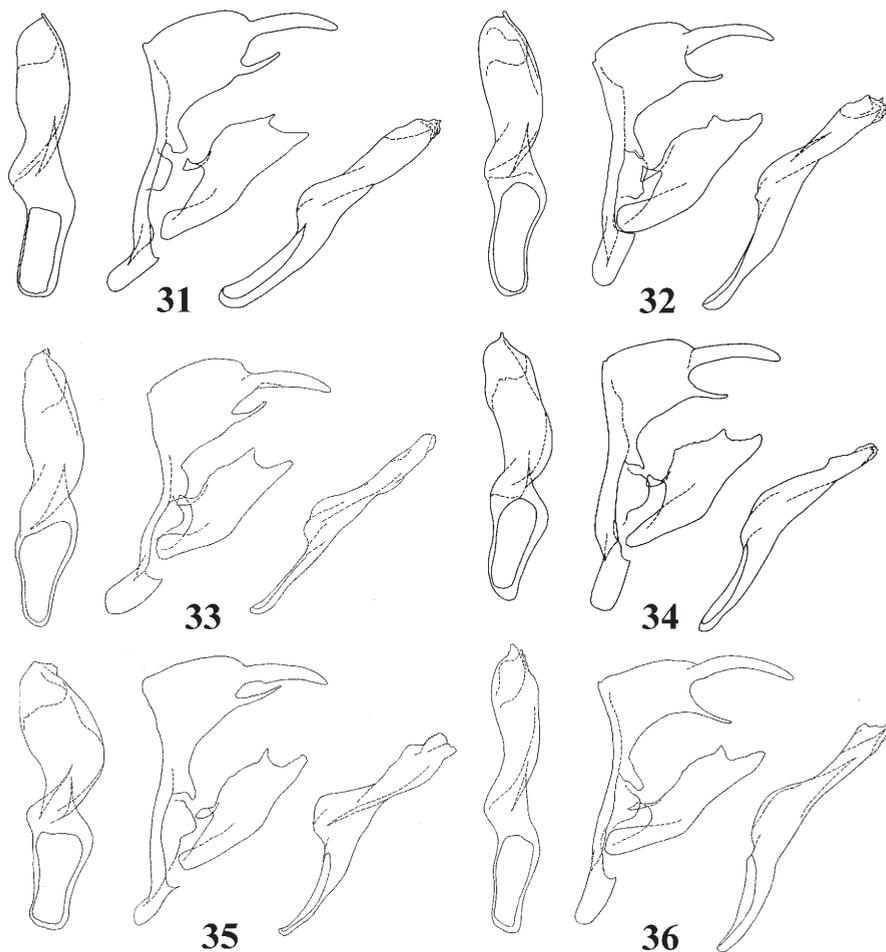
DESCRIPTION

MALE (Fig. 20): Head: frons with a tuft of blackish brown hair; eyes chocolate brown, hairy; labial palpi twice the length of head, covered with chocolate brown hair; antennae reaching two-fifths the length of costa, slender, with the club formed gradually, subcylindrical twice as thick as shaft, crimson red brown, terminal segments darker brown. Thorax: dorsally and ventrally blackish brown, legs chocolate brown. Abdomen: dorsally blackish brown, dark brown. Wings: FW length: 26-29 mm (mean: 27.1 mm, n=19), apex subacute, outer margin straight, slightly truncated from apex to vein M2; HW outer margin scalloped. FWD uniform carbon black, lustrous; androco-



25-30. Male genitalia (aedeagus removed from its natural position in lateral and dorsal view): 25. *Pedaliodes tyro* (Limbani); 26. *P. tyro* (Sina); 27. *P. ackeryi*, Paratype (Huallayoc); 28. *P. melvillei* Paratype (Qda. San Luis); 29. *P. sophismata sophismata* (Qda. Chido); 30. *P. s. reductissima*, Paratype (Satipo-Mariposa)

nial patch rectangular, medium sized, entering discal cell; fringes alternately blackish brown and whitish between the veins. HWD uniform carbon black, lustrous, hairy in basal one-third and along anal margin; fringes blackish brown, with some whitish scales from apex to vein M3. FWV: almost uniform grey black, lustrous; some sparse whitish scales in postdiscal area; apical area suffused with chocolate brown scales. HWV: blackish brown, slightly darker than on the FW, almost uniform except for some sparse, lighter dusting; a whitish anal wedge densely overcast with blackish brown, somewhat variable, in some individuals barely noticeable, in other as a triangle with the inner edge sinuate extending as a narrow line or a series of spots towards vein Cu1; a small whitish submarginal dot in Cu1-Cu2, in some individuals a second, smaller



31-36. Male genitalia (aedeagus removed from its natural position in lateral and dorsal view): 31. *Pedaliodes arena* Paratype (Qda. Mansha); 32. *P. brea* Paratype (Satipo-Mariposa); 33. *P. ampayana ampayana* Paratype (Ampay); 34. *P. a. chanka* Paratype (Cotahuacho); 35. *P. diuna* Paratype (Milpo); 36. *P. cledonia cledonia* (Chuspipata)

dot in M3-Cu1. **Male genitalia** (Fig. 32): Uncus the length of tegumen, gently arched; subunci half the length of uncus, broad in basal area, thin on 2/3 of the length; saccus moderately wide and deep, aligned to vinculum; valvae elongated, slightly narrower towards apex, dorsal surface slightly irregular with a pyramid shaped process, apex subacute; aedeagus the length of valva+saccus, strongly contorted in the middle, flattened dorso-ventrally, with a small terminal tip and little sclerotized crest, proximal entering 2/5 its entire length.

FEMALE (not illustrated): FW length: 27mm, n=4. Same as male with slightly lighter black colour. FWV apex and HWV with a reddish sheen, becoming black towards base.

ETYMOLOGY

The epithet of this species, *brea*, means tar, and it is an allusion to its predominantly black colours.

REMARKS

P. brea is apparently an endemic species of the central Peruvian Andes in the area of the department of Junín comprised between the valleys of the Rios Mantaro and Chanchamayo. It occurs sympatrically with its relative *P. sophismata reductissima* at 2600-2700 m, although it is found in larger numbers above 2900 m.

Pedaliodes diuna PYRCZ et BOYER n. sp.

(Figs. 19, 20, 35)

Type locality: Milpo-Iccho, Huancabamba, Pasco, Peru.

MATERIAL EXAMINED

PERU: HOLOTYPE ♂: Pasco, Huancabamba, Milpo-Iccho, 3000-3200 m, IV.2006, J. Bottger leg. [MUSM]; PARATYPES (15 ♂♂ and 1 ♀): 5 ♂♂: same data as the holotype [TWP]; 2 ♂♂: Milpo, Huancabamba, Pasco, 3000-3400 m, IX.2006, J. Bottger leg.; 4 ♂♂: "Chulla?", au dessus de Milpo et Cueva Blanca, Huancabamba, Pasco, 3200-3400 m, 30.X.2006, P. Boyer leg.; 3 ♂♂ and 1 ♀: Ichco, au dessus de Milpo, Huancabamba, Pasco, 3100-3300 m, 03.XI.2004, P. Boyer leg.; 1 ♂: Shuyhua (Ichco), au dessus de Milpo, Huancabamba, Pasco, 3100-3300 m, 27.V.2005, P. Boyer leg. [PBF].

DIAGNOSIS

Similar to *P. arena*, from which it differs in the slightly smaller size and most of all in the shape of the HWV orange anal wedge, whose basal edge bends basally and extends as a sinuate line towards discal cell to vein M2, and in the absence of HWV submarginal yellow dot in Cu1-Cu2.

DESCRIPTION

MALE (Fig. 19): Head: frons with a tuft of dark brown hair; eyes chocolate brown, hairy; labial palpi twice the length of head, covered with chocolate brown hair; anten-

nae reaching two-fifths the length of costa, slender, with the club formed gradually, subcylindrical twice as thick as shaft, dorsally dark brown, ventrally orange brown. Thorax: dorsally and ventrally blackish brown, legs medium brown. Abdomen: dorsally blackish brown, ventrally dull brown. Wings: FW length: 26-27 mm (mean: 26.5 mm, n=16), apex subacute, outer margin straight from M1 to 1A. HW outer margin very slightly undulated. FWD uniform blackish brown, lustrous; androconial patch rectangular, large, entering discal cell; fringes alternately gray-brown and whitish. HWD uniform blackish brown, lustrous, hairy along anal margin, a small orange suffusion from along anal margin near tornus; fringes brown, with some whitish scales from apex to vein M3. FWV: dark brown, lustrous, a shade lighter in outer one-third; in some individuals a faint barely noticeable postdiscal streak made of sparse milky white scales, gradually narrowing from costa to vein M2; apical area suffused with fine whitish scales. HWV: dark brown, slightly darker than on the FW; a narrow mid costal pale yellow streak extending into Rs-M1; a wide sandy yellow triangular anal wedge, extending as a narrow sinuate line to vein M2; a faint, submarginal blackish brown line sharply indented basally in each space. **Male genitalia** (Fig. 35): Uncus slender, delicately curved downwards, as long as tegumen; subunci thin, approximately half the length of uncus; saccus moderately deep, aligned to vinculum; valvae slightly wider in median than in basal part, with a somewhat irregular dorsal surface and a short, blunt dorsal process pointing upwards, and a blunt and stout apical part, noticeably longer than in *P. arena*; aedeagus the length of valvae+saccus, strongly contorted in the middle, with the proximal opening nearly half its entire length, and a small apical tooth, slightly flattened dorso-ventrally.

FEMALE (Fig. 20): Sexual dimorphism is slight. The female (FW length 27 mm) differs from the male in that the FWV apex and HWV are rather densely covered with lighter brown scales, in the lighter FWV postdiscal band, giving more contrast to the submarginal blackish brown line.

ETYMOLOGY

The specific epithet is the Polish translation of Frank HERBERT's science-fiction novel "Dune", and is a allusion to the most closely related species, whose name means "sand".

REMARKS

This species is known so far only from the type locality, where it occurs sympatrically with the much more abundant *P. arena*.

***Pedaliodes ampayana* LAMAS, VILORIA et PYRCZ n. sp.**

(Figs. 13, 14, 33)

[*Pedaliodes* [n. sp.] LAMAS & VILORIA, MS; LAMAS et al., 2004: 213]

Type locality: Laguna Ank'ascocha, Santuario Nacional Ampay, Apurímac, Peru

MATERIAL EXAMINED

PERU: HOLOTYPE ♂: Laguna Ank'ascocha, Santuario Nacional Ampay, Apurímac, 3300-3350 m, 19.II.2005, T. Pyrcz & R. Garlacz *leg.* [MUSM]; PARATYPES (87 ♂♂ and 5 ♀♀): 16 ♂♂: Depto. Apurímac, S. N. Ampay, Laguna Ank'ascocha, 3300-3350 m, 19-21.II.2005, T. Pyrcz & R. Garlacz *leg.*; 1 ♂: Bosque Ampay, 30.IV.1998, P. Parrillo *leg.*; 1 ♂: same data but 3200 m, 1336/7255, 13.VI. 1999, P. Hocking *leg.*; 1 ♂: same data but 12.VI.1999, P. Hocking *leg.*; 1 ♂: same data but 3320 m, 1337/7255, 28.IV.1999, P. Hocking *leg.* [MUSM]; 13 ♂♂: Depto. Apurímac, S. N. Ampay, Laguna Ank'ascocha, 3300-3350 m, 19-21.II.2005, T. Pyrcz & R. Garlacz *leg.*; 1 ♀: same data; 1 ♀: same data but 21.II.2005; 1 ♀: same data but 3200 m, 18.II.2005, P. Boyer *leg.*; 9 ♂♂: same data but 18.II.2005, P. Boyer *leg.*; 7 ♂♂: same data but 19.II.2005; 5 ♂♂: Apurímac, S. N. Ampay, Ccorhuani, 3100 m, 19.V.2005, P. Boyer *leg.* [MZUJ]; 5 ♂♂: Apurímac, S. N. Ampay, Laguna Ankasq'ocha, 3200 m, II-III.2005, J. Bottger *leg.*; 2 ♂♂: Apurímac, Distrito Tamburco, Ccorhuani, 3100-3150 m, III.2005, J. Bottger *leg.*; 1 ♂: Apurímac, Karkatera, 3300-3350 m, III.2005, J. Bottger *leg.*; 2 ♂♂: Apurímac, Distrito Abancay, S. N. Ampay, Qda. Yanacchacha, 3200 m, 21.V.2005, T. Pyrcz *leg.* [TWP]; 5 ♂♂ and 1 ♀: Apurímac, S. N. Ampay, 3300-3350 m, III. 2005, J. Bottger *leg.*; 6 ♂♂: Apurímac, S. N. Ampay, Qda. Yanacchacha, 3200 m, 19.II.2005, P. Boyer *leg.*; 4 ♂♂: Apurímac, S. N. Ampay, Laguna Ankasq'ocha, 3200 m, 18.II.2005, P. Boyer *leg.*; 5 ♂♂: Apurímac, S. N. Ampay, Ccorhuani, 3100 m, 19.V.2005, P. Boyer *leg.*; 1 ♀: Apurímac, S. N. Ampay, Qda. Yanacchacha, 3200 m, 19.II.2005, P. Boyer *leg.* [PBF]; 3 ♂♂: Depto. Apurímac, S. N. Ampay, Laguna Ank'ascocha, 3300-3350 m, 19-21.II.2005, T. Pyrcz & R. Garlacz *leg.* [MBLI]

DIAGNOSIS

This species is easy to separate from the sympatric congeners, none of which has a yellow HWV anal wedge. *P. ampayana* differs from other allopatric Peruvian species, which possess similar HWV markings by the wide orange suffusion of the anal and outer margin of the HWD.

DESCRIPTION

MALE (Figs. 13): Wings: FW length: 27-30 mm (mean: 28.8 mm, n=28), with a subacute apex and straight outer margin. HW rounded, outer margin undulated. FWD dark brown, slightly lighter in distal one-third; fringes whitish and brown. HWD dark brown; anal and outer margin towards tornus with an orange and brick red suffusion, variable in size, in some individuals extending to mid anal margin and to cell M3-Cu1, in others restricted to tornus, but always present; fringes dark brown and pale brown. FWV medium brown, somewhat lighter and paler than on the upperside; a narrow pale yellow postdiscal streak extending from costa to vein M2 or M3, barely visible in some specimens; apical and subapical areas dusted with whitish and chocolate brown scales; a diffused submarginal band, chocolate brown, barely darker than the ground colour; a tiny, whitish submarginal dot in cell M1-M2, and in some individuals a second one in Cu1-Cu2. HWV medium brown with a chocolate brown sheen, suffused liberally with a fine, lighter "ripple" pattern, chestnut or pale brown, somewhat denser in

the submarginal area; a large, yellow anal wedge, very variable, in some individuals as a triangular with an undulated basal edge reaching to vein Cu1, in others extending towards vein M2 area as a narrow band; in most individuals a yellow mid-costal streak reaching to vein Rs, in some individuals connected to the anal wedge by a fine postmedian band; two, pale yellow submarginal dots in cells M3-Cu1 and Cu1-Cu2, the latter invariably larger. **Male genitalia** (Fig. 33): Uncus the length of tegumen, straight; subunci thin, half the length of uncus; valvae with a teeth-like dorsal process pointing distally, dorsal surface of valvae slightly undulated; saccus wide but shallow; aedeagus strongly contorted and flattened dorso-ventrally.

FEMALE (Fig. 14): Sexual dimorphism is slight. Dorsal and ventral surface noticeably lighter. FW length 28 mm (=3).

REMARKS

The nominotypical subspecies of *P. ampayana* occurs in the Ampay massif and the surrounding areas between the valleys of the rivers Apurímac and Pachachaca.

Pedaliodes ampayana chanka PYRCZ n. ssp.

(Figs. 15, 16, 34)

Type material: Cotahuacho, Pachuca, Apurímac, Peru.

MATERIAL EXAMINED

PERU: HOLOTYPE ♂: Apurímac, Distrito Pachuca, Cotahuacho, 3100 m, III.2005, J. Bottger leg., ex coll. T. Pyrcz, [MUSM]; PARATYPES (29 ♂♂ and 3 ♀♀): 24 ♂♂ and 2 ♀♀: same data as the holotype [TWP]; 2 ♂♂: same data as the holotype [MUSM]; 3 ♂♂ and 1 ♀: Apurímac, Cotahuacho, 3100 m, III.2005, J. Bottger leg. [PBF].

DESCRIPTION

MALE (Fig. 15): Head, thorax and abdomen: not differing from those of the nominotypical. Wings: FW length 27-29 mm (mean: 27.8 mm, n=18), apex subacute, outer margin slightly concave, very slightly truncated from apex to vein M2; HW outer margin scalloped. FWD uniform dark chocolate brown, lustrous; androconial patch medium sized, entering discal cell; fringes alternately dark brown and some milky white between the veins. HWD uniform dark chocolate brown, lustrous, hairy in basal one-third, a narrow brick red suffusion from mid anal margin to tornus; fringes brown, with some milky white scales from apex to vein M3. FWV: dark brown, lustrous in basal half; a faint postdical streak made of sparse milky white scales, gradually narrowing from costa to vein M2, in some individuals extending as a barely noticeable lighter shade to vein Cu2; a faint lighter brown suffusion in subapical area and along outer margin; a faint sinuate dark brown submarginal line from costa to cell M3-Cu1; apical area suffused with chocolate brown and a few rufous scales. HWV: dark brown, slightly darker than on the FW, almost uniform; a wide yellow anal wedge, variable in size and shape, in some individuals as a triangle with an irregular inner edge extending vein Cu1 or into cell M3-Cu1, in others with a smooth inner edge, extending as a

yellow, gradually narrowing band to vein M2; a well marked yellow submarginal dot in Cu1-Cu2, in some individuals a second, tiny dot in M3-Cu1; a barely noticeable blackish brown sinuate submarginal line, parallel to outer margin. **Male genitalia** (Fig. 34): Uncus very gently arched, with a blunt tip, the length of tegumen; subunci slender, about half the length of uncus; saccus wide and moderately deep, at a narrow angle to vinculum; valvae considerably wider in median part with a humped ampulla and a massive, though short pyramid-shaped dorsal process, apex blunt; aedeagus the length of valva+saccus, strongly contorted and flattened dorso-ventrally, to a lesser degree than in *P. tyro* or *P. melvillei* n. sp., with a short apical tip and proximal opening two-fifths the length of aedeagus.

FEMALE (Fig. 16): Differs from the male in the lighter dorsal brown, and the presence of a faint FW postdiscal streak; ventral surface also noticeably lighter brown, especially on the HW, yellow anal wedge paler and speckled with brown scales. FW length 28,5-29,5 mm (mean: 29 mm, n=2).

ETYMOLOGY

The Chanka are native inhabitants of the department of Apurímac and are rivals of the Inkas.

REMARKS

P. ampayana chanka differs from the nominate subspecies (Figs. 13, 14, 35) primarily in that the latter has a wider HWD brick red anal suffusion, extending along outer margin to Cu1-Cu2, prominent HWV lighter, yellowish suffusion and always marked Cu1-M3 submarginal dot, and occasionally present FWV submarginal yellow dots, never showing in *chanka*. *P. chanka* also resembles *P. sophismata*, which is however noticeably smaller, with a smaller, in some specimens barely visible HWD reddish anal markings, much more variable HWV yellow markings, but its wedge is never as wide on the anal margin as in subspecies *chanka* or *ampayana*. *P. ampayana chanka* also resembles *P. arena* in size, shape and markings, but the latter differs in the lighter, sandy yellow colour of the HWV anal wedge. The two subspecies of *P. ampayana* are apparently endemic of south-central Peruvian Andes and both occur on the left bank of the Río Apurímac. They are geographically separated by the deep canyon of the Río Pachachaca. *P. ampayana ampayana* occurs only in the Ampay massif. The range of *P. chanka* is unknown, but to the West it is mostly probably limited by the valley of the Río Pampas. The only other species of *Pedaliodes* found in the type locality of *P. ampayana chanka* was *P.* n. sp. VILORIA et PYRCZ (in press), which however occurs in puna grasslands, contrary to *P. ampayana*, a denizen of humid cloud and elfin forests. All known individuals of *P. ampayana chanka* were collected at 3100 m.

DISCUSSION

The taxa discussed herein, although certainly related as indicated by several common features in the colour pattern and genital morphology, are treated as specifically distinct. Some of them for obvious ecological reasons. *P. arena* and *P. diuna* are sym-

patric, whereas *P. arena* and *P. sophismata* are parapatric along an altitude gradient. In other cases, there are conspicuously different traits in the external morphology, which prevents from treating them as conspecific, even though their genitalia indicate they are closely related allopatric allies, as in the case of *P. arena* – *P. brea* or *P. ackeryi* – *P. tyro*. Although morphological differences between *P. sophismata* and *P. tyro* are admittedly slight, their widely disjunct distribution, and the presence of closely related, probably allopatric replacements *P. melvillei* and *P. ackeryi* in their distributional gap strongly suggest they should be considered as specifically distinct. On the other hand the peripheral taxa *chanka* and *reductissima* are clearly well differentiated on the colour pattern level but anatomically not separable from the nominotypical populations of *P. ampayana* and *P. sophismata* respectively.

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