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# Systematics, ecology and zoogeography of high Andean pedaliodines. Part. 1: *Pedaliodes spina* WEYMER (Lepidoptera: Nymphalidae: Satyrinae)

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ABSTRACT. The systematics of a little known species of north Andean satyrine butterfly, *Pedaliodes spina* WEYMER, 1912, is overviewed. Geographic range of the species is delimited. The nominate subspecies is identified and a new, widely distributed Ecuadorian subspecies, *P. spina bifurcata* n. ssp. is described. The ecology of *P. spina* is briefly discussed. *Pedaliodes morenoi pilaloensis* PYRCZ et VILORIA, 1999 is raised to species rank.

Key words: entomology, taxonomy, zoogeography, Pronophilina, *Pedaliodes spina bifurcata* n. ssp., subparamo, Colombia, Ecuador, Tolima, Tungurahua.

## INTRODUCTION

*Pedaliodes spina* WEYMER is one of the least known species belonging to the Neotropical satyrine subtribe Pronophilina (LAMAS *et al*. 2004). It was first collected by FASSL (1910, 1991), who confused it with *P. chrysotaenia* THIEME, then described by WEYMER (1912) as a form of *P. pactyes* (HEWITSON). *P. pactyes* and *P. chrysotaenia* are superficially similar, otherwise only distantly related species from Peru and Bolivia. *P. spina* was correctly attributed the status of species only by ADAMS (1983), who discussed it again three years later (ADAMS 1986). The syntypes (an indefinite number of specimens of both sexes) could not be located in neither the BMNH nor the ZMHB, where generally the type material of WEYMER is deposited.

The type locality of *P. spina* is the Paso de Quindío, south of the Tolima massif in the Colombian Central Cordillera, at 3800 m. The specimens collected by FASSL remain the only record of this species from Colombia, despite ADAMS's (1986) extensive collecting in this country, including the type locality, recent sampling by SALAZAR (pers. comm.) and others. Considering that FASSL's material was exclusively from Colombia, and that his butterfly data are reliable and there are no reasons to doubt in the veracity of the original report of *P. spina*. Furthermore, as it will be seen below, *P. spina* is a widely distributed but extremely localised high elevation species, which can pass unnoticed even in relatively well sampled localities.

## MATERIAL AND METHODS

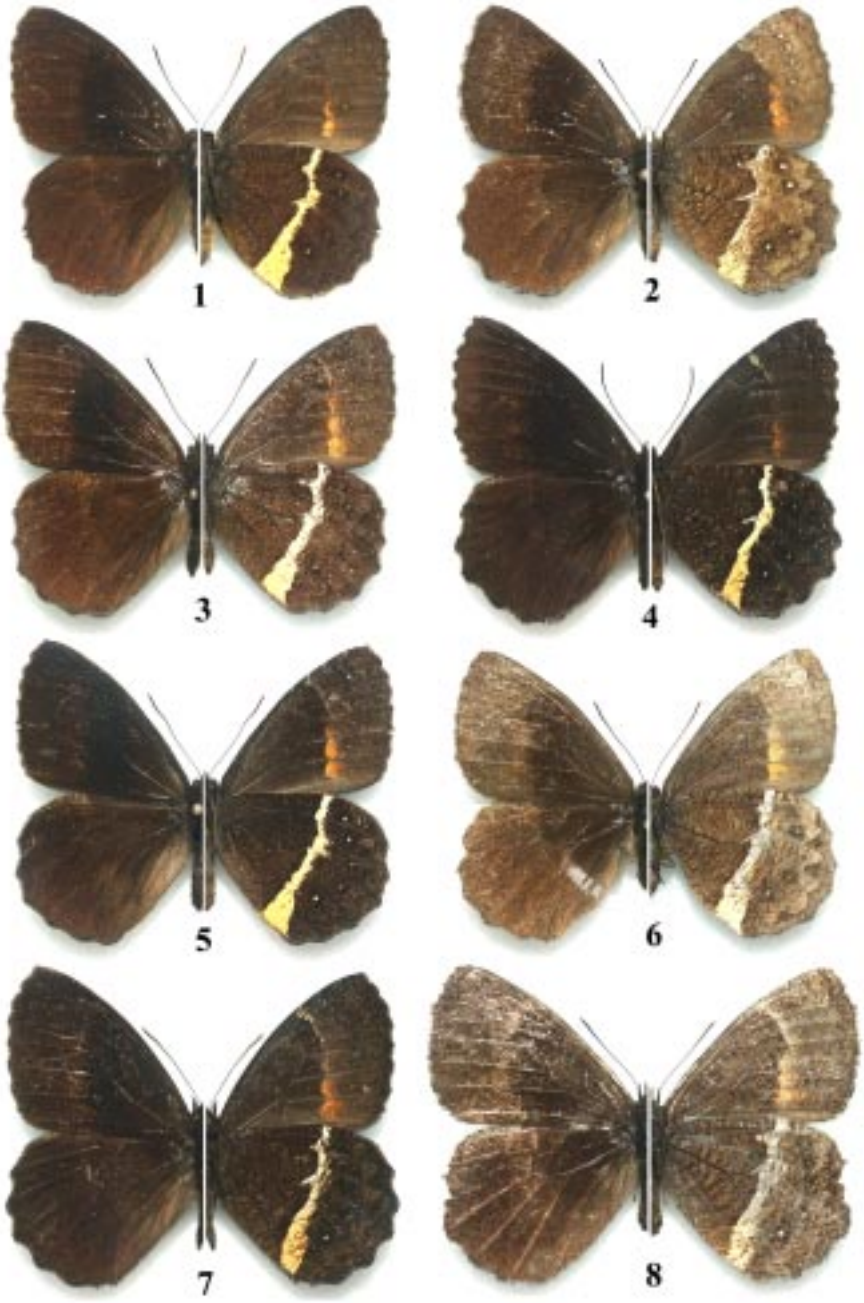
Most of the material examined during this study was collected by the author and his collaborators during the realisation of a research project "Patterns of distribution of Andean butterflies in Ecuador" in the period 2000 - 2005. Additional material was examined in the BMNH London and several other collections listed below. Male genital dissections were made, according to the standard procedure, that is by soaking in hot 10% KOH solution, and subsequently preserved in glycerol for study under an Olympus SZX9 stereomicroscope. Adults were photographed with a Minolta Dimage 5 digital camera. Colour plates were composed using Adobe PhotoShop version 6 and 7 software. The following abbreviations are used in the text:

FW: forewing
HW: hindwing
D: dorsum
V: venter
BMNH: The Natural History Museum, London, UK;
MBLI: collection of Maurizio BOLLINO, Lecce, Italy;
MZUJ: Zoological Museum of the Jagiellonian University, Kraków, Poland;
PUCE: Museo de Historia Natural, Pontificia Universidad Católica, Quito, Ecuador;
TWPP: collection of Tomasz W. PYRCZ, Warsaw, Poland;
ZMHB: Zoologische Museum Humboldt Universität, Berlin, Germany.

### *Pedaliodes spina spina* WEYMER

(Figs. 7, 8, 9)

[*Pedaliodes pactyes* (HEWITSON); FASSL 1910: 132; 1911: 26 (misidentification)].
*Pedaliodes pactyes* (HEWITSON) form *spina* WEYMER, 1912: 259, pl. 55, row b.
[*Pedaliodes chrysotaenia* (HOPFFER); KRÜGER 1924: 24; SALAZAR 1996: 18 (misidentifications)]; RACHELI & RACHELI 2000: 339 (misidentification)].
*Pedaliodes pactyes* (Hewitson) var. *spina* WEYMER; GAEDE, 1931: 492.
*Pedaliodes spina* WEYMER; ADAMS 1983: 474; 1986: 240, 304-305; D'ABRERA 1988: 859; RACHELI & RACHELI 2001: 339; LAMAS *et al*. 2004: 213.




1. *Pedaliodes spina bifurcata* male (holotype), 2. *Pedaliodes spina bifurcata* female (allotype), 3. *Pedaliodes spina bifurcata* male (Pondoa), 4. *Pedaliodes spina* ssp. (Cerro Toledo), 5. *Pedaliodes spina bifurcata* male (Morogacho), 6. *Pedaliodes spina bifurcata* female (Morogacho), 7. *Pedaliodes spina spina* male (Papallacta), 8. *Pedaliodes spina spina* female (Papallacta)

MATERIAL EXAMINED

**2** ♂♂ and **1** ♀: Ecuador, Prov. Napo, Papallacta, above Las Termas, 3250-3300 m, 19.I.2004, T. Pyrcz *leg*., TWPP; **2** ♂♂: same locality: 3400-3500 m, 29.IX.2004, T. Pyrcz *leg*., TWPP.

REMARKS

*P. spina* has been recently collected in five, widely separated localities in Ecuador. However only the phenotype of the individuals from the upper Rio Papallacta valley, on the eastern slopes of the Andes east of Quito, agrees with the WEYMER (1912) figures in Seitz. Original illustrations showing a male and a female underside are fairly good and allow to identify the nominotypical subspecies. Its diagnostic features, distinguishing it from other Ecuadorian populations of *P. spina* are found on the HWV. The yellow band is nearly straight, narrower, particularly towards anal margin, where its basal edge is curved distally. The individuals form Papallacta are also noticeably larger than other examined specimens of *P. spina* (see below). The fact that the Papallacta population is considered nominotypical is justified from the geographical viewpoint, as it is the most northerly known locality of *P. spina* in Ecuador. Male genitalia (Fig. 9): As illustrated, do not differ noticeably from the examined individuals of other Ecuadorian populations.

### ***Pedaliodes spina bifurcata*** **PYRCZ, n. ssp.**

(Figs. 1, 2, 3, 5, 6, 10, 11, 12)

[*Pedaliodes chrysotaenia* HOPFFER; D'ABRERA, 1988: 859, misidentification]

TYPE MATERIAL

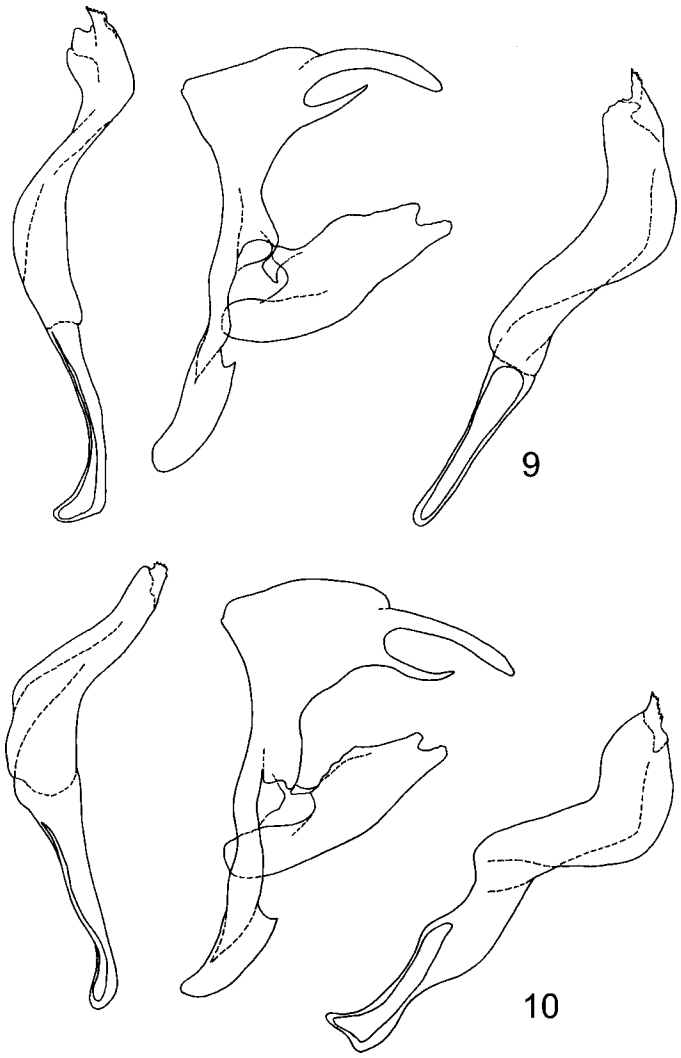
***Holotype*** ♂: Ecuador, Prov. Cotopaxi, above Pilaló, 3300 m, 03.IX.2004, T. Pyrcz *leg*., MZUJ; ***Allotype*** ♀: same data, TWP; ***Paratypes*** (**11**♂♂): same data as the holotype, TWPP; **5**♂♂: same locality as the holotype, IX.1996, I. Aldas *leg*., 3 TWPP, 2 PUCE; **1**♂: (Ecuador, Prov. Bolívar), Talahua, 3.III.[19]09, P. O. Simons, pur. from Rosenberg 99-268, (genit. prep. ALV287-97), BMNH.

ADDITIONAL MATERIAL (**42**♂♂ and **3**♀, all from Ecuador)

**8**♂♂ and **1**♀: Prov. Tungurahua, Tungurahua Volcano, above Pondoa, 3300 m, 12.I.2002, J. Wojtusiak & R. Garlacz *leg*., TWPP; **17**♂♂ and **1**♀: same locality, I. Aldas *leg*., MBLI; **9**♂♂: Prov. Tungurahua, above El Tablón, Morogacho, 3400-3500 m, IX.2004, O. Velástegui *leg.*, TWPP; **2**♂♂ and **1**♀: Ecu., Ex Grose Smith 1910, JB, BMNH; **1**♂, eastern side of Ecuador, Sarayacu, 1879, C. Buckley, OC, BMNH; **1**♂: env. d'Ambato, R. P. Irenée Blanc, OC, BMNH; **4**♂♂: E. Ecuador, Granadillas, Buckley, Grose-Smith, BMNH.

DESCRIPTION

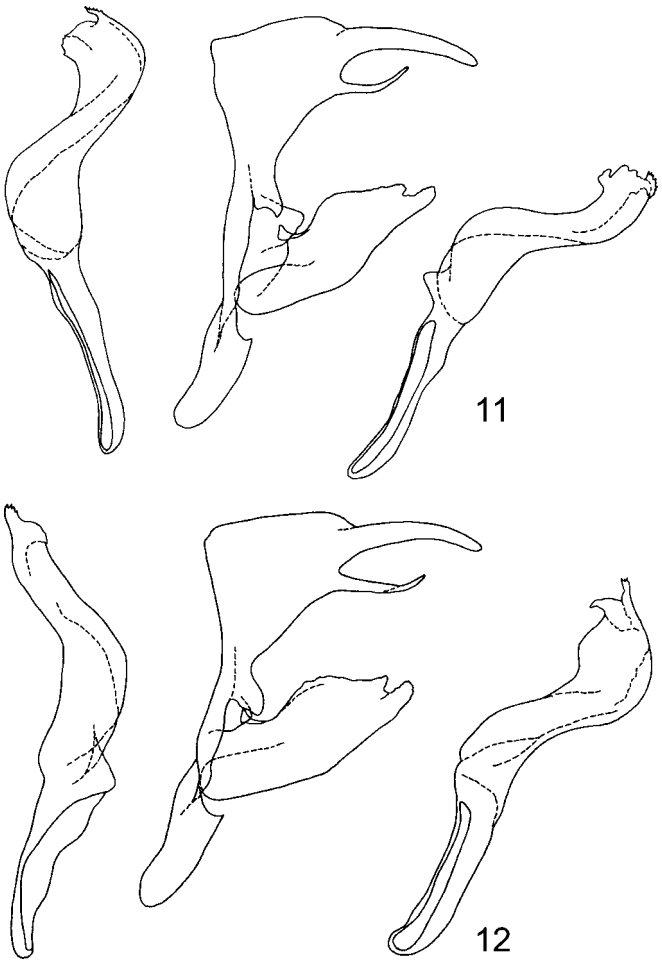
Male (Fig. 1): *Head*, *thorax* and *abdomen* as in the nominate subspecies. *Wings*: FW (length: 26-28 mm, mean: 26.5 mm, n=9) markedly smaller than the nominotypical (27-29 mm, mean: 28.2 mm, n=5). FWD and HWD: uniformly dark chocolate brown, slightly lighter than the blackish brown of the nominotypical; median bands, a shade lighter than the ground colour, showing through from the underside. FWV: postmedian line edged distally with brick red from inner margin




9, 10. Male genitalia (lateral view, aedaegus removed in dorsal and lateral view): 9 - *Pedaliodes spina spina* (Papallacta), 10 - *Pedaliodes spina bifurcata* (Pilaló, paratype)

to M3 approximately, extending into a faint light brown costal streak, not differing noticeably from the nominotypical. HWV: ground colour varying between dark brown and blackish brown with a prominent sandy yellow median band, slightly wider throughout than in the nominotypical, particularly towards anal margin where considerably widening both basally and distally, and with a basal notch into distal extremity of discal cell, not apparent in any examined individual of the nominotypical. Male genitalia (Fig. 10): As illustrated, do not differ consistently from other subspecies.

Female (Fig. 2): Compared to the male, FWD and HWD colour is lighter brown; FWV is considerably lighter brown in the distal half; postdiscal white dots




11, 12. Male genitalia (lateral view, aedaegus removed in dorsal and lateral view): 11 - *Pedaliodes spina bifurcata* (Pondoa), 12 - *Pedaliodes spina bifurcata* (Morogacho)

are clearly marked. HWV is consistently lighter brown; median yellow band is pale and diffused; postdiscal white dots are larger and better marked.

ETYMOLOGY

The epithet, *bifurcata* (Lat., adj.), bifurcated, refers to the distribution pattern of *P. spina*. It is an exclusively east Andean species in case of the nominate subspecies occurring in Colombia and northern Ecuador, and distinctively spreading over the western and eastern slopes of the Andes in central Ecuador in the case of the new subspecies.

REMARKS

Even though typical individuals occurring in Pilaló and Talahua, on the western slopes, are morphologically unrecognisable from those occurring on the slopes of the Tungurahua volcano (Pondoa), near Baños (Figs. 3, 11), the latter are not included in the type series, because the two localities are widely separated geographically and it cannot be ruled out that in the future additional, larval stages or molecular data would substantiate their splitting into two subspecies. The Morogacho (a locality situated on the left bank of the Río Pastaza) individuals (Figs. 5, 6, 12) are similar in most respects to both Pilaló and Tungurahua Volcano populations, except that the upperside ground colour is darker.

One specimen of *P. spina* is known from southern Ecuador (Fig. 4) and it presents some minor distinctive features. It is illustrated here, but I refrain from naming it as a separate race, even though its remote collecting locality suggests it may represent a separate subspecies (1 ♂: Prov. Loja, Podocarpus National Park, above Yangana, Cerro Toledo, 3300-3350 m, 14.IX.2004, R. GARLACZ & T. PYRCZ *leg*., TWP).

*Pedaliodes spina* occurs in the uppermost cloud forest and the forest – páramo ecotone, higher than most congeners, and has been reported at 3300 m and above, as high as 3700 m on the Tungurahua Volcano and, assuming that Fassl's data are precise, at 3800 m in the Tolima massif. In Pilaló the only congener restricted to the same elevational band is *P. pilaloensis* PYRCZ & VILORIA **status nova***, an endemic species of the Western Cordillera of Ecuador. Elsewhere, *P. spina* is occasionally microsympatric with the widely distributed *P. polusca* (HEWITSON), which generally occurs at slightly lower altitudes, and also with three uppermost forest specialists: *P. puracana* KRÜGER, *P. negreti* PYRCZ and *P. gustavi* VILORIA & MILLER. *P. spina* is occasionally common, but all available information seems to indicate that it is an extremely localised species with discontinuous distribution. In fact, it has not been reported from a number of well-sampled high elevation localities in Ecuador. It is worth pointing out that the habitat of *P. spina* on the Tungurahua was destroyed by an eruption of this

**P. pilaloensis*, described originally as a subspecies of *P. morenoi* DOGNIN (PYRCZ & VILORIA 1999), is elevated herein to the specific status, based on the fact that *P. pilaloensis* and *P. morenoi* were found, during this study, to occur parapatrically in Pilaló.

volcano in 2003, which covered the uppermost forest with a thick layer of ashes, as confirmed personally by this author.

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