

A NEW GENUS OF "ELFIN" BUTTERFLIES FROM THE NORTHERN HIGH ANDES (LEPIDOPTERA: LYCAENIDAE)

RODRIGO TORRES-NÚÑEZ¹, JASON P. W. HALL², KEITH R. WILLMOTT²,
AND KURT JOHNSON³

¹Museo de Historia Natural, Universidad Pedagógica Nacional, A.A. 19149, Santa Fé de Bogotá, Colombia;

²Dept. of Entomology and Nematology, University of Florida, Gainesville, Florida 32611, USA;

³Dept. of Entomology, American Museum of Natural History, Central Park West at 79th Street, New York, New York 10024, USA

ABSTRACT.— *Podanotum* n. gen. (tribe Eumaeini, infratribe Thecloxurina), a new genus of high Andean "elfin"-like hairstreak butterflies, is described from two new species recently discovered in Colombia and Ecuador: *Podanotum clarissimus* n. sp. and *Podanotum metallicus* n. sp. The morphology of *Podanotum* places the genus in the "loxurina" subclade of the infratribe and is highly autapomorphic, but its wing shape more closely resembles that of the sister "arria" subclade. Brilliant dorsal "tin-foil"-like iridescence in the new genus strongly resembles that of certain sympatric species of *Lymanopoda* Westwood, [1851] (Nymphalidae, Satyrinae). The adaptive significance of this dorsal iridescence is discussed in the light of field observations and current data concerning possible cases of mimicry in *Lymanopoda*.

RESUMEN.— *Podanotum* (tribu Eumaeini, infratribu Thecloxurina), un género nuevo de mariposas licénidas del grupo de las "elfins" procedente de las grandes alturas Andinas, es descrito a partir de dos especies nuevas recientemente descubiertas en Colombia y Ecuador. La muy ostensible morfología autapomorfa de *Podanotum* permite colocarlo en el subclado "loxurina" de la infratribu. Sin embargo, la forma de las alas se parece más a la del subclado hermano "arria". El brillo iridiscente de la superficie dorsal semejante a papel metálico en el nuevo género le confieren un marcado parecido a simpátricas especies de *Lymanopoda* Westwood, [1851] (Nymphalidae, Satyrinae). Se discute el significado adaptativo de la iridescencia dorsal considerando las observaciones de campo y los datos recientes sobre posibles casos de mimetismo en *Lymanopoda*.

KEY WORDS: *Abloxurina*, *Caerofethra*, *Candora*, *Chlorostrymon*, Colombia, Ecuador, Eumaeini, hilltopping, *Lymanopoda*, mimicry, morphology, Neotropical, *Podanotum* n. gen., *Podanotum clarissimus* n. sp., *Podanotum metallicus* n. sp., *Pons*, *Pseudolucia*, *Rhamma*, *Shapiroana*, taxonomy.

Nearly simultaneously in 1995, Torres (in Colombia) and Hall and Willmott (in Ecuador) discovered species of brilliantly colored "elfin" butterflies (Lycaenidae, tribe Eumaeini, infratribe Thecloxurina) representing a previously unrecognized lineage of generic worth. Interestingly, the dorsal colors in these "elfins" resemble the bright "tin-foil" hues of some sympatric and synchronic species of *Lymanopoda* Westwood, [1851] (Nymphalidae: Satyrinae), and we discuss the possibility of mimicry between these two genera.

The purpose of this paper is to describe these new entities. The paper follows terminology in Johnson's (1992) monograph of Andean "elfins" and a subsequent paper (Salazar and Constantino, in press) describing another new genus from this eumaeine infratribe. This includes use of VFW, VHW and DFW, DHW for ventral and dorsal fore- (FW) and hindwings (HW), respectively.

Tribe EUMAEINI (*sensu* Eliot, 1973)
Infratribe THECLOXURINA (*sensu* Johnson, 1992)

PODANOTUM Torres & Johnson, new genus

Fig. 2a-d, 3a-d; 5a-d, 6a-f, 7a-d, 8a-f

Type species: *Podanotum clarissimus* Hall, Willmott & Johnson, new sp.

Diagnosis.— Wings: compared to all other Thecloxurina, the dorsal wing surfaces are brilliant "tin-foil" green with black borders of various width;

males lack scent brands; ventral surfaces light green-hued to gray-hued brown, each wing showing a submarginal spotband of blackish brown lunules or chevrons and, medially, a variously undulate lineal blackish brown band. HWs show only a slight anal lobe, if at all.

Morphology: females with notable bipartite genital habitus, uniquely sclerotized in terminal element only; male genitalia most resembling the genus *Candora* Johnson, 1992 (vinculum venter elliptic, arc of vinculum fully filled by valvae, saccus small), but with saccus and valvae in *Podanotum* more reduced, valve bilobes and caudal extensions of about equal length, and aedeagus with unique ventro-terminal keel.

Description.— Adult: tagmata blackish brown with profuse gray hairs and with occasional patches of bright iridescent blue-green scales; frons predominantly white with some brown scaling and long brown hairs; antennae typically eumaeine, finely striped white and black. **MALE:** lacking external secondary sexual marks in known species. DFW, DHW shape broad with outer margins convex, HW anal angle completely rounded or with only slight anal lobe; structural color brilliant "fine-grained" (*sensu* Johnson, 1992) silver-hued green of "tin-foil-like" intensity; borders blackish and of various width, wider at FW apex. VFW, VHW ground color green-hued to gray-hued brown, FW with arc of 4-7 blackish-brown lunules (or chevrons) across submargins paralleled basally by a narrow undulate medial band of varying intensity (basally blackish or brown, distally with white scales); HW with arc of 6-7 prominent blackish-brown lunules (or chevrons) across submargins paralleled basally by narrow undulate medial band of varying intensity (basally blackish or brown, distally with white scales) across medial area and, sometimes, a less apparent dark brown line across the postbasal

area. FEMALE: similar to male but with somewhat duller structural color and wider blackish wing borders.

Morphology: terminal tergites of both sexes normal (i.e., without subcordate incised posterior cavity ["*sipc*" *sensu* Johnson, 1991, 1992]); brush organs lacking in known species. *Male genitalia* (Fig. 5a-d, 7a-d): vinculum elliptic (*sensu* Johnson, 1991) marked by broad, but very short saccus. Valvae with bilobed area and caudal extensions both apparent, of about equal length and, together, filling most of the vincular arc (similar to thecloxurines with prominent valvae [like *Candora* Johnson, 1992], not taxa with reduced valvae or without caudal extensions [like *Abloxurina* Johnson, 1992]). Aedeagus short (length exceeding rest of genitalia by only part of caecum length); caecum slightly arched and comprising about one-third of aedeagal length; shaft generally straight, terminating with a sculptured central keel and one pencilate cornutus. *Female genitalia* (Fig. 6a-f, 8a-f): bipartite in structure with prominently sclerotized, fluted, and distally toothed terminal element joined by transparent, membranous juncture to a hardly sclerotized, flexible, anterior tube (of about equal length) extending to ovate corpus bursae; cervix bursae lacking prominent hood typical of most Thecloxurina; corpus bursae with two extremely large, platelike, signa (comparable only to some large structures in the thecloxurine genus *Pons* Johnson, 1992).

Etymology.— The name *Podanotum* combines the Latin suffix meaning "marked like" to the prefix "Poda," alluding to the satyrine genus *Lymanopoda*, and refers to the external resemblance of these two butterfly genera; considered masculine.

Discussion.— Considering the brilliant coloration of this genus, taxa of *Podanotum* n. gen. resemble other thecloxurines only in the hindwing shape and ventral markings (which are most reminiscent of *Shapiroana* Johnson, 1992). Notably, *Shapiroana* is a member of the "*arria* subclade" of the Thecloxurina, which lacks clear tubular elements in the female genitalia. *Podanotum* belongs to the "*loxurina* subclade" of the Thecloxurina whose members show a tubular female genital habitus. However, of the genera in this group (see Johnson, 1992), *Podanotum* is alone in having fully sclerotized tubelike elements of the ductus bursae in only the terminal element. Among members of the "*loxurina* subclade," only members of *Abloxurina* Johnson, 1992, also exhibit a distinctly bipartite female genitalia (these heavily sclerotized in both the posterior and anterior elements). Neither the male genitalia nor wing pattern of *Abloxurina* are similar to *Podanotum*. It appears most likely that *Podanotum* is a sister group of the "*loxurina* subclade" genus *Candora* Johnson, 1992. This new genus is a highly autapomorphic sister group, however, considering not only the morphological characters of *Podanotum* but the possibility that it may be involved in mimicry (see final discussion). Members of *Candora* vary notably in wing shape (some with elongate anal lobes, others without) and at least one species lacks scent brands in males. The male genitalia of *Podanotum* most closely resemble those of *Candora* (in valvae and vinculum/saccus) while the terminal element in the female genitalia of *Podanotum* resembles the entire tubal configuration in *Candora*. No species of *Candora*, however, have extremely bright dorsal coloration.

Notably, the terminus of the female genitalia in one species of *Podanotum* is asymmetrical, a condition noted only in a few other thecloxurines (e.g., *Shapiroana matusiki* Johnson, 1992) which show extreme autapomorphies of both wing and morphological characters. Moreover, *S. matusiki* (an orange species in an

otherwise blue and purple genus) appears to be a member of the "orange mimicry ring" described recently by Benyamini (1995) based on the toxic polyommata lycaenid species *Pseudolucia chilensis* (Blanchard, 1852) (see final discussion). It is noteworthy, concerning autapomorphy in *Podanotum*, that in the Eumaeini reduction of anterior genital sclerotol features (or reversion to a membranous state) has only been noted in either extremely insular taxa (e.g., certain *Chlorostymon* species [Johnson 1989, 1990]) or genera characterized by extreme overall apomorphy (e.g., *Caerofethra* Johnson, 1991). This genital characteristic in *Podanotum* forms an interesting parallel with the new genus's insularity and possible mimetic involvement.

***Podanotum clarissimus* Hall, Willmott & Johnson, new sp.**

Fig. 2a-d; 5a-d, 6a-f

Diagnosis.— Wings: differs from *P. metallicus* n. sp. (see below) by possessing much wider (postmedial distad) dorsal black borders in both sexes and, on the ventral surface, a green-hued light brown ground color (of less suffusive appearance) with more prominent pattern elements in both the medial and submarginal areas and elements of the latter often appearing more chevron-like than lunulate.

Morphology: the male differs from *P. metallicus*, among other characters, in the far less angulate shape of the valvae, and broadly elliptic bilobes which terminate in short tapered caudal extensions. The female differs from *P. metallicus* by being less robust, having a symmetrical ductus bursae terminus, and a much shorter anterior ductal element.

Description.— MALE: HW with slight anal lobe. DFW, DHW brilliant iridescent green (blue-green at an oblique angle) with blackish borders extending distally from the postmedial area. VFW, VHW ground color light green-hued brown without extensive overlay of suffusive scales; FW and HW with 6-7 succinct submarginal black lunules or chevrons (particularly costa) and basally, a prominent, succinct and (on the HW only) greatly undulate medial chocolate band framing a slightly browner ground color within. *Male genitalia* (Fig. 5a-d): typical of the genus, differing from its congener *P. metallicus* in showing a more convex outline to the vinculum (ventral view), having valvae with elliptic bilobes and gradually tapered caudal extensions of about equal length, and little to no arch to the caecum of the aedeagus.

FEMALE: similar to male but with duller green dorsal iridescence and slightly wider black borders on both wings. *Female genitalia* (Fig. 6a-f): bipartite habitus divided into a heavily sclerotized, fluted, and distally toothed terminal element connected by a transparent juncture to a shorter (about half the length of the posterior) anterior element which is weakly sclerotized, flexible and extends to the corpus bursae; cervix bursae without notable sclerotol development; corpus bursae with two very large and shield-like signa, robust and inwardly toothed in the lateral view; papillae anales typical for the Eumaeini, in this species with apophyses extending the full length of the ductal tube.

Types.— *Holotype* ♂: ECUADOR.— *Loja Prov.*, km 27 Loja-Cuenca, Cerro Palma, 3000m, 7 Apr 1995 (K. R. Willmott). *Allotype* ♀: same data as above. Both to be deposited in the American Museum of Natural History, New York, USA (AMNH).

Paratypes: 1 ♂, 2 ♀, same data as above. In the collection of J. P. W. Hall and K. R. Willmott.

Etymology.— This species name is derived from the Latin for "very bright, shining" in reference to its unusually brilliant dorsal surface.

Discussion.— The type locality of Cerro Palma is a prominent conical hill in the center of the Andean mountain chain. Its upper slopes are clothed in patchy high-altitude elfin forest and bamboo,

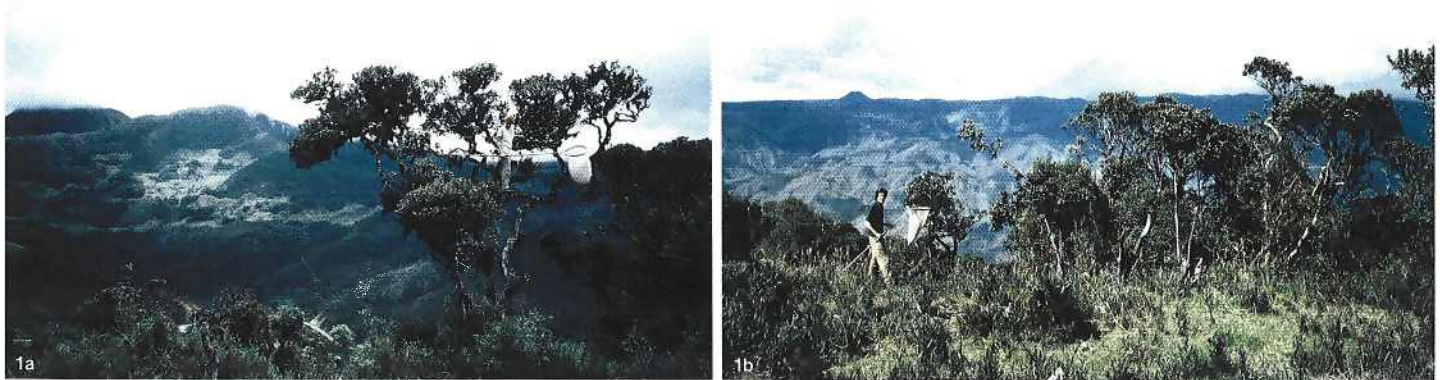


Fig. 1. The summit of Cerro Palma, South Ecuador, type locality of *Podanotum clarissimus* n. sp.: a) Keith R. Willmott in a view to the west. b) Jason P. W. Hall in a view to the north-east.

but the flat summit is devoid of vegetation. This proved to be a very diverse site for highland "elfin"-like lycaenids, and 19 species (including several undescribed species) were captured during only two days fieldwork. Like most of the other species present, both sexes of *Podanotum clarissimus* n. sp. could be found hilltopping in this cleared summit. Individuals were active in the afternoon between approximately 1300-1530h, when they would occasionally be seen flying rather rapidly across this small field, only alighting fleetingly on the surrounding vegetation.

***Podanotum metallicus* Torres & Johnson, new sp.**

Fig. 3a-d; 7a-d, 8a-f

Diagnosis.— Wings: differs from *P. clarissimus* (see above) by the more brilliant silver-green dorsal iridescence which limits the black borders to only narrow areas of FW submargin and HW margin in the male (wider in female); ventral surface suffused with silver-gray scales over a light brown ground color, markings less emphatic than in *P. clarissimus* with prominence limited to a FW medial band, and a HW submarginal arc of 6-7 prominent blackish-brown spots; HW without anal lobe.

Morphology: male differs from *P. clarissimus*, among other characters, by having a narrower and more angulate valvae shape (bilobes narrowly elliptic with membranous distal outline, caudal extension undulate along inner and outer margin); female with more robust habitus, a distinctively asymmetrical terminus to the ductus bursae, and a relatively long anterior ductal element compared to *P. clarissimus*.

Description.— MALE: DFW, DHW extremely brilliant iridescent silver-green (blue-green at an oblique angle) with very narrow and irregular blackish borders limited to FW submargin and HW margin. VFW, VHW with suffusive gray-scales over light brown; FW with light, suffusive arc of 5-7 blackish-brown spots across submargin, paralleled basally by a bipartite (basally blackish-brown, distally white-scaled) medial band from costa to cell Cu_2 ; HW with arc of 5-6 prominent blackish-brown spots across submargin paralleled basally by a lightly defined, blackish medial line framing a darker ground color within, and in postbasal area some hint of a more darkly blackish line. **Male genitalia** (Fig. 7a-d): typical of the genus, differing from its congener *P. clarissimus* in having a more angulate outline to the vinculum (ventral view), having more angulate valvae (bilobes narrowly elliptic with membranous distal outline, caudal extension angulate along inner and outer margins, latter slightly longer than former), and a prominent arch in the caecum of the aedeagus.

FEMALE: similar to male, although with wider marginal and apical black borders, slightly less brilliant dorsal iridescence and a more falcate-shaped forewing. **Female genitalia** (Fig. 8a-f): bipartite habitus divided into a heavily sclerotized, robust, elliptic and asymmetrically toothed terminal element connected by a transparent juncture to a robust anterior element (of about equal length) which is weakly sclerotized, flexible and extends to the corpus bursae; cervix bursae without notable sclerotical development; corpus bursae with two very large and shield-like signa (although less robust than in the Ecuadorian sister species), inwardly toothed in the lateral view; papillae anales typical of the Eumaeini in this species with apophyses only about three-quarters of the ductus bursae length.

Types.— **Holotype** ♂: COLOMBIA.— Boyacá, Santuario de Flora y Fauna de Iguaque, Cerro Pan de Azúcar, 2970m, 6 Nov 1994 (A. Flórez, a student survey worker). **Allotype** ♀: same data as above but 18 Dec 1994. Both deposited in the AMNH.

Paratypes: 1 ♂, same data as holotype but, 17 Dec 1994. Deposited in the AMNH.

Etymology.— This species is named after the Latin for "metallic" in reference to the brilliant "tin foil"-like iridescence of the dorsal surface.

Discussion.— Torres and students under his supervision have been conducting a biodiversity survey of the Santuario de Flora y Fauna de Iguaque, in Colombia, for several years. In addition to *Podanotum metallicus* n. sp., they have collected two new *Rhamma* species, and a new species of *Heoda* (Strymonina) whose description is in press.

DISCUSSION

Discovery of the genus

Torres collected the initial samples of this genus in a survey of the Lycaenidae of the Santuario de Flora y Fauna de Iguaque, Boyacá, in the Cordillera Oriental of Colombia. He noted the general similarity of the external features to taxa of *Rhamma* Johnson, 1992, and *Shapiroana* Johnson, 1992, and forwarded two males to the AMNH for morphological study. Johnson noted some similarity in the male morphology to *Candora* Johnson, 1992, but additional sister species, and particularly females, were needed to confirm such a placement. Caution was warranted because Johnson (1991, 1992) had cited numerous in-

