

**Notes on *Pseudolucia jujuyensis*  
(Lepidoptera: Lycaenidae: Polyommatainae)**

Dubi BENYAMINI<sup>1</sup> & Zsolt BÁLINT<sup>2\*</sup>

<sup>1</sup> 4D MicroRobotics Ltd., 7194700 Beit Arye, 91 Levona street, Israel.

E-mail: [dubi\\_ben@netvision.net.il](mailto:dubi_ben@netvision.net.il)

<sup>2</sup> Hungarian Natural History Museum, Department of Zoology, Lepidoptera Collection,  
H-1088 Budapest, Baross utca 13, Hungary. E-mail: [balint.zsolt@nhmus.hu](mailto:balint.zsolt@nhmus.hu)

**Abstract** – The polyommataine lycaenid butterfly *Pseudolucia jujuyensis* Bálint, Eisele et Johnson, 2000 (Lepidoptera) was described on the basis of a single male from Coraya, Humahuaca, Jujuy, Argentina; its bionomics has remained unknown. Based on subsequently collected materials the species is now recorded from Yavi in Argentina and Torotoro in Bolivia (the latter representing a new country record). Eggs are recorded from *Cuscuta* sp. (Convolvulaceae), a suspected host plant of the larva. The bionomics and behaviour of the species are discussed. The species is considered to be endemic to the cold arid steppe (Prepuna) vegetation of low diversity, found along the eastern side of the Andes below the Altiplano in Bolivia and Argentina.

**Key words** – Polyommataini, Neotropical Region, *Cuscuta*, biocontrol, discoloration, perching

## INTRODUCTION

The most northern representative of the Neotropical genus *Pseudolucia* Nabokov, 1945 (type species: *Lycaena collina* Philippi, 1859) (Lepidoptera: Lycaenidae, Polyommatainae, Polyommataini) is *P. jujuyensis* Bálint, Eisele et Johnson, 2000, described on the basis of a single male specimen collected in “Coraya” (Humahuaca, Jujuy, Argentina) by BÁLINT *et al.* (2000). The type locality has been visited several times by the first author of this paper since 2001, however, no further material could be collected. In 2016 a *Pseudolucia* species was found at Torotoro (Bolivia), 550 km north of the type locality, at an altitude of 2700–2850 m; the same species has also been recorded from Tajira (Bolivia), 68 km from the Argentinean border and 100 km northeast of Yavi (GUERRA SERRUDO *et al.* 2018, D. Benyamini, unpublished field notes). The specimens were treated as a species closely related to but potentially different from

\* Corresponding author.

*P. jujuyensis*, and accordingly they were referred to as “*Ps. torotorensis*” (an informally proposed, nomenclaturally unavailable name) by GUERRA SERRUDO *et al.* (2018).

*Pseudolucia jujuyensis* belongs to the *Cuscuta*-feeder clade of the genus, members of which have a peculiar morphology (BÁLINT & BENYAMINI 2001, BENYAMINI & BÁLINT 2015) and a specialized life history (BENYAMINI 1995). One of the members of the clade, *P. parana* Bálint, 1993, is globally endangered (BENYAMINI *et al.* 2019). The purpose of the present paper is to provide additional records of *P. jujuyensis*, document aspects of its life history, and compare specimens from Argentina to those from Bolivia.

## NOTES

### Discoveries

The first author tried to find *P. jujuyensis* several times (annually between 2001 and 2003, then in 2011, 2012 and 2018) at its type locality, however, without any success. Additional attempts were made in 2018 in the companion of his assistant, O. Tomer, after the publication of the paper by GUERRA SERRUDO *et al.* (2018). A search in the Lepidoptera collection of the Fundación Miguel Lillo in Tucumán yielded no additional specimens, and a consultation with botanists of the institution provided no new information about locations of *Cuscuta* spp. At the beginning of the rainy season, Coraya ridge, west of Humahuaca (7 December 2018) and the area from La Quiaca to Santa Catalina along the northern border road in Argentina were visited, again without success. In 8 December they drove eastwards in the direction of Santa Victoria and reached Yavi. In a valley east of the settlement (22.138°S 65.488°W), the flat ground was dominated by bushes of *Baccharis* sp. (Asteraceae) in bloom (Fig. 1). The first female of *P. jujuyensis* was collected at this location by the first author; a perching male on a bush was observed (Fig. 2). Further three females were captured between 10 and 12 a.m., at an altitude about 3850 m. The next day (9 December) further specimens were observed, and a fourth female and a male were collected in the same area, at an altitude of 3930 m. No *Cuscuta* (suspected host plants of the larvae based on the systematic placement of the species) was observed. The following butterfly species were recorded at the same habitat: *Yramea sobrina* (Weymer, 1890) (Heliconiidae); *Paralycaeus vapa* (Staudinger, 1894) (swarming around the suspected larval host plant *Astragalus garbancillo* Cavanilles, 1791, Fabaceae) and *Strymon oribata* (Weymer, 1890) around

*Krameria* sp. (Krameriaceae) in bloom (both Lycaenidae) (Benyamini & Tomer, in preparation); *Vanessa carye* (Hübner, [1812]) (Nymphalidae); *Tericolias* sp. and *Tatochila* sp. (both Pieridae); and *Pyrgus* sp. and *Hylephila* sp. (both Hesperiiidae).

In 2019 R. Vila (from Barcelona), was on an expedition in North Argentina in the company of L. A. Kaminski, G. Talavera and L. Volkmann. They arrived in the region on the 13th of February, two months after the visit of D. Benyamini and O. Tomer. They found young plants of a *Cuscuta* sp. growing on *Baccharis* sp. at two localities: (1) Yavi Chico (22.121°S 65.427°W, 3647 m) and (2) San José de Yavi (22.138°S 65.488°W, 3643 m). Individuals of *Cuscuta* sp. were scarce, hard to locate. In the first locality two large plants and in the second locality a single smaller parasitized plant were discovered (Figs 3–4). All provided fresh white polyommatine lycaenid eggs (Fig. 5), but larvae were not found. Rearing larvae from the collected eggs was unsuccessful.



**Fig. 1.** Prepuna habitat of *Pseudolucia jujuyensis* Bálint, Eisele et Johnson, 2000 with *Baccharis* shrubs in bloom; 3 km East of Yavi, Department Jujuy, northern Argentina at 3844 m, 8.XII.2018 (photo by Ofir Tomer)



**Fig. 2.** Perching male of *Pseudolucia jujuyensis* Bálint, Eisele et Johnson, 2000 (indicated by the arrow), 9 km East of La Quiaca, Department Jujuy, northern Argentina at 3930 m, 9.XII.2018 (photo by Ofir Tomer)



**Fig. 3.** Roger Vila inspecting a *Baccharis* plant parasitized by *Cuscuta* sp. on which eggs of *Pseudolucia jujuyensis* Bálint, Eisele et Johnson, 2000 were found; at Yavi Chico, department Jujuy, northern Argentina, 3647 m, 13.II.2019 (photo by Lucas A. Kaminski)



**Fig. 4.** Close up image showing *Baccharis* branches parasitized by *Cuscuta* sp.; at Yavi Chico, department Jujuy, northern Argentina, 3647 m, 13.II.2019 (photo by Roger Vila)



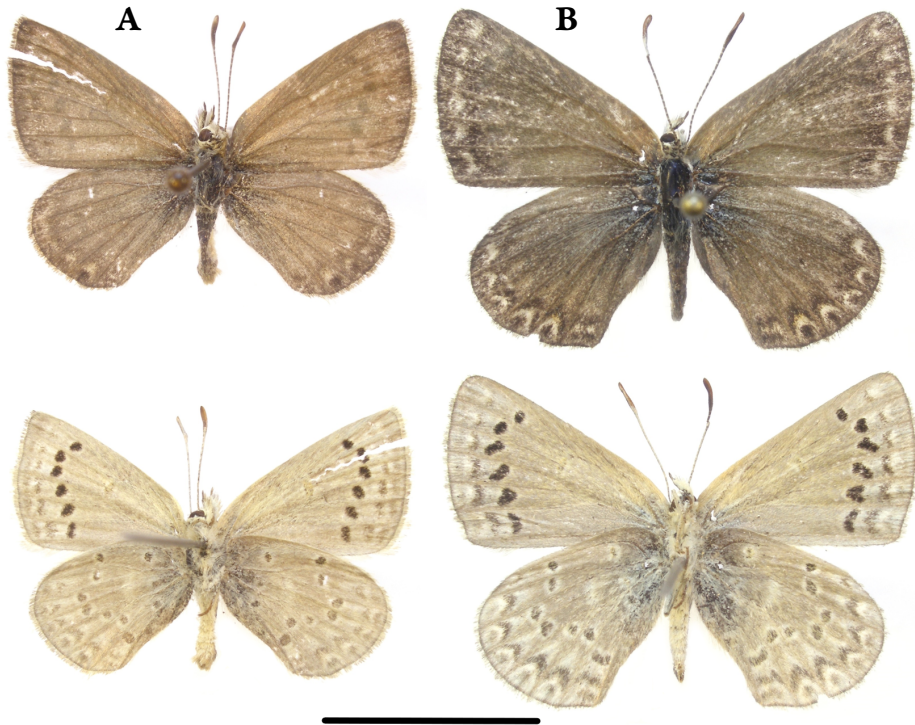
**Fig. 5.** Egg of *Pseudolucia jujuyensis* Bálint, Eisele et Johnson, 2000 placed near *Cuscuta* tendril in dorsal view, showing the typical polyommatae lycaenid flat shape with fine sculptured surface. Scale bar = 500  $\mu$ m (photo by Roger Vila)

## Identification and taxonomy

*Material examined* – Five specimens: Argentina, Province Jujuy, 3 km East of Yavi, 3844 m, 8.XII.2018, leg. D. Benyamini (three females) (Fig. 6); 9 km East of La Quiaca, 3930 m, 9.XII.2018, leg. O. Tomer (one male, dissected: Bálint gen. prep. no. 1718 and one female, dissected: Bálint gen. prep. no. 1719) (Fig. 6). Two females collected on 8.XII, and the male specimen collected on 9.XII. are deposited in the Benyamini collection, Steinhardt Museum of Natural History (Tel-Aviv, Israel). One female will be deposited in the Lepidoptera Collection of the Hungarian Natural History Museum (Budapest, Hungary) and one female will be deposited in Nabokov blues reference collection at the McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida (Gainesville, USA).

*Identification* – BÁLINT & BENYAMINI (2001) proposed the *chilensis* species group of the genus *Pseudolucia* for species with the following character states: dorsal wing surfaces of both sexes without structural colouration, ventral wing surface pattern being ordinary polyommata, male genitalia tegumen with a dorso-lateral projection, uncus lobe with a securiform shape, suprazonal portion of aedeagus being extremely short and pointed, and the female genitalia ductus heavily plated and long. Besides *P. jujuyensis* the group includes further three species: *P. chilensis* (Blanchard, 1839), *P. parana* Bálint, 1993, and *P. sosneada* Benyamini et Bálint, 2015. All these species can be discriminated on the basis of wing and genitalia characters (BENYAMINI & BÁLINT 2015, BENYAMINI et al. 2019). Specimens from Yavi (Fig. 6) cannot be separated from specimens of *P. jujuyensis* from Bolivia on the basis of genitalia or wing traits (cf. GUERRA SERRUDO et al. 2018). Therefore, we conclude that *P. jujuyensis* is present in Bolivia, and we suspect that besides the well-recorded occurrence at Torotoro and the anecdotal observation at Tajira the species may occur in several places in the xerotypic “Prepuna” habitats with arid cold steppe climate up to the edge of the Altiplano, where it has not been recorded yet (GUERRA SERRUDO et al. 2013) (Fig. 7).

*Systematics and taxonomy* – Based on molecular analysis, *P. jujuyensis* is the sister of the clade [*P. parana*+(*P. chilensis*+*P. sosneada*)], suggesting an age older than any of the species of its sister clade (BENYAMINI et al. 2019). Genitalia and wing traits should be analysed in the future to prove the results of the molecular analysis and to find synapomorphic characters to define the clades. The apex of the forewing of *P. jujuyensis* is obviously more pointed (resulting from the slightly bent outer margin, which is strongly bent in the related species) and the fringes are not chequered (all related species have chequered fringes). These characters make the species superficially similar to the species *Madeleinea moza* (Staudinger, 1894) (see D’ABRERA 1993).



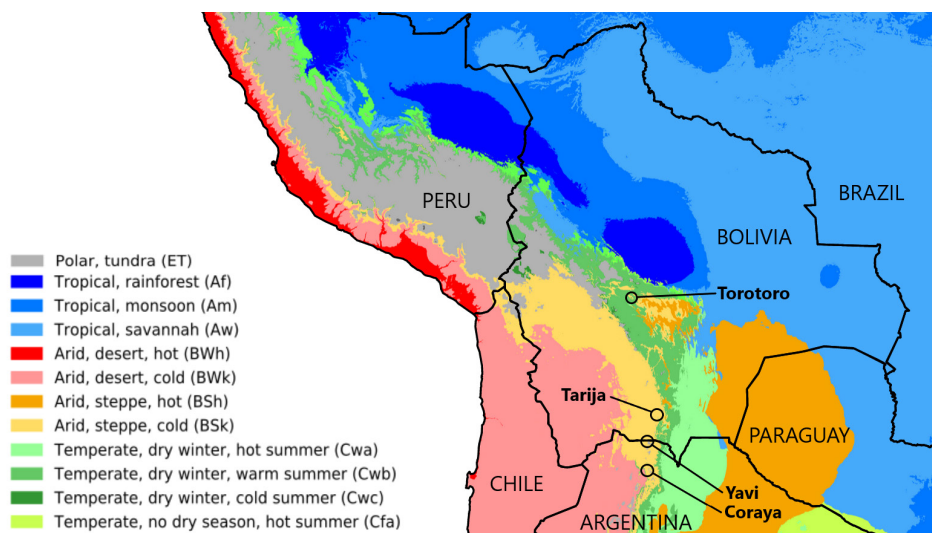
**Fig. 6.** *Pseudolucia jujuyensis* Bálint, Eisele et Johnson, 2000 specimens in dorsal (above) and ventral (below) views, A = male (before dissection): 9 km East of La Quiaca, 3930 m, 9.XII.2018, leg. O. Tomer (deposited in the Benyamini collection, Steinhardt Museum of Natural History, Tel-Aviv), B = female: 3 km East of Yavi, Department Jujuy, northern Argentina at 3844 m, 8.XII.2018, leg. D. Benyamini (deposited in the Hungarian Natural History Museum, Budapest). Scale bar = 1 cm (photos by Gergely Katona)

### Life history

Larvae of all species in the *chilensis* group of *Pseudolucia* feed solely on members of the genus *Cuscuta*, comprising parasitic and toxic plants (BENYAMINI *et al.* 2019). Despite the rarity of *Cuscuta* species in natural biotopes of North Argentina, three plants parasitized by *Cuscuta* spp. were found by R. Vila near Yavi (Fig. 4). The proximity to the flourishing Bolivian *Cuscuta* spp. suggests that *P. jujuyensis* feeds on *Cuscuta globiflora* Engelman in North Argentina (GUERRA SERRUDO *et al.* 2018), and the common native widespread weed *Cuscuta boliviana* Yuncker is very likely also one of its host plants.

The presently known evidence from Bolivia and Argentina suggests that diapausing larvae of the previous summer pupate in late November and adults emerge in early December, simultaneously with the sprouting of annual *Cuscuta* seedlings. Females oviposit on the parasitic *Cuscuta* spp. and their host plants a few weeks after mating. (This observation may explain why R. Vila did not collect adults but recorded eggs.) The young larvae feed on the flower buds of *Cuscuta* spp. It is expected that during the summer individuals of *P. jujuyensis* breed continuously and produce up to three or four broods annually, similarly to *P. chilensis* distributed in Chile (BENYAMINI 1995).

Both in Yavi and Torotoro males were hilltopping and displayed aggressive territorial behaviour. Perching individuals (Fig. 3) were intolerant not only towards conspecifics, but even individuals of the more common *Strymon oribata* were chased out of their territory. It was suggested that polyommata species with blue males exhibit a patrolling behaviour, while perching or hilltopping have never been recorded (BÁLINT *et al.* 2018, BÁLINT 2022). This may influence individual behaviour and population structure in polyommata: species with discoloured males tend to be sedentary with high population density, while the species with structurally coloured males intensively patrol suitable habitats and their population density is lower.



**Fig. 7.** Map of various climates in central South America, according to BECK *et al.* (2018), showing that the Argentinean and Bolivian localities (indicated by bold letters) of *Pseudolucia jujuyensis* Bálint, Eisele et Johnson, 2000 are all in cold arid steppe climate (composed by Gergely Katona)



## CONCLUSIONS

On the basis of field notes, records, and examination of museum material, it turned out that *P. jujuyensis* has a relatively wide distribution in the eastern chain of the Andes, ranging from central Bolivia (department Potosi) to northern Argentina (province Jujuy) (Fig. 7). It may produce several generations per year. Host plants of its larva are the obligate parasitic *Cuscuta* spp. As the host plants cause severe problems for local farmers in their plantations (Dubí Benyamini's personal communication with local farmers in Bolivia, HOLM *et al.* (2017) for Argentina), *P. jujuyensis* might have a potential as biological control agent against them, therefore the bionomics of this butterfly species should be studied. Torotoro National Park, where *Cuscuta* weeds are extremely common in the vegetation growing season, is a promising locality for further explorations.

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*Acknowledgements* – Mr. Alfredo Ugarte (Santiago, Chile) and Mr. Ofir Tomer (Na'ale, Israel) joined the first author on some of his expeditions to northern Argentina looking for *P. jujuyensis*. Dr. Roger Vila (Barcelona, Spain) kindly informed us on the discovery of *Cuscuta* sp. near Yavi and contributed with additional information and documentation on the host plant. Mr. Juan Fernando Guerra Serrudo (La Paz, Bolivia) identified the larval host plant in Torotoro and intended to look for the early stages in Potosi, but we have lost contact with him since the start of COVID-19 pandemic. Mr. Gottfried Siebel (La Paz, Bolivia) collected some *P. jujuyensis* specimens near Torotoro, and accompanied the first author in his visit to Torotoro National Park. Mr. Gergely Katona (Hungarian Natural History Museum, Budapest) composed the figure plates and drew the map.

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