

Description of a new species of the genus *Psoralis* Mabille, 1904 with a note on two other Panamanian species of the genus (Lepidoptera: Hesperiiidae: Hesperiiinae: Moncini)

Richard A. Anderson¹, Ichiro Nakamura², and Donald J. Harvey³

1. Research Associate, McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, P.O. Box 112710, Gainesville, Florida 32611-2710, USA; ragabry@tampabay.rr.com, 2. Research Associate, McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, Gainesville, Florida; Mississippi Entomological Museum, Mississippi State, MS 39762, and the Smithsonian National Museum of Natural History, Washington, DC, inakamur@buffalo.edu, 3. Department of Systematic Biology-Entomology, National Museum of Natural History, Smithsonian Institution, Washington, DC 20560-0127, USA; harveyd@si.edu

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Abstract: A new species, *Psoralis panamensis* Anderson & Nakamura **sp. nov.**, is named and described from a cloud forest habitat in Panama and illustrated with its genitalia. Panamanian records of two other species of the genus, *P. darienensis* and *P. mirnae*, are also given along with a description and photograph of a female *P. darienensis*.

Key words: Panama, cloud forest, neotropics, genitalia, Hesperiiidae.

INTRODUCTION

Several Hesperiiinae specimens from Panama were forwarded to the authors for identification, and it was determined that they represented examples of an undescribed species of *Psoralis* Mabille, 1904 (Hesperiiidae: Hesperiiinae: Moncini), which is described here. The collector, John MacDonald of Starkville, Mississippi, has made numerous trips to Panama in recent years and particularly to the site of the new discovery. It is interesting to note that this area has been visited frequently for years by local and visiting collectors, yet only now has this taxon been recognized. Records of two other Panamanian *Psoralis* species collected by Gordon Small in the 1980s in Darién, *P. darienensis* Gaviria, Siewert, Mielke & Casagrande, 2018, and *P. mirnae* Siewert, Nakamura & Mielke, 2014, are also discussed and the female of *P. darienensis* is described for the first time, and the habitat characteristics of these *Psoralis* species and the new species described here are compared.

Psoralis panamensis Anderson & Nakamura, **sp. nov.**
(Figs. 1, 2, 3)

Description. Male (Fig 1): Forewing length 14 mm (average 14.5 mm, n=5). Forewing; produced, outer margin convex, costal margin straight. Dorsum dark brown, fringe dark brown with paler outer one half; two semi-hyaline trapezoidal spots in CuA_1-CuA_2 and M_3-CuA_1 , and a minute semi-hyaline spot in R_5-M_1 . Forewing with inconspicuous tripartite black band (Fig. 2): upper section above vein CuA_2 sagittate reaching halfway up to origin of CuA_1 ; middle section linear, below and parallel to vein CuA_2 ; lower section small and oval above vein 2A. Hind wing; apex rounded, costal margin convex, tornus slightly lobed, fringe same as forewing, unmarked.

Venter same dark brown as dorsum; forewing with similar spotting on upper side, plus an opaque elongated yellowish patch in CuA_2-2A . When

viewed at an oblique angle forewing has a reddish-brown hue. Hindwing with faint yellow spot in distal end of cell, and two very faint yellow postmedian spots in M_3-CuA_1 and CuA_1-CuA_2 .

Dorsum of head a mixture of brown and yellow elongated scales on first and second segments of palpi, third segment conical, some faint ochreous scales behind eyes; antenna brown with yellow scales under club, slightly checkered underside, nudum of fifteen segments; legs brown, while middle and rear legs contain ochreous scaling on their rear half, mid tibia with spines; thorax covered both dorsally and ventrally in dark brown setiform scales that appear green when viewed at oblique angles.

Genitalia (Fig. 3): tegumen longer than wide; uncus bifid, distal portion squared with downward pointed tips; gnathos as long as uncus in lateral view; vinculum smooth and slightly rounded; valvae symmetrical, longer than broad, caudal end serrated dorsally with prominent spike projecting dorsad best seen in interior lateral view; aedeagus cylindrical and tapered to a point caudally in both dorsal and lateral view. Both sides of tegumen with lateral process or projection beginning near base of tegumen and extending caudally nearly as far as gnathos and uncus.

Female. Unknown.

Type. Holotype male with the following labels: white, printed: / Panama / Cocle / El Valle de Anton / Cerro Gaital trail / ca. 875 m N 08° 37' 47.2", W 80° 06' 58.0" / Sept 9, 2016 / John R. MacDonald /; white, printed: / Gent. Vial No. / RAA0999 /; red, printed: / HOLOTYPE / *Psoralis panamensis* Anderson, Nakamura /. The holotype is deposited in the National Museum of Natural History (Smithsonian Institution), Washington, D.C., USA (USNM). One paratype is located in the collection of the first author with the data as follows: Panama / Cocle / El Valle de Anton / Cerro Gaital Trail / ca. 875 m. N 08° 37' 47.2" / W 080° 06' 58.0" / Jan 28, 2017 / John R. MacDonald; one paratype is deposited in the McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, Gainesville, FL, USA (MGCL), with data as follows: Panama / Cocle / El Valle de Anton / Cerro Gaital Trail / ca. 875 m. N08° 37' 47.2" / W 080° 06' 58.0" / Jan 28, 2017 / John R. MacDonald; one paratype in the collection of the second author: Panama / Cocle / El Valle de Anton / Cerro Gaital Trail / ca. 875 m N 08° 37' 47.", W 80° 06' 58.0" / Jan 28, 2017 / John R. MacDonald; and one in the collection of John MacDonald: Panama / Cocle / El Valle de Anton / Cerro Gaital trail / ca. 875 m N 08° 37'



Figure 1. Adult of *Psoralis panamensis* sp. nov.: a) dorsal and b) ventral view of holotype male, data in text.

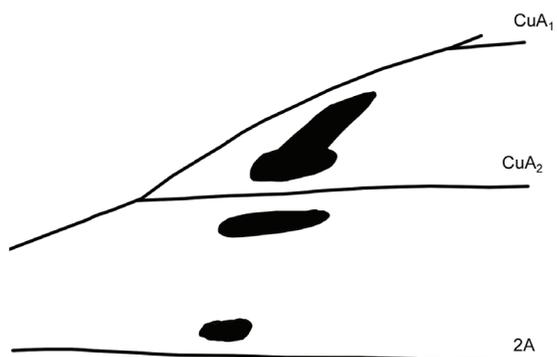


Figure 2. Male holotype of *Psoralis panamensis* sp. nov., dorsal forewing brand configuration.

47.2", W 80° 06' 58.0" / Jan 28, 2017 / John R. MacDonald.

Type locality and natural history. PANAMA: Coclé Province, El Valle de Antón, Cerro Gaital Trail above the community of El Valle. The area is a wet mid-elevation cloud forest on the Pacific slope of the continental divide. The trail is 4-5 m wide and is shaded from direct morning sun until mid- to late morning. All the specimens were collected on flowering trees at a lower section of the trail and where the edge of the forest had formed a light-gap, either natural, or perhaps from some past human disturbance. Other species associated with *P. panamensis* sp. nov. in the area include *Saturnus s. saturnus* (Fabricius, 1787), *Saturnus reticulata* (Plotz, 1883), *Lento hermione* (Schaus, 1913), *Euselasia eucrates* (Hewitson, 1872), *Periplacis pretus* (Cramer, 1777), *Mesosemia carissima* H. W. Bates, 1866, *Thestiopus epepea* (Hewitson, 1870), *Strymon gabatha* (Hewitson, 1870), *Magneptychia tiessa* (Hewitson, 1869), and *Forsterinaria neonympha* (C. Felder & R. Felder, 1867) (John MacDonald, pers. comm.).

Etymology. This species is named for the country of Panama where the type specimens were collected.

Diagnosis. *Psoralis panamensis* sp. nov. differs in a number of

ways from the other *Psoralis* species so far known from Central America, i.e., *P. mirnae* and *P. darienensis*. The type series of *P. panamensis* is small and may not reveal the full extent of variability. Compared to *P. mirnae*, *P. panamensis* is smaller, the forewing has a single subapical spot rather than two, the two spots in CuA_1 - CuA_2 and M_3 - CuA_1 are much smaller, and unlike *P. mirnae* there is no spot on the dorsal side in space CuA_2 -2A. Moreover, the shape of the male dorsal forewing brand is quite different. In *P. mirnae* the brand is much larger, extending to the origin of vein CuA_1 and appearing contiguous from CuA_1 to the middle of space CuA_2 -2A. In *P. panamensis* all three parts are clearly separate. The hind wing dorsal side has no spot, whereas *P. mirnae* has one or two spots. The male genitalia of the two species differ substantially, even though the general form of the two species, particularly the broadly bifid and square uncus suggest a close relationship. It is of interest to note that some other species of the genus, such as *P. exclamationis* (Mabille, 1898), and particularly *P. degener* (Plötz, 1882) (Seiwert *et al.*, 2014), share a finger-like central projection on the dorsal center of the uncus, perhaps suggesting that these species comprise a separate group within the genus. The figure of the male genitalia of *P. degener* in Seiwert *et al.* (2014) clearly shows that the valvae and the aedeagus are quite distinct from those of *P. panamensis*.

Psoralis panamensis on the other hand is quite similar in appearance to *P. darienensis*, although the size (Fig. 5) and the genitalia of the two are distinct. In *P. panamensis* the caudal end to the valvae are serrated dorsally, while in *P. darienensis* the valvae have a caudally pointed and central process. The uncus in *P. panamensis* is bifid with distal portions squared versus a trapezoidal shape in *P. darienensis*. The ventral hind wing of *P. panamensis* has two postmedian spots versus four in *P. darienensis*. Both species have similar dorsal forewing tripartite brands or stigma with a sagittate part in CuA_1 - CuA_2 . The brand in *P. panamensis* extends roughly half way to the base of vein CuA_1 , while in *P. darienensis* it extends to the base of the vein similar to that in *P. mirnae*. Most notable in *P. panamensis* is

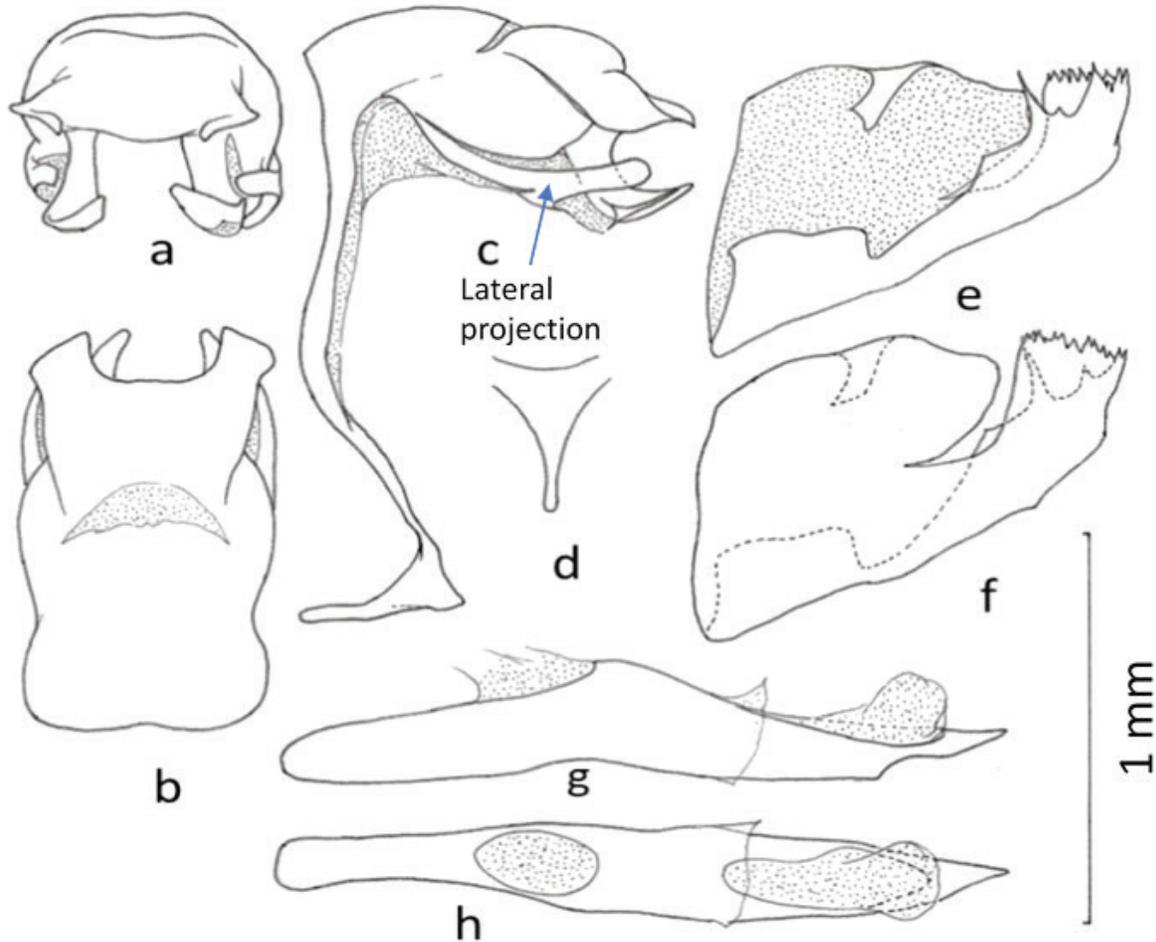


Figure 3. Male genitalia of *Psoralis panamensis* sp. nov.: a) posterior view of uncus and gnathos, b) dorsal view of tegumen and uncus, c) lateral view of vinculum, saccus, tegumen, gnathos and uncus, d) dorsal view of saccus, e) interior lateral view of right valvae, (f) lateral view of left valvae, g) lateral view of aedeagus, h) dorsal view of aedeagus.

a lateral process or projection along both sides of the tegumen beginning near the base of the tegumen and extending caudally nearly as far as the gnathos and uncus. The form of this feature appears to be unique to *P. panamensis* and is not found in other members of the genus

Discussion. *Psoralis panamensis* sp. nov. is at present known only from the type series, and three additional male specimens recently collected by John MacDonald. As with *P. mirnae* from Guatemala, the habitat of *P. panamensis* is cloud forest. As noted by Myers (1969) and Lewis (1971), cloud forest is found in Panama in areas substantially lower than 1000 m and is known for its high degree of floristic endemism. Whether *P. panamensis* represents an entomological counterpart to this plant endemism within this part of central Panama remains to be determined. Collection dates of September and January/February suggests that it is at least bivoltine and may fly during both the wet and dry seasons. As with *P. mirnae* in Guatemala (Siewert *et al.*, 2014), *P. panamensis* specimens were collected on flowers.

DISCUSSION

The Gordon Small collection (Robbins & Gates Clarke, 1986) at the USNM contains series of two other *Psoralis* species collected in cloud forest habitats above Cana in Darién Province in Panama. The first is *P. darienensis*, described and figured recently by Gaviria *et al.* (2018) based on two males from the USNM series. Since the rest of the series is much longer and includes females, we provide below a description and photograph of the female (Fig. 4), collecting dates, and FW size distribution as well as a note on its habitat. The second species of *Psoralis* in the Small collection is *P. mirnae*, previously known only from Guatemala (Siewert *et al.*, 2014), again collected in the same habitat along with *P. darienensis*, but in much smaller numbers.

Psoralis darienensis

The collecting dates and altitude data for specimens in the USNM are as follows:

March 23, 1983, 1550 m, 4♂♂; March 24, 1983, 1550 m, 2♂♂; March 26, 1983, 1450 m, 2♂♂; March 31, 1983, 1550 m, 1♂; April 4, 1983, 1550 m,

Darién, Cana and the habitat of *P. darienensis* and *P. mirnae*

The Darién region of Panama is a major center of floral and faunal diversity and is located at the southeastern end of the Mesoamerican land bridge. Much of the area is within the Darién National Park, established in 1980. Its altitudinal range extends from the sea level to 1875 m at Cerro Tacarcuna, the highest peak on the Serranía del Darién along the Atlantic side border with Colombia. As far as we are aware, Serranía del Darién remains entomologically unexplored. Botanically, however, the cloud forest of Cerro Tacarcuna and nearby Cerro Mali is known to include a distinctive montane oak forest and a high degree of endemism (Davis *et al.*, 1997).

Across a wide central valley along Rio Tuira and its tributaries to the southwest of Serranía del Darién is another mountain range called Serranía de Pirre that rises to about 1550 m, and this is where the two species of *Psoralis* discussed above were found. Cana is an abandoned gold mine town at the eastern foot of this range at about 600 m, and this is from where Gordon Small started to reach the higher ground where those *Psoralis* species were collected. A brief description of his trips to this area is given in Nicolay's (1989) obituary of Gordon Small. Paleoecological studies indicate that the lowland areas in this valley, and probably elsewhere as well, had been extensively cultivated by the local indigenous population for at least 4000 years until the Spanish contact in early 1500s (Bush & Colinvaux, 1994). Gold mining in the area by the Spaniards is said to have brought here over 20,000 people at one time, but after several raids by pirates, Cana's gold mine was abandoned in the 1820s. After a brief reopening of the mining operation by the British in the early 1900s, the area has reverted ever since to "seasonally semi-deciduous tropical moist forest," as Davis *et al.* (1997) describe the lowland forest of the area. In recent years, the Panamanian ANCON (National Association for the Conservation of Nature) has operated guided tours of the area using the landing strip and a lodge owned by them, but they have since stopped such tours for, apparently, safety concerns. However, the landing strip is said to have deteriorated too far since then for a safe use. Thus, for at least the last several years, Cana remains inaccessible to outside visitors.

The northern part of Serranía de Pirre, however, is still accessible from El Real de Santa María via the national park ranger station at Rancho Frío at about 110 m above sea level. The cloud forest in the Serranía de Pirre occurs from about 900 m up, which is below the ridge top at the northern end of the serranía (Myers, 1969). Interestingly, in several parts of Panama, the cloud forest zone is known to come down to well below 1000 m (Lewis, 1971). In the part of Serranía de Pirre further south, that is the area above Cana, the cloud forest occurs at higher elevations, beginning at around 1300 m (Myers, 1969), indicating that those *Psoralis* species occur well within the cloud forest zone, just as *P. mirnae* does in Guatemala (Siewert *et al.*, 2014). Three attempts in early to late February by one of us (I. N.) to find these species in the northern part of Serranía de Pirre at about 1100 m to 1200 m (at or near 07°59'21", 77°42'26"W), which is well within the cloud forest zone, have been unsuccessful so far. *Psoralis mirnae* in

Guatemala was found in mid-October (Siewert *et al.*, 2014), but a subsequent visit in June to the same location failed to find even a single individual (I. N., unpublished observation). It is difficult to determine the voltinism of these species from Small's records, as it depends on his trip schedules, time of the day he was at their habitat and the weather he encountered.

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