

A NEW SUBSPECIES OF *ADELPHA ERYMANTHIS* FROM MEXICO, WITH A KEY TO IDENTIFICATION OF SIMILAR TAXA (LEPIDOPTERA: NYMPHALIDAE: LIMENITIDINI)

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ABSTRACT.— *Adelpha erymanthis esperanza* n. ssp. is described from the Sierra de Juárez in northern Oaxaca, Mexico, and a key for identification of similar taxa in Mexico is presented (*Adelpha milleri*, *A. boeotia oberthurii*, *A. erymanthis erymanthis*, *A. delinita utina*, *A. phylaca phylaca*).

RESUMEN.— Se describe *Adelpha erymanthis esperanza* n. ssp., de la Sierra de Juárez en el norte de Oaxaca, México. Se presenta una clave para la identificación de otros táxones similares presentes en México (*Adelpha milleri*, *A. boeotia oberthurii*, *A. erymanthis erymanthis*, *A. delinita utina*, *A. phylaca phylaca*).

KEYWORDS: *Adelpha erymanthis esperanza* n. ssp., biogeography, cloud forest, endemism, Neotropical, Oaxaca, taxonomy.

Recent decades have seen an increased lepidopterological activity throughout the neotropics, and this is particularly evident in Mexico (e.g., Maza, 1987; Maza and Maza, 1993). The country's remarkably varied topography and climate has generated a great diversity of natural habitats, and it is therefore perhaps not surprising that intensive faunistic surveys have brought to light numerous taxa endemic to restricted areas of the country (Maza *et al.*, 1982; Llorente, 1984; Maza and Turrent, 1985; Luis *et al.*, 1991; Vargas *et al.*, 1991). The Sierra de Juárez, Macizo Central de Chiapas, and Sierra Madre del Sur are some of the geologically oldest mountain chains in Mexico, and the very humid submontane forests occurring there contain the highest number of endemic taxa in the country (Llorente and Escalante, 1992). In the genus *Adelpha*, three species have been described as recently as the mid-1970s (Beutelspacher, 1975b, 1976), while both *Adelpha salus* Hall, 1935, and *A. salmoneus* (Butler, 1866) contain undescribed Mexican subspecies (Willmott, 1999, in press).

While curating the Saldaña collection (which includes the Díaz Francés Collection, among others), recently acquired by the National Collection of Insects, Mexico, the first author found some specimens of *Adelpha* similar to *A. erymanthis erymanthis* Godman & Salvin but clearly distinct. The second author, conducting a revision of the genus *Adelpha* (Willmott, 1999), had also noticed a single specimen of this phenotype, actually the female paratype of *Adelpha jacquelineae* Steinhauser & Miller, 1977. These specimens belong to an undescribed subspecies of *Adelpha erymanthis*, which we herein describe and name. Although Willmott and Hall (1999) provided a schematic diagram and terminology for the *Adelpha* wing pattern groundplan, we have here followed traditional terminology for the sake of simplicity.

In common with all areas of the Neotropics where a number of *Adelpha* species occur together, there are some difficulties in identification of similar Mexican taxa. This has led to the description of several synonyms (Willmott, 1999, in press). We, therefore, also take this opportunity to provide a key for the identification of similar *Adelpha* taxa in Mexico.

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The following collection acronyms are used in the text:

AME	Allyn Museum of Entomology, Sarasota, Florida, USA
CNIN	Colección Nacional de Insectos, Universidad Nacional Autónoma de México, México D. F., Mexico
USNM	United States National Museum, Smithsonian Institution, Washington DC, USA

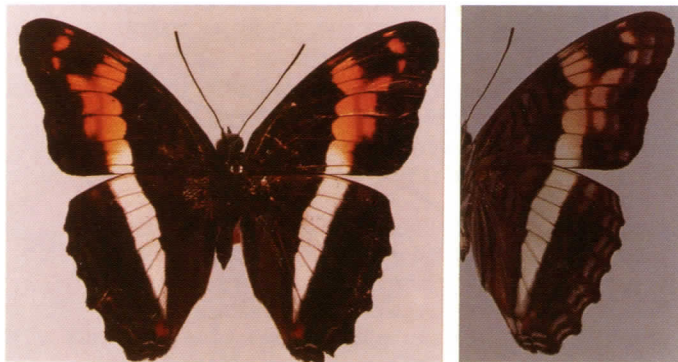


Fig. 1-2. *A. erymanthis esperanza* n. ssp., holotype female: 1) dorsal surface; 2) ventral surface.

Adelpha erymanthis esperanza Balcázar & Willmott, new subsp.

Fig. 1-3

Description.— FEMALE: forewing length: 31-34mm (mean = 32.3mm, n = 3). **Dorsal surface:** Forewing: ground color dark brown, with darker transverse markings in basal and submarginal area typical of species; vertical postdiscal band from anal margin to costa, white at anal margin, shading into orange in cell 2A-Cu2, remainder of band orange; white area posterior to vein Cu2 narrower, approximately 2/3 width of contiguous orange part of band; band widest in cell M3-M2; spot in cell M3-M2 quadrate; three orange subapical spots in cells M2-M1, M1-R5, R5-R4, largest in cell M1-R5, that in cell M2-M1 displaced distally with respect to distal edge of orange band in cell M3-M2; basal edge of band approximately straight, slightly incised at each vein; fringe dark brown, narrowly white at apex, with a few white scales between veins. **Hindwing:** ground color dark brown, with darker brown lines in discal cell and submarginal area, typical of species; white postdiscal band extending from costa, broadening in middle and terminating in a point near tornus; tornus with two black spots with

white distal edges and some orange scaling basally, in cell 2A-Cu2; fringes checkered, black-brown at vein ends, white between them. *Ventral surface*: *Forewing*: ground color reddish brown; discal cell silvery white with dark streak at base and two transverse red-brown bands, edged with darker brown, trace of darker brown line between them; postdiscal band, reflecting that on dorsal surface, very pale cream, divided in two in cells Cu2-M2 by vertical, slightly concave red-brown line; very pale cream subapical spots in cells M2-M1, M1-R5 and R5-R4 (corresponding to dorsal orange subapical spots), all complete, not divided vertically by a reddish-brown line; submarginal series of pale bluish gray spots, just distal of postdiscal band and subapical spots, from cell 2A-Cu2 (a pair of spots) to cell M1-R5; additional pair of small bluish gray dots in cell 2A-Cu2, at tornus; distal margin orange-brown; fringe black with white scales towards apex, and between veins. *Hindwing*: ground color reddish-brown; basal half mostly silvery gray with red-brown bands, edged with dark brown, crossing discal cell; vein 3A and mid-cell 3A-2A lined with dark brown; postdiscal band pure white, reflecting dorsal band; a postdiscal series of paler markings parallel and distal of postdiscal band, expanded in cells M1-Rs and Rs-Sc+R1, faint or absent throughout rest of wing, where series appears just as paler ground color; a paler line distal and parallel to this series, then two further submarginal series of silver-gray, concave crescent-shaped markings in each cell, forming a pair of spots in cell 2A-Cu2; inner pair of spots bordered basally by two black spots, then orange-brown scaling, in cell 2A-Cu2; fringe checkered with brownish-black and white between the veins. *Head*: eyes densely setose; frons with medium brown hairs; antennae dark brown with sparse white scales at ventral base and at ventral surface of basal few segments; labial palpi black dorsally, white ventrally and laterally with a black lateral stripe. *Thorax*: dorsal surface black with short dark brown hairs; ventral surface grayish white with brown stripes where legs rest against thorax, legs white with black dorsal surface on mid and hindlegs. *Abdomen*: dorsal surface black with short dark brown hairs, ventral surface white, then with dark gray lateral stripe, then white lateral stripe, spiracles ringed in white. *Female genitalia* (Fig. 3): corpus bursae rounded, lacking sclerotised bands.

MALE: unknown.

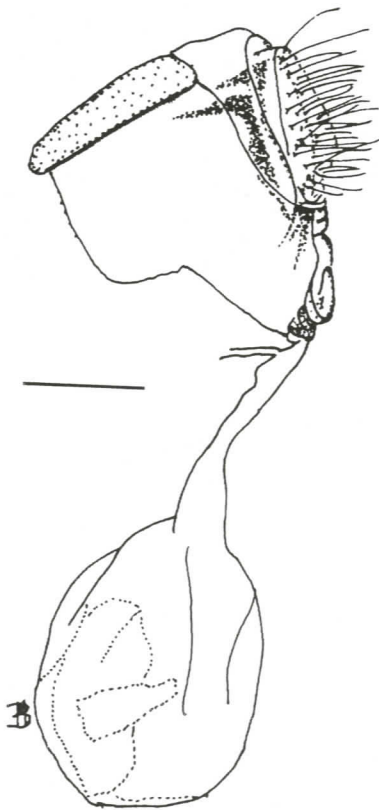


Fig. 3. *A. erymanthis esperanza* n. ssp., holotype female: genitalia, lateral view.

Types.—*Holotype* female: MEXICO.—*Oaxaca*: Santiago Comaltepec, La Esperanza, Sierra de Juárez, 17°37'45"N, 96°22'5"W, 1600m, Sep 1976 (A. Díaz Francés) — CNIN LEP 066691; in the CNIN.



Fig. 4. Map illustrating known collection localities for *A. erymanthis esperanza* in eastern Mexico.

Paratypes: 1 female: same locality data as HT, Jul 1976 (A. Díaz Francés) — CNIN LEP 066690; 1 female: same locality data as HT, Aug 1976 (A. Díaz Francés) — CNIN LEP 066692; both in the CNIN (one will be deposited in USNM); 1 female: MEXICO.—*Oaxaca*: Santiago Comaltepec, Puerto Eligio, 17°42'19"N, 96°18'25"W, 650m, 1 Nov 1961 (T. Escalante) (paratype of *Adelpha jacquelineae* Steinhauser & Miller, 1977); in the AME. **Etymology.**— This species is given a toponymical epithet based on "La Esperanza", Oaxaca, the type locality.

Diagnosis.— *Adelpha erymanthis esperanza* n. ssp. is distinguished from the neighboring subspecies, the nominate, by lacking orange scaling on the dorsal surface at the distal edge of the white hindwing band near the costa, and by the postdiscal band on the dorsal forewing being constricted and white, instead of orange, towards the anal margin.

Discussion.— *Adelpha erymanthis esperanza* is, to date, known only from 4 female specimens, all collected in a restricted area in the Municipality of Santiago Comaltepec, in the Sierra de Juárez, Oaxaca (Fig. 4). Despite thorough searches of major collections in Mexico, Europe, and the USA, in which over 20,000 *Adelpha* specimens were examined (Willmott, 1999, in press), no further specimens have been located. All four specimens show the diagnostic wing pattern characters of this subspecies, and differ consistently from the seven males and four females examined of the nominate subspecies (which, like all other *Adelpha*, is not sexually dimorphic in wing pattern). The nominate subspecies ranges from Chiapas in southeastern Mexico to central Panama (Willmott, 1999, in press), and is almost certainly isolated from this new subspecies by the low region of the Isthmus of Tehuantepec.

The known collection localities of this subspecies lie between 650-1600m in cloud forest habitat ["bosque mesófilo de montaña" *sensu* Rzedowski (1978)], a type of vegetation that shows a discontinuous distribution in Mexico, occurring at altitudes between 700 and 2900m locally along the Pacific slope, the Gulf slope, and

the "Macizo Central de Chiapas". These isolated submontane "island" areas often have characteristic faunas differentiated from neighboring areas of similar habitat (Luis *et al.*, 1991). Due to its relatively high species richness and large number of endemic taxa, the Sierra de Juárez has been one of the best collected areas for butterflies in the last 25 years. Among butterflies, at least 12 species and subspecies have been described from the area (Luis *et al.* 1991), perhaps the most notable being the primitive swallowtail *Pterourus esperanza* (Beutelspacher, 1975a; Tyler *et al.*, 1994). In common with all other subspecies of *A. erymanthis*, this taxon is evidently very rare and restricted to premontane cloud forest habitats (DeVries, 1987; Willmott, 1999, in press). Little is known of the biology of the species, but males of the nominate subspecies may be locally common during the wet season perching high (10m) above mountain rivers in small groups (Hall and Willmott, 1993). The majority of known specimens of *Adelpha erymanthis esperanza* have been collected at an altitude of 1600m, from July to September, immediately after the hottest month, in the wet season (with a monthly average precipitation of more than 400mm and average temperatures above 22°C).

One of the paratypes of this new subspecies is also a paratype of *Adelpha jacqueliniae* Steinhauser & Miller, 1977, a synonym of *A. boeotia oberthurii* (Boisduval, 1870) (Willmott, 1999). Several characters on the ventral forewing distinguish this new taxon from *A. boeotia* and unite it with *A. e. erymanthis*, including the entire pale subapical spots, particularly in cells M1-R5 and R5-R4, which are clearly divided by a dark red-brown line in *A. b. oberthurii*, the curved, rather than straight, red-brown line dividing the pale postdiscal band, and the absence of an outer submarginal series of pale spots, except in cell Cu2-Cu1. On the ventral hindwing the pronounced whitish dashes immediately distal to the white postdiscal band, near the costa, are also characteristic of *A. erymanthis*. The specimen figured by Steinhauser and Miller (1977: fig. 15-16) as "*A. baeotia oberthueri*" is in fact a form of *A. phylaca* (Bates, 1866), rarely occurring with typical *A. phylaca phylaca* in Mexico, but being the only form present further east in Central America, where it has been named *A. phylaca pseudoaethalia* Hall, 1938. It should also be noted that *Adelpha escalantei* Steinhauser & Miller, 1977, is a synonym of *A. delinita utina* Hall, 1938 (Willmott, 1999, in press).

Steinhauser and Miller (1977) discussed the identification of *A. boeotia oberthurii*, *A. delinita utina*, *A. phylaca phylaca*, *A. phylaca pseudoaethalia* and *A. milleri* Beutelspacher, 1976, concluding that they represented a closely related complex of species. However, a number of wing pattern, and male and female genitalic characters, suggest that they do not form a monophyletic group and that the superficially similar dorsal wing patterns have arisen through convergence (Willmott, 1999, in press). Since *A. erymanthis esperanza* was not recognised by Steinhauser and Miller (1977), and these five species are often confused in collections, we present a key to their identification below.

KEY TO IDENTIFICATION OF SIMILAR ADELPHA TAXA IN MEXICO

1. Distal half of pale postdiscal band and pale subapical spots in cells M2-M1 and M1-R5 on ventral forewing (corresponding to dorsal orange subapical spots), distinct and cream-colored 2
- Distal half of pale postdiscal band and pale subapical spots in cells M2-M1 and M1-R5 on ventral forewing (corresponding to dorsal orange subapical spots), indistinct and orange-brown *A. milleri*
- 2(1). Pale subapical spots in cells M2-M1 and M1-R5 on ventral

- forewing (corresponding to dorsal orange subapical spots) complete, not divided vertically into two by a reddish-brown line 3
- Pale subapical spots in cells M2-M1 and M1-R5 on ventral forewing (corresponding to dorsal orange subapical spots) divided vertically into two by a reddish-brown line *A. boeotia oberthurii*
- 3(2). Pale cream postdiscal block in cell Cu1-M3 on ventral forewing (corresponding to dorsal orange postdiscal band) not split by dark red-brown line, or only by faint darker scaling ... 4
- Pale cream postdiscal block in cell Cu1-M3 on ventral forewing (corresponding to dorsal orange postdiscal band) split vertically by distinct dark red-brown line 5
- 4(3). Orange subapical spot in cell M2-M1 on dorsal forewing of similar size to that in cell M1-R5; indistinct, orange-brown scaling present in cell 2A-Cu2 on ventral forewing distal to white postdiscal band *A. delinita utina*
- Orange subapical spot in cell M2-M1 on dorsal forewing absent or much smaller than that in cell M1-R5; no orange-brown scaling present in cell 2A-Cu2 on ventral forewing distal to white postdiscal band, this area being black *A. phylaca phylaca*
- 5(3). Orange scaling present at distal edge of white postdiscal band near costa on dorsal hindwing; orange postdiscal band on dorsal forewing narrowing slightly towards costa and uniformly orange *A. erymanthis erymanthis*
- No orange scaling at distal edge of white postdiscal band near costa on dorsal hindwing; orange postdiscal band on dorsal forewing noticeably narrower and entirely white in cell 2A-Cu2 *A. erymanthis esperanza* ssp. nov.

CLAVE PARA LA SEPARACIÓN DE TAXONES SIMILARES DE ADELPHA EN MÉXICO

1. Mitad distal de la banda postdiscal clara y puntos subapicales pálidos de las celdas M2-M1 y M1-R5 en la parte ventral de las alas anteriores (que corresponden a los puntos subapicales naranjas del dorso), obvios y de color crema 2
- Mitad distal de la banda clara postdiscal y puntos subapicales pálidos de las celdas M2-M1 y M1-R5 en la parte ventral de las alas anteriores (que corresponden a los puntos subapicales naranjas del dorso), indistintos y café-naranja .. *A. milleri*
- 2(1). Puntos subapicales pálidos de las celdas M2-M1 y M1-R5 de la cara ventral de las alas anteriores (que corresponden a los puntos subapicales naranjas del dorso) completos, no divididos verticalmente en dos por una línea café rojiza 3
- Puntos subapicales pálidos de las celdas M2-M1 y M1-R5 de la cara ventral de las alas anteriores (que corresponden a los puntos subapicales naranjas del dorso) divididos verticalmente por una línea café rojiza *A. boeotia oberthurii*
- 3(2). Bloque postdiscal crema pálido en la celda Cu1-M3 en la cara ventral de las alas anteriores (que corresponden a la banda postdiscal dorsal naranja) no dividido por una línea café rojiza oscura, o sólo por una serie de escamas ligeramente más oscuras 4
- Bloque postdiscal crema pálido en la celda Cu1-M3 en la cara ventral de las alas anteriores (que corresponden a la banda postdiscal dorsal naranja) dividido verticalmente por una línea café rojiza oscura obvia 5
- 4(3). Punto subapical naranja de la celda M2-M1 de la cara dorsal de las alas anteriores de tamaño similar a la de la celda M1-R5; escamas café anaranjadas en la celda 2A-Cu2 en la cara ventral de las alas anteriores, distal a la banda postdiscal

- blanca, indistintas *A. delinita utina*
 Punto subapical naranja de la celda M2-M1 de la cara dorsal de las alas anteriores ausente o de tamaño mucho menor que el de la celda M1-R5; sin escamas café anaranjadas en la celda 2A-Cu2 en la cara ventral de las alas anteriores, distal a la banda postdiscal blanca, esta zona es negra
 *A. phylaca phylaca*
- 5(3). Escamas naranja presentes en el borde distal de la banda postdiscal blanca cerca de la costa en la cara dorsal de las alas posteriores; banda postdiscal naranja en la cara dorsal de las alas anteriores, se angosta ligeramente hacia la costa y es naranja uniforme *A. erymanthis erymanthis*
 Sin escamas naranja en el borde distal de la banda postdiscal blanca cerca de la costa en el dorso de las alas posteriores; banda postdiscal naranja del dorso de las alas anteriores notablemente más angosta y completamente blanca en la celda 2A-Cu2 *A. erymanthis esperanza ssp nov.*

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