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TAXONOMIC NOTES ON ECUADORIAN *ADELPHA*, WITH THE DESCRIPTION OF TWO NEW SPECIES AND SEVEN NEW SUBSPECIES (LEPIDOPTERA: NYMPHALIDAE: LIMENITIDINAE)

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ABSTRACT.– Two new species and seven new subspecies of *Adelpha* Hübner, [1819], are described from Ecuador (*Adelpha attica hemileuca* **n. ssp.**, *Adelpha hesterbergi* **n. sp.**, *Adelpha hyas hewitsoni* **n. ssp.**, *Adelpha iphicleola thessalita* **n. ssp.**, *Adelpha iphiclus estrecha* **n. ssp.**, *Adelpha lamasi* **n. sp.**, *Adelpha radiata aiellae* **n. ssp.**, *Adelpha radiata explicator* **n. ssp.**, *Adelpha salus emmeli* **n. ssp.**). The taxonomy and synonymy of *Adelpha serpa* (Boisduval, 1836) and related species, and *Adelpha iphiclus* (Linnaeus, 1758) and *Adelpha iphicleola* (H. W. Bates, 1864), are discussed and a number of taxonomic changes made.

KEY WORDS: ***Adelpha attica hemileuca*** n. ssp., ***Adelpha hesterbergi*** n. sp., ***Adelpha hyas hewitsoni*** n. ssp., ***Adelpha iphicleola thessalita*** n. ssp., ***Adelpha iphiclus estrecha*** n. ssp., ***Adelpha lamasi*** n. sp., ***Adelpha radiata aiellae*** n. ssp., ***Adelpha radiata explicator*** n. ssp., ***Adelpha salus emmeli*** n. ssp., bait trapping, Bolivia, Brazil, Canal Zone, Central America, Chocó, Colombia, Costa Rica, Ecuador, endemism, Mexico, mimicry, Neotropical, Panama, Paraguay, perching behavior, Peru, premontane rainforest, ridgetop, South America, taxonomy, Venezuela.

The genus *Adelpha* contains some of the most common and conspicuous species in the Neotropics, but also many that are localised and rare, and a number of taxa have remained undetected until relatively recent intensive faunal surveys (Beutelspacher, 1975, 1976; Steinhauser and Miller, 1977; DeVries and Chacón, 1982; Orellana, 1996; Neild, 1996). In Ecuador to date, 56 species of *Adelpha* have been recorded out of a predicted total of 59, approximately two thirds of the genus and a number equalled only by Colombia. This great diversity of species, in combination with the country's range of habitats and the relative lack of historical collecting, has resulted in the discovery of a number of new *Adelpha* taxa by the authors (see also Willmott and Hall, 1995). In particular, many of these taxa inhabit the western slope of the Andes, an area of high butterfly species and subspecies endemism in both lowland and middle elevation habitats where a number of recent discoveries have been made in other butterfly families (Willmott and Hall, 1994; Hall and Willmott, 1995, 1996, 1998; Hall, 1998). This paper forms part of a larger study by the first author to revise the systematics of the genus *Adelpha*, in addition to a long term research project by both authors examining the diversity, ecology and biogeography of the true butterflies (Papilionoidea) of Ecuador.

Some of the historical confusion between species in *Adelpha* has arisen due to apparent mimicry between unrelated taxa (Aiello, 1984; Willmott, in prep.). In fact, although the genus exhibits a diversity of wing patterns, these are all simple modifications of the general *Adelpha* groundplan which can be readily recognised in all species. In order to facilitate comparisons between taxa, we use a standard terminology for various elements of the wing pattern groundplan in each description, as illustrated in Figure 1. It should be noted that according to the studies of the evolution of butterfly wing patterns of Schwanwitsch (1924) and Nijhout (1991), the majority of the pattern elements in Figure 1 actually represent the ground color of the wing, including the postdiscal band, and the postdiscal and submarginal series. True "pattern elements" (*sensu* Schwanwitsch and Nijhout) are the dark areas between these pale markings. However, it is much clearer to discuss the ventral wing pattern differences between *Adelpha* taxa in terms of the shape, orientation and expression of these pale areas of the wing, and we have therefore adopted an alternative terminology which allows this.

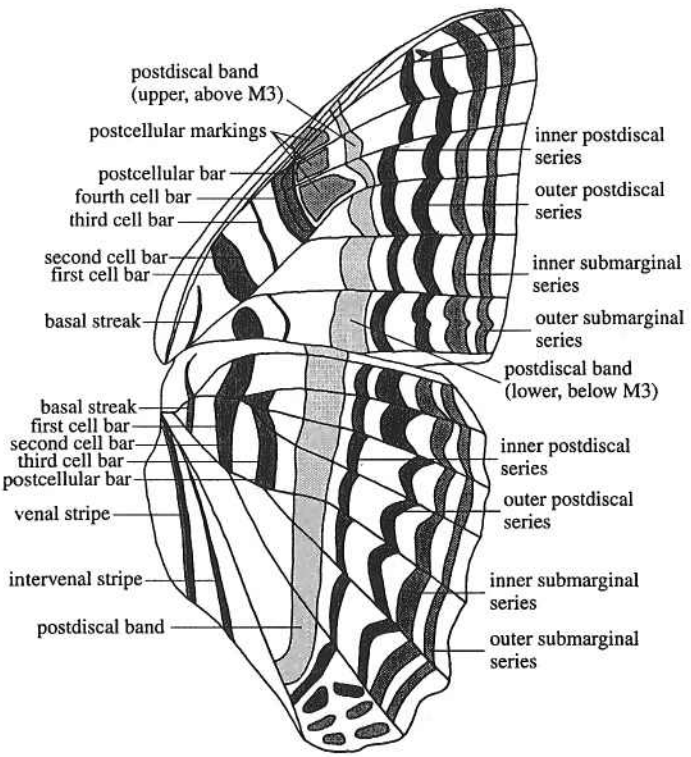

Fig. 1. A schematic drawing of the ventral wings of *Adelpha aricia* (Hewitson, 1847), illustrating the terminology used in this paper for elements of the *Adelpha* groundplan.

Most dorsal patterns are very simple and for the sake of clarity we describe them using more widespread terminology. For example, we refer to an orange "subapical marking" on the forewing as opposed to the inner and outer postdiscal series, which is actually what this marking represents. In all the species treated in this paper the inner and outer postdiscal series are not visibly separate on the ventral forewing in cells M_1 and M_2, and only sometimes in cell M_3. We use the terms "concave" and "convex" with respect to the wing base.

When describing subspecies in taxonomically difficult groups we give a full description, while for those whose affinities are obvious the description is comparative. For the complex *Adelpha serpa* group, and *Adelpha iphiclus* and *Adelpha iphicleola*, which have historically caused much confusion (e.g., Fruhstorfer, 1915; Hall, 1938; D'Abrera, 1987; DeVries, 1987), we present a more detailed taxonomic discussion and synonymic checklists before the descriptions. Nomenclature for wing venation largely follows Comstock and Needham (1918), except we refer to wing cells by the vein lying below or posterior to the cell, and genitalic terminology largely follows Klots (1956), except that we refer to the projection from the basal, inner edge of the valva as the clunicula, after Fruhstorfer (1915).

We use the following standard abbreviations in discussing taxonomic changes: n. syn. (a taxon which has been formerly regarded as a valid species or subspecies, but here is regarded as infrasubspecific); rev. stat. (a taxon which has most recently been regarded as a valid species or subspecies or a synonym, here is revised to a status which an earlier worker recognised); n. stat. (a taxon whose rank has changed or is now regarded as a subspecies or synonym of a different taxon to previous taxonomic combinations).

It has been necessary to make three other taxonomic changes in this paper in order to compare similar or related taxa, and we give an abbreviated discussion for each. More extensive treatment will be given in a forthcoming revision of the genus by the first author (Willmott, in prep.). Male genitalia are figured for all taxa, and the female genitalia for one of the two new species, the female being unknown in the second. We have examined specimens or photographs of virtually all *Adelpha* types known to be extant and consulted all original descriptions of the known taxa; in the few instances where a type has not been located we base our identification on the original description.

The following collections have been examined, the acronyms of which are used throughout the text:

AFEN	Andrew F. E. Neild collection, Greenwich, London, UK
AME	Allyn Museum of Entomology, Florida Museum of Natural History, Sarasota, FL, USA
AMNH	American Museum of Natural History, New York, NY, USA
BMB	Booth Museum, Brighton, UK
BMNH	Natural History Museum, London, UK [(M)=Main, (R)=Rothschild, (T)=Type collection]
DAT	David A. Trembath collection, Surrey, UK
EWSM	Ernesto W. Schmidt-Mumm collection, Bogotá, Colombia
FSCA	Florida State Collection of Arthropods, Division of Plant Industry, Gainesville, FL, USA
JFL	Jean F. LeCrom collection, Bogotá, Colombia
KWJH	Keith R. Willmott and Jason P. W. Hall collection, Gainesville, FL, USA
LMC	Luis M. Constantino collection, Cali, Colombia
MCZ	Museum of Comparative Zoology, Harvard University, Cambridge, MA, USA
MJP	Michael J. Perceval collection, Surrey, UK
MNCN	Museo Nacional de Ciencias Naturales, Quito, Ecuador
MNHN	Muséum National d'Histoire Naturelle, Paris, France
MUSM	Museo de Historia Natural, Universidad Nacional Mayor de San Marcos, Lima, Peru
MHNUC	Museo de Historia Natural Universidad de Caldas, Manizales, Colombia
STRI	Smithsonian Tropical Research Institute, Panama
USNM	National Museum of Natural History, Smithsonian Institution, Washington, DC, USA
ZMHU	Zoologisches Museum, Humboldt Universität, Berlin, Germany

Adelpha hesterbergi Willmott & Hall, **new sp.**
Fig. 2a,b; 12a,b

Description.– MALE: forewing length 32.5mm; forewing distal margin slightly dentate, hindwing distal margin dentate, hindwings triangular and slightly produced at tornus. *Dorsal surface*: *Forewing*: ground color dark brown; four darker brown lines in discal cell, one thick bar marking cell end and three basally, these three also extending into cell 1A+2A; vertical, orange postdiscal band extending from anal margin to costa, slightly thinning from vein Cu_2 to anal margin, widest in cell M_3, narrowing from cell M_2 to costa and slanting slightly basally, basal edge of band slightly concave, angled slightly towards costa at vein M_3; three orange subapical spots in cells M_2, M_1 and R_4, that in M_1 roughly twice the size of that in M_2, a narrow dash in R_4; fringe dark brown, white flecks at midpoint of cells M_3-M_1 and R_4. *Hindwing*: ground color dark brown; three very faint darker brown lines in discal cell; white postdiscal band extending from costa towards anal margin near tornus, thickest in cell M_3 then tapering to just extend into cell 1A+2A; three faint, darker brown bands distal of white band extending from costa to tornus, middle band terminating at tornus with two black basally pointing semicircular spots, lined basally with sparse orange-brown scaling and distally with a very thin silvery blue line; anal margin paler brown; fringe dark brown, two white flecks in cell 1A+2A. *Ventral surface*: *Forewing*: ground color dark reddish brown; discal cell and postcellular bars blackish, first cell bar angled basally away from costa, second straighter, third absent, fourth and postcellular straight, area between first and second, and fourth and postcellular, reddish, remainder of discal cell silvery gray except for broad reddish basal streak; silvery gray scales distal of postcellular bar in cell M_3 and slight silvery gray scaling at base of cells 1A+2A and Cu_2; bright, very pale cream postdiscal marking reflecting dorsal orange band, of similar shape except basal and distal edges indented slightly at veins, thick dark brown scaling dividing marking (separating fused postdiscal series from postdiscal band) in cell M_3, distal edge of marking in cells 1A+2A-Cu_1 and M_2-M_1 dissolving in diffuse orange scaling; three subapical spots of same color as band reflecting those on dorsal surface, representing fused postdiscal series; inner submarginal series composed of isolated silvery gray spots lined basally with black, displaced basally in cells Cu_2-M_3 (most displaced in Cu_1), two in cell 1A+2A with anterior spot twice width of posterior spot, single spots in remaining cells, a large dash in Cu_2, faint scales in Cu_1, a larger semicircle in M_3, an oblong in M_2 and M_1; outer submarginal series absent, except for a few scales in cells Cu_2, M_2 and in 1A+2A, where it exists as two silvery gray dashes; all veins lined indistinctly with paler orange-brown scaling within and distal to the pale postdiscal marking; distal margin blackish between each pair of veins in cells Cu_2-M_1; fringe black. *Hindwing*: ground color dark reddish brown in distal half, paler orange-brown in basal half; silvery gray band at base of wing extending to anal margin, filling most of area posterior to vein 3A, except margin and vein 3A; silvery gray filling posterior half of cell 3A from base to anal margin, anterior half orange-brown except for a silvery gray triangle bordering anal margin; postcellular and discal cell bars dark brown, area between first and second, and third and postcellular, pinkish, remainder of discal cell silvery gray (except basal streak); first and second bars continue to vein Sc+R_1, second bordered distally, and first basally, with a silvery gray bar, latter extending to fill area between humeral vein and vein Sc+R_1; silvery gray streak filling basal third of cell 1A+2A; postdiscal band extending and tapering from near costa (thin red-brown costal margin) to end roundly at vein 1A+2A near tornus, pure white where coinciding with dorsal postdiscal band, grayish in cell 1A+2A and along distal edge of band to cell M_1; inner postdiscal series a very faint, poorly defined, pale reddish brown line terminating in a small whitish triangle at vein 1A+2A; outer postdiscal series similar to inner, but line segments between each pair of veins crescent shaped and concave, each bordered distally with a dark brown basally pointing semicircle; inner submarginal series composed of separate silvery gray, elongate ovoid spots, two spots in cell 1A+2A

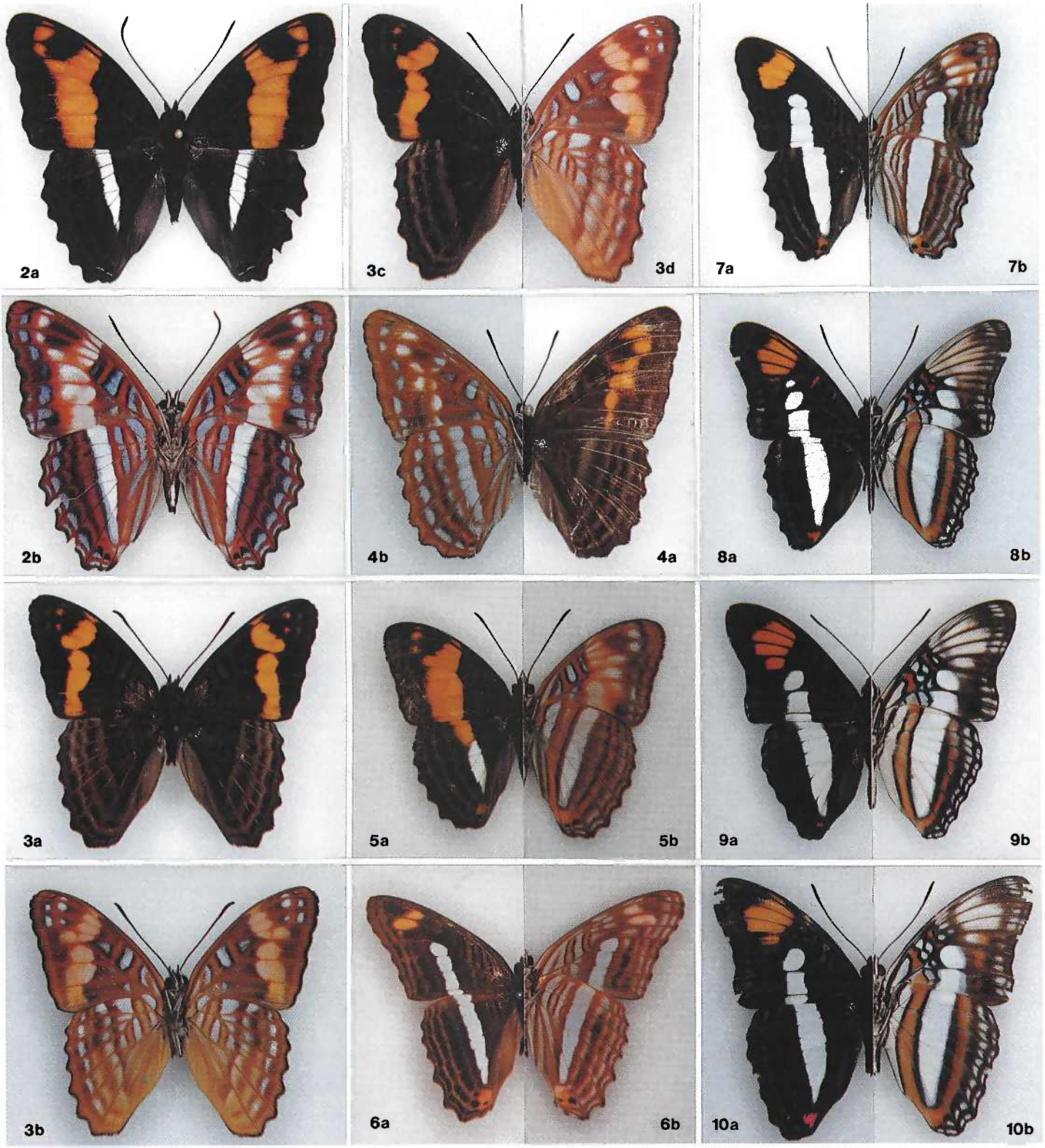

Fig. 2-10. Types of new taxa: a,c) dorsal surface; b,d) ventral surface. **2.** *Adelpha hesterbergi* **n. sp.** holotype male. **3.** *A. lamasi* **n. sp.** holotype male (a,b); allotype female (c,d). **4.** *A. salus emmeli* **n. ssp.** holotype female. **5.** *A. attica hemileuca* **n. ssp.** holotype male. **6.** *A. iphiclus estrecha* **n. ssp.** holotype male. **7.** *A. iphicleola thessalita* **n. ssp.** holotype male. **8.** *A. hyas hewitsoni* **n. ssp.** holotype male. **9.** *A. radiata explicator* **n. ssp.** holotype male. **10.** *A. radiata aiellae* **n. ssp.** holotype male.