

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.

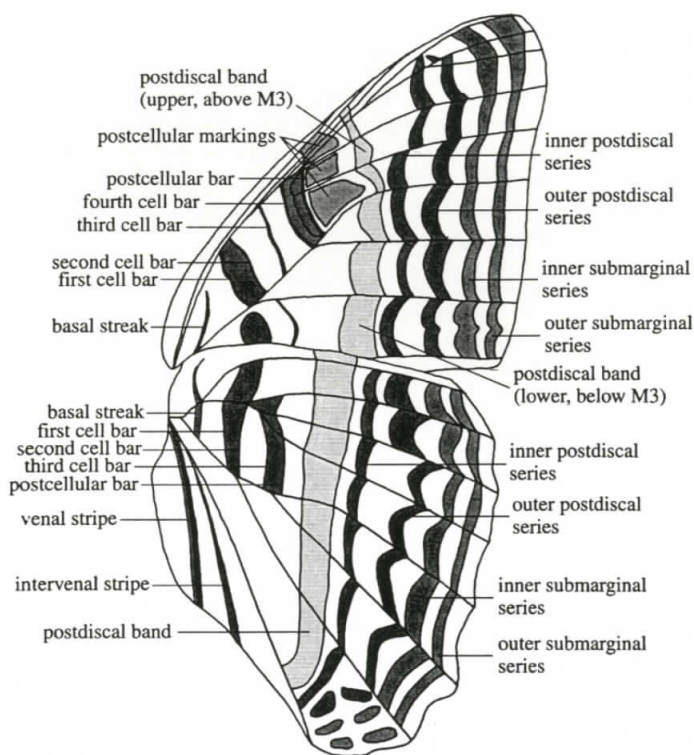


Fig. 1. A schematic drawing of the ventral wings of *Adelpha aricia* (Hewitson, 1847), illustrating the terminology used in this paper for elements of the *Adelpha* groundplan.

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 Klotz (1956), except that we refer to the projection from the basal, inner edge of the valva as the clunícula, 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. iphicles 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.

bordered basally by basally pointing black semicircles; outer submarginal series composed of small silvery dashes, each bordered distally by black; fringe black, with two faint white dashes in cell 1A+2A. **Head:** eyes dark brown with short setae in anterior half; dense white scales at ventral base of eyes; antennae black with white at ventral base and ventral surface of basal few segments; labial palpi white with broad black inner and outer lateral stripe and dorsal surface, latter also with long black hairs; top of head with chestnut brown scales, frons with brown hairs. **Thorax:** dorsal surface black with short dark brown hairs, ventral surface grayish white, brown stripes where legs rest against thorax, legs white, mid and hindlegs with black dorsal surface. **Abdomen:** dorsal surface black with short dark brown hairs, ventral surface white, then with dark gray lateral stripe, then white lateral stripe, spiracles outlined with white. **Genitalia** (Fig. 12a,b): valvae with squared distal tip bearing numerous small spines, clunacula long and pointed; saccus short compared to valvae.

FEMALE: unknown.

Types.—**Holotype** ♂: ECUADOR.—Carchi Prov.: nr. Lita, Río Baboso, ridge to east, 1050m, 17 Jul 1998 (K. R. Willmott) (to be deposited in the BMNH).

Paratypes: 2 ♂: same data as HT except 6 Jul 1998 (1 ♂ to be deposited in the MNCN, 1 ♂ in KWJH).

Etymology.—This species is named for our friend Richard Hesterberg, who to our knowledge collected the first known specimen in Costa Rica.

Diagnosis.—*Adelpha hesterbergi* n. sp. is superficially similar to a number of species, but clearly externally closest to *Adelpha sichaeus* (Butler, 1866). It differs from this species on the dorsal surface by having a broader postdiscal band on the forewing anterior to vein M_2 , which is not obscured by darker scales at the costa or cut by dark veins, and an entirely dark hindwing distal marginal fringe, which in *A. sichaeus* has white scaling between each pair of veins. On the ventral surface of the forewing, *A. hesterbergi* has no silvery gray spot distal to the postcellular bar in cell M_2 and the pale postdiscal band is not cut by a darker line in cells Cu_2 and Cu_1 . On the ventral hindwing, the silver line filling the posterior half of cell 3A extends distally almost to the end of the white postdiscal band, whereas in *A. sichaeus* it is shorter; this reflects the relatively shorter distance between the distal ends of veins 3A and 1A+2A in *A. hesterbergi* compared with *A. sichaeus*. Also on the ventral hindwing the outer postdiscal series in *A. hesterbergi* is a pale reddish brown line composed of concave crescent-shaped segments, whereas in *A. sichaeus* it is visible only as very pale gray dashes. In addition there are clear differences in the male genitalia, *A. sichaeus* having a smoothly rounded and tapering valve with no spines, *A. hesterbergi* having a squared tip to the valve with a number of spines (see Fig. 12 and 13). The substantially different genitalia suggest that *A. hesterbergi* may actually be more closely related to a group of *Adelpha* species typical of the Amazon lowlands, including *A. capucinus* (Walch, 1775)¹, *A. fabricia* Fruhstorfer, 1913, and *A. barnesia* Schaus, 1902, and the shape of the hindwing anal margin is also consistent with this hypothesis. When the female is discovered the genitalia may help clarify the systematic status of *A. hesterbergi*, since female genitalia show some characters useful in higher level classification within the genus (Willmott, in prep.). Both *A. fabricia* and *A. barnesia* occur in northwestern Ecuador sympatrically with *A. hesterbergi*, while *A. capucinus* is only known east of the Andes. The ventral surface of *A. hesterbergi*, with its rich reddish and silver colors, the absence on the forewing of any dark line in the postdiscal band and the two prominent silvery gray spots in the tornus, of which the anterior spot is twice the width of the

posterior spot, differentiate this species from *A. capucinus* and all other similar species.

Discussion.—*Adelpha hesterbergi* exhibits little variation in the three Ecuadorian specimens known, except that the hindwing white postdiscal band is slightly more extended towards the tornus in the two paratypes. The only other specimen we have seen, a male from Costa Rica (which bears the data “Costa Rica—Cartago, Moravia de Chirripo, 28-VI-1983, 1200m, leg. R. L. Hesterberg”), is smaller (forewing length 30mm), has the dorsal forewing subapical spot in cell M_2 almost absent, the hindwing postdiscal band more elongated towards the tornus, the ventral forewing postdiscal band less obscured by orange-brown scaling and the outer postdiscal series on the ventral hindwing with sparse silvery gray scales in each cell. As it seems likely that the populations from the western Andes and Costa Rica are isolated, we do not include the Costa Rican specimen as a paratype in case more material shows it to belong to a distinct taxon.

Adelpha hesterbergi is currently known only from two premontane forest localities between 1000m and 1200m in Costa Rica and northwestern Ecuador, and it is clearly very rare throughout its range. Despite numerous visits since 1994 to the type locality we have only recently discovered the species there, where several individuals were encountered within a 200 meter stretch of path along a steep ridge lined with primary forest. All were males attracted to traps baited with rotting fish hung along the forest edge or near the ground in light gaps in the middle of the morning. The visit to the type locality was made at the very end of the wet season, and several other rare *Adelpha* were recorded there for the first time, suggesting that *A. hesterbergi* may be highly seasonal.

Adelpha lamasi Willmott & Hall, new sp.

Fig. 3a-d; 14a-d

Description.—**MALE:** forewing length 24.5mm; forewing and hindwing relatively elongate, hindwing dentate at distal margin, slightly pointed at end of vein Cu_1 , slightly angled basally from end of vein R_5 to apex. **Dorsal surface:** Forewing: ground color dark brown; slightly darker postcellular line and three similar lines in discal cell, ground color in discal cell slightly paler between outer pair; relatively narrow, uneven orange postdiscal band extending from anal margin near tornus to costa, initially slightly diagonal towards base between anal margin and vein M_3 , a wide spot in cell M_3 which narrows to costa and extends beyond vein R_1 , band noticeably constricted at vein M_3 (almost broken) and at vein Cu_2 ; two faint orange subapical spots in cells M_2 and M_1 , few orange scales in R_4 , with a very faint pale grayish spot distal of spots in M_2 and M_1 ; fringe dark brown with white flecks at midpoint of cells M_3 – R_4 . **Hindwing:** ground color dark brown; four slightly darker lines in discal cell, one marking cell end and three basally; indistinct, slightly paler grayish brown postdiscal band extending from vein Cu_2 to costa; three indistinct, pale grayish brown submarginal lines, basalmost between vein Cu_2 and costa, middle and distalmost extending from anal margin near tornus to costa, distalmost much thinner and fainter; anal margin paler brown; fringe dark brown with white in middle of cells M_3 – R_s . **Ventral surface:** Forewing: ground color dark orange-brown; postcellular and discal cell bars dark orange-brown, first cell bar convex, second cell bar concave, third absent, fourth and postcellular bar straight, area basal to

1. Walch (1775) described and figured both wing surfaces of a species of *Adelpha* under the name *Papilio capucinus*. This name has been ignored by all subsequent authors except Herbst (1793) and Kirby (1871), the latter placing it next to *A. cocala* (Cramer, 1779). Although the figure is badly drawn, the overall ventral surface pattern and arrangement of dorsal forewing subapical spots, especially that in cell M_2 , which is not displaced distally with respect to the distal edge of that in cell M_3 , place it closest to a species which has been treated under a wide variety of names, most recently by Neild (1996) as *Adelpha juruana* Butler, 1877. Although *juruana* is otherwise the oldest name for the Amazonian subspecies of this species, the taxon *velia* C. & R. Felder, 1867 (S. E. Brazil) is also regarded by the present authors as conspecific with *juruana* and therefore that name would have precedence (as Neild (1996) noted). As no author has used the name *velia* for this species in its entirety, we believe there is little cause for disregarding the name *capucinus* on the grounds of nomenclatural stability, and therefore synonymise *juruana* with *capucinus* (n. syn.) and place *velia* as a subspecies of the latter (n. stat.). As the type of *capucinus* appears to be lost (Lamas, pers. comm.), a neotype will be designated in a forthcoming revision of *Adelpha* (Willmott, in prep.) to ensure future stability.

first cell bar and between second and fourth cell bars silvery gray, area between first and second, and fourth cell bar and postcellular bar, orange-brown, broad and indistinct orange-brown basal streak, triangular silvery gray spot distal to postcellular bar in cell M_3 ; triangular silvery gray spot in cell 1A+2A at base of vein Cu_2 , some faint grayish scaling at base of cell Cu_2 ; pale orange postdiscal marking reflecting dorsal orange band, consisting of postdiscal band and fused postdiscal series, spot in cell M_3 , almost divided in two by darker brown scaling, blackish area basal to postdiscal marking in cell 1A+2A; all veins lined indistinctly with orange-brown, paler than ground color; five silvery gray subapical spots in cells M_2 , M_1 and R_4 , diffuse, paler orange band continues from anterior end of postdiscal marking between subapical spots in cells M_2 and M_1 (basal-most spots in cells M_2 and M_1 belong to fused postdiscal series, distalmost spots belong to inner submarginal series, which is either absent throughout remainder of wing or, at least in some cells, fused with postdiscal band); diffuse paler orange-brown line, representing outer submarginal series, just basal of distal margin from apex to tornus; fringe black with faint white scales midway between each pair of veins in cells M_3 - R_4 . **Hindwing:** ground color dark orange-brown; area basal to humeral vein entirely pale orange-brown; a silvery gray spot between humeral vein and vein $Sc+R_1$; basal area of discal cell and area between first and second cell bars, and third cell bar and postcellular bar, pale orange-brown, remainder of discal cell (except basal streak) silvery gray; first and second discal cell bars continue anterior of cell to vein $Sc+R_1$, silvery gray basal to first cell bar and with a rough, silvery gray square distal to second cell bar in cell Rs ; basal area of cells M_2 and M_1 silvery gray; postdiscal band and inner postdiscal series almost overlapping and forming a single pale silvery gray postdiscal marking, which is brightest at costa and fades towards anal margin, with slightly undulate basal and distal edges; outer postdiscal series pale orange-brown, thinnest at costa and thickening towards anal margin to almost completely obliterate darker ground color; inner submarginal series of distinct silvery gray spots, brightest at costa and becoming fainter and more indistinct towards tornus, spots thickest in cells M_2 - M_1 and spot in cell M_3 slightly displaced basally; outer submarginal series pale orange-brown, diffuse and extending to margin; entire area between anal margin, posterior edge of discal cell and basal edge of postdiscal band pale orange-brown; fringe black with white scaling between veins in cells Cu_2 - Rs . **Head:** eyes brown and covered with relatively long setae; labial palpi white, with broad black inner and outer lateral stripe, sparse, long black hairs ventrally and dense long black hairs dorsally; antennae black, with white at ventral base and on ventral surface of basal few segments; top of head with chestnut brown scales, frons with brownish hairs. **Thorax:** dorsal surface black with long dark brown hairs, ventral surface pale grayish white except brown where legs rest against thorax, legs pale grayish white, mid and hindlegs with dark brown dorsal surface. **Abdomen:** dorsal surface black with long dark brown hairs, ventral surface white, then with dark gray lateral line, then white lateral line, spiracles outlined with white scales. **Genitalia** (Fig. 14a,b): valvae lacking distal spines, clunacula medium height, just projecting above dorsal surface of valvae, rounded, saccus short compared to valvae.

FEMALE: differs externally from male as follows: forewing length 26mm; wings slightly broader; fringe with flecks of white only at midpoint of cells 1A+2A- Cu_1 on forewing, and at midpoint of cell Cu_1 on hindwing. **Genitalia and abdomen** (Fig. 14c,d): corpus bursae rounded, lacking sclerotized bands, ductus bursae narrow and of approximately even width throughout, lamella postvaginalis weakly sclerotized; antero-ventral corner of terminal tergite not more heavily sclerotized than remainder of tergite.

Types.— **Holotype** ♂: ECUADOR.— *Carchi Prov.*: nr. Lita, Río Baboso, ridge to east, 1000m, 26 Aug 1996 (K. R. Willmott) (to be deposited in the BMNH).

Allotype ♀: ECUADOR.— *Esmeraldas Prov.*: km. 15 Lita-Alto Tambo rd., Anchayacu, 950m, 1 Jul 1998 (K. R. Willmott) (KWJH).

Paratypes: ECUADOR.— 1 ♂: same data as HT (to be deposited in the USNM); 1 ♂: same data as AT (KWJH); *Esmeraldas Prov.*: 1 ♀: km. 16 Lita-Alto Tambo rd., El Encanto, 800m, 1 Dec 1996 (K. R. Willmott) (to be deposited in the AME); 1 ♀: km. 16 Lita-Alto Tambo rd., 850m, 19 Jun 1994 (K. R. Willmott) (to be deposited in the MNCN). COLOMBIA.— *Chocó*: 1 ♂: San José del Palmar, 20 Jan 1991 (J. Salazar) (JFL); *Valle del Cauca*: 1 ♂: Queremal, km. 55, 1200m, 10 Apr 1990 (J. Salazar) (JFL); 1 ♂: Cali, 1000m, 18 Jul 1976 (L. Denhez) (MUSM); 1 ♂: El Queremal, 22 Jul 1982 (L. Constantino) (LMC).

Etymology.— We name this species for Gerardo Lamas, whose unpublished checklist of *Adelpha* provided the framework for the first author's revision of the genus and who has freely shared his peerless knowledge of Neotropical butterfly taxonomy with us.

Diagnosis.— The ventral wing pattern and male and female genitalia of *Adelpha lamasi* n. sp. indicate that it belongs to a group of closely related species including *A. saundersii* (Hewitson, 1867), *A. olynthia* (C. & R. Felder, 1867), *A. justina* (C. & R. Felder, 1861), *A. zina* (Hewitson, 1867), *A. jordani* Fruhstorfer, 1913, *A. milleri* Beutelspacher, 1976, and probably *A. cocala* (Cramer, 1779), *A. irmina* (Doubleday, [1848]), *A. leucophthalma* (Latreille, [1809]) and *A. felderi* (Boisduval, 1870). In all of these species the female genitalia lack sclerotised bands on the corpus bursae, while the majority of species also lack terminal spines on the male genitalic valvae. Within this group, *A. saundersii*, *A. felderi*, *A. cocala*, *A. irmina* and *A. leucophthalma* share a similar configuration of the ventral forewing inner submarginal series; the silvery gray dashes of this series are very reduced or absent in cells Cu_2 and M_3 , while they are present as pronounced, rounded, silvery white spots in cells M_2 and M_1 . Although there is variation between these species in whether or not terminal spines are present on the male genitalic valvae, spines are few and small in *A. irmina* and probably represent a relatively weak character. Terminal spines occur on the valvae of the latter three species, unlike those of *A. lamasi*, and *A. irmina* differs additionally in having a more diagonal forewing postdiscal band, a darker reddish brown ventral hindwing ground color and only two rather than four prominent silvery white subapical spots on the ventral forewing. Several shared ventral hindwing pattern characters, such as the overlapping postdiscal band and inner postdiscal series, the fading of all the postdiscal and submarginal series from costa to anal margin and the uniformly yellowish brown color posterior to vein 1A+2A, and the hindwing apex sharply angled basally at vein Rs , suggest that *A. lamasi* and *A. saundersii* are sister species. *A. lamasi* may be distinguished from this species by the thinner and more vertically oriented orange postdiscal band on the forewing (in *A. saundersii* the anterior part of the band almost borders the discocellulars, whereas in *A. lamasi* it is displaced distally), by the more elongate hindwing shape, and on the ventral surface by the second and fourth forewing discal cell bars not meeting posteriorly and by the more distinct silvery gray spots of the inner submarginal series in hindwing cells Cu_1 and M_3 . We have recently captured *A. saundersii frontina* Hall, 1935, in northwestern Ecuador, in the same valley as *A. lamasi* but at higher elevations (1700m).

There are a number of other superficially similar *Adelpha* taxa, such as *A. levona* Steinhäuser & Miller, 1977, *A. rothschildi* Fruhstorfer, 1913, *A. salus* Hall, 1935, *A. ximena ximena* (C. & R. Felder, 1862), *A. tracta* (Butler, 1872), and *A. zina inachia* Staudinger, 1886 (stat. nov.).² The lack of any silvery markings distal to the pale orange postdiscal band on the ventral forewing and the washed out postdiscal and submarginal series on the ventral hindwing distinguish this species from all of the above.

Discussion.— There is some variation in the width of the forewing orange band and the extent to which it is constricted at vein M_3 , in

2. In his original description, Staudinger (1886) placed *inachia* (from Sierra Nevada de Sta. Marta, Colombia) as a form of *A. olynthia*, and this was repeated by Fruhstorfer (1915) and Neild (1996), although Orellana (1996), citing personal communication from Lamas, placed it as a subspecies of *A. justina*. We believe that the ventral wing pattern, especially the configuration of the hindwing postdiscal and submarginal series, suggests it is best placed as a subspecies of *A. zina* (stat. nov.).

addition to the size of the dorsal forewing subapical spots, but this variation occurs within populations and is not geographical.

Adelpha lamasi is currently known from very wet premontane rainforest habitats in a narrow elevational band from 900-1200m along the western slopes of the Andes, from the center of the Cordillera Occidental in Colombia to extreme northwestern Ecuador. All the males we have seen in nature have been attracted to traps baited with rotting fish in light gaps along ridgetops in slightly disturbed primary forest. Females may be found in large light gaps or along trails through more disturbed habitats, where there is an abundance of secondary growth near primary forest. The species can be not uncommon and its rarity in collections probably reflects its limited range. *A. lamasi* occurs sympatrically with several species with a similar dorsal wing pattern, such as *A. rothschildi*, *A. levona*, and (presumably) *A. salus emmeli* n. ssp. (see below). All are restricted to similar elevational and geographic ranges, and the fact that they do not form a monophyletic group within the genus (Willmott, in prep.) suggests convergence on a similar dorsal wing pattern for some as yet unknown benefit (see Aiello, 1984).

Adelpha salus emmeli Willmott & Hall, new ssp.

Fig. 4a,b

Description.— FEMALE: forewing length 21mm; hindwing rounded, margin dentate. *Dorsal surface: Forewing:* ground color dark brown, three faint, darker lines in discal cell and a similar postcellular line; vertical, orange postdiscal band extending from vein 1A+2A to vein M₂, basal edge slightly indented at each vein, band in cell 1A+2A approximately 1/3, and in cell Cu₂ 1/2, width of band in cells Cu₁ and M₃, faint orange postdiscal scaling in cell M₂; two large, orange subapical spots in cells M₂-M₁, squarish in M₂, more triangular and basally pointing in M₁, faint orange scaling anterior to latter spot in cell R₄; fringe dark brown, white dashes at midpoint of cells 1A+2A-M₁, entirely white in cells R₅-R₄. *Hindwing:* ground color dark brown, paler along anal margin; three faint, darker lines in discal cell and a similar postcellular line; faint, pale grayish brown postdiscal band from costa to vein Cu₂, followed distally by three faint, pale grayish brown lines from costa to anal margin, area between these three bands darker brown; fringe dark brown, with white dashes at midpoint cells 1A+2A-Rs. *Ventral surface: Forewing:* ground color orange-brown; discal cell bars dark brown, first cell bar curving basally away from costa, second cell bar slightly concave, third cell bar absent, fourth cell bar slightly convex, postcellular bar faint, area between first and second, and fourth and postcellular, bars orange-brown, remainder of cell silvery gray except for dark brown basal streak; silvery gray triangle distal to postcellular bar in cell M₃, slight scaling in cell M₂; slight silvery gray scaling in cell 1A+2A at base of vein Cu₂; very pale orange postdiscal marking reflecting dorsal orange band, except split into spots each surrounded by orange-brown scaling, and marking in cells Cu₁-M₃ split in two by a vertical orange-brown line (separating postdiscal band from fused postdiscal series) which continues along distal edge of postdiscal band in cells 1A+2A and Cu₂; a blackish area distal to this orange-brown line in cells 1A+2A and Cu₂; three small silvery gray postdiscal spots in cells M₃-M₁; two very pale orange subapical spots (fused postdiscal series) in cells M₂-M₁ reflecting dorsal subapical spots; inner submarginal series separate silvery gray dashes, single in each cell except double in cell 1A+2A, displaced basally in cells Cu₁ and M₃; outer submarginal series absent or replaced by orange-brown, except for single silver spot at tornus; fringe black with slight white scaling between each pair of veins. *Hindwing:* ground color orange-brown; wing base entirely orange to humeral vein; silvery gray band filling most of area posterior to vein 3A extending to anal margin; silvery gray filling most of cell 3A from base to anal margin, vein 3A broadly lined with orange-brown; postcellular bar absent, discal cell bars dark brown, area between first and second, and third and discocellulars, orange-brown, remainder of discal cell (except basal streak) silvery gray; first and second bars continue to vein

Sc+R₁, second bordered distally, and first basally, with a silvery gray bar, latter extending to fill area between humeral vein and Sc+R₁; silvery gray streak filling basal third of cell 1A+2A; silvery gray postdiscal band extending from near costa to end roundly at vein 1A+2A near tornus, basal and distal edges uneven; inner and outer postdiscal series joined in cell Rs forming a single, squarish silvery gray spot, separating subsequently, inner composed of a similar spot in cell M₁, then much reduced to a few silvery gray scales in remaining cells and extending to cell 1A+2A, outer an orange-brown line, area between two series dark brown; inner submarginal series composed of isolated silvery gray, thick dashes, bordered basally by dark brown; outer submarginal series orange-brown; fringe black, some white scaling between each pair of veins. *Head:* eyes brown and covered with relatively long setae; labial palpi white with broad black inner and outer lateral stripe, sparse, long black hairs ventrally and dense long black hairs dorsally; antennae black, with white at ventral base and on ventral surface of basal few segments; top of head with chestnut brown scales, frons with grayish brown hairs. *Thorax:* dorsal surface dark brown with long dark brown hairs, ventral surface pale grayish white except brown where legs lie against thorax, legs pale grayish white, mid and hindlegs with dark brown dorsal surface. *Abdomen:* dorsal surface black with long dark brown hairs, ventral surface white, then with dark gray lateral line, then white lateral line, spiracles outlined with white scales. *Genitalia and abdomen:* corpus bursae rounded, lacking sclerotized bands, ductus bursae narrow and of approximately even width throughout, lamella postvaginalis weakly sclerotized; antero-ventral corner of terminal tergite not more heavily sclerotized than remainder of tergite.

MALE: unknown.

Types.— *Holotype* ♀: ECUADOR.— *Pichincha Prov.*: km 85 Old Sto. Domingo rd., 1 Jul 1980 (T. C. Emmel) (FSCA).

Etymology.— This distinctive subspecies is named for its discoverer, Thomas Emmel, in recognition of his lifetime's study of butterflies and in gratitude for all his help and encouragement during the course of our research.

Diagnosis.— *Adelpha salus emmeli* n. ssp. differs from the nominate in having a vertical, instead of diagonal, orange dorsal forewing band, which does not extend to the costa (in the nominate it is as broad at the costa as it is in cell Cu₂). A further undescribed subspecies was figured by Hall and Willmott (1993) (as *Adelpha* nr. *boreas*) which also has a diagonal forewing band as in the nominate. *A. salus emmeli* is very similar to *Adelpha levona* and *Adelpha rothschildi*, but both of those species have the postdiscal band and postdiscal series fused on the ventral surface of the forewing in cells Cu₁ and M₃ (i.e. there is no dark line splitting the pale postdiscal marking in cells Cu₁ and M₃).

Discussion.— Although this new subspecies differs on the dorsal surface significantly from the nominate, the ventral hindwing pattern, especially the fusion of the inner and outer postdiscal series at the costa and their configuration over the remainder of the wing, is identical in all other specimens of *A. salus* we have examined and diagnostic of this species. In addition, the holotype lacks sclerotized bands on the corpus bursae of the female genitalia, similar to specimens of Central American *A. salus*.

Adelpha salus is a very rare and poorly known species, which was unknown to Fruhstorfer (1915), subsequently figured by Hall (1935) in his original description, but omitted by D'Abrera (1987) due to the absence of specimens in the BMNH. We have seen just 19 specimens in collections, distributed from Mexico to western Ecuador; an undescribed subspecies represented by specimens in several collections occurs from Mexico to Panama, the nominate is known from a handful of sites around the northern tips of the Cordilleras Occidental and Central in Colombia, while the new subspecies described here is known only from the holotype female from central western Ecuador, although based on the ranges of other sympatric *Adelpha* taxa its range is certain to extend into southern Colombia. The type locality lies at around 1200m on the western slopes of the

Ecuadorian Andes, in premontane rainforest, while the nominate subspecies is known from 800m to 1500m, with one doubtful record of 2000m. Although only a single specimen of *A. salus emmeli* is known to us, it differs on the dorsal surface so substantially from the nominate, which is otherwise constant in all the specimens we have seen, that we feel it merits description. The close resemblance of the dorsal surface to other, relatively unrelated, species of *Adelpha*, which are endemic to a similar elevational range in the western Andes, such as *A. levona*, *A. rothschildi* and *A. lamasi* n. sp. (see above), suggests some mimetic relationship between these taxa.

***Adelpha attica hemileuca* Willmott & Hall, new ssp.**

Fig. 5a,b; 15a,b

Description.— MALE: forewing length 24.5mm; wings of similar shape to nominate subspecies. Differs from the nominate subspecies as follows: *Dorsal surface: Forewing:* orange postdiscal band slightly darker and broader, with less of a "notch" at basal edge at vein M_3 , band is thicker at costa, subapical spots reduced. *Hindwing:* postdiscal band entirely orange from costa to vein M_2 , constricted so as almost broken at vein M_2 , and tapering to a point in cell 1A+2A. *Ventral surface: Forewing:* postdiscal band obscured throughout by sparse orange scales; faint silvery gray dashes of inner submarginal series in cell Cu_1 . *Hindwing:* darker, slightly purplish brown ground color; inner postdiscal series a better defined, faint pale grayish line. *Head, Thorax, Abdomen, and Genitalia* (Fig. 15a,b) as in nominate subspecies.

FEMALE: unknown.

Types.— *Holotype* ♂: COLOMBIA.— Chocó: "Juntas, Río Tamaná, Río San Juan, Chocó Colombia 400' G.M. Palmer, Feb. '09/Joicey Bequest. Brit. Mus. 1934-120" (BMNH(M)).

Paratypes: COLOMBIA.— 1 ♂: "Santa-Fé de Bogotá. Acq. Donckier; 1907/Ex. Oberthür Coll. Brit. Mus. 1927-3" (BMNH(M)); 1 ♂: "Colombia. 1898. Purch. from Rosenberg. 99-268." (BMNH(M)); 2 ♂: "Bogotá coll. 1898" (BMNH(R)); 1 ♂: "Bogotá" (BMNH(R)). ECUADOR.— 1 ♂: *Esmeraldas Prov.*: Río San Miguel, San Miguel, 100m, 11 Jun 1994 (J. P. W. Hall) (KWJH); 2 ♂: *Carchi Prov.*: nr. Lita, Río Baboso, ridge to east, 900m, 26 Aug 1996 (K. R. Willmott) (1 ♂ in the KWJH, 1 ♂ in the MNCN).

Etymology.— This species name is derived from the Greek words "hemi", half, and "leukos", white, with reference to the distinctive half-white, half-orange postdiscal band on the dorsal hindwing.

Diagnosis.— *Adelpha attica hemileuca* n. ssp. is easily distinguished from *A. attica attica* (C. & R. Felder, 1867) by the half white, half orange postdiscal band on the dorsal hindwing, in addition to the reduction in the subapical spots on the dorsal forewing and the more even width of the forewing orange band. The dorsal hindwing band also distinguishes this new subspecies from all other *Adelpha* taxa.

Discussion.— *Adelpha attica hemileuca* shows little variation in the six Colombian specimens examined. Ecuadorian specimens differ slightly from the holotype on the dorsal forewing in having almost no trace of a subapical spot in cell M_2 and a slightly broader orange postdiscal band anterior to vein M_3 . They also have slightly more white scaling on the ventral surface in the inner submarginal series of the forewing and the inner postdiscal series of the hindwing. These differences however are too minor to warrant taxonomic recognition. In the USNM there is a single female of *A. attica* collected by Gordon Small in Panama, with the following data: "Darién, Cana 900m 25/7/81 G.B. Small", referred to by Lamas and Small (1992) as "*A. attica*". This specimen is transitional between the nominate and the new subspecies, having a dorsal hindwing band typical of the nominate but the dorsal forewing with a reduced spot in cell M_2 and a wider postdiscal band. *A. attica* is otherwise unknown from the rest of Panama and Central America.

Adelpha attica hemileuca is represented by several specimens in the BMNH but was thought by Hall (1938) to be simply a form of

the nominate, occurring with typical *A. attica* in Colombia. This was presumably due to a lack of precise locality data as all *A. attica* known from the Chocó region of Colombia and northwestern Ecuador are typical *A. a. hemileuca*, while the nominate shows little variation throughout its range, from southeastern Venezuela to Bolivia and western Brazil. Nevertheless, four further names have been described for nominate *A. attica*: *lesbia* Staudinger, 1886 (TL: Brazil), *oronoco* Weeks, 1906 (TL: Venezuela), *serita* Fruhstorfer, 1915 (TL: Bolivia), and *carmela* Fruhstorfer, 1915 (TL: Colombia), all of which were synonymised by Hall (1938). D'Abrera (1987) figured a specimen of *A. attica hemileuca* under the name *carmela* Fruhstorfer, although the syntype of *carmela* in the BMNH clearly differs little from the nominate. Fruhstorfer's (1915) description of *carmela*, in comparison with the nominate subspecies, is as follows: "ochreous band of the upper surface of the forewings somewhat narrower [in *attica attica*] than in *carmela* subsp. nov.. This is, as to the habitus, larger than the preceding form; under surface with broader white, and with more extensive dark brown, longitudinal bands. Colombia, without exact habitat in the collection of Fruhstorfer, but presumably from the Río Dagua, since it was obtained by W. Rosenberg". One of the paratype specimens of *hemileuca* in the BMNH(M) bears the following data: "Colombia. 1898. Purch. from Rosenberg. 99-268.". The data match closely that given in Fruhstorfer's description, but as the specimen lacks any indication that it came from Fruhstorfer's collection or that it represents a type specimen, and as Fruhstorfer (1915) failed to mention the most obvious distinguishing features of *hemileuca*, such as the dorsal hindwing band or forewing subapical spots, it seems that he cannot have been referring to a specimen of *hemileuca*.

Adelpha attica hemileuca is restricted to lowland forest along the base of the western Andes in northern Ecuador and western Colombia, the Chocó center of endemism. It is much rarer than the nominate subspecies and we have found it at only two sites, the Río San Miguel, where a single male was attracted to a trap baited with rotting fish in selectively logged lowland rainforest, and along a ridgetop near Lita. The latter site consists of a 15m wide path along a steep-sided ridge lined with forest. We encountered males perching in small groups on the tops of bushes 4-5m high from 1300 to 1330h in bright sun, patrolling from one perch to another, up to 20m apart, with a slow, gliding flight with the wings pointing slightly downwards.

Adelpha iphicles* and *Adelpha iphicleola

A full discussion of the taxonomy and synonymy of the names associated with these two species will be given in Willmott (in prep.), and we summarize the systematic status of these species here to allow comparisons with the new taxa under description. As understood by the majority of authors, *Adelpha iphicles* (Linnaeus, 1758) was first figured by Drury (1770), although there was much confusion caused in the century or so following its description by Clerck (1764) figuring a completely different species (*Adelpha naxia* (C. & R. Felder, 1867)) as Linnaeus' *A. iphicles*. Aurivillius (1882) selected Drury's figure as representing typical *A. iphicles*, a decision with which we agree, given that Linnaeus' original description mentions only a single orange marking in the dorsal forewing subapex, instead of the two markings possessed by *Adelpha naxia*. As the type of *A. iphicles* appears to be lost (Honey, pers. comm.; Lamas, pers. comm.) a neotype will be designated in order to ensure future nomenclatural stability (Willmott, in prep.). The original type of *A. iphicles* probably originated in the Guianas, and the species is characterised by the orange subapical marking on the dorsal forewing broadly bordering vein M_2 and extending as a pointed hook across the vein into cell M_3 at the distal edge of the marking. The shape of this subapical marking is a key feature of this species and is found

in all specimens from Mexico to the Amazon, only changing in the south east Brazilian *A. iphiclus ephesa* (Ménétrières, 1857), which Fruhstorfer (1915) also regarded as a subspecies of *A. iphiclus*. In this population the orange subapical marking on the forewing extends into cell M_3 and broadly borders vein M_3 , but there are several ventral characters (see below) shared with *A. iphiclus iphiclus*, in addition to specimens of *A. iphiclus* from Paraguay and Brazil with subapical markings intermediate between typical *iphiclus* and *ephesa*.

In northwestern South America *A. iphiclus* appears to exhibit much phenotypic variation in the width of the white postdiscal bands and the size of the dorsal forewing orange subapical marking, and Neild (1996) recognised the northwest Venezuelan population, which typically has broad white postdiscal bands and a narrow dorsal forewing orange subapical marking, as distinct, applying the name *A. iphiclus exanima* Fruhstorfer, 1915. While the majority of specimens from this area differ clearly from typical Amazonian specimens, we have been unable to find discrete characters that allow the definitive application of this name further west in Colombia and Panama, and in Central America specimens are often phenotypically indistinguishable from those to the east of the Andes. We therefore, for the present, recognise only a single subspecies of *A. iphiclus* outside of western Ecuador and southeastern Brazil, whilst recognising that more detailed faunistic studies may necessitate a reappraisal of this decision.

Bates (1864) was the first to describe, as *Heterochroa iphicleola*, a sibling species which appears to be sympatric with *A. iphiclus* over much of the range of the latter. The syntype specimens are from Guatemala and the two species are clearly distinct in western Central America, differing in the shape of the orange forewing subapical spot, which extends into cell M_3 and broadly borders vein M_3 in *A. iphicleola*. Bates (1864) pointed out this difference and also noted that the distal wing margin of *A. iphicleola* was more dentate. The forewing is also more falcate, and there are in addition several differences on the ventral surface, *A. iphicleola* having more uneven hindwing postdiscal series which become closer and are marked on the inner series with a whitish spot at vein M_3 , and a "cleaner" and more sharply defined forewing subapical marking. However, subsequent authors have usually treated *A. iphicleola* as the Central American subspecies of *A. iphiclus* (e.g. Fruhstorfer, 1915; DeVries, 1987; D'Abbrera, 1987; Lamas and Small, 1992), presumably regarding any differences as variation, or associated it with various completely distinct species such as *A. basiloides* (H. W. Bates, 1865) and *A. naxia* (see Kirby, 1871; Hall, 1938). Beutelspacher (1976) figured the species but called it *Adelpha massilia*, which name in fact applies to the Central American subspecies of *A. paraena*. Austin (1992) correctly realised that *A. iphicleola* was distinct from *A. iphiclus* but repeated Beutelspacher's misidentification, Neild (1996) being the first author since the original description to treat *A. iphicleola* under the correct name. No consistent genitalic differences were found between *A. iphiclus* and *A. iphicleola* in the 20 specimens examined by one of us (KRW) from Central America and eastern Ecuador, despite a claim to the contrary by Austin (1992). Apparent differences between the genitalia of the holotypes of *A. iphiclus estrecha* and *A. iphicleola thessalita* are not constant within each species.

In Central America, *A. iphicleola iphicleola* is common and represented by roughly three times as many specimens in collections as *A. iphiclus*. The two species are distinct and the differences consistent throughout western Central America in approximately 600 specimens examined, but *A. iphicleola* becomes noticeably rarer in collections from Costa Rica and Panama, and the differences that are so clear in Mexico begin to disappear. Panamanian specimens in particular are extremely difficult, if not sometimes impossible, to

identify, as the typical ventral characters merge into those of sympatric *A. iphiclus*. However, in coastal areas from Venezuela to southern Brazil and across to Paraguay there appears to be a species additional to typical *A. iphiclus*, although locality data are vague and specimens few, which has characters typical of *A. iphicleola iphicleola*, except that the postdiscal white band is wider, the wings rounder and the typical ventral characters are not so distinct. Two names have been described for this taxon, *daceleia* Fruhstorfer, 1915 (TL: Trinidad), and *leucates* Fruhstorfer, 1915 (TL: Bahia, Brazil). While there is some geographic variation in the width of the white forewing postdiscal band and orange subapical marking, with the broadest banded specimens typically from northern Venezuela and specimens with narrower bands typically from Trinidad, we believe that such variation is relatively slight in comparison with the variation within local populations, and we therefore follow Hall (1938) in regarding *daceleia* as a synonym of *leucates* and place the latter as a subspecies of *A. iphicleola*.

Neild (1996) figured specimens of *A. iphicleola leucates* from northern coastal Venezuela under the name *A. iphiclus phera* Fruhstorfer, 1915, following Hall (1938) in assigning the latter name to this population, a logical decision based on Fruhstorfer's original description and the unspecified type locality. However, the syntype of *phera*, located by Lamas (pers. comm.) in the Musée d'Histoire Naturelle de Genève, is most similar to specimens of the Cuban population, *iphimedia* Fruhstorfer, 1915, which has a very narrow orange subapical marking on the dorsal forewing. Although the label data on the syntype of *phera* simply state "Mexico", this is clearly erroneous and we therefore synonymise *phera* with *iphimedia*. We regard *iphimedia* as a subspecies of *A. iphicleola* on the basis of ventral characters similar to those in the nominate subspecies and its similarity to certain northern Venezuelan specimens of *A. iphicleola leucates*.

Throughout central and northwestern Colombia and northwestern Venezuela west of the Andes, possibly into eastern Panama, occur specimens that are smaller than typical *A. iphiclus* and have a forewing subapical marking similar to *A. iphicleola iphicleola*, lacking the hook typical of *A. iphiclus*. These specimens also have a distinctly shaped forewing postdiscal band of even width with a convex distal edge. Although they lack the ventral characters diagnostic of central and south American *A. iphicleola*, the shape of the forewing subapical marking suggests that they represent a subspecies of *A. iphicleola*. One specimen in the BMNH(M) representing this subspecies is a syntype of *Adelpha iphicla* [sic] *gortyna* Fruhstorfer, 1915, bearing the label data "TYPE/Bogotá/Paratype/Fruhstorfer Coll. B.M. 1933-131"; we therefore designate this specimen as the lectotype and place *gortyna* as a subspecies of *A. iphicleola*. We have examined two further syntypes of *gortyna* in the BMNH(M and T), both specimens of which represent typical Colombian *A. iphiclus*. Specimens of *A. iphiclus* from Colombia west of the Andes generally have narrower white bands on the dorsal surface and a narrower orange subapical marking on the dorsal forewing, but for the present we do not recognise them as a distinct subspecies given the lack of accurate locality data and the variation within typical *A. iphiclus*. If this Colombian population were to prove distinct, then the name *funalis* Fruhstorfer, 1915 (TL: Río Dagua, Colombia) would be applicable.

It should be noted that the taxonomy of *A. iphiclus* and *A. iphicleola* and their constituent taxa is possibly the most problematic within the entire genus, due to substantial local variation, the very minor wing pattern characters that separate the two species and the lack of long series of precisely and accurately labeled specimens in collections. The systematic arrangement presented here is therefore our best hypothesis and one that requires testing in the field by

workers within the regions of greatest confusion, notably Panama to northwestern Venezuela.

Below we present a synonymic checklist of *A. iphiclus* and *A. iphicleola* (taxa considered infrasubspecific are preceded by a "-"):

***Adelpha iphicleola* (H. W. Bates, 1864)**

iphicleola (H. W. Bates, 1864) (Mex.-W. Pan.)

- *massilides* Fruhstorfer, 1915, **n. syn.**

gortyna Fruhstorfer, 1915 (E. Pan.?, Col.-N.W. Ven., W. of Andes), **n. stat.**

thessalita Willmott & Hall, **n. ssp.** (E. Ecuad.-N. Peru)

leucates Fruhstorfer, 1915 (N. Ven.-S.E. Braz. [coast], Parag.), **n. stat.**

- *daceleia* Fruhstorfer, 1915, **rev. stat.**

iphimedia Fruhstorfer, 1915 (Cuba), **n. stat.**

- *phera* Fruhstorfer, 1915, **n. syn.**

***Adelpha iphiclus* (Linnaeus, 1758)**

iphiclus (Linnaeus, 1758) (Mex.-W. Col., Ven.-Bol., Braz. [Amaz.], Parag., Guianas)

- *basilea* (Cramer, 1777)

- *basilis* Hübner, [1819]

- *pharae* Fruhstorfer, 1915

- *funalis* Fruhstorfer, 1915, **n. syn.**

- *exanima* Fruhstorfer, 1915, **rev. stat.**

estrecha Willmott & Hall, **n. ssp.** (W. Ecuad.)

ephesea (Ménétrières, 1857) (S.E. Braz.- N.E. Argentina)

- *gellia* Fruhstorfer, 1915

- *abylina* Fruhstorfer, 1915

***Adelpha iphiclus estrecha* Willmott & Hall, new ssp.**

Fig. 6a,b; 11; 16a,b

Description.— MALE: forewing length 28mm; forewing falcate and elongate, hindwing elongate with distal margin straight and dentate. **Dorsal surface:** Forewing: ground color dark brown; basal area of cell 1A+2A and discal cell with some sparse orange-brown scaling; four black lines in discal cell, black postcellular line; narrow, slightly bluish white postdiscal band extending from anal margin to vein M₃, broadening slightly anteriorly, distal edge slightly incised at each vein, spot in cell Cu₁ ovoid and pointing at base of vein Cu₁; narrow, roughly rectangular orange subapical marking in cells M₃-M₁, spot in M₂ twice size of that in M₁, a tiny triangle in M₃ at distal edge of marking, basal edge of marking incised at vein M₁, veins crossing marking dark brown; darker brown postdiscal band followed distally by three pale grayish postdiscal and submarginal lines; fringe dark brown with white scales in cells M₃-R₅. **Hindwing:** ground color dark brown; three faint black lines in discal cell; narrow postdiscal band of same color as forewing extending from costa and tapering slightly to end roundly in middle of cell 1A+2A near tornus, band incised slightly at each vein; four faint, pale gray postdiscal and submarginal lines extending from costa to tornus, middle two more distinct than remainder and ending at tornus with two black, roundish spots, the smaller spot nearer anal margin surrounded by orange scaling; fringe dark brown. **Ventral surface:** Forewing: ground color blackish brown distally, reddish brown basally; first and second discal cell bars dark reddish brown and roughly parallel, slanting basally away from costa, third cell bar absent, fourth and fifth cell bars slightly concave, postcellular bar distinct and dark reddish brown, discal cell grayish white with diffuse reddish scaling between first and second cell bars, and fourth cell bar and postcellular, reddish brown basal streak, first and second cell bars continue into cell 1A+2A; grayish white triangle distal of postcellular bar in cell M₃, grayish white filling base of cells M₂ and M₁; slight whitish scaling in cell 1A+2A at base of vein Cu₂, and basal to intruding discal cell bars and at base of cell Cu₂; faintly bluish white postdiscal band reflecting that on dorsal surface; ill-defined white postdiscal spots in cells M₂ and M₁ extending

into cell R₁; very pale orange subapical marking reflecting dorsal marking and extending into cell R₃, with dark orange scaling along intruding veins (and along veins distal to marking); inner postdiscal series continues posterior to subapical marking as a silvery white dash in cell M₃, smaller dash in cell M₂, then a very faint, pale grayish line into cell 1A+2A, slightly concave in cell 1A+2A; outer postdiscal series also a faint, pale grayish line from cell Cu₁-1A+2A, lines slightly concave in cell 1A+2A; area between postdiscal series reddish brown in cells Cu₂-Cu₁; inner submarginal series a line of silvery gray bars parallel to distal margin, faint in anterior half of cell Cu₁; outer submarginal series replaced by orange-brown, with silvery gray dashes in cells 1A+2A (paired), Cu₂, M₃, M₂ and R₅, a little pale scaling in cells Cu₁ and M₁; fringe black with very thin area of white scaling between each pair of veins. **Hindwing:** ground color red-brown; base grayish white, continuing as a band filling most of area posterior to vein 3A extending to anal margin; cell 3A grayish white, with central blackish brown line bisecting it from base to anal margin, anterior half with some dark brown scaling; postcellular bar absent, discal cell bars reddish brown with very sparse reddish scaling between, remainder of discal cell (except basal streak) grayish white, extending with first and second cell bars to vein Sc+R₁, white also extending to fill area between humeral vein and vein Sc+R₁; white streak filling basal third of cell 1A+2A; faintly bluish white postdiscal band, bordered basally by orange-brown, reflecting that on dorsal surface; inner and outer postdiscal series joined in cell R₅ forming a single, whitish marking, separating subsequently and continuing as even, pale grayish silver lines to tornus, inner thickening in cell 1A+2A, outer ending in diffuse orange marking reflecting that on dorsal surface; area between postdiscal series reddish brown; inner submarginal series an even silvery gray line, bordered basally by dark brown except in cell 1A+2A where there are two black spots; outer submarginal series reddish brown with isolated whitish crescents between each pair of veins; fringe black, some white scaling between each pair of veins. **Head:** eyes brown and covered with relatively long hairs; labial palpi white, with broad black inner and outer lateral stripe, sparse, long black hairs ventrally and dense long black hairs dorsally; antennae black, with white at ventral base and on ventral surface of basal few segments; top of head with chestnut brown scales, frons with brown hairs. **Thorax:** dorsal surface dark brown with long dark brown hairs, ventral surface pale grayish white except brown where legs lie against thorax, legs pale brownish white, mid and hindlegs with a little dark brown scaling on dorsal surface. **Abdomen:** dorsal surface black with long dark brown hairs, ventral surface white, then with dark gray lateral line, then white lateral line, spiracles outlined with white scales. **Genitalia** (Fig. 16a,b): valvae tapering sharply towards distal tip, single row of sharp, long teeth pointing dorsally at outer edge of distal valvae tip, clunicle long and pointed.

FEMALE: differs from male as follows: forewing length of two paratypes 30mm and 30.5mm; broader wings, rounder hindwings, a slightly broader dorsal postdiscal band and more extensive pale ventral markings.

Types.— **Holotype** ♂: ECUADOR.— "Ecuador. Hewitson Coll. 79-69 Heterochroa 1/Ecu." (BMNH(M)).

Allotype ♀: ECUADOR.— *Los Ríos Prov.*: "Quevedo, W. Ecuador. (V. Buchwald)" (BMNH(R)).

Paratypes: ECUADOR.— *Esmeraldas Prov.*: 1 ♂: km. 44 Lita-San Lorenzo rd., La Punta, 300m, 25 Aug 1996 (K. R. Willmott); 1 ♂: km. 20 San Lorenzo-Lita rd., 100m, 23 Aug 1996 (K. R. Willmott); 1 ♂, 1 ♀: km. 18 San Lorenzo-Ibarra rd., 100m, 3 Jul 1998 (K. R. Willmott); 1 ♀: km. 40 Lita-San Lorenzo rd., El Durango, 400m, 3 Jul 1998 (K. R. Willmott) (all in the KWJH); *Pichincha Prov.*: 2 ♂: Río Tanti, Tinalandia, 750m, 2-3 Aug 1993 (J. P. W. Hall) (1 ♂ to be deposited in the MNCN, 1 ♂ in the KWJH); 1 ♂: same data as preceding except 8-14 May 1994 (to be deposited in the MUSM); 1 ♂: same data as preceding except 26 Sep 1993 (A. F. E. Neild) (to be deposited in the AME); 1 ♂: Alluriquín, 700m, 28 Aug 1977 (S. S. Nicolay) (USNM); 1 ♂: same data and depository as AT; 1 ♂: *Los Ríos Prov.*: "St. Ana María. Quevedo.

Ecuador. I. von Buchwald" (BMB); 1 ♀: "Ecuador. Hewitson Coll. 79-69 Heterochroa 2/Ecu." (BMNH(M)); 1 ♂: "Ecuador/Coll. Frank Johnson" (AMNH); 1 ♂: "Oriente Ecuador/Coll. Frank Johnson" (AMNH).

Etymology.— This subspecies is named after the Spanish word "estrecha", meaning narrow, with reference to the dorsal postdiscal band.

Diagnosis.— *A. iphicles estrecha* n. ssp. is distinguished from all other subspecies of *A. iphicles* by the very narrow dorsal postdiscal band, tinged very pale blue, which has the spot in cell M_3 wider than the rest of the band, in addition to the reduced orange subapical marking on the forewing. The forewings are also distinctly more pointed and falcate than other *A. iphicles* subspecies. Only a single specimen that appears to represent *A. iphicleola* is known to us from western Ecuador (possibly belonging to a distinct and undescribed subspecies); this specimen is smaller than typical *A. iphicles estrecha* specimens, has a broader dorsal band, much less falcate forewings and a wider orange subapical marking on the forewing.

Discussion.— There is very slight variation in the width of the dorsal band and the forewing subapical marking, some specimens almost lacking orange in cell M_3 . Otherwise this subspecies is phenotypically very stable.

It is strange that this distinctive subspecies has escaped description for so long, for it is certainly not rare and is represented in several collections. Strand (1918) mentioned a male specimen from Los Llanos, in western Ecuador, which he identified as *A. iphiclea* [sic] *funalis* Fruhstorfer, 1915. However, although Fruhstorfer (1915) stated in his description of *funalis* that "the white median band of both the wings is reduced to half its normal width", this is something of an exaggeration, and in fact the thickness of the band in five male specimens (including the syntype of *funalis*) from Río Dagua in the BMNH(R) does not differ greatly from that in typical Colombian specimens west of the Andes. We currently regard *funalis* as a synonym of the nominate subspecies and, although it may prove to be a valid name for the Central America to Colombia *A. iphicles* population, it clearly does not apply to west Ecuadorian specimens. Arthur Hall applied a manuscript name, "tenuivitatta", to a specimen in his collection, now in the BMB, but apparently never published it.

Adelpha iphicles estrecha is known from a number of sites in Ecuador west of the Andes from near sea level to 900m, from the far north to the Quevedo area, and may be locally and seasonally common. Both sexes feed at flowering bushes along forest edges, while males are attracted to rotting fish bait in ridgetop light gaps and may be found puddling along roads. Males also perch in ridgetop forest light gaps around 3m above the ground. The parallel development of a similar dorsal pattern through reduction of the postdiscal band and subapical orange marking in a number of microsympatric west Ecuadorian *Adelpha*, such as *A. serpa duilliae* and *A. basiloides*, suggests there may be a mimetic relationship between these species. To date no specimens of *A. iphicles* (or indeed any of the *Adelpha* that develop thin postdiscal bands in western Ecuador) are known between Río Dagua and northwestern Ecuador, and the northerly limits of *A. iphicles estrecha* are currently unknown.

Adelpha iphicleola thessalita Willmott & Hall, new ssp.

Fig. 7a,b; 17a,b

Description.— MALE: forewing length 26mm; hindwing distal margin straight and dentate. **Dorsal surface:** Forewing: ground color dark brown; basal area of cell $1A+2A$ and discal cell with some sparse orange-brown scaling; four black lines in discal cell and black postcellular line; white postdiscal band extending from anal margin to vein M_3 , tapering very slightly anteriorly, distal edge slightly concave, spot in cell Cu_1 ovoid and pointing at base of vein Cu_1 ; large orange subapical marking in shape of an irregular pentagon in cells M_3 , M_2 , M_1 , R_4 and R_5 , spot in



Fig. 11. Male of *Adelpha iphicles estrecha* n. ssp. imbibing sweat from a leaf, near Lita, northwestern Ecuador.

M_3 broadly bordering vein M_3 , basal edge straight and almost perpendicular to costa, distal edges parallel to distal margin and then straight almost perpendicular to costa; four very faint, pale grayish postdiscal and submarginal lines; fringe dark brown with white scaling at midpoint of cells M_3-M_1 , white in most of cells R_5-R_4 . **Hindwing:** ground color dark brown; three faint black lines in discal cell; white postdiscal band extending from costa and tapering slightly to end roundly at vein $1A+2A$ near tornus; four faint, pale gray postdiscal and submarginal lines extending from costa to tornus, middle two more distinct than remainder and ending at tornus with two black, roundish spots with orange scaling between, basally and distally; fringe dark brown, with two white dashes in cell $1A+2A$, a little white scaling in cells Cu_2 , M_1 and R_5 . **Ventral surface:** Forewing: ground color blackish brown distally, reddish brown basally; discal cell bars dark reddish brown and roughly parallel, slanting basally away from costa, third cell bar absent, postcellular bar distinct and reddish brown, discal cell grayish white with diffuse reddish scaling between cell bars one and two, and fourth and postcellular, reddish brown basal streak, first and second cell bars continue into cell $1A+2A$; grayish white triangle distal to postcellular bar in cell M_3 , white dashes in M_2 and M_1 ; slight whitish scaling in cell $1A+2A$ at base of vein Cu_2 , and basal to intruding discal cell bars, and at base of cell Cu_2 ; white postdiscal band reflecting that on dorsal surface; diffuse white postdiscal dashes in cells M_2 and M_1 , paler area in cell M_3 ; pale orange subapical marking reflecting dorsal marking, split by dark orange line in cell M_3 , with dark orange scaling along intruding veins (and along veins distal to marking) and distal edge of marking in cell M_1 ; inner postdiscal series continues posterior to subapical marking as a silvery white spot at base of cell M_3 and in cell M_2 , then as a faint, pale grayish line into cell $1A+2A$; outer postdiscal series also a faint, pale grayish line in cells $Cu_1-1A+2A$, lines slightly concave in cells $1A+2A$ and Cu_1 ; area between postdiscal series reddish brown in cells Cu_2-Cu_1 ; inner submarginal series a line of silvery gray bars parallel to distal margin, faint in cells $1A+2A$ and Cu_1 , strong in cells Cu_2 and M_3-R_5 ; outer submarginal series replaced by orange-brown, with silvery gray dashes in cells $1A+2A$, Cu_2 , M_3 , M_2 and R_5 ; fringe black with faint white scaling between each pair of veins. **Hindwing:** ground color red-brown; wing base white, continuing as a band filling most of area posterior to vein $3A$ and extending to anal margin; cell $3A$ grayish white, with central orange-brown line bisecting it from base to anal margin, anterior half with some orange-brown scaling and a white triangle at margin; postcellular bar absent, discal cell bars reddish brown, remainder of discal cell (except basal streak) white, extending with first and second cell bars to vein $Sc+R_1$, white also extending to fill area between humeral vein and vein $Sc+R_1$; white streak filling basal third of cell $1A+2A$; white postdiscal band, bordered basally by red-brown, tapering slightly from near costa to end roundly at vein $1A+2A$ near

tornus; inner and outer postdiscal series joined in cell Rs forming a single, whitish dash, separating subsequently and continuing as even, pale gray lines to tornus, inner ending with a white triangle at vein 1A+2A, outer with an orange marking reflecting that on dorsal surface; area between postdiscal series reddish brown; inner submarginal series composed of even, contiguous silvery gray dashes, bordered basally by dark brown except in cell 1A+2A where there are two black spots; outer submarginal series reddish brown with isolated silvery gray crescents between each pair of veins; fringe black, some white scaling between each pair of veins. **Head, Thorax and Abdomen:** as in *A. iphiclus estrecha* n. ssp. **Genitalia** (Fig. 17a,b): similar to *A. iphiclus estrecha* n. ssp., but teeth on outer edge of valve do not project above dorsal surface of valve in lateral view and clunicle is shorter, more triangular.

FEMALE: differs from male as follows: forewing length 25mm; both wings broader, hindwings more rounded.

Types.—**Holotype** ♂: ECUADOR.—*Napo Prov.*: km. 12 Tena-Puyo rd., Finca San Carlo, 600m, 23 Sep 1996 (K. R. Willmott) (to be deposited in the MNCN).

Allotype ♀: ECUADOR.—*Napo Prov.*: nr. Coca, Río Napo, Río Manduro, Yarina, 250m, 22-24 Jul 1998 (K. R. Willmott) (to be deposited in the BMNH).

Paratypes: ECUADOR.—1 ♂: same data as AT (KWJH); *Napo Prov.*: 2 ♂: Río Napo (MNH); 1 ♂: Río Napo, Jul 1927 (Spillmann) (BMNH(R)); 1 ♂: Talag, 800m, 15 Sep 1995, No. 14179 (D. A. Trembath) (DAT); 1 ♂: Río Misahuallí, Las Minas, 450m, 8 Jul 1993 (J. P. W. Hall) (KWJH); 1 ♂: Río Jatunyacu, Pimpilala, 600m, 24 Sep 1996 (K. R. Willmott) (to be deposited in the MUSM); 1 ♂: same data as preceding except 14-15 Sep 1996 (KWJH); 1 ♂: Tena-Puyo rd., El Capricho, 800m, 26 Oct 1996 (K. R. Willmott) (KWJH); 1 ♂: same data as HT except 7-8 Sep 1996 (KWJH); *Pastaza Prov.*: 2 ♂: km. 30 Puyo-Canelos rd., camino a Tinguiza, 600m, 5 Oct 1996 (K. R. Willmott) (1 ♂ in the KWJH, 1 ♂ to be deposited in the USNM); 1 ♂: Canelos (A. Simson) (BMNH(M)). PERU.—1 ♀: *San Martín*: Moyobamba, Jun (AME).

Etymology.—This subspecies is named for its close resemblance on the dorsal surface to *Adelpha thessalia* (C. & R. Felder, 1867).

Diagnosis.—*A. iphicleola thessalita* n. ssp. is distinguished from the nominate subspecies on the dorsal surface by having narrower white bands, the forewing band tapering from the anal margin to vein M_3 with the distal edge of the band concave (the band is of even width or widens from anal margin to M_3 and has a straight distal edge in the nominate), and by having more rounded hindwings. On the ventral surface *A. i. thessalita* has the forewing subapical marking more obscured with dark red-brown scaling at the edges and along the veins, the inner postdiscal series on the hindwing is uniformly pale grayish white and parallel to the outer postdiscal series, whereas in *A. i. iphicleola* the postdiscal lines are closer at vein M_3 and the inner postdiscal line is marked with white in cell Cu_1 (usually) and the posterior half of cell M_3 (always). *A. iphicleola leucates* has broader white dorsal bands, a narrower orange forewing subapical marking and dorsal markings more typical of the nominate subspecies. *A. iphicleola gortyna* differs on the dorsal surface of the forewing (generally) in having a narrower orange subapical marking which does not border broadly along vein M_3 and is narrower in cell M_3 than in M_2 , and a white postdiscal band which does not taper anteriorly. *A. iphicleola thessalita* is distinguished from *Adelpha iphiclus iphiclus* on the dorsal surface by the slightly tapering white band on the forewing with a concave distal edge, by the larger orange subapical marking on the forewing, which borders vein M_3 instead of entering cell M_3 as a small "hook" at the distal edge of the marking, and by its overall smaller size and less rounded, but more distally dentate, hindwing. *Adelpha thessalia thessalia* is also very similar but has the postdiscal and submarginal series on the ventral hindwing very straight and parallel and the subapical marking on the ventral forewing split by a dark line in cell M_2 as well as M_3 , in addition to genitalic differences.

Discussion.—There is some variation in the shape of the orange subapical marking on the dorsal forewing, which may border almost completely on vein M_3 , or have only a triangular wedge in that cell,

but if the latter is present its width is always equal to that of the marking in cell M_2 . The white postdiscal band on the forewing varies slightly in thickness, the holotype having a band of medium width, and the distal edge is almost always concave. The genitalia of the holotype are slightly different to other specimens examined in that the "teeth" on the valve do not project above the dorsal surface of the valve in lateral view; this is a character of *Adelpha thessalia*, but seems to be produced in this case simply by the valve being slightly twisted. The distal tip of the valve in the holotype is asymmetrical in lateral view, the ventral edge below the "teeth" sloping but the dorsal edge being rounded, and this shape is characteristic of all *A. iphicleola thessalita* examined and distinct from *A. thessalia*, which has a symmetrical distal valve tip.

In the new subspecies described here all the ventral characters that are typical of the nominate subspecies are lost, and it is associated with *A. iphicleola* on the basis of the shape of the dorsal forewing subapical marking, the hindwing shape, and similarities to the subspecies *A. iphicleola gortyna* from western Colombia and northwestern Venezuela (see Discussion above). In addition, it seems more parsimonious to regard taxa that are sister species of *Adelpha iphiclus* in central America and the Amazon, which appear to be parapatric, as conspecific.

A. iphicleola thessalita is, inexplicably, very poorly represented in collections from the Amazon basin. Excluding specimens collected by the authors, only five males and a female have been located in collections, of which all the males are from Ecuador. We have found it to be locally common in ridgetop light gaps in primary forest, where several males may be seen attracted to a single trap baited with rotting fish. We have also observed males in large forest clearings along river banks, perching in small groups on tops of bushes 3-4m high in a manner similar to sympatric *A. serpa diadochus* and *A. thoasa manilia* Fruhstorfer, 1915. We have yet to observe this behavior in *A. iphiclus*, which is more widespread in a variety of habitats and, unlike *A. iphicleola thessalita*, is often encountered puddling along sandy roads and rivers, perhaps accounting for its greater representation in collections. The single female we have seen was flying low at the edge of a large clearing recently cut in primary forest in the early afternoon. We have recorded *A. iphicleola thessalita* in eastern Ecuador in ten separate localities, from 300-1000m, in six of which we also synchronically collected typical *A. iphiclus*. In addition to the localities given for the type specimens above, we have also recorded *A. iphicleola thessalita* at the following sites in Ecuador (all *Napo Prov.*): Tiguino, Río Tiguino, 300m (Aug), Chichicorrumi, Río Napo, 450m (Jul), Río Shandia, nr. Tena, 550m (Sep), Apuya, Tena-Puyo rd., 600m (Aug, Sep). The phenotypically similar and closely related *A. thessalia thessalia* also occurs in eastern Ecuador, and although it is sympatric with *A. iphicleola thessalita* at the very lower limit of its elevational range, at 600m, it is typically a lower montane species, occurring as high as 1800m.

Adelpha serpa and Related Species

The taxonomic problems surrounding *Adelpha serpa* and similar species have stemmed from a lack of any distinguishing genitalic characters, few clues as to the relationships of taxa from wing pattern and an absence of accurate knowledge of the sympatry of phenotypes due to the rarity of several taxa. However, through field work by the authors in eastern Ecuador during the last five years, it has become apparent that five distinct species (*A. serpa*, *A. radiata*, *A. hyas*, *A. seriphia* and *A. paraena*) occur there, enabling recognition of important specific characteristics and thus clarification of subspecies relationships.

In fact, *A. paraena* is easily distinguished from the remaining four

by always having the submarginal series on the ventral surface composed of single dashes, rather than paired spots, between the veins; this character is especially noticeable in cell M_3 on the forewing. Fruhstorfer (1915) placed *A. paraena* as a subspecies of *A. serpa*, but following the rearing experiments of Moss (1933), Hall (1938) correctly reinstated *A. paraena* as a full species, as which it has subsequently been regarded by most authors. However, on account of the confusingly similar dorsal pattern, *A. paraena massilia* has been placed as a subspecies of *A. serpa* (DeVries, 1987; Lamas and Small, 1992), or completely synonymised with *A. serpa celerio* (Hall, 1938), and it was only recently that Neild (1996) correctly placed it as the Central American subspecies of *A. paraena*.

The various subspecies of the remaining four species have been placed in numerous combinations by previous authors. Fruhstorfer (1915) separated *A. seriphia* and *A. serpa* (as *A. celerio*), and with the exception of *synna* and *godmani*, which he treated as forms of subspecies of *A. celerio*, he correctly associated all the then known taxa with each species. Fruhstorfer (1915) however associated both *A. hyas* and *A. radiata* with *A. serpa* as forms or subspecies, despite the stability of phenotypes in each taxon and apparent sympatry, though the rarity of *A. radiata radiata* somewhat justifies his decision. Hall (1938), in his influential review of Fruhstorfer names, followed the rather extreme course of regarding all the described taxa of *A. hyas*, *A. serpa*, *A. seriphia* and *A. radiata* as forms of a single species, *A. serpa*. Workers in South America varied in their treatment of nominate *A. hyas*, either following Fruhstorfer (1915) and Hall (1938) in regarding it as a subspecies or form of *A. serpa* (Hayward, 1973), or treating it as a distinct species (Hoffmann, 1937; Biezanko *et al.*, 1978; Brown, 1992).

DeVries (1987) made no mention of *A. seriphia godmani* occurring in Costa Rica, while Lamas and Small (1992) retained *A. seriphia* and *A. serpa* as separate species with some reservations that they might prove to be elevational forms. Neild (1996) treated *A. seriphia* and *A. serpa celerio* as good species, and also correctly noted that *godmani* represented Central American *A. seriphia*. Although *A. seriphia godmani* and *A. serpa celerio* are very similar, they can be distinguished by several characters, the first three of which are diagnostic for each species (with the exception of *A. serpa serpa*) throughout its range: *A. seriphia* has the blocks of the white postdiscal band on the dorsal forewing displaced slightly diagonally, whereas in most *A. serpa* taxa they are arranged more vertically; the orange subapical marking on the forewing of *A. seriphia* is oriented vertically, in *A. serpa* it is more horizontal; on the ventral hindwing the orange band distal to the white postdiscal band is straight in *A. seriphia*, but convex in *A. serpa*, while the inner submarginal series is roughly parallel with this band in *A. serpa* but noticeably closer to the band in cell M_1 and Rs in *A. seriphia*. Throughout the eastern Andes there is little difficulty separating *A. seriphia* and *A. serpa*, and the two species also appear to occupy exclusive elevational ranges, with *A. seriphia* occurring at higher elevations. *A. serpa serpa* is similar in several respects to Central American *A. seriphia*, but as the Bolivian *A. seriphia theasia* appears to be very distinct, and as the species occurs only at fairly high elevations in the eastern Andes, we do not believe that *A. serpa serpa* and *A. seriphia* are conspecific. We regard *A. s. serpa* as being conspecific with remaining *A. serpa* taxa on the basis of close allopatry and specimens from Paraguay in the BMNH that are phenotypically intermediate between *A. s. serpa* and the Amazonian *A. serpa diadochus* (the latter was regarded as conspecific with *A. s. celerio* by Fruhstorfer (1915)).

Except for the nominate subspecies of each, both *A. hyas* and *A. radiata* contain some very rare taxa and therefore have been taxonomically poorly understood. East Andean *A. hyas* (*viracocha* and *hewitsoni*) closely resemble *A. seriphia*, but are usually smaller,

lack the dark orange outer postdiscal series dashes on the ventral forewing in cells $1A+2A-Cu_1$, have ventral hindwing characters typical of *A. serpa* and have the base of the ventral forewing costa white, not red. These characters link nominate *A. hyas* with *A. h. viracocha* and *A. h. hewitsoni*. *A. radiata* has a ventral pattern similar to *A. serpa*, but in all subspecies (except *myrlea*) lacks a well developed white spot at the base of cell Cu_1 on the dorsal forewing. *A. radiata myrlea* resembles *A. serpa serpa* on the dorsal surface, but like *A. radiata radiata* has the hindwing submarginal series split by dark rays between each pair of veins.

Below we present a synonymic checklist of *Adelpha serpa* and the related species discussed here (taxa considered infrasubspecific are preceded by a "-"):

Adelpha serpa (Boisduval, 1836)

celerio (H. W. Bates, 1864) (Mex.-N.W. Ven.) **rev. stat.**

- *diademeta* Fruhstorfer, 1913

- *phintias* Fruhstorfer, 1913

duiliae Fruhstorfer, 1913 (W. Ecuad.)

diadochus Fruhstorfer, 1915 (Ven.-Bol., Braz. [Amaz.], Guianas) **n. stat.**

- *timehri* Hall, 1938 **n. syn.**

- *floreia* Brévignon, 1995 **n. stat.**

serpa (Boisduval, 1836) (S.E. Braz.-Parag., N.E. Arg.)

- *damon* Fruhstorfer, 1913

- *ornamenta* Fruhstorfer, 1915

Adelpha hyas (Doyère, [1840])

hewitsoni Willmott & Hall, **n. ssp.** (E. Ecuad.)

viracocha Hall, 1938 (C. Peru-Bol.) **n. stat.**

hyas (Doyère, [1840]) (S.E. Braz.-Urug.)

Adelpha seriphia (C. & R. Felder, 1867)

godmani Fruhstorfer, 1913 (Mex.-W. Ecuad.)

- *synna* Fruhstorfer, 1915 **n. stat.**

egregia Röber, 1927 (Col. [Sta. Marta]) **n. stat.**

seriphia (C. & R. Felder, 1867) (Ven. [Cord. de la Costa])

pione Godman & Salvin, 1884 (Ven. [Mérida]-Col. [Cord. Occ. N. of Bogotá])

aquillia Fruhstorfer, 1915 (Col. [Cauca, Cord. Centr. and Occ. S. of Bogotá]-C. Peru)

- *naryce* Fruhstorfer, 1915 **n. stat.**

therasia Fruhstorfer, 1915 (S. Peru-Bol.)

n. ssp. Willmott, in prep. (Trinidad)

Adelpha radiata Fruhstorfer, 1915

aiellae Willmott & Hall, **n. ssp.** (C. Pan.-W. Ecuad.)

gilletella Brévignon, 1995 (F. Guiana) **n. stat.**

explicator Willmott & Hall, **n. ssp.** (E. Ecuad.)

myrlea Fruhstorfer, 1915 (S.E. Braz. [Esp. Sant.-Rio de J.]) **n. stat.**

radiata Fruhstorfer, 1915 (S.E. Braz. [Rio de J.-Sta. Cat.]) **n. stat.**

Adelpha paraena (H. W. Bates, 1865)

massilia (C. & R. Felder, 1867) (Mex.-W. Pan.)

n. ssp. Willmott, in prep. (E. Pan.-W. Col.)

reyi Neild, 1996 (N.W. Ven.)

paraena (H. W. Bates, 1865) (Ven.-Bol., Braz., Guianas)

Adelpha hyas hewitsoni Willmott & Hall, **new ssp.**

Fig. 8a,b; 18

Description.— MALE: forewing length 27mm; forewing slightly falcate, hindwing with dentate distal margin. **Dorsal surface:** Forewing: ground color dark blackish brown; orange-brown scaling at very base of discal cell at posterior edge of costal vein; two black lines in discal cell with red scaling between near costa, a red bar over the discocellulars; line of white postdiscal blocks extending from anal margin to cell Cu_1 , that in

cell 1A+2A squarish and bordered by a white band of equal width along anal margin, an isolated oval spot in cell Cu_2 and a small, isolated, roundish spot near base of cell Cu_1 ; large orange subapical marking in shape of an irregular pentagon, in cells M_3 - M_1 , R_4 and R_3 , one side broadly bordering vein M_3 , basal side straight and almost perpendicular to costa, distal edges parallel to distal margin and then straight almost perpendicular to costa; all veins within subapical marking black; sparse orange scaling posterior to subapical marking in anterior half of cell Cu_1 ; very faint, pale gray paired spots of inner submarginal series visible, most obvious in cells 1A+2A and Cu_2 ; fringe dark brown, a few white scales in cells 1A+2A and R_5 - R_4 . **Hindwing:** ground color dark blackish brown; white postdiscal band extending from costa, constricted slightly at vein R_s , broadest in cell M_3 then tapering to end roundly at vein 1A+2A near tornus; very faint, pale gray paired spots of inner submarginal series visible, ending at tornus with a small triangular orange spot; fringe dark brown, few white scales in each cell. **Ventral surface:** **Forewing:** ground color dark brown; base of costa mostly white with sparse reddish scaling along anterior edge of costal vein; discal cell bars black, first cell bar strongly convex, second cell bar "w"-shaped, third cell bar "v"-shaped dividing space between second and fourth cell bars into three, fourth and postcellular bars straight; discal cell ground color bluish white distal to first cell bar, white basal to first cell bar with no basal line, reddish in middle of space between first and second cell bars and filling space between fourth and postcellular bar; base of cell 1A+2A whitish, then thin black line, then reddish, then thin black line, then whitish, then black line followed by white postdiscal block similar to dorsal surface except extended slightly distally; postdiscal markings in cells Cu_2 and Cu_1 as on dorsal surface; few bluish white scales distal to postcellular bar in cell M_3 ; very pale orange subapical marking reflecting that on dorsal surface, fused with white postdiscal markings in cells M_3 to costa which fill each cell, distal edges of subapical marking indistinct, dark brown lines intruding halfway into subapical marking bisecting each cell and veins within subapical marking dark brown; area between subapical marking, distal margin and vein Cu_1 slightly paler brown than ground color, each cell bisected by a dark line intruding in from distal margin; almost entire inner and outer submarginal series composed of paired silvery white spots in each cell, very faint in cells Cu_1 - M_2 and posterior half of cell M_1 ; fringe as on dorsal surface. **Hindwing:** ground color dark brown; basal area and all of anal margin to vein 3A white, a black line from base across distal half of humeral vein to costa; black postbasal line from just anterior to vein $Sc+R_1$ through middle of discal cell then extending along vein 3A to anal margin; broad orange band distal to preceding black line extending from costa to anal margin, bordered distally by thin black line crossing discocellulars; white postdiscal band as on dorsal surface; inner postdiscal series absent, outer postdiscal series an even orange band almost touching white postdiscal band at costa, then curving gently away from wing base to end at anal margin where band broadens and joins the inner orange band; submarginal series entire and consisting of paired, roughly oblong flecks in each cell, those of inner series wider than outer series, inner series almost parallel to orange band of outer postdiscal series, displaced slightly distally in cell M_2 ; fringe as on dorsal surface. **Head:** eyes dark brown with short hairs in anterior half; dense white scales at ventral base of eyes and a small tuft of white scales at top of head behind eyes; antennae black with white at ventral base and ventral surface of basal few segments; labial palpi outer side white with broad black lateral stripe, inner side black with few white hairs, ventral surface white with long black hairs; top of head black, frons black. **Thorax:** dorsal surface black with short dark brown hairs, ventral surface grayish white, black stripes where legs rest against thorax, forelegs white, mid and hindlegs black with ventral surface of femur white, tibia with few white scales. **Abdomen:** dorsal surface black with short dark brown hairs, ventral surface white, then with dark gray lateral stripe, then white lateral stripe, spiracles outlined with white. **Genitalia** (Fig. 18): valvae triangular in lateral view, tapering sharply from base to posterior tip, posterior half of ventral surface with "teeth," clunicle absent, aedeagus

relatively straight and with a small internal sclerotised pad bearing tiny spines; saccus deep.

FEMALE: differs from male as follows: forewing length 28mm; wings broader and more rounded. **Dorsal surface:** **Forewing:** ground color paler; submarginal series paler and more prominent; postdiscal white spots larger; pale postdiscal dashes in cells M_3 - M_1 . **Hindwing:** ground color paler; white postdiscal band broader and more rounded near tornus; outer postdiscal series visible as a pale brown line on hindwing; submarginal series paler and more prominent. **Ventral surface:** **Forewing:** postdiscal spots larger; submarginal series broader. **Hindwing:** white postdiscal band as on dorsal surface; orange bands surrounding white postdiscal band broader and paler; submarginal series broader.

Types.—**Holotype** ♂: ECUADOR.—*Napo Prov.*: nr. Talag, Río Jatunyacu, Pimpilala, 600m, 14-15 Sep 1996 (K. R. Willmott) (to be deposited in the BMNH).

Allotype ♀: ECUADOR.—*Napo Prov.*: km. 20 Tena-Puyo rd., Apuya, 600m, 10 Oct 1996 (K. R. Willmott) (to be deposited in the BMNH).

Paratypes: ECUADOR.—*Napo Prov.*: 1 ♂: same data as HT (in the MNCN); 1 ♂: same data as HT except 17 Apr 1995 (J. P. W. Hall) (KWJH); 1 ♂: same data as HT except 14-16 Sep 1995 (A. F. E. Neild) (to be deposited in the USNM); 1 ♂: same data as HT except 20 Oct 1996 (KWJH); 1 ♂: same data as HT except 30 Aug 1997 (KWJH); 1 ♂: *Pastaza Prov.*: Río Llandia, km. 25 Puyo-Tena rd., San José, 950m, 10 Sep 1993 (J. P. W. Hall) (to be deposited in the AME).

Etymology.—This subspecies is named for William Chapman Hewitson, who described more valid species of *Adelpha* than any other worker, and who showed a far greater understanding of the important wing pattern characters in the genus than most who succeeded him.

Diagnosis.—*Adelpha hyas* consists of three known subspecies, *Adelpha h. hyas*, *Adelpha h. viracocha*, and *A. h. hewitsoni* n. ssp.. Both previously described subspecies differ from *A. hyas hewitsoni* in having the submarginal series on the ventral hindwing (and ventral forewing, though less noticeably) greatly enlarged and fused so that no individual markings are evident between the veins; the submarginal series also almost blend with the orange band of the outer postdiscal series on the ventral hindwing. *Adelpha seriphia aquillia* is also very similar, but has thinner white postdiscal bands on the dorsal surface, the base of the ventral forewing costa is orange instead of white, and on the ventral hindwing the orange band of the outer postdiscal series is straight rather than convex and the markings of the inner submarginal series are wider. *A. serpa diadochus* differs by not having dark lines intruding into the pale subapical marking on the ventral forewing and by having a larger white spot in Cu_1 on the dorsal forewing. Sympatric subspecies of *A. radiata* and *A. paraena* lack a white spot in cell Cu_1 on the dorsal forewing.

Discussion.—There is some variation in the amount of subapical orange in cell Cu_1 on the dorsal forewing, which may be absent or almost extend to vein Cu_1 .

Adelpha hyas hewitsoni is to date known only from a few localities at the base of the east Ecuadorian Andes, from 600-950m. It is sympatric with *Adelpha paraena paraena*, *Adelpha radiata explicator* n. ssp. and *Adelpha serpa diadochus*, while *Adelpha seriphia aquillia* also occurs in the east Ecuadorian Andes, but at higher elevations (1600-1800m). Males of *A. hyas hewitsoni* are typically encountered in groups in large (20-30m wide), old forest clearings along streams and rivers. Usually they perch from 1200-1330h in bright sun on the tops of bushes 5-6m high, making sorties out and returning to the same perch. At the type locality, Pimpilala, the species seems to be present year round in a particular coffee orchard, where it is often the most common perching *Adelpha*. Other species that resemble it on the dorsal surface and with which *A. hyas* perches include *Adelpha iphicleola thessalita* n. ssp., *Adelpha thoasa manilia* and *Adelpha serpa diadochus*. The single known female was flying in heavily disturbed ridgetop forest around midday, at a site where males have yet to be recorded.

Given its locally common nature and the ease of access to its preferred microhabitat, the absence of this new subspecies in all collections studied by the authors is peculiar. The recently described species *Adelpha shuara* Willmott & Hall, 1995, which perches with *A. hyas*, is also unrepresented in most major collections and locally common in similar microhabitats (Willmott and Hall, 1995). *A. hyas viracocha* is also rare in collections, only 8 specimens having been examined, while the nominate subspecies appears to be not uncommon.

Adelpha radiata explicator Willmott & Hall, new ssp.

Fig. 9a,b; 19

Description.—MALE: forewing length 28mm; forewing slightly falcate, hindwing with slightly dentate distal margin. **Dorsal surface:** Forewing: ground color dark blackish brown; orange-brown scaling at very base of discal cell at posterior edge of costal vein; two black lines in discal cell with red scaling in anterior half, a little red scaling over anterior half discocellulars; white postdiscal band extending from anal margin to cell Cu₂, block in cell Cu₂ oval and extending slightly distally from band in cell 1A+2A, only touching vein Cu₂ for a short distance; large orange subapical marking in shape of an irregular pentagon, in cells M₃, M₂, M₁, and R₄, one side broadly bordering vein M₃, basal side straight and angled steeply to costa, one distal edge parallel to distal margin, the other angled towards costa, a rectangular orange postdiscal marking in cell Cu₁ around 2/3 size of orange in cell M₃; very sparse orange scaling in anterior half of cell Cu₂; all veins within subapical marking distinctly lined with dark brown; very faint, pale gray paired spots of inner submarginal series visible, most obvious in cells 1A+2A and Cu₂; fringe dark brown. **Hindwing:** ground color dark blackish brown; white postdiscal band extending from costa widening to broadest point in cells M₂ and M₃ then tapering slightly to end roundly at vein 1A+2A near tornus; tiny orange spot at tornal end of white postdiscal band; very faint, pale gray paired spots of inner submarginal series just visible; fringe dark brown. **Ventral surface:** Forewing: ground color dark brown; base of costa white; discal cell bars black, first cell bar convex, second cell bar "w"-shaped, third cell bar "v"-shaped dividing space between second and fourth cell bars into three, fourth cell bar slightly convex, postcellular bar slightly concave; discal cell ground color silvery white, basal streak absent, reddish orange between first and second cell bars and between fourth and postcellular bar; base of cell 1A+2A whitish, then thin black line, then white with slight red tinge, then thin black line, then whitish, then black line followed by white postdiscal block similar to dorsal surface; white postdiscal marking in cell Cu₂ as on dorsal surface; small bluish white spot distal to postcellular bar in cell M₃; anterior postdiscal band represented by faint, whitish postdiscal markings which merge into subapical marking; very pale orange subapical marking reflecting that on dorsal surface in cells M₃, M₂, M₁, and R₄; marking in cell Cu₁ as on dorsal surface; sparse whitish scales in anterior half of cell Cu₂ just distal to white postdiscal band; inner and outer submarginal series composed of paired silvery white dashes in each cell, inner series almost invisible in cells Cu₁, anterior half of cell M₂ and posterior half of cell M₁, outer series almost invisible except in cells 1A+2A, posterior half of cell Cu₂, and cell M₃; fringe dark brown. **Hindwing:** ground color dark brown; basal area and all of anal margin to vein 3A white, with a black line from base across distal half of humeral vein to costa; black postbasal line from just anterior to vein Sc+R₁ through middle of discal cell then extending along vein 3A to anal margin; broad orange band distal to preceding black line from costa to anal margin, bordered distally by thin black line crossing discocellulars; white postdiscal band as on dorsal surface; inner postdiscal series absent, outer postdiscal series a slightly uneven orange band thinning from costa to tornus and cut by dark veins, almost touching white postdiscal band at costa then curving gently away from wing base to end at anal margin, where band broadens and joins inner orange band; submarginal series entire and consisting of paired, roughly oblong flecks in each cell, those of inner series largest

at apex and thinning towards tornus, inner series almost parallel to orange band of outer postdiscal series; fringe dark brown. **Head, Thorax and Abdomen** similar to *A. hyas hewitsoni*, but legs with entire ventral surface white. **Genitalia** (Fig. 19): similar to *A. hyas hewitsoni*.

FEMALE: unknown.

Types.—**Holotype** ♂: ECUADOR.—Napo Prov.: km. 13 Puyo-Tena rd., Finca San Carlo, 600m, 7-8 Sep 1996 (K. R. Willmott) (to be deposited in the BMNH).

Etymology.—The name is derived from the Latin noun "explicator", meaning an explainer, with reference to the importance of this taxon in clarifying relationships between taxa in the *Adelpha serpa* group.

Diagnosis.—*Adelpha radiata* consists of five known subspecies, *A. r. radiata*, *A. r. myrlea*, *A. r. gillettella*, *A. r. explicator* n. ssp. and *A. r. aiellae* n. ssp. (see Discussion above). *A. r. explicator* differs from *A. r. aiellae* as detailed in the Description of the latter. Most noticeable in *A. r. aiellae* is the shape of the orange subapical marking on the dorsal forewing, which is broader, paler and cut by paler veins, and the presence of the orange markings of the outer postdiscal series on the ventral forewing. *A. r. gillettella* has, on the dorsal forewing, an additional orange block in cell Cu₂, a wider orange block in cell Cu₁, and a wider subapical marking with the veins that cross it only faintly lined with black, and the white postdiscal band is narrower, especially the spot in cell Cu₂. On the ventral forewing the pale subapical marking and postdiscal spot in cell Cu₁ have the distal edge dark orange. Both the nominate subspecies and *A. r. myrlea* have the white spots of the ventral submarginal series greatly elongated and almost fused with each other. *A. paraena paraena* is very similar but the ventral submarginal series are composed of single dashes instead of paired spots.

Discussion.—Only a single specimen is known of *A. radiata explicator* and so it is not possible to assess variation. We deliberated for some time as to whether or not to describe this subspecies; although it is instantly recognisable from *A. radiata gillettella* by the lack of an orange spot on the dorsal forewing in cell Cu₂, in other species, such as *A. serpa*, the amount of orange on the forewing can be slightly variable, extending into cell Cu₁ in most Guianan specimens but not, or only very minorly, in Amazonian individuals. Thus Hall (1938) described specimens with orange in cell Cu₁ as *A. serpa timehri*, while Brévignon (1995) described those without as *A. celerio florea*. We regard both these names as synonyms of *A. serpa diadochus*, described from Peru. However, since the difference in the amount of forewing orange between *A. radiata gillettella* and *A. radiata explicator* is much more pronounced than that between any Guianan and Amazonian *A. serpa*, and since there also exist other differences in the shape of the forewing subapical marking, the width of the white postdiscal band on the forewing and the color of the pale postdiscal spot on the ventral forewing in cell Cu₂, we believe *A. radiata explicator* merits subspecific recognition.

Adelpha radiata explicator is extremely rare, only a single specimen being known, although it must have a broader west Amazonian range, at least. The holotype male was captured in a large light gap created by a recent tree fall along a ridgetop in primary forest. This individual was flying about the clearing in bright sun in the middle of the morning, with the characteristic flight of all *serpa*-group members, periods of alternating rapid wing beats and gliding. It perched in between flights on bushes 1-5m above the ground around the edge of the arena, in the company of *A. paraena paraena*. The behavior of this subspecies (and *A. radiata aiellae* described below) is similar to that observed in *A. radiata gillettella* as reported by Brévignon (1995), who states that *gillettella* occurs in openings on hilltops in the late morning. In fact, it seems that all known male specimens of *A. radiata* outside of southeastern Brazil have been captured on hilltops, and no doubt further collecting in this microhabitat will extend the known ranges of *A. radiata* subspecies and possibly reveal further undescribed taxa.

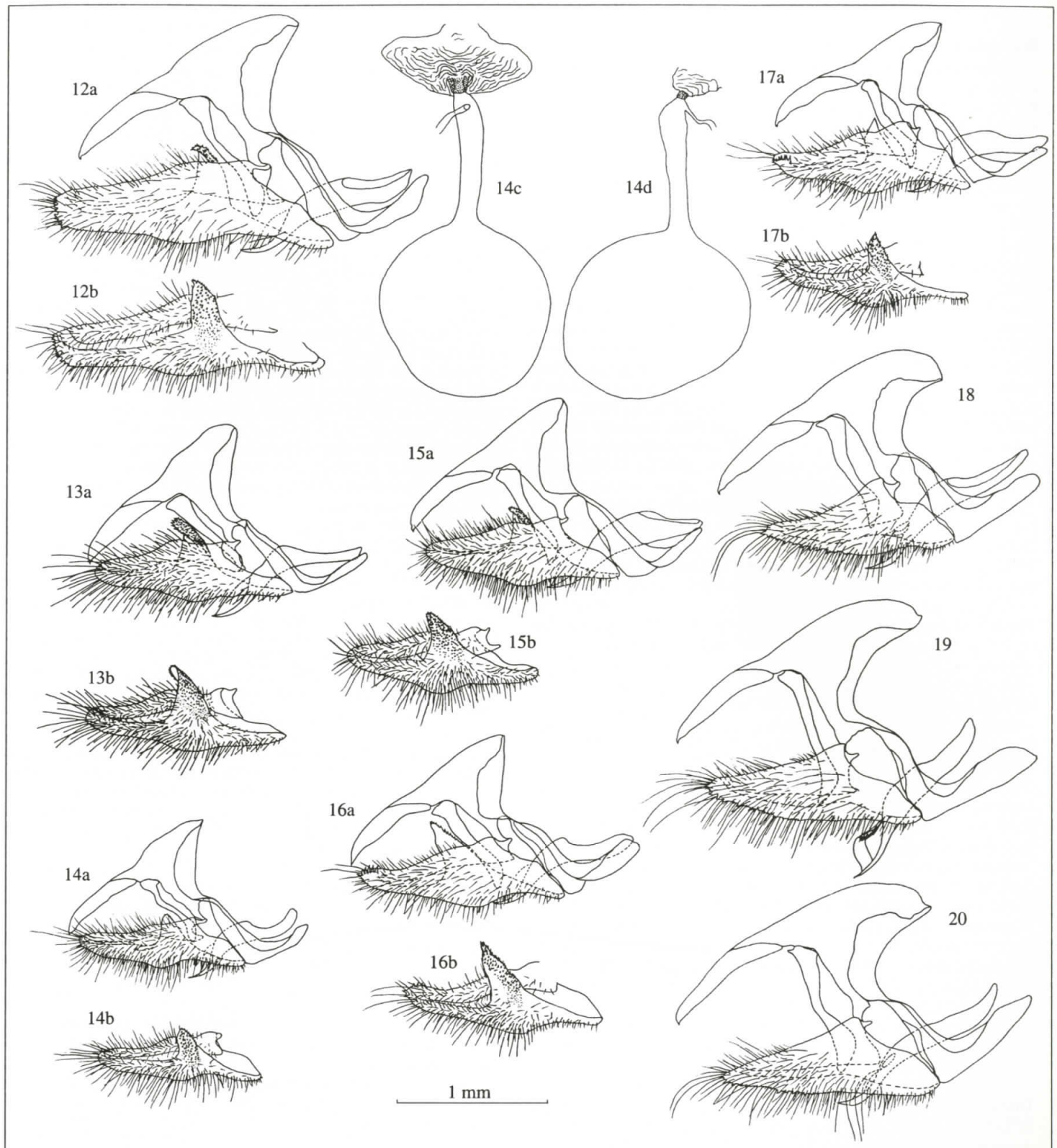


Fig. 12-20. Male and female genitalia. For Fig. 12-17: a) male, lateral view; b) male, inside lateral view of left valve showing clunicula; c) female, dorsal view; d) female, lateral view. For Fig. 18-20: male genitalia, lateral view. 12. *Adelpha hesterbergi* n. sp. holotype. 13. *A. sichaeus* (Butler, 1866), E. Ecuador. 14. *A. lamasi* n. sp. holotype: a,b; paratype: c,d. 15. *A. attica hemileuca* n. ssp. paratype, W. Ecuador. 16. *A. iphiclus estrecha* n. ssp. paratype. 17. *A. iphicleola thessalita* n. ssp. holotype. 18. *A. hyas hewitsoni* n. ssp. holotype. 19. *A. radiata explicator* n. ssp. holotype. 20. *A. radiata aiellae* n. ssp. holotype.

Adelpha radiata aiellae Willmott & Hall, new ssp.

Fig. 10a,b; 20

Description.— MALE: forewing length 30.5mm; wing shape similar to *A. radiata explicator*. Differs from *A. radiata explicator* n. ssp. as follows: *Forewing*: reddish scaling in discal cell fills area between first and second cell bars, a pale grayish "hourglass"-shaped marking in discal cell distal to second cell bar; postdiscal white blocks along anal margin and in cell 1A+2A narrower, white marking in cell Cu₁ more angular and bordering vein Cu₂; orange subapical marking paler, wider, outer edge inclined less sharply to costa, basal edge more perpendicular, veins crossing marking only faintly marked with darker scales; orange postdiscal marking in cell Cu₁ smaller and poorly defined; anterior half cell Cu₂ entirely dark brown. *Hindwing*: white postdiscal band narrower, more even, ending more sharply at vein 1A+2A; orange spot at tornus larger; outer postdiscal series visible as an indistinct, paler brown line. *Ventral surface*: *Forewing*: white postdiscal marking in cell 1A+2A extends more distally than on dorsal surface; whitish postdiscal spots (anterior postdiscal band) distal to discocellulars distinct and isolated from subapical marking; pale orange postdiscal spot in cell Cu₁ with an orange distal half; outer postdiscal series present as an ill-defined thick orange dash in cell Cu₂, sparse scales in cell 1A+2A. *Hindwing*: white postdiscal band differs as on dorsal surface; orange postdiscal band of outer postdiscal series broader, paler and of even width; spots of inner submarginal series of constant width. *Head, Thorax, Abdomen and Genitalia* (Fig. 20) as in *A. radiata explicator*.

FEMALE: differs from male as follows: forewing length 34mm; wings broader and more rounded. Wider and more rounded white postdiscal spot in cell Cu₂ and a tiny white spot near base of cell Cu₁ on forewing dorsal surface, and a little orange scaling on hindwing dorsal surface outer postdiscal series in cells M₁-Rs. Ventral surface markings of submarginal series slightly broader.

Types.— *Holotype* ♂: ECUADOR.— *Carchi Prov.*: nr. Lita, Río Baboso, ridge to east, 900m, 11 Jul 1994 (J. P. W. Hall) (to be deposited in the BMNH).

Allotype ♀: ECUADOR.— *Esmeraldas Prov.*: km. 40 Lita-San Lorenzo rd., Río Durango, 250m, 3 Jul 1998 (K. R. Willmott) (KWJH).

Paratypes: PANAMA.— *Canal Zone*: 1 ♀: Gatún, 350', 25 May 1971 (G. B. Small) (USNM); 1 ♀: Gatún, 27 Jan 1973 (G. B. Small) (STRI); 1 ♀: Colón: Piña, 200m, 5 Jul 1972 (H. L. King) (FSCA); 1 ♀: same data as preceding except 7 Feb 1972 (FSCA). COLOMBIA.— 1 ♀: *Valle del Cauca*: Yatacué, Alto Anchicayá, 600m, 18 Sep 1994 (L. M. Constantino) (LMC).

Etymology.— This subspecies is named for Annette Aiello, who has contributed greatly to the understanding of species relationships within *Adelpha* through her studies of immature stages, and who has always been a source of much help and encouragement.

Diagnosis.— *Adelpha radiata aiellae* n. ssp. differs from *A. radiata explicator* as detailed in the Description above. *A. radiata gillettella* has the orange subapical marking on the dorsal forewing continuing as orange postdiscal blocks into cell Cu₂ and the white postdiscal band reduced, particularly in cell Cu₁. The nominate subspecies and *A. radiata myrlea* differ from *A. radiata aiellae* as they do from *A. radiata explicator*. All subspecies of the similar *A. paraena* have single instead of paired spots composing the submarginal series.

Discussion.— There is some variation in the size of the orange spot in cell Cu₁ on the dorsal forewing, but this is not geographically dependent. Panamanian specimens have the veins crossing the orange subapical marking on the dorsal forewing slightly less strongly lined with dark brown than the two known Ecuadorian specimens.

Adelpha radiata aiellae is currently known from central Panama to northwestern Ecuador, from near sea-level to 900m, and like all other subspecies of *A. radiata* it is very rare. The only known male was found perching on top of a 4m high bush at the edge of a very wide path along the top of a steep-sided forested ridge. The single

female we have seen was flying 5m above a wide river through secondary growth in the early afternoon.

Constantino (1998) has recently reared this new subspecies in western Colombia on *Cespedezia spathulata* (Ochnaceae), and described the last instar and pupa under the name *A. serpa*. Examination of the voucher specimen in the LMC confirms it to be this taxon. Aiello (1984: 28) also reports rearing a species in the *serpa* group (her Group I) with a larva resembling *A. serpa celerio* but a pupa resembling *A. paraena*. Unfortunately the pupa died, but this species might well have been *A. radiata*.

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LITERATURE CITED

- Aiello, A.
1984. *Adelpha* (Nymphalidae): Deception on the wing. *Psyche* (Cambridge), 91:1-45.
- Aurivillius, P. O. C.
1882. Recensio critica Lepidopterorum Musei Ludovicae Ulricae quae descripsit Carolus a Linné. *Kong. Svens. Vetensk.-Akad. Handl.* (Ny Följd), 19(5):1-188.
- Austin, G. T.
1992. New and additional records of Costa Rican butterflies. *Trop. Lepid.* (Gainesville), 3:25-33.
- Bates, H. W.
1864. New species of butterflies from Guatemala and Panama, collected by Osbert Salvin and F. du Cane Godman, Esqs. *Ent. Mon. Mag.* (London), 1:126-131.
- Beutelspacher, C. R.
1975. Dos nuevas especies del género *Adelpha* Hübner (Nymphalidae)

- de México. *Revta. Soc. Mex. Lepid.* (Mexico City), 1:31-37.
1976. Estudios sobre el género *Adelpha* Hübner en México (Lepidoptera: Nymphalidae). *Revta. Soc. Mex. Lepid.* (Mexico City), 2:8-14.
- Biezanko, C. M., A. Ruffinelli, and D. Link**
1978. Catálogo de lepidópteros do Uruguai. Catalogue of Lepidoptera of the Republic of Uruguay. *Revta. Centro Ciênc. Rur.* (Santa Maria), 8(suppl.):1-84.
- Brévignon, C.**
1995. Description et figuration de nouveaux Limenitidinae provenant de Guyane française (Lepidoptera, Nymphalidae). *Bull. Soc. Sci. Nat.* (Vennette), 83:14-18.
- Brown, K. S., Jr.**
1992. *Borboletas da Serra do Japi: Diversidade, habitats, recursos alimentarios e variação temporal*. In L. P. C. Morellata (ed.), *História natural da Serra do Japi. Ecologia e preservação de uma área forestal no Sudeste do Brasil*, 142-187. Campinas: Editoria da Unicamp/Fapesp.
- Clerck, C. A.**
1764. *Icones insectorum rariorum cum nominibus eorum trivialibus, locisque a C. Linnaei Arch: R: et Equ: Aur: Syst: Nat: allegatis*. Holmiae. Pl. 41.
- Comstock, J. H., and J. G. Needham**
1918. The wings of insects. *Amer. Nat.* (Salem), 32:253-257.
- Constantino, L. M.**
1998. Butterfly life history studies, diversity, ranching and conservation in the Chocó rain forests of western Colombia (Insecta: Lepidoptera). *SHILAP Revta. Lepid.* (Madrid), 26:19-39.
- D'Abrera, B.**
1987. *Butterflies of the Neotropical Region. Part IV. Nymphalidae (partim)*. Victoria, Black Rock: Hill House. 152pp.
- Drury, D.**
1770. *Illustrations of Natural History. Wherein are exhibited upwards of 240 figures of exotic insects, according to their different genera; very few of which have hitherto been figured by any author, being engraved and colored from nature, with the greatest accuracy, and under the author's own inspection, on fifty copper plates. With a particular description of each insect interspersed with remarks and reflections on the nature and properties of many of them*. Vol. 1. London: B. White. 130pp.
- DeVries, P. J.**
1987. *The butterflies of Costa Rica and their natural history. Papilionidae, Pieridae, Nymphalidae*. Princeton: Princeton Univ. Pr. 327pp.
- DeVries, P. J., and I. A. Chacón**
1982. A new species of *Adelpha* (Nymphalidae) from Parque Nacional Braulio Carrillo, Costa Rica. *J. Res. Lepid.* (Beverly Hills), 20: 123-126.
- Fruhstorfer, H.**
1915. 49. Gattung *Adelpha* Hbn. In A. Seitz (ed.), *Die Gross-Schmetterlinge der Erde*, 5:510-533. Stuttgart: Alfred Kernen.
- Hall, A.**
1935. New forms of Nymphalinae and Ithomiinae. *Ent.* (London), 68: 221-227.
1938. On the types of *Adelpha* (Lep., Nymphalidae) in the collection of the British Museum. *Ent.* (London), 71:184-187, 208-211, 232-235, 257-259, 284-285.
- Hall, J. P. W.**
1998. A review of the genus *Sarota* (Lepidoptera: Riodinidae). *Trop. Lepid.* (Gainesville), 9 (Suppl. 1):1-21.
- Hall, J. P. W., and K. R. Willmott**
1993. Temporal and elevational additions of distribution for Costa Rican butterflies. *Trop. Lepid.* (Gainesville), 4:139-141.
1995. Two new species of *Mesene* from western Ecuador (Lepidoptera: Riodinidae). *Trop. Lepid.* (Gainesville), 6:110-112.
1996. Systematics of the riodinid tribe Symmachiini, with the description of a new genus and five new species from Ecuador, Venezuela and Brazil (Lepidoptera: Riodinidae). *Lambill.* (Tervuren), 96:637-660.
1998. Nine new species and one new subspecies of *Euselasia* from Ecuador (Lepidoptera: Riodinidae). *Trop. Lepid.* (Gainesville), 9 (Suppl. 1):27-35.
- Hayward, K. J.**
1973. Catálogo de los rhopalóceros argentinos. *Opera Lillo.* (Tucumán), 23:1-318.
- Herbst, J. F. W.**
1793. In C. G. Jablonsky, *Natursystem aller bekannten in- und ausländischen Insekten als eine Fortsetzung der von Buffonschen Naturgeschichte. Nach dem System des Ritters Carl von Linné bearbeitet. Der Schmetterlinge*. Vol. 6. Berlin: Joachim Pauli. 162 pp.
- Hoffmann, F.**
1937. Beiträge zur Naturgeschichte brasilianischer Schmetterlinge. II. *Int. Ent. Zeit.* (Frankfurt), 50:212-213, 231-232.
- Kirby, W. F.**
1871. *A Synonymic Catalogue of Diurnal Lepidoptera*. London: John Van Voorst. 690pp.
- Klots, A. B.**
1956. *Lepidoptera*. In S. L. Tuxen (ed.), *Taxonomist's Glossary of Genitalia of Insects*, 97-111. Copenhagen: E. Munksgaard.
- Lamas, G., and G. B. Small, Jr.**
1992. Catalogue of the Nymphalinae of Panama (Lepidoptera: Nymphalidae). In D. Quintero and A. Aiello (eds.), *Insects of Panama and Mesoamerica: Selected Studies*, 554-566. Oxford: Oxford Univ. Pr.
- Moss, M.**
1933. Some generalizations on *Adelpha*, a Neotropical genus of nymphalid butterflies of the group Limenitidi. *Novit. Zool.* (Tring), 39:12-20.
- Neild, A. F. E.**
1996. *The Butterflies of Venezuela. Part I: Nymphalidae I (Limenitidinae, Apaturinae, Charaxinae)*. Greenwich: Meridian Publ. 144pp.
- Nijhout, H. F.**
1991. *The Development and Evolution of Butterfly Wing Patterns*. Washington: Smithsonian Inst. Pr. 297pp.
- Orellana B., A. M.**
1996. Nueva subespecie de *Adelpha justina* Felder & Felder, 1861, (Lepidoptera: Nymphalidae: Limenitidinae) en Venezuela. *Zoocriaderos*, 1:21-24.
- Schwanwitsch, B. N.**
1924. On the groundplan of wing-pattern in nymphalids and certain other families of rhopaloceros Lepidoptera. *Proc. Zool. Soc. Lond.* (B) (London), 34:509-528.
- Staudinger, O.**
1886. I. Theil. Exotische Tagfalter in Systematischer Reihenfolge mit Berücksichtigung neuer Arte. In O. Staudinger and E. Schatz, *Exotische Schmetterlinge*, 1:142-144. Fürth: G. Löwensohn.
- Steinhauser, S. R., and L. D. Miller**
1977. Three new species of *Adelpha* (Nymphalidae) from Mexico and Colombia. *Bull. Allyn Mus.* (Sarasota), 46:1-10.
- Strand, E.**
1918. Nachtrag zum Zweiten Teil meiner "Lepidoptera Niepeltiana". *Soc. Ent.* (Stuttgart), 33:2-3.
- Walch, J. E. I.**
1775. Beiträge zur Insekten-Geschichte. *Naturforscher* (Halle), 6: 123-131.
- Willmott, K. R., and J. P. W. Hall**
1994. Four new species of riodinids from western Ecuador (Lepidoptera: Riodinidae). *Trop. Lepid.* (Gainesville), 5:87-91.
1995. Two new species of *Adelpha* from eastern Ecuador (Lepidoptera: Nymphalidae). *Trop. Lepid.* (Gainesville), 6:106-109.