

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 *syrra* 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 diadachus* (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-Cu₁, 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 Cu₁ 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.**
- *diademata* Fruhstorfer, 1913
- *phintias* Fruhstorfer, 1913
- duilliae* Fruhstorfer, 1913 (W. Ecuad.)
- diadachus* Fruhstorfer, 1915 (Ven.-Bol., Braz. [Amaz.], Guianas) **n. stat.**
- *timehri* Hall, 1938 **n. syn.**
- *florea* 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.)
- *syrra* 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.)
- reysi* 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 Cu₁, 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 Cu_2 , block in cell Cu_2 oval and extending slightly distally from band in cell $1A+2A$, only touching vein Cu_2 for a short distance; large orange subapical marking in shape of an irregular pentagon, in cells M_3 , M_2 , M_1 , and R_4 , one side broadly bordering vein M_3 , 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 Cu_1 around 2/3 size of orange in cell M_3 ; very sparse orange scaling in anterior half of cell Cu_2 ; 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 Cu_2 ; fringe dark brown. Hindwing: ground color dark blackish brown; white postdiscal band extending from costa widening to broadest point in cells M_2 and M_3 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 Cu_2 as on dorsal surface; small bluish white spot distal to postcellular bar in cell M_3 ; 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 M_3 , M_2 , M_1 , and R_4 ; marking in cell Cu_1 as on dorsal surface; sparse whitish scales in anterior half of cell Cu_2 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 Cu_1 , anterior half of cell M_2 and posterior half of cell M_1 , outer series almost invisible except in cells $1A+2A$, posterior half of cell Cu_2 , and cell M_3 ; 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 $Sc+R_1$ 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 Cu_2 , a wider orange block in cell Cu_1 , 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 Cu_2 . On the ventral forewing the pale subapical marking and postdiscal spot in cell Cu_1 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 Cu_2 , in other species, such as *A. serpa*, the amount of orange on the forewing can be slightly variable, extending into cell Cu_1 in most Guianan specimens but not, or only very minorly, in Amazonian individuals. Thus Hall (1938) described specimens with orange in cell Cu_1 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 Cu_2 , 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.

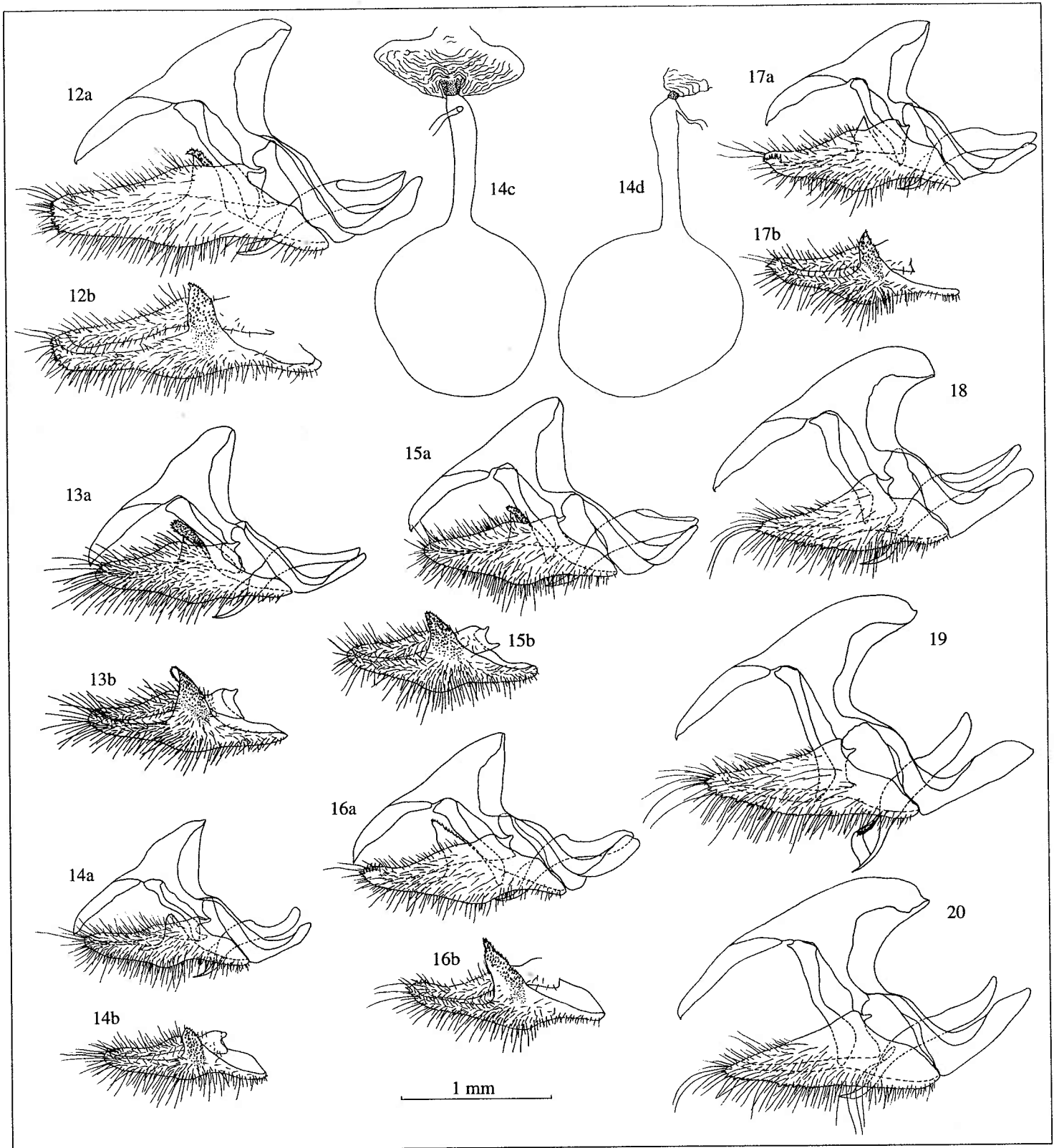


Fig. 12-20. Male and female genitalia. For Fig. 12-17: a) male, lateral view; b) male, inside lateral view of left valve showing clunícula; c) female, dorsal view; d) female, lateral view. For Fig. 18-20: male genitalia, lateral view. 12. *Adelpha hesterbergi* n. sp. holotype. 13. *A. sichaeus* (Butler, 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-R₅. 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.