

NOTES ON THE SUBGENUS *GLUTOPHRISSA*, GENUS *APPIAS*
 (LEPIDOPTERA, PIERIDAE)

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A study of the Antillean butterflies of the subgenus *Glutophrissa* of the genus *Appias* has led me to conclusions somewhat different from those expressed by Talbot (1932) or d'Almeida (1939) concerning their interrelationship and subspeciation.

I. *Appias drusilla*

In general, the males of the Floridian and the Antillean populations are entirely white on the upper surface, with only a narrow infuscation at the base of the forewing costa, thence extending as a narrow black line about the apex and for some distance along the outer margin. The males of continental populations show a definite enlargement of the fuscous area at the apex of the forewing, but Mexican specimens show this to the least extent, many being similar to Antillean examples.

The male genital armatures from any region examined are in agreement with the figure given by Klots (1933, Fig. 76). The males do not show much variation in pattern but may vary individually in size from 20 to 35 mm. in length of forewing. Usually the forewings are slightly acute at the apex, but the degree of acuteness is variable. Subspecific morphological differences are difficult to discern.

Individually the females are highly variable in pattern in any population examined and as variable in size as the males. The forewing of the female is less acute apically than that of the male, and the tornus is usually almost right angular.

From a study of the females, which have definitely recognizable pattern trends in different populations, the general constancy of divergent patterns in different geographical areas becomes evident and warrants the recognition of some subspecies.

Records of migrations of *drusilla* are given by Williams (1930, pp. 27, 111). The separate recognition of *drusilla* from *Ascia monuste* in flights might be difficult, but that it is a migrant species seems quite evident.

A. *Appias (Glutophrissa) drusilla drusilla* (Cramer)

Papilio drusilla CRAMER, 1777, II, p. 21, Pl. cx, fig. C. Female. "Batavia."

The probable origin of Cramer's specimen is Surinam. The figure may be matched by specimens from the Guianas, Venezuela and Colombia.

Papilio fuscofimbriatus GOEZE, 1779, p. 182. Female.

This is doubtfully included by Talbot in the synonymy of *drusilla* (1932, p.184). I have not seen the reference.

Pieris ilaire LATREILLE, 1819, p. 142. Male. "Brazil."

As shown by a photograph, made by Mr. C. F. dos Passos, one of the reputed types is labeled: "Ilaire. Godart. Brazil." This is a male of the continental kind which flies with the female *drusilla*.

Pieris mysia LATREILLE, 1819, p. 143. Female. "Brazil."

This is a minor variant of the female of *drusilla*, judging from the description and from a photograph of the reputed type, labeled "Bresil. auc. coll. Type de Godart Mysia. v. monuste."

Pieris albunea DALMAN, 1823, p. 39. Male. "Brazil."

From the description, this is a typical male of *drusilla*.

Mylothris margarita HÜBNER, 1825, Sammlung, II, Pl. cccxxxiii, figs. 1-4. Male. No locality.

The figures, called male and female, are

of two slightly variant males of continental *drusilla*.

Appias castalia BUTLER (nec Fabricius), 1872, p. 50. Male.

A mistaken reference. (See Talbot, 1932, p. 184; 1935, p. 545.)

Mylothris molpadia HÜBNER, 1823, Zuträge, II, p. 15, Figs. 259 and 260. Female. "Brazil."

Hübner said that his specimen was probably a male but that he was not sure of it. The figure shows a small female with a forewing length of 29 mm. The forewing is narrowly fuscous bordered on the outer margin, but there is no fuscous area along the costa. The hindwing is without marking. I have before me such small lightly marked specimens, from Florida (April), Cuba (March), Panama (February) and Mexico. D'Almeida (1939, Pl. iv, fig. C) showed a female from Rio de Janeiro which is of the *molpadia* form which he called *janeira*. I do not agree with d'Almeida's statement that the locality, Brazil, given by Hübner for *molpadia* is incorrect. I further do not consider that d'Almeida is correct in assigning the name *molpadia* to the Cuban subspecies, which is normally heavily shaded with fuscous along the costa in the females (see d'Almeida, 1939, Pl. III, fig. C; Pl. iv, fig. E). In an earlier paper (1921, p. 59), d'Almeida recognized the female sex of Hübner's *molpadia*, synonymized *janeira* with it and placed it as the winter form of *drusilla* in Brazil. In this action, I consider that he was entirely correct.

Tachyris janeira BÖNNINGHAUSEN, 1896, p. 30. Male and female. Rio de Janeiro.

Böninghausen caught five small specimens in two years in a place where he said that *ilaire* was common. From his description, the males are not unusual and the females would agree with *molpadia*. D'Almeida (1939, p. 56, Pl. iv, fig. C) considered *janeira* the winter form of *drusilla* and said that it was common about Rio de Janeiro in the months of June, July and August. I cannot consider *janeira* other than a synonym of *molpadia*, the status of which is no more than a form name for the South American winter

brood. The odd specimens in other populations which look like *molpadia* cannot be regarded otherwise than as extreme variants of those populations.

Appias drusilla f. *nana* D'ALMEIDA, 1913, p. 4; 1921, p. 59; 1939, p. 56, Pl. iv, fig. F. Female. Rio de Janeiro.

D'Almeida, in his last reference, placed *nana* as an aberration of *drusilla*, which is suggested by his figure.

B. *Appias* (*Glutophrissa*) *drusilla* *neumoegenii* (Skinner)

Tachyris ilaire n. var. *neumoegenii* SKINNER, 1894, p. 110, Pl. iv. Female. Florida.

This subspecies is well defined by the females, which vary from specimens with an immaculate creamy upper surface to specimens with bold, dusky brown forewing margins and ochre hindwings. The general characters which separate *neumoegenii* from other geographical races of *drusilla* appear constant in a series of forty specimens. The creamy coloring, with a suggestion of pink, is distinctive, individual variation notwithstanding.

Appias drusilla ab. *hollandi* RÖBER, 1909, p. 68. Female. Florida.

Röber's *hollandi*, erected upon Holland's figure (1898, Pl. xxxv, fig. 5), is not an aberration but the normal female of *neumoegenii*. Röber was entirely mistaken in stating that Holland's figure was that of a male, for it is of a female which is obvious from the figure, judging by the characteristic female wing-shape.

C. *Appias* (*Glutophrissa*) *drusilla* *poeyi* Butler

Appias poeyi BUTLER, 1872, p. 49. Female. Cuba.

Butler described *poeyi* as follows:

"54. *Appias poeyi*, sp. nov.

"♀. *Pieris ilaire*, Poey (nec Godart).

Cen. Lep. (1833).

"St. Domingo; Panamá; Honduras. B. M.

"The species figured by Poey has nothing to do with the Brazilian *A. ilaire*, although much like it in the male sex."

Through the citation to the *ilaire* of Poey, the type of *poeyi* is definitely fixed

as a female from Cuba and not from elsewhere. Poey's figure showed a well-marked specimen, characteristic of the Cuban population, although many, more lightly marked specimens occur. The base of the forewing is infuscated for about one-third of the area of the wing, but the cell is only about two-thirds filled with the dark color; the apex and outer margin are fuscous for a width of about 3 mm.; the ochre-colored hindwing has fuscous marginal spots at the ends of the veins. D'Almeida (1939, Pl. III, fig. C) figured a specimen from Cuba which closely approximates the type but which he misidentified as *molpadia* as previously noted.

Butler's localities for *poeyi* are quite in error and presumably he further labeled a pair of specimens as types which are not mentioned in his description. These specimens, existing in the British Museum, are labeled "*Glutophrissa poeyi* ♂ type Butler" and "*Glutophrissa poeyi* ♀ type Butler." On the reverse of the labels is the inscription "St. Domingo. 55-1." As Butler did not erect the genus *Glutophrissa* (genotype: *poeyi*) until 1887, these "types" could not have been so labeled at the time of description and presumably not less than fifteen years later. I do not regard the above-mentioned specimens as types, and furthermore they are not *poeyi* but examples of a different subspecies occurring in Hispaniola.

It thus appears that no valid type of *poeyi* was ever designated. A female, in almost exact agreement with Poey's figure, from Sierra Maestra, Cuba, in the collection of The American Museum of Natural History, is here designated as the neotype.

Appias janeira f. *peregrina* RÖBER, 1909, p. 105, Pl. xxvi, C. Female. Cuba.

Röber, again mistaking sexes, showed two figures of females, calling them males. Although Röber described *peregrina* as a form of *janeira*, Talbot (1932, p. 185) listed *peregrina* as a species and made the previously described *janeira* a form of it, which is an oversight. D'Almeida (1939, p. 62) also listed *peregrina* as a species, but doubtfully, for he considered the possibility of Röber's specimens being

females, in which case he would associate *peregrina* with *molpadia* d'Almeida (nec Hübner) from Cuba.

I have before me a female from Cuba which matches Röber's figures of *peregrina* both in size and pattern. I cannot regard Röber's figures otherwise than as representing females, and I therefore place *peregrina* as an individual variant of the Cuban subspecies *poeyi*. I have also before me from Cuba a number of intergrades between the lightly marked *peregrina* and the heavily marked, typical *poeyi*.

D. *Appias* (*Glutophrissa*) *drusilla jacksoni* (Kaye)

Glutophrissa drusilla jacksoni KAYE, 1920, p. 188. Male and female. Jamaica.

This is a geographical race distinguished by small size in both sexes, with a length of forewing varying from 22 to 29 mm. The females are creamy white, devoid of upper-side marking on the forewing or with obsolete marginal marking and with a delicate yellowish suffusion at the base of the hindwing.

The male genital armature of *jacksoni* has the characteristic structure found in other forms of *drusilla*.

This subspecies *jacksoni* (the Jamaican race), or a very close subspecies, apparently occurs on Little Cayman and Cayman Brac. Carpenter and Lewis (1943, p. 376) briefly characterized the form from these islands, misdetermined for them by A. Hall as *Appias drusilla peregrina* Röber. As described, the Cayman form is inseparable from *jacksoni* Kaye. It is definitely not *peregrina*, as a reference to Röber's figures will show.

E. *Appias* (*Glutophrissa*) *drusilla monomorpha* Hall

Appias drusilla monomorpha HALL, 1936, p. 275. Male and female. Grenada.

Hall said of this: "The female is wholly white, like the male, without any black scaling at the apex or base of fore wings and without the yellow mark at the base of hind wings beneath." This appears to be a subspecies similar in its nature to *jacksoni* from Jamaica.

F. *Appias* (*Glutophrissa*) *drusilla*
boydi, new subspecies
Hispaniola

Glutophrissa drusilla poeyi, KAYE (nec Butler), 1920, p. 188.

Tachyris drusilla poeyi, HALL (nec Butler), 1925, p. 163.

SIZE AND SHAPE.—The males have a length of forewing varying from 28 to 32 mm.; the forewing is apically acute, emarginate on the outer margin at M_3 , and the angle at the tornus is about 100° ; the hindwing is fully rounded; the females have a length of forewing varying from 25 to 30 mm.; at the apex, the forewing is sharply angled but not acute, but slightly emarginate on the outer margin at M_3 , and the angle at the tornus is about 95° ; the hindwing is shaped as in the male.

fuscous border beginning with a width of about 10 mm. on the costa, gradually narrowed to about 4 mm. at M_2 , abruptly broadened to about 7 mm. from M_2 to Cu_1 and again narrowed to 4 mm. thence to the inner margin; an area from the wing base along the costa to the base of R_2 , filling the entire area of the cell and extending from the cell to the inner margin for a distance of about one-half of the length of the cell, is heavily fuscous scaled; on the hindwing there is a fuscous outer border, about 2 mm. wide, made up of contiguous spots, otherwise the wing surface is tinted pale yellow; on the underside the maculation is confined to the forewing, consisting of a bright yellow suffusion from the base, filling half or more of the area of the cell and a fuscous suffused area diagonal to the outer margin, extending approximately from M_3 to Cu_2 . Some females show a tendency to

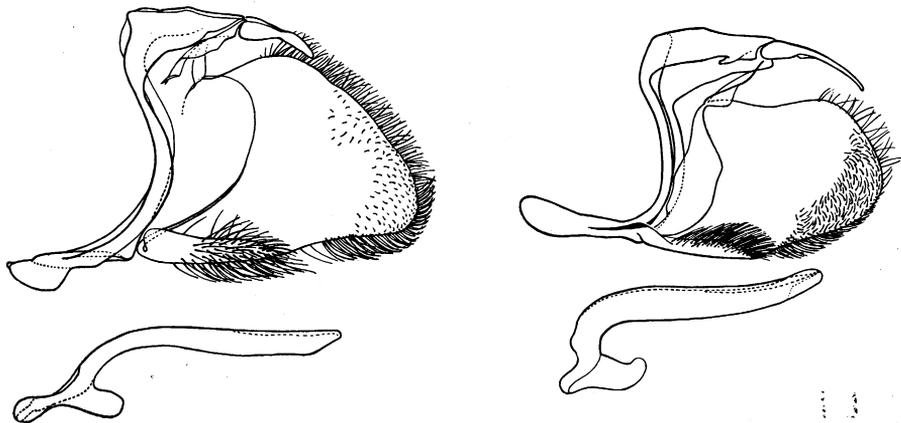


Fig. 1. (Left) *Appias drusilla boydi*, new subspecies. Left lateral view of male genital armature, partly dissected to show inner surface of right harpé and aedeagus. Specimen from Monte Cristi, Dominican Republic.

Fig. 2. (Right) *Appias punctifera* d'Almeida. A similar view at the same scale. Specimen from St. John, Virgin Islands.

The drawings were made by Miss Alice Gray.

GROUND COLOR.—The male on the upperside is shiny white, on the underside less shiny white with the apex of the forewing and the entire surface of the hindwing slightly cream-colored; the ground color of the female is like that of the male but much modified by the markings.

MARKINGS.—The forewing of the male, on both surfaces, is dusted with fuscous scales along the costa to the base of R_1 and beyond, a black line edges the wing to the apex and along the outer margin to Cu_1 , in some specimens slightly farther; the hindwing is immaculate on the upperside, but on the underside there is an orange line along the costa from the base and thinly showing to the apex of Sc ; in some specimens there is a faint yellow suffusion at the base of the forewing on the underside; the female, on the forewing, has a broad terminal

reduction in the markings in the forewings and a loss of the marginal markings of the hindwings.

GENITAL ARMATURE.—This is of the typical *drusilla* pattern (Fig. 1).

Of the various insular and continental populations of *drusilla*, that of Cuba, *drusilla poeyi* Butler, is the closest to *boydi*. I am not able to separate the males of *poeyi* from *boydi*, but the females can be separated without difficulty. The females of *poeyi* differ as follows: the marginal border of the forewing is one-half as wide as that of *boydi*; the projection of the border basad below M_2 is less than 4 mm.; less than half the cell area basad is suffused with fuscous; the fuscous margining of the hindwing is less than half as prominent; the hindwing is

usually a uniform ochre yellow, more noticeable than in *boydi*.

Types, all from Hispaniola: holotype, female, Barahona, Dominican Republic, July 29-31, 1932, and allotype, male, Barahona, Dominican Republic, July 20-26, 1932, both collected by W. M. Bush. Paratypes: two males and four females, Barahona, Dominican Republic, July 6-19, August 1-15, 1932, collected by W. M. Bush; male, Monte Cristi, Dominican Republic, March 13, 1931; male, Fond Parisien, Haiti, February 11-18, 1922; female, Freres, Haiti, May 27, 1930; female, Kenscoff, Haiti, 4826 feet elevation, March 10, 1935; female, Mira Goane, Haiti, August 14, 1927; two males, St. Marc, Haiti, March 30-April 2, 1922; female, Trouin, Haiti, 500 feet elevation, March 30, 1935.

The following paratypes are in the British Museum, male and female, labeled "St. Domingo. 55-1" and "*Glutophrissa poeyi* ♂ type Butler" and "*Glutophrissa poeyi* ♀ type Butler," the same being the two specimens misdetermined as types of *poeyi* Butler.

I have named this subspecies in memory of John Boyd, young entomologist of promise, student at Princeton University, who enlisted in the United States Navy at the beginning of the war and died of wounds received in action in the Solomon Islands, during the month of November, 1942.

II. *Appias punctifera*

Appias (Glutophrissa) punctifera d'Almeida

Tachiris margarita, DEWITZ (nec Hübner), 1877, p. 234. Female. Puerto Rico.

Tachiris molpadia, DEWITZ (nec Hübner), 1877, p. 245, Pl. I, figs. 1 and 2. Female. Puerto Rico.

Appias drusilla molpadia, RÖBER (nec Hübner), 1924, p. 1017.

Appias (Glutophrissa) drusilla punctifera D'ALMEIDA, 1939, p. 61, Pl. IV, figs. A and B. Puerto Rico.

D'Almeida recognized that the four females, which Dewitz had and described at some length with figures, were distinctly different from the usual *drusilla*. Dewitz considered his four females "Bastarden" (hybrids), or "ein Ruckschlag" (a throw-back), and did not propose a new name for them. Möschler (1890, p. 93) and Gundlach (1891, p. 420) made note of these females without further comment. D'Almeida based his name on Dewitz's description and figures, apparently without

specimens. No one appears to have recognized previously the male of this species, which is sympatric with *Appias drusilla boydi* in Puerto Rico and the Virgin Islands. That *punctifera* is a distinct species is quite evident when both sexes are examined.

The male has a length of forewing varying from 26 to 29 mm.; unlike the *drusilla* forms, the outer margin is not noticeably emarginate at M_3 ; the shape of the hindwing scarcely differs from that of *drusilla*. The upper surface is white, infuscated slightly at the base of the forewing costa and with a faintly indicated black line beyond and about the apex, much less obvious than in *drusilla boydi*; at the end of the forewing cell there is a black linear spot, 1 mm. long, sometimes barely indicated. The under surface is glistening white, except for the disk of the forewing, thus differing from *drusilla* which in contrast is slightly creamy; the black spot at the end of the forewing cell is intensified, and there is a bright yellow basal suffusion occupying one-third of the cell.

Three females, varying from 26 to 29 mm. in length of forewing, have the angle at the tornus more nearly rectangular than is the case with the males; otherwise the wing shape is about the same. The forewings are white, with or without an outer marginal fuscous border; the hindwings are distinctly cream-colored. The spot at the end of the forewing cell is larger than in the male, partly or completely closing the cell, 2 mm. long and from 1 to 2 mm. wide, and prominent on the wing, as shown by Dewitz' figures. The underside is similar to that of the male but with the cell spot more prominent and the basal yellow suffusion extended to fill half or more of the area of the cell.

The male genital armature is of the *Glutophrissa* type but differs from *drusilla*, as shown in Fig. 2.

This species is recorded in Puerto Rico: male, Barros, June 4; two males, Coamo Springs, April 6, male and female, July 17-19. It has been taken also in the Virgin Islands: five males and one female, St. John, March 6; female, St. Thomas, June 3.

BIBLIOGRAPHY

- BUTLER, ARTHUR GARDINER
1872. A synonymic list of the species formerly included in the genus *Pieris*; with all others described since the subdivision of the group by recent authors. Proc. Zool. Soc. London, pp. 26-67.
- BÖNNINGHAUSEN, VICTOR VON
1896. Beitrag zur kenntnis der Lepidopteren-fauna von Rio de Janeiro. Verh. Ver. naturwissen. Unterhaltung, Hamburg, IX, pp. 19-41.
- CARPENTER, G. D. HALE, AND LEWIS, C. B.
1943. A collection of Lepidoptera (Rhopalocera) from the Cayman Islands. Ann. Carnegie Mus., Pittsburgh, XXIX, pp. 371-396.
- CRAMER, PIERRE, AND (in part) STOLL, CASPAR
1775-1791. Papillons exotiques de trois parties du monde, etc. Amsterdam, I-IV (Cramer), supplement (Stoll).
- DALMAN, JOH. WILH.
1823. Analecta Entomologica. Holmiae, pp. I-VIII, 1-104, (1-4), Pls. I-IV.
- D'ALMEIDA, R. FERREIRA
1913. "Trois Lépidoptères nouveaux du Brésil. Rio de Janeiro, in-8.°, 2 pp."
1921. Notes sur quelques Lépidotères d'Amérique du Sud. Ann. Soc. Ent. France, Paris, XC, pp. 57-65.
1939. Revisão do gênero *Appias* (subgen. *Glutophrissa* Butl.). Bol. Biol., Rio de Janeiro, (n. s.) IV, pp. 50-66, Pls. III, IV.
- DEWITZ, HERMANN
1877. Tagschmetterlinge von Portorico. Ent. Zeit., Stettin, XXXVIII, pp. 233-245, Pl. I.
- GOEZE, JOHANN AUGUST EPHRAIM
1777-1783. Entomologische Beiträge zu des Ritter Linné zwölften ausgabe des Natursystems. Leipzig, I-III, Pts. 1-4.
- GUNDLACH, JUAN
1891. Apuntes para la fauna Puerto-Riqueña. VII, Part 7. Orden Lepidópteros. Ann. Soc. Española Hist. Nat., Madrid, XX, pp. 411-572.
- HALL, ARTHUR
1925. List of the butterflies of Hispaniola. Entomologist, London, LVIII, pp. 161-165, 186-190.
1936. The butterflies of St. Kitts. *Ibid.*, LXIX, pp. 274-278.
- HOLLAND, WILLIAM JACOB
1898. The butterfly book. New York, pp. I-XX, 1-382, Pls. I-XLVIII.
- HÜBNER, JACOB, AND (in part) GEYER, CARL
1806-1838. Sammlung exotischer Schmetterlinge. Augsburg, I-III.
1818-1837. Beiträge zur Sammlung exotischer Schmettlinge. Augsburg, I-V.
- KAYE, W. J.
1920. New species and subspecies of S. American Lepidoptera. Ent. Record and Jour. Variation, London, XXXII, pp. 187-189.
- KLOTS, ALEXANDER BARRETT
1933. A generic revision of the Pieridae. Entomologica Americana, Brooklyn Ent. Soc., New York, (N.S.) XII, pp. 139-242, Pls. v-XIII, figs. 1-100.
- LATREILLE, PIERRE ANDRÉ
1819-1823. Encyclopédie Méthodique, etc. Paris, IX, pp. 1-828.
- MÖSCHLER, HEINRICH BENNO
1890. Die Lepidopteren-Fauna von Portorico. Abhandl. d. Senckenb. naturf. Ges., Frankfurt, XVI, pp. 69-360, Pl. I.
- POEY, FELIPPE
1832. Centurie de Lépidoptères de l'Isle de Cuba, etc. Paris, first decade, pp. 1-30, Pls. I-X; second decade, pp. 1-22, Pls. I-X.
- RÖBER, J.
1909-1924. Pieridae. Macrolep. World, Stuttgart, V, pp. 53-111, 1014-1026, Pls. XVIII-XXX.
- SKINNER, HENRY
1894. *Tachyris ilaire* n. var. *neumoegenii*. Ent. News, V, p. 110, Pl. IV.
- TALBOT, GEORGE
1932-1935. Pieridae. Lepidopterorum catalogus, Berlin, Partes 53, 60 and 66, pp. 1-697.
- WILLIAMS, C. B.
1930. The migration of butterflies. Edinburgh and London, pp. I-XI, 1-473.