

The distribution, status, and eco-ethology of *Glutophrissa punctifera* (D'ALMEIDA, 1939) in the Dominican Republic

(Lepidoptera, Pieridae)

by

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Zusammenfassung: Der selten nachweisbare karibische Endemit *Glutophrissa punctifera* (D'ALMEIDA, 1939) wird für den westlichen Teil der Dominikanischen Republik gemeldet. Hinweise zur Geschichte der Einstufung, zur Ökologie und zur Verbreitung werden gegeben. *Dynamine postverta mexicana* D'ALMEIDA, 1952 wird erstmals aus der Dominikanischen Republik gemeldet. Mit 10 zusätzlichen Arten erhöht sich die Schmetterlingsfauna von Arroyo Calabaza, in der Nähe von Arroyo Cano, in der Provinz S. Juan, auf insgesamt 80 Arten.

Resumen: El esquivo endemismo Caribeño *Glutophrissa punctifera* (D'ALMEIDA, 1939) se cita en el occidente de la República Dominicana. Se dan notas de la clasificación, la eco-etología y la distribución de dicha especie. *Dynamine postverta mexicana* (D'ALMEIDA, 1952) se cita por primera vez en la República Dominicana. Con 10 nuevos registros la fauna de mariposas de Arroyo Calabaza, cerca de Arroyo Cano, provincia de S. Juan, se eleva a un total de 80 especies.

Abstract: The elusive Caribbean endemic *Glutophrissa punctifera* (D'ALMEIDA, 1939) is reported for the western part of the Dominican Republic. Notes on history of classification, eco-ethology, and distribution are given. *Dynamine postverta mexicana* (D'ALMEIDA, 1952) is recorded from the Dominican Republic for the first time. With 10 additional records, the butterfly fauna of Arroyo Calabaza, near Arroyo Cano, S. Juan Province, raises to a total of 80 species.

Introduction: *Glutophrissa punctifera* (D'ALMEIDA) (fig. 1) is perhaps the least known and most elusive of endemic Antillean pierids. It much resembles *G. drusilla* (CRAMER, 1777) which is widespread from S Florida and Bahamas down to central America and to S Brasil. *Glutophrissa punctifera* (D'ALMEIDA) and *G. drusilla* (Cr.) are likely sister species and the latter shows an almost uniform external morphology from S Florida to S Brasil. *Glutophrissa drusilla* (Cr.) is a migratory species (see BROWN & HEINEMAN, 1972; TURNER & TURLAND, 2017) and although inter-island dispersal is at present unknown, it is odd that a number of morphologically different populations have been recognized in various islands of the Antilles. These are currently treated as subspecies.

Glutophrissa punctifera (D'ALMEIDA), distributed in the Dominican Republic, Puerto Rico and the Virgin Islands, differs for the FW black spot at the distal end of the cell in both sexes, more evident in the ♀. It is rare in collections, and RILEY (1975) as well as SCHWARTZ (1983, 1989) and D'ABRERA (2016) mentioned that they had not seen a specimen. Following researches in the Dominican Republic the authors found *G. punctifera* (D'ALMEIDA) in 3 different sites in the western part of the island.

Abbreviations: UP = Upperside; UN = Underside; LFW = Length of FW; FW = Forewing (s); HW = Hindwing (s); UPFW = Upperside Forewing (s); UNFW = Underside Forewing (s); UPHW = Upperside Hindwing (s); UNHW = Underside Hindwing (s); DR = Dominican Republic.



Fig. 1: *Glutophrissa punctifera* (D'ALMEIDA, 1939), ♂, upper (left) and underside (right) from Arroyo Calabaza, Arroyo Cano, San Juan Prov., 2.VII. 2019.

History of classification: DEWITZ (1877: pl. I, figs 1, 2) under the name *Tachiris Margarita* HÜBNER, [1823], diagnosed a butterfly for "the lemon yellow on the underside at the root of the wings" on the basis of 4 ♀♀ collected by the Consul KRUG in Puerto Rico. Then, D'ALMEIDA (1939) noticed the differences among *Tachiris Margarita* and the figures given by DEWITZ (1877), and proposed the new name *punctifera* referring to the two figures A and B, the same depicted in DEWITZ (1877). D'ALMEIDA (1939) had no material from Puerto Rico and therefore by implication the two ♀♀ reported by DEWITZ (1877) are considered syntypes. It is not

unlike that the specimens of HERMANN DEWITZ are still present in the Museum für Naturkunde in Berlin.

The first author who looked further on the issue was COMSTOCK (1943) who detected differences between ♂ genitalia of *G. drusilla boydi* (COMSTOCK, 1943), described as a new subspecies from Dominican Republic, and *G. punctifera* (D'ALMEIDA) mainly for the shape of the valvae, of the aedeagus, and the length of the uncus (fig. 2). Therefore, COMSTOCK (1943) raised *G. punctifera* (D'ALMEIDA) to specific status.

No more information was added to *G. punctifera* (D'ALMEIDA) until RILEY (1975) gave differential diagnosis with *G. drusilla* (CR.) but did not illustrate *G. punctifera* (D'ALMEIDA) as well as D'ABRERA (2016) due to absence of material at their disposal.

Morphology: COMSTOCK (1944) suggested the following characters to distinguish *G. punctifera* (D'ALMEIDA) ♂♂: “Outer margin not noticeably emarginate at M3; HW shape similar to that of *G. drusilla* (CR.); UPFW white; FW costa slightly darkened basally; faint black line beyond and about the apex; end of FW cell with a black linear spot, sometimes very faint; underside glistening white except FW discal area which in *G. drusilla* (CR.) is slightly creamy; FW cell black spot prominent; bright basal yellow suffusion filling one third of the cell. COMSTOCK (1943; 1944) did not differentiate ♀♀ from Puerto Rico and Virgin islands (St. John and St. Thomas). The 3 available ♀♀ have a LFW 26 to 29 mm; wing shape similar to that of ♂ but the “angle at the tornus more nearly rectangular than is the case with the ♂♂”; FWs white with or without an outer marginal fuscous border; HWs creamy coloured; FW cell black spot larger than in the ♂ partly or completely closing the cell.

Underside as in the ♂ but FW cell spot more prominent, and basal yellow suffusion filling half or more of the cell area.

SMITH et al. (1989) reported that D'ALMEIDA (1939) based his description of *G. punctifera* (D'ALMEIDA) on four “all white” ♀♀ collected in Puerto Rico, the type locality. These four original ♀♀ were “white” with only a limited black suffusion at the FW apex, as illustrated by DEWITZ (1877) whereas COMSTOCK (1944), as noted above, described this sex as “white, with or without a fuscous border”.

SMITH et al. (1989: fig. 3a-b) illustrated one of 2 ♀♀ collected near Ponce (Puerto Rico) which fits the “white” morph (sensu DEWITZ, 1877). In these specimens, the fuscous FW border above is very reduced in width, to only approximately 1 mm at the apex. In addition, the FW end-cell spot above is slightly narrower than in the more heavily marked morph. In these specimens this spot occupies about two thirds of the distal end of the cell. A ♂ collected near Ponce shows no differences from specimens taken at the same time in the Dominican Republic. The first two Dominican ♀♀ of *G. punctifera* (D'ALMEIDA) are reported from Boca de Yuma and both show broad fuscous-black borders (SMITH et al. 1989: fig. 2a-b). These authors wonder whether this forms may reflect seasonality. Also, SMITH et al. (1989) compared their specimens with COMSTOCK's (1943, 1944) descriptions, and they found similar characters mostly in the cell spot size and the conspicuous bright lemon-yellow suffusion which fills the basal third of the UNFW cell, and half or more of the cell area in the ♀. The “glistening” or silky appearance of the underside ground color in both sexes is striking.

Their material diverges slightly from COMSTOCK's accounts in that the UPFW ♀ ground colour is pale cream whereas deeper cream-yellow on the HWs (rather than “white” and “distinctly cream”). In fresh ♂♂, the upperside ground colour is not “white” but very pale eggshell green-blue, a colouration that soon fades in dried specimens.

Later, SMITH et al. (1994: pl. 14, fig. 11a and fig. 11c) depicted the two above mentioned ♀♀ from Ponce, Puerto Rico, and from Boca de Yuma, La Altagracia Prov., DR, respectively. Both ♀♀ were collected in January 1987 but the Puerto Rican specimen shows light markings whereas that from Boca de Yuma is darker. These were alleged to be seasonal forms. TURNER & TURLAND (2017) discussing *G. drusilla castalia* (FABRICIUS, 1793) stated that in the Jamaican ♀♀ “there are no dramatically marked seasonal forms”. To our opinion, they represent ♀♀ of different populations, possibly different subspecies of *G. punctifera* (D'ALMEIDA) in the respective islands. TAKIZAWA et al. (2003: pl. 12 fig. 3) reported one ♀ specimen collected in July from Catuana, Saona island (La Altagracia Province), and noted its resemblance with the wet forms of *G. drusilla boydi* (COMSTOCK). Indeed, this specimen shows a reduced melanism if compared with that of ♀♀ of *G. d. boydi* (COMSTOCK) but the UPFW marginal band is joined with the black cellular spot. PÉREZ-ASSO et al. (2017: 209, figs [7-8]) illustrated a ♀ of *G. punctifera* (D'ALMEIDA) which shows the UPFW marginal band reaching and joining with the black spot at cell end. This specimen is almost identical to the ♀ illustrated by TAKIZAWA et al. (2003: pl. 12 fig. 3). A ♀ collected by ROBERT WESTPHAL at Boca de Yuma, on the contrary, shows the UPFW marginal band separated from the black spot at the end of the cell.

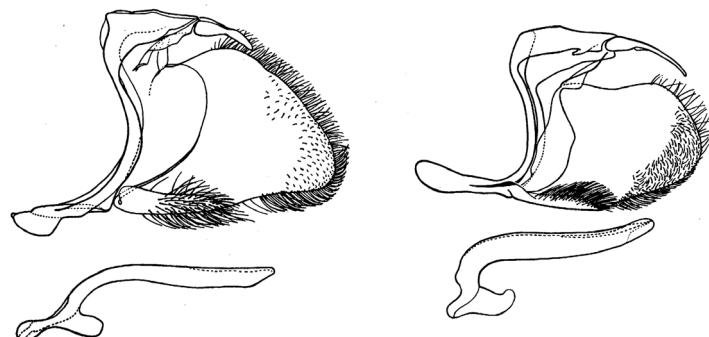


Fig. 2: *Glutophrissa drusilla boydi* COMSTOCK, 1943 (left) - Lateral view of ♂ genital profile to show the inner surface of the right harpe and the aedeagus. Specimen from Monte Cristi, Dominican Republic. *Glutophrissa punctifera* (D'ALMEIDA, 1939) (right) - A similar view at the same scale. Specimen from St. John, Virgin Islands (modified after COMSTOCK, 1943).

Distribution: The type locality is “Porto Rico” (D'ALMEIDA, 1939), and SMITH et al. (1994: 134) apparently restricted the type-locality of *G. punctifera* (D'ALMEIDA) to Guánica xeric forest of south-western Puerto Rico. COMSTOCK (1943) recorded from Puerto Rico 1 ♀ (Barros, June), 3 ♀♀ and 1 ♂ (Coamo Springs, April) and 1 ♀ (Lajas, June). The known range of *G. punctifera* (D'ALMEIDA) was extended eastwards (COMSTOCK, 1944) to include the American Virgin Islands, based on 5 ♂♂ and 1 ♀ (St. John, March) and 1 ♀ (St. Thomas, June).

SMITH et al. (1989) reported that RAMOS found *G. punctifera* (D'ALMEIDA) to be rare but occurring in the Guánica xeric forest region of SW Puerto Rico, where it coexists with the common *G. drusilla* (CR.), from which it is indistinguishable on the wing. Additional records include 1 ♂ (Toro Negro, October 1974), another ♂ (Coamo, November 1974), and 3 ♂♂ and 2 ♀♀ (Ponce, Rt. 139, km 9.0, January 1987).

Glutophrissa punctifera (D'ALMEIDA) was first recorded from Hispaniola by CUCURULLO (1959) but without details about locality or collecting data. Later, it was reported by MARIÓN (1975) but with no details.

Surprisingly, *G. punctifera* (D'ALMEIDA) was not reported by SCHWARTZ (1983, 1989) from Haiti or western Hispaniola (but see below). More recent and detailed records for Hispaniola are those by SMITH et al. (1989) and SMITH et al. (1994) who collected few specimens at Boca de Yuma (La Altagracia Province) and at Río Chavón (La Romana Province) together with *G. drusilla* (CR.). As noted above, TAKIZAWA et al. (2003: pl. 12 fig. 3) reported 1 ♀ collected in July from Catuana, Saona island, La Altagracia Province. WAHLBERG & PEÑA (2007) reported one specimen from Parque Nacional Jaragua possibly near Oviedo (Pedernales Province). PÉREZ-ASSO et al. (2009) reported *G. punctifera* (D'ALMEIDA) as fairly rare from Guánica, Coamo, Lejas and in the hills north of Ponce, Puerto Rico apparently on the basis of old records e.g. COMSTOCK (1944).

Comments: SCHWARTZ (1989: 153) discussing *G. drusilla boydi* (COMSTOCK) reported 43 ♀♀ of a “wet form” and 2 ♀♀ of a “dry form”. These latter, collected in the Sierra de Martín García on 25 July and 13 August, respectively, show “the cell gray only on its anterior edge, and a black discocellular spot connected to the dark anterior cell margin. Spot vividly distinct on UNFW”. To our opinion these are ♀♀ of *G. punctifera* (D'ALMEIDA). SMITH et al. (1989) reported field observations on a population of *G. punctifera* (D'ALMEIDA) in eastern Dominican Republic. They visited the Dominican Republic during January 1987 especially near Boca de Yuma in the Altagracia Province. The area is characterized by limestone heavily under cultivation or pasture, but with patches of xeric forest much resembling that of the Guánica region of SW Puerto Rico. *G. drusilla boydi* (COMSTOCK) was common, but confined to forest patches whereas *G. punctifera* (D'ALMEIDA) was found in open areas. All *Glutophrissa* specimens collected in open fields and cleared areas proved to be *G. punctifera* (D'ALMEIDA). Specimens were seen flying out of reach around isolated trees and they saw perhaps five specimens for each one collected. They were not certain whether *G. punctifera* (D'ALMEIDA) was syntopic with *G. drusilla* (CR.) in the forest scrub, but all *Glutophrissa* specimens collected there were of the latter species.

During many years of visits of the authors to the Dominican Republic, only a single specimen, flying together with *G. drusilla* (CR.), was collected at Banano (Pedernales Province). During June 2019, one of us (EMILIO STEFANELLI) collected many specimens at Arroyo Cano, 450-500 m (San Juan Province), and at Las Mercedes, approx. 300 m (Pedernales Province). At the former locality (See Tab. 1, fig. 3), contrary to the observations of SMITH et al (1989) made at Boca de Yuma, *G. punctifera* (D'ALMEIDA) congregates at water puddles whereas *G. drusilla boydi* (COMSTOCK) prefers shady places. *Glutophrissa punctifera* (D'ALMEIDA) was found always in the presence of pools or small creeks.

After some rainy nights at Las Mercedes, there were small ponds along the road for several days, and some specimens of *G. punctifera* (D'ALMEIDA) were found puddling. It was always seen together with *G. drusilla* (CR.), and never found alone. At Arroyo Calabaza (see fig. 3) *G. punctifera* (D'ALMEIDA) was found along the “arroyo” (=creek, gully) at 4 different sites: at the entrance, inside the forest at sunny spots through the canopy, outside the pools along the creek, and also it was present outside at the cross junction of the “arroyo” with the new road.

		<i>G. punctifera</i> (D'ALMEIDA)	<i>G. drusilla</i> (CRAMER)
Date	Locality	number of specimens	number of specimens
01.VI.2019	Boca de Yuma	1 ♂	9 ♂♂
15.VI.2019	Boca de Yuma		5 ♂♂, 1 ♀
24.VI.2019	Las Mercedes	7 ♂♂	3 ♂♂
29.VI.2019	Arroyo Cano	1 ♂	11 ♂
30.VI.2019	Arroyo Cano	5 ♂♂	34 ♂♂, 1 ♀
01.VII.2019	Arroyo Cano	13 ♂♂	44 ♂♂
02.VII.2019	Arroyo Cano	10 ♂♂	54 ♂♂
03.VII.2019	Boca de Yuma		14 ♂♂

Tab. 1: *Glutophrissa punctifera* (D'ALMEIDA, 1939) and *G. drusilla* (CRAMER, 1777) specimens collected at each locality,

The flight is more nervous (in other words less predictable) than that of *G. drusilla* (CR.). It is common to observe specimens of both species flying together forming clusters of 4-5 individuals. They start to play follow-the-leader, which sometimes becomes a ring-around-the-rosey. *Glutophrissa punctifera* (D'ALMEIDA) is recognizable even in flight as it is, in almost all cases, considerably smaller than *G. drusilla* (CR.). (See Tab. 2). Morphologically, a quick diagnostic character lies in the angle of the apices of the fore wings of *G. punctifera* (D'ALMEIDA) which is much less pronounced than in *G. drusilla* (CR.). Specimens of *G. punctifera* (D'ALMEIDA) collected at Las Mercedes have the UPFW black spot very faint.

	<i>G. punctifera</i> (D'ALMEIDA)	<i>G. drusilla</i> (CRAMER)
Arroyo Cano	26,82 (29 ♂♂)	28,41 (32 ♂♂, 1 ♀)
Banano	25 (1 ♂)	26,71 (10 ♂♂, 7 ♀♀)
Boca de Yuma	25 (1 ♂)	27,43 (5 ♂♂, 2 ♀♀)
Las Mercedes	27,2 (7 ♂♂)	28,79 (28 ♂♂, 1 ♀)
Total average LFW	26,01	28,11

Tab. 2: Averages of LFWs (in mm) for both species at each locality (number of specimens among parentheses).

At present, it is not clear how many ♀ forms of both species occur in Hispaniola and if these forms are correlated to climate. The ♀ of *G. punctifera* (D'ALMEIDA) figured by SMITH et al. (1994: pl. 14, fig. 11c) from Boca de Yuma (La Altagracia Prov.) was collected in January and therefore should be the wet form. It is the morph with a large black border on the FWs - if compared with Puerto Rican ♀♀ - but not so large as that of the specimen figured by TAKIZAWA et al. (2003: pl. 12 fig. 3) collected in Saona island on 6th July 2002.

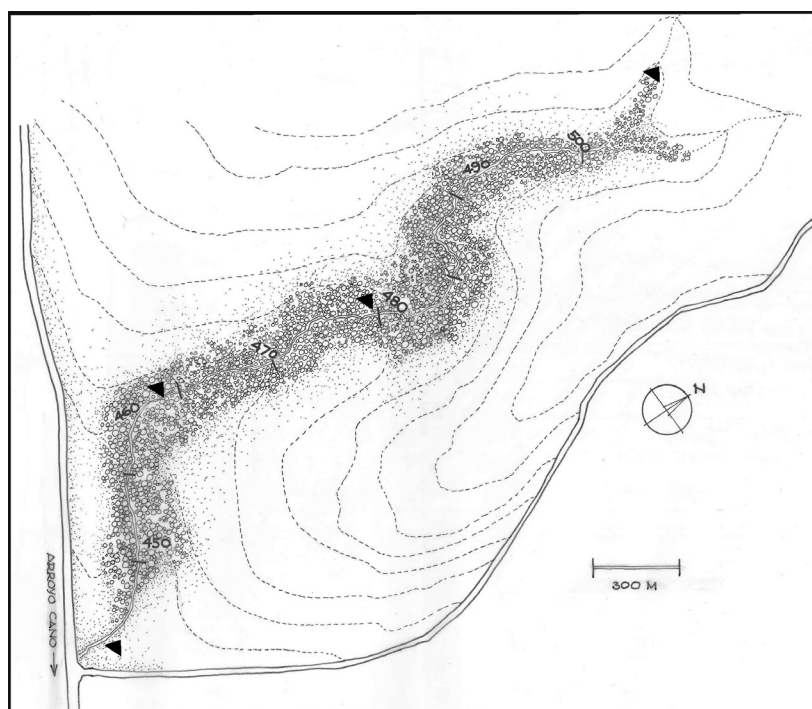


Fig. 3: Sketch of the gully Arroyo Calabaza with altitudes near Arroyo Cano, San Juan Province. White dots indicate the forested area. Black triangles represent presence of *Glutophrissa punctifera* (D'ALMEIDA, 1939) (modified after RACHELI et al., 2017).

Lastly, 9 new records of butterflies other than the new record for *G. punctifera* (D'ALMEIDA), are to be added to the 70 already reported by RACHELI et al. (2017) for the Arroyo Cano long term field research raising the total to 80 species. These are the new records: *Cynaenestis tripunctus* (HERRICH-SCHÄFFER, 1865), *Choranthus haitiensis* SKINNER, 1920, *Heraclides aristor* (GODART, 1819), *Eurema daira palmira* (POEY, [1853]), *Pyrisitia euterpiformis* (MUNROE, 1947), *Doxocopa thoe* (GODART, 1824), *Eunica monima* (STOLL, 1782), *Siderone galanthus nemesia* (ILLIGER, 1801), and *Dynamine postverta mexicana* D'ALMEIDA, 1952. SCHWARTZ (1989: 505) reported 84 species for El Aguacate, 4-7 km NE, 519-824 m, Independencia Prov. Therefore, the second butterfly species richness place for Hispaniola is represented by Arroyo Calabaza.

Dynamine postverta (CRAMER, 1779) is new for the Hispaniolan fauna and it was found also abundant at Las Mercedes (Pedernales Prov.) and at Vallejuelo (S. Juan Prov.) during October 2019. It is a seasonally abundant species in western Cuba (HERNÁNDEZ, 2004) reported as *D. mylitta* CRAMER, 1782, and Hispaniolan specimens are not separable from *D. m. mexicana* D'ALMEIDA, 1952. It is not unlike that this species migrated from Cuba and established breeding populations. It is to point out that while *D. postverta* (CR.) was found during July and October 2019 in all the surveyed sites, not a single *G. punctifera* (D'ALMEIDA) was found in October.

Conclusions: Alas, we were able to reply to only one question put by SMITH et al. (1989) 30 years ago, namely the range extension of *G. punctifera* (D'ALMEIDA) which is now more extended westwards. Female dimorphism and preimaginal stages remain untold. Another problem are the ♀♀ forms. RILEY (1975) claimed that *A. drusilla boydi* (COMSTOCK) is indistinguishable from the Cuban *A. d. poeyi* BUTLER, 1872 except in the wet form ♀ which has the the whole UPFW cell black. The hypothesis that light and dark forms of ♀♀ are linked to seasonality is therefore open to question being *G. punctifera* (D'ALMEIDA) ♀♀ poorly represented in collections. Possibly, by analogy to *G. drusilla* (CR.), also *G. punctifera* (D'ALMEIDA) may show dimorphic ♀♀. Indeed, the more heavily marked ♀♀ of *G. drusilla poeyi* (COMSTOCK) and *A. drusilla boydi* (COMSTOCK) have been associated with the wet season. Also, it is not unlike that populations of *G. punctifera* (D'ALMEIDA) from Hispaniola may constitute a different subspecies from that of Puerto Rico. SMITH et al. (1989) claimed that the center of the range of *G. punctifera* (D'ALMEIDA) is Puerto Rico. Although it occurs in W Puerto Rico and E Hispaniola, and now also in W, it has not been found in the Mona Island, almost equidistant from the two localities on either side of the Mona Passage. On this small island, *A. drusilla boydi* (COMSTOCK) is present in a very restricted area (SMITH et al. 1988).

TURNER & TURLAND (2017) reported *A. drusilla boydi* (COMSTOCK) from NE Jamaica stressing the migration of this species from Hispaniola. It is then not unlike that a strong migration of *G. punctifera* (D'ALMEIDA) from Puerto Rico occurred and that now breeding populations are established in both the eastern and western parts of the Dominican Republic. Future researches in forthcoming years will exclude or confirm this hypothesis.

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