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BIOGEOGRAPHIC AFFINITIES OF GUANTANAMO BUTTERFLIES AND A REPORT ON SPECIES RECORDED FROM THE UNITED STATES NAVAL BASE, CUBA

Deborah L. Matthews[1], Jacqueline Y. Miller[1], Terry A. Lott[2], Roger W. Portell[3], and James K. Toomey[3]

[1]McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, P. O. Box 112710, Gainesville, Florida 32611-2710, USA

[2]Paleobotany Division and University of Florida Herbarium, Florida Museum of Natural History, University of Florida, P.O. Box 110575, Gainesville, Florida 32611-0575, USA

[3]Invertebrate Paleontology Division, Florida Museum of Natural History, University of Florida, P. O. Box 117800, Gainesville, Florida 32611-7800, USA

ABSTRACT: A synopsis of data for 41 butterfly species collected and observed at the United States Naval Base, Guantanamo Bay, Cuba, during January 2012 is presented along with observations on habitat, nectar plants, and natural history. Data are also provided for specimens in the collections of the McGuire Center for Lepidoptera which were collected on the base prior to our studies, as well as those collected in areas surrounding the base in 1994-95. Larval hosts and adult nectar sources are summarized for the 51 species recorded from the base since 1962. Vegetative habitats, climate, and geomorphology of the area are described and biogeographic patterns discussed. Distribution summaries are given with special reference to endemic and invasive species.

KEY WORDS: *Astraptes*, biogeography, bird predation, endemic species, faunal inventory, Hesperiidae, invasive species, Lycaenidae, *Papilio demoleus*, Papilionidae, Pieridae, nectar plants, Nymphalidae, rain shadow.

INTRODUCTION

The Cuban butterfly fauna has been studied and well documented by various researchers since the late 1800s. Numerous guides have been published (Alayo and Hernández 1987; Bates 1935; Hernández 2004; Barro and Núñez 2011; Riley 1975; Smith et al. 1994; and

Torre 1981) along with notes and faunal lists for the entire region, specific parks, transects, or mountain ranges (Alayón and Solana 1989; Núñez Aguila and Barro Cañamero 2012; Bates 1936, 1939; Gundlach 1881a, b; Lamas 2004; Skinner and Ramsden 1924; Schwartz and Hedges 1991; Torre 1954; Hernández et al. 1994, 1998; and Fernández-Hernández 2007) as well as life history studies on specific taxa (Dethier 1939, 1940, 1942; Dyar 1897; and Hernández et al. 1995). To date, no publications specific to Lepidoptera of the semi-arid desert environment of the Guantanamo Bay area have been produced. Collecting in this area, in particular, within the boundaries of the southern portion leased by the United States government, has been limited. Material from periodic collecting by Richard A. Anderson (1962-1980) is deposited in the collections of the McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History [MGCL]. Photographs of some of these specimens are available online by Warren et al. (2012).

In collaboration with ongoing studies of the invertebrate paleofauna (Portell et al. 2008, 2009), a project was initiated to inventory the Lepidopteran fauna of the Guantanamo Bay Naval Base [GTMO]. As an introduction to this project, we present results and observations of butterflies collected during initial fieldwork conducted 18-26 January 2012. In addition, records of material previously deposited at MGCL by various collectors are included. An overview of sampled habitats, climate, geography, and historical geology is given, and the distribution and biogeography of species encountered are discussed. Observations of nectar associations and evidence of attempted bird predation are presented for several species. Furthermore, the presence of an invasive species, the lime swallowtail, *Papilio demoleus* Linnaeus, first discoved in Cuba in 2007 by Lauranzón Meléndez et al. (2011) is recorded from the base by the collection of a voucher specimen.

Geography and Climate

The tectonic history of Cuba is very complex. With the separation of Pangea during the mid-late Cretaceous, the Proto-Greater Antillean arc was formed over time and later moved through the strait between Central and South America into the Caribbean basin during the Oligocene. Although Cuba is now the largest island in the Greater Antilles, it was originally composed of four smaller islands during this period. Cuba overrode the Bahama Rise during the mid-Tertiary and as a result, Cuba is the only island of the Greater Antilles that is now residing on the North American Plate. Also, there was fragmentation and accretion of the outer margins of these islands, especially between Cuba and Hispaniola. In the Caribbean Basin today, there is a complex interplay of the Chortis Block off Honduras, the Cayman trough off the Yucatan Basin, the North American plate to the north, and a proto-Caribbean subduction zone along northern South America with the Lesser Antillean volcanic arc to the north and west. Thus, there is little “room” for some of these plates to expand or move.

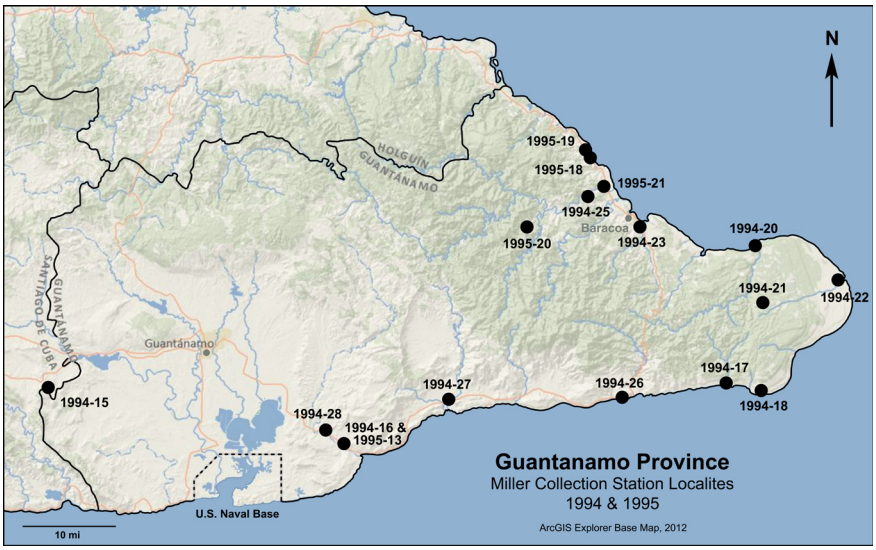
The Guantanamo Bay area consists of a round low basin 35–40 km in diameter which is surrounded by a complex arrangement of several mountain ranges formed as the result of orogeny. This area is best depicted with digital relief mapping such as shown by Castellanos Abella (2008) in producing landslide risk assessment maps. Principal surrounding ranges are the Sierra Maestra massif west of the bay area along the southern coast and the Sagua-Baracoa massif to the northeast. The Sierra Maestra includes Pico Turquino, the highest peak in Cuba (1,980 m). The Sagua-Baracoa massif is comprised of several ranges including the Sierra del Cristal, with the second highest peak in the country, Pico Cristal (1,214 m). The

present day climate of the area is directly influenced by geography. Prevailing tradewinds from the east-northeast bring ample rains to tropical rainforests on the northern slopes of the Sagua-Baracoa massif but result in a rain shadow effect, with semi-arid conditions in the Guantanamo Bay area to the south. Although rainfall is limited, with the average annual precipitation for Guantanamo Bay less than 610 mm (Weatherbase 2012), there are distinct seasonal patterns of annual rainfall with the wet season occuring in two peaks (May-June and August-November) and the dry season (December-April). Highest overall average rainfall (120 mm) is in October and the lowest (20 mm) in January and February. Average monthy high temperatures range from 29–33°C and lows 20–24°C with August the warmest month and January and February the coolest.

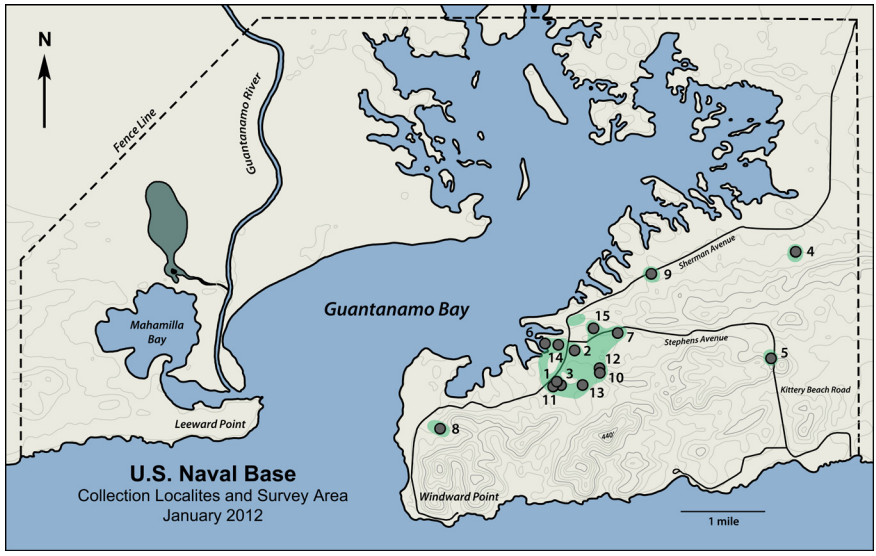
Historical Geology

As with the rest of Cuba, the geology within the GTMO boundaries appears quite complex and poorly understood. The most recent detailed geologic map available to the authors (1:250,000 Santiago de Cuba, 1988) indicates that surface exposures on the Naval Base's Windward side are composed primarily of middle to late Eocene conglomerates belonging to several formally named units (i.e., Boqueron and San Luis Formations). These conglomeratic beds are surrounded, along the coastline, mostly by a continuous, marine unit recorded as middle to late Pliocene (i.e., Jaimanitas Formation) and occasional Holocene alluvial deposits. The map also indicated that the Naval Base's Leeward side is much less complex than the Windward side and consists mostly of Holocene alluvial deposits, the Jaimanitas Formation, and in the southwesternmost portion, some conglomeratic beds (San Luis Formation). However, considerable paleontological prospecting on the Windward side by RWP, JKT and colleagues beginning in 2007 reveals much more complexity. In addition to the aforementioned conglomeratic beds, uplifted and tilted volcaniclastic sandstones, shales, and claystones were encountered, as well as, some metamorphic outcrops. Based on marine fossil mollusks and foraminiferans collected from a limey claystone outcrop near Site 4, the geologic unit was determined to be of middle to late Eocene age. Volcaniclastic sandstones in an outcrop northwest of Site 4 and across Sherman Avenue (Map 2) contained abundant marine and occasional terrestrial fossils (primarily mollusks and plants). Based on the taxa present, it was determined that the age of that unit is probably early Miocene (Portell et al., in prep.). A faunal study of the up to 12 m raised reef Jaimanitas Formation that outcrops along the shoreline of the naval base and in a few interior areas was detailed in Aguayo (1938) and Portell et al. (2008, 2009). This coral-shell dominated unit was dated as late Pleistocene rather than middle to late Pliocene. Further geologic studies are underway.

Our understanding of age and position of geological formations and emergent land forms is key to interpreting the evolutionary relationships and distributions of present day floras and faunas in terms of dispersal vs. vicariance events. From a broader perspective, plate tectonics, volcanic activity, erosion, rising and falling sea levels, and the resulting juxtaposition of geological deposits and marine environments have all played a role in shaping the landforms and exposed substrates of the Caribbean Basin. The variable drainage and soil substrate composition, together with the semi-arid climate, in turn, directly influence present day vegetative communities at GTMO. These factors, along with variable land management practices, have led to the variety of habitats described for our study area below.



Map 1. Physical base map of Guantanamo Province showing location of U.S. Naval base and collection stations for field work conducted within the province in 1994 and 1995 by L. D. and J. Y. Miller and colleagues.



Map 2. Topographic map of U.S. Naval Base showing location of numbered collection sites for fieldwork conducted in January 2012. Green shading indicates area surveyed. Contour interval 40 feet (12.2 m).

Study Area and Habitats

The Guantanamo Bay Naval Base, leased to the United States since 1903, covers an approximately 117 km^2 area at the southeastern shore of Cuba (Maps 1-2) (including the southern half of Guantanamo Bay which divides the base into Windward and Leeward sides). Elevations range from sea level with mangrove and marsh habitats to dry tropical sub-montane scrub hills (Figs. 1-2, 7-8) and ridges up to 153 m. Fieldwork in January 2012 was restricted to the Windward (easternmost) side of the base (Map 2). Patches of mangroves along the edge of the bay consist of *Avicennia germinans* (L.) Stearn, *Rhizophora mangle* L., *Laguncularia racemosa* C.F.Gaertn., and *Conocarpus erectus* L. One such mangrove location (Site 6) has a brackish water creek that extends east through a salt flat (Site 14) lined with mangroves. This creek merges into fresh water and contains *Typha* L., *Acacia* Mill., and scattered patches of *Calotropis procera* (Aiton) W.T.Aiton. Further inland, the creek merges into a marsh containing grass flats, scattered stands of *C. erectus*, *Acacia,* and herbs such as *Scoparia dulcis* L. and *Pluchea odorata* (L.) Cass. (Site 15), all of which run parallel to a dry scrub ridge. A stream enters the marsh from the east then south, which flows through mowed and disturbed fields. Site 7 is adjacent to the mowed fields, and a disturbed stand of *Leucaena leucocephala* (Lam.) de Wit as well as a single mature *Gliricidia sepium* (Figs. 11-12), all of which are adjacent to a plant nursery. Stands of *L. leucocephala* are typical of highly disturbed areas of the Naval Base, especially around buildings (Site 11), but also on hills mixed with *Colubrina* Friche-Joset & Montandon, *Randia* L., and *Acacia* species (Site 10). Disturbed fields in low lying areas or at the end of valleys typically contain tall grass flats with *Crotalaria retusa* L., *Macroptilium cf. lathyroides* (L.) Urb., *Rhynchosia minima* (L.) DC., *Desmodium* Desv., and isolated trees of *L. leucocephala* and *Acacia*. At Site 4, situated between a disturbed field and a thorn thicket is *Commicarpus scandens* (L.) Standl., along with *Melochia tomentosa* L. (Figs. 3-4) which is very abundant at a power line cut (Site 12). Along Site 5, which is in an uninhabited area and slightly higher in elevation, is a narrow stream nestled within a typical thorn thicket, consisting of plants such as *Erythroxylum minutifolium* Griseb., *Bourreria ovate* Miers, *Colubrina* sp., *L. leucocephala*, *Coccothrinax fragrans* Burret (palm), *Acacia*, *Vanilla barbellata* Rchb.f., *Randia*, and *Harrisia taylorii* Britton (cactus). Numerous small valleys are found within the hills and ridges, some of which are open and rocky, with scattered patches of *Stemodia maritima* L. within moist areas (Site 8).

MATERIALS AND METHODS

Butterfly specimens were hand collected with nets and stored individually in glassine envelopes, and frozen at the end of each day. A variety of habitats were sampled for butterflies, some in concordance with the location of night collections for moths with sheets illuminated by Mercury vapor and UV light. The ranges of areas sampled are shown on Map 2. Specimens were dispatched by pinching the thorax or freezing with compressed air (computer duster). For most species, tissue samples, consisting of two legs each of 1–12 representative specimens for each species, were removed prior to specimen preparation and placed in cryogenic vials, and deposited at the Genetic Resources Repository of Florida Museum of Natural History [GRR-FLMNH]. Voucher plant samples of hostplants and nectar sources are deposited in the University of Florida Herbarium [FLAS]. All adult Lepidoptera specimens were prepared, labeled, databased with unique identifier numbers

Figures 1-6. Habitats and nectar sources: **1-2)** vegetation and hillside terrain in central area of Site 10; **3)** *Melochia tomentosa* (Site 10); **4)** closeup of *M. tomentosa* flower; **5)** large patch of *Canavalia rosea* at Site 13; **6)** *C. rosea* flowers.

with corresponding barcode labels, and deposited at MGCL as accession number 2012-2. Common names listed below follow Warren et al. (2012). Lepidoptera specimens collected at GTMO in 2012, and all specimens examined from previous fieldwork are deposited at MGCL unless otherwise indicated. Additional collection codens are JVCC – John V. Calhoun Collection, Palm Harbor, Florida, and USNM – National Museum of Natural History, Washington, DC. Material was examined from elsewhere in Cuba, Bahamas, Florida, and the West Indies, but the corresponding specimen data listed in the species accounts below are limited to material collected from within the Guantanamo Province, with GTMO material listed first. This material includes specimens from fieldwork conducted in 1994 and 1995 by JYM and colleagues which covered a broader diversity of habitats within

Figures 7-14. Habitats and nectar sources: **7)** vegetation and hillside terrain at Site 15; **8)** ridge bordering Site 15 and salt flat with *Sesuvium portulacastrum*; **9)** grassy marsh area at Site 15 with *Spilanthes urens*; **10)** *S. urens* flower head; **11)** top branches of *Gliricidia sepium* tree in flower at Site 7; **12)** *G. sepium* flowers; **13)** *Stemodia maritima* at Site 12; **14)** drainage area near Site 13 with *Typha* and *S. maritima*.

the province (see Map 1) and resulted in additional species. These species are mentioned in the discussion for comparative purposes; however, data for specimens collected outside the boundaries of the U. S. Naval Base are only included for those species currently known to occur on the base and treated in the individual species accounts below. Nectar hosts and larval hostplants listed in the species accounts are derived in part from Smith et al. (1994) and Hernández (2004) unless otherwise indicated. Diagnostic descriptions for all species discussed below are included in the latter publications.

RESULTS

Over the course of seven days of active daytime collecting, a total of 228 specimens representing 41 butterfly species was collected. Additional records from museum specimens bring the total number of butterfly species recorded for GTMO up to 51. Tissue samples deposited at GRR-FLMNH include 87 specimens, representing 39 species, with an additional 12 tissue samples of *Calisto herophile* provided to A. Sourakov for ongoing systematic studies of the genus. The number of moth species collected exceeds 192, with greatest number of species belonging to the Crambidae and Erebidae. Accounts of moth species will be given in subsequent publications, though we note that the bella moth, *Utethesia ornatrix* Linnaeus (Erebidae: Arctiinae) was exceptionally common, with adults active during the day, and attracted to lights at night. Larvae of the latter species were also frequently encountered, as the hostplant, *Crotalaria retusa* L., was ubiquitous at most sites visited. Adults of *Pseudosphinx tetrio* were collected, and the brightly colored larvae of this large species previously encountered and photographed by residents (Merril Lee, pers. comm.). An invasive species, *Cactoblastis cactorum*, has been well known from the area since 1974 and controls populations of the native *Opuntia stricta* var. *dillenii*, though there has been concern about the impact on other cacti as the species is now widespread and occurs in the United States (Emmel and Hernandez 1993, Zimmerman et al. 2001).

A synopsis of the butterfly species and specimen data follows, with individual notes for each taxon, including observations of nectar sources, data from material previously deposited at MGCL, and pertinent information from published literature. While the emphasis herein is on reporting results from initial dry season sampling, the MGCL material includes specimens collected in other months, giving more complete coverage of the GTMO butterfly fauna.

PAPILIONIDAE

Papilio demoleus demoleus Linnaeus, 1758
Lime Swallowtail
Fig. 21 ♂

Material. CUBA: Guantanamo: U.S. Naval Base, Site 7, vic. Stephens Ave., 19.92296, -75.12894, 23.i.2012, J. Toomey, D. Matthews, R. Portell, T. Lott, 1 ♂, MGCL 171146.

Notes. Only one adult was observed and collected; however, defoliation of backyard *Citrus* L. trees has been noted by GTMO residents (S. Rinehart, pers. comm.). The species is an invasive pest and of special concern to the citrus industry as it continues to spread through the Antilles and approaches Florida.

Figures 15-20. Nectaring and perching butterflies photographed January 2012: **15)** *Electrostrymon a. angelia* resting on *Calliandra* at Site 7; **16)** *Strymon limenia* resting on *Abutilon*; **17)** *Anartia jatrophae guantanamo* on *Melochia tomentosa*; **18)** *Calisto herophile*; **19-20)** *Astraptes x. xagua* ♀ nectaring on *M. tomentosa*.

Larval Hosts. Young nursery plants and new growth on mature trees are especially vulnerable. Larvae are known to feed on a wide range of Rutaceae including cultivated *Citrus* as well as the genera *Glycosmis* Corrêa*, Ruta L., Aegle* Dulac*, Murraya* J. Koenig ex. L., and *Chloroxylon* DC. (Lewis 2009).

Distribution. This species occurs throughout tropical and subtropical Asia. It is an invasive pest in the New World tropics, recorded from Cuba (Lauranzón Meléndez et al. 2011), the Dominican Republic (Guerrero et al. 2004), Puerto Rico (Homziak and Homziak 2006), Jamaica (Garraway and Murphy 2006, Lewis 2009), and the Bahamas (Miller 2012). While it has been established in Cuba since 2007 (Lauranzón Meléndez et al. 2011), the GTMO specimen is the first museum voucher collected from the Naval Base. This distribution and spread of this species is of special concern for the United States and Florida Agriculture in the production of *Citrus*.

PIERIDAE

Eurema elathea elathea (Cramer, 1777)
Banded Yellow
Figs. 22 ♂, 23 ♂

Material. CUBA: Guantanamo: U.S. Naval Base, Site 7, vic. Stephens Ave., 19.92296, -75.12894, 23.i.2012, D. Matthews, R. Portell, J. Toomey, T. Lott, 2 ♂, MGCL 171062, 171064; Site 10 general area E of Sherman Ave. < 0.75 mi. radius from, 19.91604, -75.131641, 24.i.2012, D. Matthews, R. Portell, J. Toomey, T. Lott, 1 ♀, MGCL 171063; U.S. Naval Base, 13.vii.1972, R. A. Anderson, Acc. 1990-23, 1 ♂, 2 ♀; same location, 4.x.1962, 1 ♀ [JVCC]; 12.vii.1962, 1 ♂ [JVCC]; 2 km E of Yateritas, sea level, 26.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-16, Acc. 1994-12, 1 ♀; same location, 10.vii.1995, L. D. & J. Y. Miller, M. J. Simon, & L. R. Hernández, sta. 1995-13, Acc. 1995-14, 2 ♂; 2 km W of Yateritas, sea level, 29.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-28, Acc. 1994-12, 3 ♂; El Aguacate, NW Cd. (= ciudad) Guantanamo 180 m, 25.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-15, Acc. 1994-12, 1 ♀; Maisi Mpio., Jauco, 60–100 m, 26.vi.1994 L. D. & J. Y. Miller & L. R. Hernández, sta.1994-17, Acc. 1994-12, 2 ♂, 2 ♀; Maisi Mpio., Maisi, 20 m, 27.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-22, Acc. 1994-12, 1 ♂, 1 ♀; Pacaré, sea level, 29.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-26, Acc. 1994-12, 6 ♂, 3 ♀.

Notes. Adults were collected flying or hovering close to the ground in low vegetation.

Larval Hosts. *Stylosanthes hamata* (L.) Taub. (Smith et al. 1994) and *Zornia* J.Gmelin (Hernández 2004) [both Fabaceae].

Distribution. The subspecies *E. e. elathea* occurs in the Greater and Lesser Antilles, Cayman Islands and the Bahamas, while the subspecies *vitellina* (Felder & Felder) occurs in Central and South America.

Pyrisitia lisa euterpe (Ménétriés, 1832)
Little Yellow
Figs. 24 ♂, 25 ♀

Material. CUBA: Guantanamo: U.S. Naval Base, Site 7, vic. Stephens Ave., 19.92296, -75.12894, 23.i.2012, D. Matthews, R. Portell, J. Toomey, T. Lott, 2 ♂, MGCL 171069,

171070; Site 10 general area E of Sherman Ave. < 0.75 mi. radius from, 19.91604, -75.131641, 22.i.2012, D. Matthews & T. Lott, 1 ♀, MGCL 171067; same locality, 23.i.2012, 1 ♀, MGCL 171072; 24.i.2012, 3 ♂, 1 ♀, MGCL 171066, 171068, 171071, 171145; 25.i.2012, 1 ♂, MGCL 171065; U.S. Naval Base, 30.ix.1962, Jae Colln. A. C. Allyn Acc. 1969-20, 1 ♂; same location, 30.ix.1962 R. A. Anderson, 1 ♂ [JVCC]; 2 km E of Yateritas, sea level, 26.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-16, Acc. 1994-12, 5 ♂; 2 km W of Yateritas, sea level, 29.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-28, Acc. 1994-12, 3 ♂, 3 ♀; El Aguacate, NW Cd. Guantanamo 180 m, 25.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-15, Acc. 1994-12, 1 ♂; Los Camerones, Minas Amores road, 60 m, 12.vii.1995, L. D. & J. Y. Miller, M. J. Simon & L. R. Hernández , sta. 1995-18, Acc. 1995-14, 1 ♀; Maisi Mpio., Jaruco, 60–100 m, 26.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta.1994-17, Acc. 1994-12, 1 ♂, 1 ♀; mtns. E of upper Rio Toa, 250 m, 13.vii.1995, L. D. & J. Y. Miller, M. J. Simon & L. R. Hernández, sta. 1995-20, Acc. 1995-14, 1 ♂; Pacaré, sea level, 29.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-26, Acc. 1994-12, 4 ♂, 1 ♀; San Antonio del Sur, sea level, 29.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-27, Acc. 1994-12, 1 ♂, 1 ♀.

Notes. As in the previous species, adults were generally collected while flying low to the ground in mowed areas, occasionally landing on various forbs and flowers including lawn composites but with no distinct nectar associations observed.

Larval Hosts. All larval hosts are species of Fabaceae. Larvae have been reared on *Mimosa pudica* L. and *Desmanthus virgatus* (L.) Willd. in Jamaica (Smith et al. 1994). Hernández (2004) also indicates *Cassia* L., *Chamaecrista* (L.) Moench, *Amphicarpaea* Elliot ex Nutt., *Soja* Moench, and *Trifolium* L. are used in Cuba.

Distribution. The subspecies *P. lisa euterpe* occurs in the Greater and Lesser Antilles to Barbados while *P. lisa lisa* (Boisduval & Le Conte) is found in the Bahamas and southeastern United States.

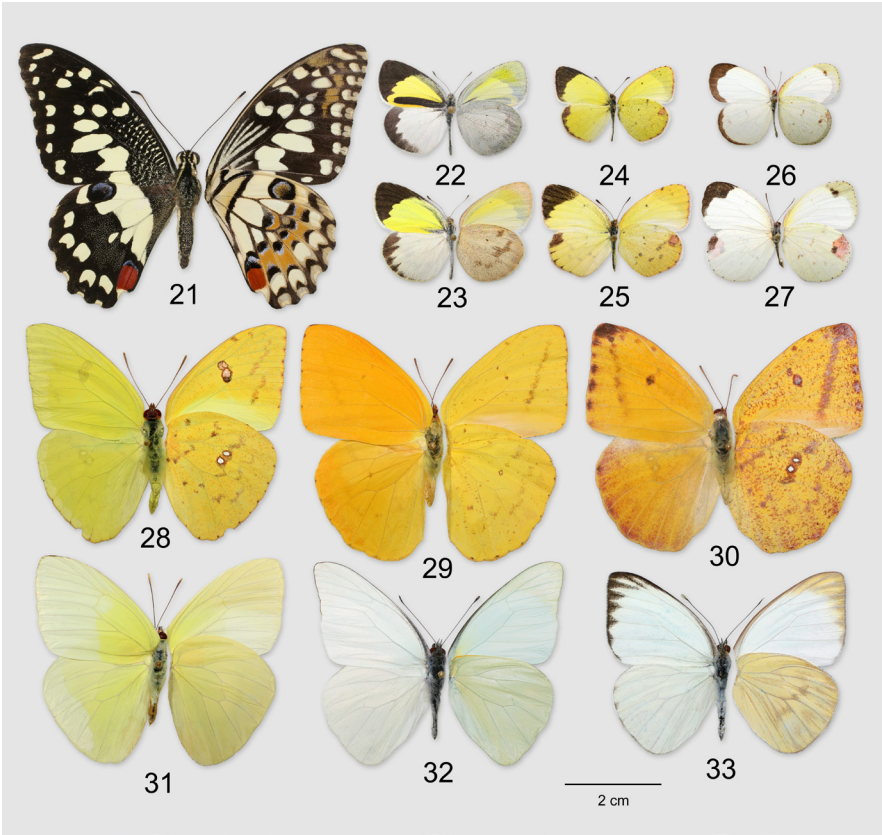
Pyrisitia messalina (Fabricius, 1785)
Whitish Yellow
Figs. 26 ♂, 27 ♀

Material. CUBA: Guantanamo: U.S. Naval Base, 11.x.1962, R. A. Anderson, 3 ♂ [JVCC]; mtns. E of upper Rio Toa, 250 m, 13.vii.1995, L. D. & J. Y. Miller, M. J. Simon & L. R. Hernández, sta. 1995-20, Acc. 1995-14, 1 ♂, 1 ♀; Maisi, Mpio. Maisi, 20 m, 27.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-22, Acc. 1994-12, 1 ♀.

Notes. Although there are not many voucher specimens of *P. messalina* from Guantanamo, there is a long series in MGCL from the provinces of Granma and Santiago de Cuba. Nectar sources previously recorded include *Bidens*, *Stachytarpheta*, and *Lippia*. (Hernandez, 2004).

Larval hosts. Gundlach (1881b) stated that the larval foodplant was *Desmodium*, but Turner (pers. com.) indicated that it was associated with selected species of *Cassia* in Jamaica, especially *C. viminea* L., *C. uniflora* Mill., *C. obtusifolia* L., and *C. laevigata* Willd.

Distribution. This species has been recorded from the Bahamas, Cuba, Isla de la Juventud, Jamaica, Caymans, and probably was in southern Florida prior to the 1899 freeze.



Figures 21-33. Papilionidae and Pieridae (dorsal surface left, ventral surface on right): **21)** *Papilio d. demoleus* ♂; **22)** *Eurema e. elathea* ♂, form with black bar along anal margin of forewing; **23)** same species ♂, form without black bar on forewing and variation of hindwing color pattern; **24)** *Pyrisitia lisa euterpe* ♂; **25)** *P. l. euterpe* ♀; 26) *Pyrisitia messalina* ♂ 27) *P. messalina* ♀; **28)** *Phoebis s. sennae* ♂; **29)** *Phoebis agarithe antillia* ♂; **30)** *P. agarithe antillia* ♀; **31)** *Aphrissa statira cubana* ♂; **32)** *Glutophrissa drusilla poeyi* ♂; **33)** *Ascia m. monuste* ♂.

Phoebis sennae sennae (Linnaeus, 1758)
Cloudless Sulphur
Fig. 28 ♂

Material. CUBA: Guantanamo: U.S. Naval Base, Site 10 general area E of Sherman Ave. < 0.75 mi. radius from, 19.91604, -75.131641, 19.i.2012, resting in low vegetation at night, D. Matthews & T. Lott, 1 ♂, MGCL 171060; Guantanamo, 19.ii.1958, Harry Wright, AME Acc. 1970-1, 1 ♂; same data, 22.ii.1958, 1 ♂, 1 ♀; 2 km W of Yateritas, sea level, 29.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-28, Acc. 1994-12; 4 ♂, 2 ♀; Maisi Mpio., Maisi, 20 m, 27.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-22, Acc. 1994-12, 1 ♂.

Notes. Only one specimen was collected but additional individuals were observed around *Bougainvillea* Comm. ex Juss. at Site 7.

Larval Hosts. Larvae feed on various species of *Cassia* L. [Fabaceae].

Distribution. Three subspecies have been described, ranging from the southern U.S. through Central and South America. The subspecies *P. s. sennae* occurs throughout the Antilles and extends into southern Florida.

Phoebis agarithe antillia F. Brown, 1929
Large Orange Sulphur
Figs. 27♂, 28♀

Material. CUBA: Guantanamo: U.S. Naval Base, Site 10 general area E of Sherman Ave. < 0.75 mi. radius from, 19.91604, -75.131641, 25.i. 2012, D. Matthews & T. Lott, 1 ♂, MGCL 171059; 2 km E of Yateritas, sea level, 10.vii.1995, L. D. & J. Y. Miller, M. J. Simon, & L. R. Hernández, sta. 1995-13, Acc. 1995-14, 2 ♂; 2 km W of Yateritas, sea level, 29.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-28, Acc. 1994-12, 2 ♂; San Antonio del Sur, sea level, 29.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-27, Acc. 1994-12, 1 ♂.

Notes. The one male collected at GTMO in January is uniformly tattered along the wing margins indicating a long flight period. No other individuals were spotted.

Larval Hosts. Three genera of Fabaceae are known as larval hosts: *Pithecellobium* Mart., *Inga* Mill., and *Cassia* L. Hernández (2004) includes *Inga vera* Willd. as a larval host in Cuba.

Distribution. Five subspecies of *P. agarithe* have been described with the subspecies *P. agarithe antillia* restricted to the Bahamas and Antilles.

Aphrissa statira cubana d'Almeida, 1939
Statira Sulphur
Fig. 31 ♂

Material. CUBA: Guantanamo: U.S. Naval Base, Site 7, vic. Stephens Ave., 19.92296, -75.12894, 23.i.2012, D. Matthews, R. Portell, J. Toomey, T. Lott, 1 ♀, MGCL 171061; Baracoa, Minas Amores, sea level, 28.vi.1994, L. D. & J. Y. Miller, & L. R. Hernández, sta. 1994-23, Acc. 1994-12, 1 ♂.

Notes. The specimen from Site 7 was collected around *Bougainvillea* Comm. ex Juss. Additional individuals of this species as well as *Phoebis sennae* were observed at the same site.

Larval Hosts. Various species of Fabaceae are known hosts for *A. statira* in the West Indies including, *Calliandra* spp., *Cassia* spp. (Hernández 2004), *Dalbergia ecastophyllum* Taub., and *Entada gigas* (L.) Fawc. & Rendle as well as *Melicocca bijuga* L. [Sapindaceae]. Though larvae have not been found, *Calliandra haematomma* Benth. is present at Site 7 where the female was collected.

Distribution. The species ranges from southern Florida and Texas through Central and South America. Four subspecies have been described with the subspecies *A. statira cubana* occurring in Cuba, Jamaica, and the Cayman Islands.

Glutophrissa drusilla poeyi (Butler, 1872)
Florida White
Fig. 32 ♂

Material. CUBA: Guantanamo: U.S. Naval Base, Site 4, 19.9347, -75.0972, 19.i.2012, J. Toomey & R. Portell, 1 ♂, MGCL 171054; Site 7, vic. Stephens Ave., 19.92296, -75.12894, 23.i.2012, D. Matthews, R. Portell, J. Toomey, T. Lott, 2 ♂, MGCL 171048, 171049; Site 10, general area E of Sherman Ave. < 0.75 mi. radius from, 19.91604, -75.131641, 21.i.2012, D. Matthews & T. Lott, 2 ♂, MGCL 171046, 171073; same location, 22.i.2012, 1 ♂, MGCL 171047.

Notes. This species was less common than *Ascia monuste* at GTMO but also more difficult to collect as it is a faster flyer and spent less time at nectar sources. Individuals were intercepted while in flight but a few were spotted nectaring at *Melochia tomentosa* L.

Larval Hosts. *Capparis flexuosa* (L.) L. [Brassicaceae], *Drypetes alba* Poit., and *D. lateriflora* (Sw.) Krug & Urb. [Putranjivaceae]. The latter genus is apparently unrelated to the Brassicaceae but contains mustard oils (Hall et al. 2002) which are used as oviposition cues (Braby and Truman 2006).

Distribution. This subspecies occurs in the Bahamas, Cuba including Isla de la Juventud, and the Cayman Islands.

Ascia monuste Linnaeus
Great Southern White
Fig. 33 ♂

Material. CUBA: Guantanamo: U.S. Naval Base, Site 4, 19.9347, -75.0972, 19.i.2012, J. Toomey & R. Portell, 2 ♂, MGCL 171053, 171055; Site 5, wash off Kittery Rd., 19.91809, -75.10183, 21.i.2012, D. Matthews, R. Portell, J. Toomey, T. Lott, 1 ♂, MGCL 171051; Site 7, vic. Stephens Ave., 19.92296, -75.12894, 23.i.2012, D. Matthews, R. Portell, J. Toomey, T. Lott, 1 ♂, MGCL 171057; Site 10 general area E of Sherman Ave. < 0.75 mi. radius from, 19.91604, -75.131641, 21.i.2012, D. Matthews & T. Lott, 3 ♂, MGCL 171050, 171052, 171056; same locality, 22.i.2012, 1 ♀, MGCL 171058; 2 km E of Yateritas, sea level, 26.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-16, Acc. 1994-12, 1 ♀; 2 km W of Yateritas, sea level, 29.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-28, Acc. 1994-12, 1 ♂; El Aguacate, NW Cd. Guantanamo, 180 m, 25.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-15, Acc. 1994-12, 1 ♀; Maisi Mpio., Maisi, 20 m 27.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-22, Acc. 1994-12, 3 ♂; Pacaré, sea level, 29.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-26, Acc. 1994-12, 1 ♂; San Antonio del Sur, sea level, 29.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-27, Acc. 1994-12, 3 ♀.

Notes. Adults were most frequently encountered as they were nectaring on *Melochia tomentosa* L. Adults were commonly encountered in January, though not as numerous as the similar-sized nymphalid, *Anartia jatrophae*. There are reports of large swarms of white butterflies at certain times of the year, primarily late summer and fall, which most likely refer to this species. Though for the most part popular local lore, outbreaks of the butterfly are associated with the end of the hydroid season, thus giving divers the "all clear" signal. The hydroids apparently bloom during the reproductive stage and produce a protein which causes severe skin reactions (Pisano and Morris 2002). Hernández (2004) notes frequent

migrations from west to east along the north and south coasts of Cuba. Carpenter and Lewis (1943) give an account of daily coastal swarms on Grand Cayman in August, with flight in this case from east to west and the butterflies settling in vegetation by 2:00 in the afternoon.

Larval Hosts. Larvae feed on various species of the order Brassicales including crops and ornamental species. Known host genera from the West Indies include *Armoracia* G.Gaertn., B.Mey. & Scherb., *Brassica* L., and *Lobularia* Desv. [Brassicaceae], *Batis* P. Browne [Bataceae], *Cleome* L. [Cleomaceae], and *Tropaeolum* L. [Tropaeolaceae]. Hosts in other orders are less frequently used but have included *Croton* L. [Euphorbiaceae] (Carpenter and Lewis 1943) and *Allophylus* L. [Sapindaceae].

Distribution. Five subspecies have been described for this species with *A. m. eubotea* (Godart 1819) defined for Cuban and other Antillean populations. However, migrations and dispersal between Florida and the Antilles make this distinction uncertain and *A. m. phileta* (Fabricius) may also occur in Cuba.

LYCAENIDAE

Chlorostrymon maesites (Herrich-Schäffer, 1865)
Amethyst Hairstreak
Fig. 35 ♀

Material. CUBA: Guantanamo: U.S. Naval Base, Site 7, vic. Stephens Ave., 19.92296, -75.12894, 23.i.2012, D. Matthews, R. Portell, J. Toomey, T. Lott, 1 ♀, MGCL 171105.

Notes. The female collected at Site 7 was nectaring on *Calliandra haematomma* Benth. [Fabaceae]. Other legumes have been recorded as nectar sources from Florida and the West Indies, including *Acacia* Mill. and *Pithecellobium* Mart. in addition to *Cordia* L. [Boraginaceae], *Eupatorium* L. [Asteraceae], *Morinda* L. [Rubiaceae], *Schinus* L. [Anacardiaceae], *Terminalia* L. [Combretaceae], and *Jatropha* L. [Euphorbiaceae] (Schwartz 1989, Smith et. al 1994, Hernández 2004).

Larval Hosts. Fernández (2001) reared larvae collected on flowers of *Calopogonium caeruleum* (Benth.) Hemsl. (Fabaceae) in Cuba. Other legumes may serve as hosts, but very little is known about the life history of the species.

Distribution. Southern Florida, Bahamas, Greater and Lesser Antilles.

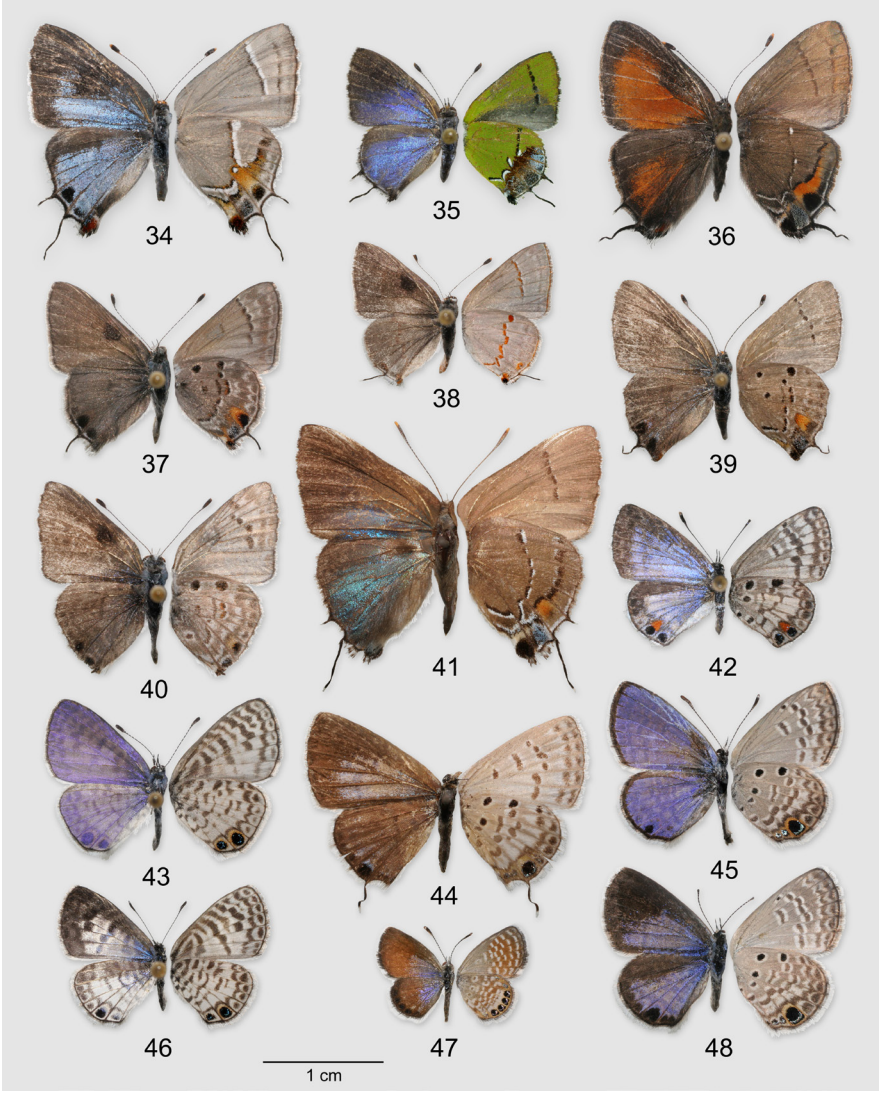
Allosmaitia coelebs (Herrich-Schäffer, 1862)
Cuban Hairstreak
Fig. 39 ♂

Material. CUBA: Guantanamo: U.S. Naval Base, 7.x.1962, R. A. Anderson, MGCL Acc. 2006-27, 1 ♂.

Notes. Nectar sources include *Lantana* L., *Bidens* L., and *Palicourea* Aubl. (Hernández 2004). The species is apparently uncommon and the current status at Guantanamo unknown.

Larval Hosts. Larvae are known to feed on flowers and young fruits of three species of Malpighiaceae: *Stigmaphyllon tomentosum* (Desf. ex DC.) Nied., *S. diversifolium* A.Juss., *S. sagranum* A.Juss., *Byrsonima crassifolia* Steud., and *Tetrapteris* Cav. (Riley 1975, Smith et al. 1994, Fernández 2001, Hernández 2004).

Distribution. Cuba including Isla de la Juventud, Hispaniola, Puerto Rico, and Jamaica. Known from Jamaica by a single specimen (Smith et al. 1994).



Figures 34-48. Lycaenidae: **34)** *Strymon martialis* ♀; **35)** *Chlorostrymon maesites* ♀; **36)** *Electrostrymon a. angelia* ♂; **37)** *Strymon istapa cybira* ♂; **38)** *Ministrymon azia* ♂; **39)** *Strymon limenia* ♀; **40)** *Strymon toussainti* ♂; **41)** *Allosmaitia coelebs* ♂; **42)** *Cyclargus ammon* ♀; **43)** *Leptotes cassius theonus* ♂; **44)** *Pseudochrysops bornoi yateritas* ♀; **45)** *Hemiargus ceraunus filenus* ♂; **46)** *L. cassius theonus* ♀; **47)** *Brephidium exilis isophthalma* ♂; **48)** *H. ceraunus filenus* ♀.

Electrostrymon angelia angelia (Hewitson, 1874)
Fulvous Hairstreak
Figs. 15, 36 ♂

Material. CUBA: Guantanamo: U.S. Naval Base, Site 7, vic. Stephens Ave., 19.92296, -75.12894, 23.i.2012, D. Matthews, R. Portell, J. Toomey, T. Lott, 2 ♂, 2 ♀, MGCL 171074–171076, 171117; same locality, 24.i.2012, 2 ♂, 1 ♀, MGCL 171077–171079; 25.i.2012, 1 ♂, MGCL 171080; U.S. Naval Base, 13.vii.1972, R. A. Anderson, Acc. 2005-26, 1 ♀; Minas Amores road, 20 m, 12.vii.1995, L. D. & J. Y. Miller, & L. R. Hernández, sta. 1995-19, Acc. No. 1995-14, 1 ♀.

Notes. Some individuals are darker with less obvious orange scaling on dorsum. Both males and females at GTMO were found nectaring on *Calliandra haematomma* Benth. Several trimmed shrubs were present bordering a parking lot at Site 7 where *Leptotes cassius* were actively nectaring. In contrast, all of the *E. angelia* specimens were found on a more distant tree in a less maintained hedge row where fewer *Leptotes* were present. The *E. angelia* adults were active at all levels but tended to perch most often in higher branches near the top of the tree.

Larval Hosts. In Florida, larvae feed on new shoots of *Piscidia piscipula* Sarg. and *Pongamia pinnata* (L.) Pierre [Fabaceae] (Minno et al. 2005) and are also known to feed on *Schinus terebinthifolius* Raddi [Anacardiaceae]. In Cuba, Fernández (2001) found larvae on flowers of *Salvia misella* Kunth, which were transferred and successfully reared on *S. micrantha* Desf. [Lamiaceae].

Distribution. Four subspecies are known from the West Indies. The nominotypical subspecies was originally restricted to Cuba, but colonized the Florida Keys by the early 1970s (Anderson 1974) and is established in southern Florida, recorded as far north as Pinellas County on the Gulf Coast (Miller and Miller 1997).

Strymon martialis (Herrich-Schäffer, 1865)
Martial Scrub-Hairstreak
Fig. 34 ♀

Material. CUBA: Guantanamo: U.S. Naval Base, Site 7, vic. Stephens Ave., 19.92296, -75.12894, 23.i.2012, D. Matthews, R. Portell, J. Toomey, T. Lott, 1 ♀, MGCL 171103.

Notes. The GTMO specimen was most likely collected on *Calliandra* Benth. but not noted at the time. Adults are known to take nectar from *Suriana* Domb. & Cav. ex D.Don, *Bidens* L., *Lantana* L., *Schinus* L., *Tournefortia* L., and *Flaveria* Juss.

Larval Hosts. Larvae feed on *Suriana maritima* L. [Surianaceae], *Trema micrantha* (L.) Blume [Celtidaceae], and *Conocarpus erectus* L. [Combretaceae] (Minno et al. 2005).

Distribution. Cuba including Isla de la Juventud, Bahamas, Cayman Islands, Jamaica and southern Florida.

Strymon istapa cybira (Hewitson, 1874)
Mallow Scrub-Hairstreak
Fig. 37 ♂

Material. CUBA: Guantanamo: U.S. Naval Base, Site 10, general area E of Sherman Ave. < 0.75 mi. radius from, 19.91604, -75.131641, 22.i.2012, D. Matthews & T. Lott, 2 ♂, 2 ♀, MGCL 171118-171121; same locality, 24.i.2012, 2 ♂, 4 ♀, MGCL 171122–171127;

25.i.2012, 1 ♀, MGCL 171128; U.S. Naval Base, 15.vii.1971, R. A. Anderson, 2005-26, 2 ♀; same data, 12.vii.1972, 1 ♂, 1 ♀; 13.vii.1972, 1 ♂; 9.i.1980, 1 ♂; Guantanamo, 13.ii.1958, Barry Wright, A. C. Allyn Acc. 1970-1, 2 ♂, 1 ♀; same data, 19.ii.1958, 1 ♀; 2 km W of Yateritas, sea level, 29.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-28, Acc. 1994-12, 2 ♀; Maisi Mpio., Jauco, 60-100 m, 26.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta.1994-17, Acc. 1994-12, 1 ♂, 1 ♀; Maisi Mpio., Maisi, 20 m, 27.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-22, Acc. 1994-12, 3 ♂, 5 ♀; Pacaré, sea level, 29.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-26, Acc. 1994-12, 1 ♀; Puerto Caleta, sea level, 26.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-18, Acc. 1994-12, 1 ♂.

Notes. Adults were collected while momentarily perching on low hillside vegetation including the mallow *Abutilon permolle* (Willd.) Sweet. No distinct nectar associations were observed.

Larval Hosts. Most of the recorded larval hosts in the West Indies are Malvaceae, including the genera *Abutilon* Mill., *Hibiscus* L., *Malvastrum* A.Gray, *Melochia* L., *Sida* L., and *Waltheria* L. Other families used include Acanthaceae (*Blechum* P.Browne, *Ruellia* L.), Portulacaeae (*Portulaca* L.), and Surianaceae (*Suriana* Domb. & Cav. ex D.Don) (Fernández 2001).

Distribution. Seven subspecies of *S. isatapa* have been described from the Americas. The subspecies *S. istapa cybira* occurs in the Bahamas, Cuba, Hispaniola, and Jamaica, while *S. istapa modesta* (Maynard) occurs in southern Florida, and *S. istapa arecibo* (W. Comstock & Huntington, 1943) is limited to Puerto Rico (Warren 2012).

Strymon toussainti (W. Comstock & Huntington, 1943)
Toussaint's Scrub-Hairstreak
Fig. 40 ♂

Material. CUBA: Guantanamo: U.S. Naval Base, Site 15, marsh area nr. Ridge Trail, 19.92278, -75.13268, 22.i.2012, D. Matthews & T. Lott, 1 ♂, MGCL 171102; U.S Naval Base, 13.vii.1972, R. A. Anderson, Acc. 2005-26, 1 ♀; same location, 9.i.1980, R. A. Anderson, Acc. 2005-26, 1 ♀.

Notes. The specimen collected at Site 15 was perching on a dried flower head of *Spilanthes urens* Jacq. (Asteraceae). These plants were growing amongst grasses surrounding a marsh area (Figs. 9-10).

Larval Hosts. The life history of this species is unknown.

Distribution. The species was originally described from Haiti by Comstock and Huntington (1943). *Strymon andrewi* Johnson and Matusik, 1988 was described from specific upland localities in the southwestern part of the Dominican Republic (Johnson and Matusik 1988) and *S. amonensis* D. Smith, K, Johnson, J. Y. Miller & Mckenzie, 1991 from Mona Island of Puerto Rico (Smith et al. 1991). The latter two taxa were synonymized with *S. toussainti* by Robbins and Nicolay (1998).

Strymon limenia (Hewitson, 1868)
Disguised Scrub-Hairstreak
Figs. 16, 39 ♂

Material. CUBA: Guantanamo: U.S. Naval Base, Site 10, general area E of Sherman Ave. < 0.75 mi. radius from 19.91604, -75.131641, 25.i.2012, D. Matthews & T. Lott, 1

♀, MGCL 171129; San Antonio del Sur, sea level, 29.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-27, Acc. 1994-12, 1 ♂.

Notes. The ferruginous tornal spot on the hindwing dorsal surface, though worn in the GTMO specimen, as well as the angled vs. curved row of black and white dashes in the lower part of the hindwing, distinguish this species from *S. istapa cybira*. One specimen was collected and others photographed (Fig. 16) in the same general area with mallow and low vegetation where *S. istapa* was common.

Larval Hosts. In Cuba, Fernández (2001) found eggs and larvae and reared this species on *Malachra alceifolia* Jacq. and *M. urens* Poit. ex Ledeb. as well as *Malvastrum coromandelianum* (L.) Garcke and *M. corchorifolium* (Desr.) Britton ex Small [all Malvaceae]. The larvae feed on the developing flowers and flower bracts. Larvae of *S. istapa cybira* were also reared on *Malvastrum* A.Gray, thus making it necessary to rear adults for identification since both species occur in the same areas.

Distribution. Lower Florida Keys, Greater Antilles, and St. Thomas.

Ministrymon azia (Hewitson, 1873)(1860)
Gray Ministreak
Fig. 38 ♂

Material. CUBA: Guantanamo: U.S. Naval Base, Site 7, vic. Stephens Ave., 19.92296, -75.12894, 25.i.2012, D. Matthews & T. Lott, nectaring on *Calliandra haematomma* Benth., 1 ♂, MGCL 171101; 2 km E of Yateritas, sea level, 26.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-16, Acc. 1994-12, 1 ♀.

Notes. Adults have been reported to nectar on species from various plant families but many of the reported known nectar sources are legume species with "powder puff" type flowers like *Calliandra* Benth. at Site 7 and also include the reported larval hosts.

Larval Hosts. Larvae feed on flower buds of species of Fabaceae. *Leucaena leucocephala* (Lam.) de Wit is the principal host in Florida (Minno et al. 2005). In Cuba, Hernández (2004) indicates that larvae have been reared on *Mimosa pudica* L. and *M. malacophylla* A. Gray and *Lysiloma bahamense* Benth. have also been listed as larval hosts in the United States (Hernández 2004).

Distribution. Southern United States, Mexico to Argentina, Antilles.

Leptotes cassius theonus (Lucas, 1857)
Cassius Blue
Figs. 43 ♂, 46 ♀

Material. CUBA: Guantanamo: U.S. Naval Base, Site 7, vic. Stephens Ave., 19.92296, -75.12894, 23.i. 2012, D. Matthews, R. Portell, J. Toomey, T. Lott, 4 ♂, 7 ♀, MGCL 171081–171091; Site 10 general area E of Sherman Ave. < 0.75 mi. radius from 19.91604, -75.131641, 21.i.2012, D. Matthews & T. Lott, 1 ♂, 4 ♀, MGCL 171092–171096; same locality, 22.i.2012, 3 ♀, MGCL 171097–171099; 25.i.2012, 1 ♀, MGCL 171100; U.S. Naval Base, east side of bay, 1.x.1985, B. I. Crother, Gonzalez coll. Acc. No. 1995-8, 1 ♂; same data, 9.x.1985, 1 ♀; 2 km W of Yateritas, sea level, 29.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-28, Acc. 1994-12, 1 ♀; Baracoa, Las Vertientes, 280 m, 27.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-21, Acc. 1994-12, 2 ♀; Baracoa, Naranjal, sea level, 28.vi.1994, L. D. & J. Y. Miller & L. R. Hernanadez, sta. 1994-25, Acc. 1994-12,

1 ♀; Maisi Mpio., Maisi, 20 m, 27.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-22, Acc. 1994-12, 1 ♀.

Notes. This species is known to nectar on plants from a variety of families. Adults were especially abundant at Site 7. While not noted on labels, the majority of specimens from this locality were nectaring on *Calliandra haematomma* Benth.

Larval Hosts. Larvae feed on various species of Fabaceae, Malpighiaceae, and Plumbaginaceae. Legume genera reported as hosts in Cuba include *Cajanus* Adans., *Calopogonium* Desv., *Crotalaria* L., *Galactia* P.Browne, *Desmodium* Desv., *Indigofera* L., *Pithecellobium* Mart., and *Phaseolus* L. (Fernández 2004; Hernández 2004). *Crotalaria* was especially abundant at GTMO, though the majority of adults encountered were in the vicinity of the plant nursery at Site 7. A common ornamental plant, *Plumbago auriculata* Lam. [Plumbaginaceae], is also a well-known larval host in Florida.

Distribution. Florida, Bahamas, Greater Antilles, and Cayman Islands.

Brephidium exilis isophthalma (Herrich-Schäffer, 1862)
'Antillean' Western Pygmy-Blue
Fig. 47 ♂

Material. CUBA: Guantanamo: U.S. Naval Base, Site 10, general area E of Sherman Ave. < 0.75 mi. radius from 19.91604, -75.131641, 24.i.2012, D. Matthews & T. Lott, 2 ♀, MGCL 171143, 171144; Site 14, salt flat, vic. chapel, W of Sherman Ave., 19.92045, -75.138971, 23.i.2012, D. Matthews & T. Lott, 10 ♂, 5 ♀, MGCL 171130–171142; U.S. Naval Base, 15.vii.1971, R. A. Anderson, Acc. 1996-19, 8 ♂, 4 ♀; U.S. Naval Base, east side of bay, 9.x.1985, B. I. Crother, Gonzalez coll. Acc. No. 1995-8, 1 ♂, 1 ♀; 2 km E of Yateritas, sea level, 26.vi.1994, L. D. & J. Y. Miller, & L. R. Hernanadez, sta. 1994-16, Acc. No. 1994-12, 12 ♂, 16 ♀; Maisi Mpio., Jauco, 60-100 m, 26.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta.1994-17, Acc. 1994-12, 1 ♂.

Notes. All individuals from 2012 were collected flying very low to the ground in isolated patches of *Sesuvium portulacastrum* L. growing in salt flats at Site 14 and other nearly barren disturbed areas (within Site 10).

Larval Hosts. Several halophytes have been reported as larval hosts for the species *B. exilis* or ovipostion recorded. In Cuba, larvae of the subspecies *B. exilis isopthalma* have been found on *S. portulacastrum* [Aizoaceae] and *Batis maritima* L. [Bataceae] and oviposition observed on *Suaeda linearis* (Elliott) Moq. [Chenopodiaceae] (Fernández 2001; Hernández 2004).

Distribution. This subspecies is found in the Bahamas, Cuba, Hispaniola, and Jamaica.

Pseudochrysops bornoi yateritas D. Smith & Hernández, 1992
Antillean Blue
Fig. 44 ♀

Material. CUBA: Guantanamo: U.S. Naval Base, 4.x.1962, R. A. Anderson, Acc. 1996-19, 1 ♀.

Notes. This subspecies was described by Smith and Hernández (1992) from two specimens collected in 1991. The holotype female was collected in flight over *Batis* P.Browne and the male paratype on a flower of *Acacia farnesiana* (L.) Willd. Both the holotype female (Hope Entomological Collections, Oxford) and paratype male (Cuban

National Collection, La Habana) are from Yateritas, ca. 5 km west of Tortuguillas. The GTMO specimen, collected by Richard Anderson three decades earlier, was recently located within a series MGCL protem material including the subspecies *P. bornoi escobioi* (Schwartz) from Puerto Rico, and now represents one of very few specimens known for the subspecies. A single specimen from the Tortuguilla-Yateritas area was also collected and reported by Alayo and Hernández (1987) but not included in the type series. The current deposition of the latter specimen and the paratype is unknown.

Larval Hosts. Unknown.

Distribution. The subspecies *P. bornoi yateritas* is known only from the Guantanamo province. The nominate subspecies is from Hispaniola and *P. bornoi escobioi* is limited to Puerto Rico.

Cyclargus ammon (Lucas, 1857)
Nickerbean Blue
Fig. 42 ♀

Material. CUBA: Guantanamo: U.S. Naval Base, GTMO Naval Base, Site 15, marsh area nr. Ridge trail, 19.92278, -75.13268, 22.i.2012, D. Matthews & T. Lott, 1 ♀, MGCL 171104; U.S. Naval Base, 4.x.1962, R. A. Anderson, Acc. no. 1996-19, 1 ♂, 2 ♀; same locality, 14.vii.1971, R. A. Anderson, Acc. 1996-19, 2 ♂; 15.vii.1971, 1 ♀; San Antonio del Sur, sea level, 29.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-27, Acc. 1994-12, 1 ♀.

Notes. The female collected at Site 15 was nectaring on *Erythroxylum minutifolium* Griseb. [Erythroxilaceae]. Other nectar sources in Cuba include *Lantana* L., *Lippia* L., *Stachytarpheta* Vahl [Plantaginaceae], *Tournefortia* L. [Boraginaceae], and *Bidens* L. [Asteraceae].

Larval Hosts. Larvae are associated with several species of Fabaceae, including *Acacia farnesiana* (L.) Willd., *Caesalpinia bahamensis* Lam., *C. pauciflora* (Griseb.) C.Wright ex Sauvalle, *C. vesicaria* L., *Mimosa fagaracantha* Griseb., and *Neptunia plena* (L.) Benth. The latter species, however, is not a field record but used as a substitute foodplant (Fernández 2001). Other hosts include *Ouratea ilicifolia* Baill. [Ochnaceae] and *Stigmaphyllon sagranum* A.Juss. [Malpighiaceae].

Distribution. Florida Keys and Cuba including Isla de la Juventud.

Hemiargus ceraunus filenus (Poey, 1832)
Ceraunus Blue
Fig. 45 ♂, 48 ♀

Material. CUBA: Guantanamo: U.S. Naval Base, Site 10, general area E of Sherman Ave. < 0.75 mi. radius from, 19.91604, -75.131641, 19.i.2012, D. Matthews & T. Lott, 4 ♂, 2 ♀, MGCL 171106–171111; same locality, 21.i.2012, 1 ♂, MGCL 171112; 22.i.2012, 2 ♀, MGCL 171113, 171114; 24.i.2012, 2 ♂, MGCL 171115, 171116; U.S. Naval Base, 30.ix.1962, R. A. Anderson, Acc. 1996-19, 1 ♂; same data, 12.vii.1972, R. A. Anderson, Acc. 1996-19, 1 ♂, 2 ♀; 13.vii.1972, 2 ♂, 1 ♀; 2 km W of Yateritas, sea level, 26.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-16, Acc. 1994-12, 1 ♂; same locality, 29.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-28, Acc. 1994-12, 7 ♀; 10.vii.1995, L. D. & J. Y. Miller & M. J. Simon & L. R. Hernández, sta. 1995-13, Acc. 1995-14, 1 ♂; Baracoa, Las Vertientes, 280 m, 27.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-21,

Acc. 1994-12, 1 ♂, 2 ♀; El Aguacate, NW Cd. Guantanamo 180 m, 25.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-15, Acc. 1994-12, 2 ♂, 1 ♀; Guantanamo, 13.ii.1958, Barry Wright, A.C. Allyn Acc. 1970-1, 2 ♂, 1 ♀; Maisi Mpio., Jauco, 60-100 m, 26.vi.1994 L. D. & J. Y. Miller & L. R. Hernández, sta.1994-17, Acc. 1994-12, 5 ♂; Maisi Mpio., Maisi, 20 m, 27.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-22, Acc. 1994-12, 1 ♂, 4 ♀; mtns. E of upper Rio Toa, 250 m, 13.vii.1995, L. D. & J. Y. Miller, M. J. Simon & L. R. Hernández, sta. 1995-20, Acc. 1995-14, 1 ♂, 3 ♀; Pacaré, sea level, 29.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-26, Acc. 1994-12, 15 ♂, 4 ♀; Puerto Caleta, sea level, 26.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-18, Acc. 1994-12; 1 ♂.

Notes. This species was abundant at GTMO in an open grassy area with *Crotalaria* L. Adults were not observed nectaring or perching but were fluttering low to the ground amongst the vegetation. Recorded nectar sources in Cuba include *Bidens* L., *Stachytarpheta* Vahl, *Lippia* L., and *Mimosa* L.

Larval Hosts. Larvae feed on the flowers and leaf shoots of various Fabaceae. Legume host genera record in Cuba by Hernández (2004) include *Abrus* Adans., *Acacia* Mill., *Cassia* L., *Crotalaria* L., *Chamaecrista* (L.) Moench, *Macroptilium* (Benth.) Urb., *Medicago* L., *Mimosa* L., *Prosopis* L., *Phaseolus* L., and *Rhynchosia* Lour. In addition to adults flying in the vicinity of *Crotalaria*, at GTMO the same grassy area included *Macroptilium* cf. *lathyroides* (L.) Urb. Two adults were observed hovering close to this plant and a sample was thus collected for identification. At another GTMO location (within the boundaries of Site 10), numerous *H. ceraunus filenus* adults were observed in close association with dense mats of *Rhynchosia minima* (L.) DC. vines. Adults of the plume moth *Exelastis montischristi* (Walsingham) were also found at this location, perching on the same plants which are the only known larval host for the moth (Matthews and Landry 2008).

Distribution. The species *H. ceraunus* (Fabricius) has a complex distribution with six subspecies described, and there is confusion and potential conspecificity with *H. hanno* (Stoll) (Warren et al. 2012). Four subspecies occur within the Caribbean region. Cuban populations, including Isla de la Juventud, are recognized as subspecies *H. ceraunus filenus*, which also occurs in the Cayman Islands, Grand Turk and in the Bahamas on Great Inagua and Long Island.

NYMPHALIDAE

Libytheana motya (Hübner, [1823])
Cuban Snout
Fig. 49 ♀

Material. CUBA: Guantanamo: U.S. Naval Base, 11.x.1962, R.A. Anderson, Acc. 1990-23, 1 ♀; Santiago de Cuba: "Santiago" Jae Colln. A.C. Allyn Acc. 1969-20, 1 ♂, 1 ♀.

Notes. This species is known from GTMO from the single specimen collected by Anderson. Three additional specimens in MGCL with limited label data include two females labeled "Cuba" and another female from the Kaye collection bearing the labels "Cuba 1886" and "187". Smith et al. (1994) give an account of this species, based in part on material collected from Isla de la Juventud in July 1993. Recorded nectar sources are *Morinda* spp. [Rubiaceae], *Cordia* spp. and *Tournefortia hirsutissima* L. [both Boraginaceae] (Hernández 2004).

Larval Hosts. The larval hostplant is unknown but presumed to be a *Celtis* L., hackberry [Cannabaceae] as in related species.

Distribution. Hernández (2004) indicates that its range covers the entire island of Cuba and Isle of Pines where it is endemic and is most commonly encountered in coastal areas.

Danaus eresimus tethys W. Forbes, [1944]
Soldier
Fig. 50 ♀

Material. CUBA: Guantanamo: U.S. Naval Base, 1.x.1962, R. A. Anderson, Acc. 1990-23, 1 ♀.

Notes. The above female is the only Cuban specimen of this species in the MGCL collections. One individual was spotted in January 2012 in the vicinity of Site 3 but not collected.

Larval Hosts. Apocynaceae. There are no confirmed larval host records from Cuba; however, the species has been reared on *Sarcostemma clausum* Schult. in Jamaica (Smith et al. 1994).

Distribution. The subspecies occurs in southern Florida, Grand Cayman, Cuba, Hispaniola, and Jamaica.

Dryas iulia nudeola (M. Bates, 1934)
Julia
Fig. 56 ♂

Material. CUBA: Guantanamo: U.S. Naval Base, Site 10, general area E of Sherman Ave. < 0.75 mi. radius from 19.91604, -75.131641, 21.i.2012, D. Matthews & T. Lott, 1 ♂, MGCL 171152; same locality, 24.i.2012, 1 ♂, MGCL 171153; Baracoa, Boca de Yumuri, 60-100 m, 27.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-20, Acc. 1994-12, 2 ♂; El Aguacate, NW Cd. Guantanamo, 180 m, 25.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-15, Acc. 1994-12, 1 ♀; Maisi Mpio., Jaruco, 60-100 m, 26.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta.1994-17, Acc. 1994-12, 1 ♂; Puerto Caleta, sea level, 26.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-18, Acc. 1994-12, 1 ♀.

Notes. The two males from Site 10 were nectaring on *Melochia tomentosa* L. Other genera of nectar plants recorded from Cuba are *Bidens* L., *Lantana* L., and *Eupatorium* L. (Hernández 2004).

Larval Hosts. Species of *Passiflora* L. [Passifloraceae].

Distribution. The species *D. julia* ranges throughout the Caribbean region, southern Florida and Texas though Central America. Thirteen subspecies have been described to classify various insular populations with discernible morphological differences. The subspecies *D. iulia nudeola* is restricted to Cuba.

Heliconius charithonia ramsdeni W. Comstock & F. Brown, 1950
Zebra Longwing
Fig. 53 ♀

Material. CUBA: Guantanamo: U.S. Naval Base, Site 10, general area E of Sherman Ave. < 0.75 mi. radius from, 19.91604, -75.131641, 21.i.2012, D. Matthews & T. Lott, 1 ♂, MGCL 171154; same location, 22.i.2012, 2 ♂, 2 ♀, MGCL 171155-171158; U.S. Naval Base, 12.vii.1972, R. A. Anderson, Acc. 1990-16, 1 ♂, 1 ♀; same data, 13.vii.1972, Acc.

Figures 49-65. Nymphalidae: **49)** *Libytheana motya* ♀; **50)** *Danaus eresimus tethys* ♀; **51)** *Euptoieta claudia* ♂; **52)** *Anartia jatrophae guantanamo* ♂; **53)** *Heliconius charithonia ramsdeni* ♀; **54)** *Euptoieta h. hegesia* ♂; **55)** *Anartia chrysopelea* ♀; **56)** *Dryas iulia nudeola* ♂; **57)** *Anaea troglodyta cubana* ♂; **58)** *Calisto herophile* ♂**; 59)** *Siproeta stelenes biplagiata* ♀; **60)** *Anaea troglodyta cubana* ♀; **61)** *Junonia genoveva* ♂; **62)** *J. genoveva* ♀; **63)** *Hypna clytemnestra iphigenia* ♂; **64)** *Antillea pellops anocoana* ♂; **65)** *A. pellops anocoana* ♀.

1995-23, 1 ♂; same data, Acc. 1990-16, 2 ♀; 2 km E of Yateritas, sea level, 10.vii.1995, L. D. & J. Y. Miller, M. J. Simon & L. R. Hernández, sta. 1995-13, Acc. 1995-14, 1 ♂, 1 ♀; 2 km W of Yateritas, sea level, 29.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-28, Acc. 1994-12, 1 ♂, 1 ♀; Maisi Mpio., Jaruco, 60-100 m, 26.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta.1994-17, Acc. 1994-12, 2 ♂; Minas Amores road, 20 m, 12.vii.1995, L. D. & J. Y. Miller, & L. R. Hernández, sta. 1995-19, Acc. No. 1995-14, 1 ♂; Mouth of Rio Toa, sea level, 13.vii.1995, L. D. & J. Y. Miller, M. J. Simon & L. R. Hernanadez, sta. 1995-21, Acc. 1995-14, 1 ♂.

Notes. Adults were collected in a shaded thicket of thorn scrub within Site 10. No nectar associations were observed. Known nectar plant genera in Cuba include *Bidens* L., *Bourreria* P.Browne, *Melochia* L., *Plumbago* L., and *Stachytarpheta* Vahl.

Larval Hosts. Species of *Passiflora* L. [Passifloraceae].

Distribution. The species *H. charithonia* occurs throughout the Caribbean region and extends from southern Florida and Texas through Central and South America to Ecuador. The subspecies *H. charithonia ramsdeni* occurs in Cuba and Andros Island, Bahamas.

Euptoieta claudia (Cramer, 1775)
Variegated Fritillary
Fig. 51 ♂

Material. CUBA: Guantanamo: U.S. Naval Base, 4.x.1962, R. A. Anderson, Acc. 1990-23, 1 ♂.

Notes. Smith et al. (1994) give an account of colonization, disappearance, and rediscovery of this species in the West Indies, including the type locality, Jamaica. The species may be especially common in certain areas but then not found again for several years. It is thought to have colonized eastern Cuba sometime before 1930 and was subsequently common for a few years in the Guantanamo area (Alayo and Hernández 1987, Hernández 2004). It is known from GTMO by the single specimen collected in 1962 but the current status is unknown as it was not sighted during recent field work.

Larval Hosts. Recorded hosts belong to the Violaceae, Turneraceae, and Passifloraceae but no specific host species have been recorded in Cuba.

Distribution. Southern North America, Bahamas, Greater and Lesser Antillies (Barbuda), south to Panama.

Euptoieta hegesia hegesia (Cramer, 1779)
Mexican Fritillary
Fig. 54 ♂

Material. CUBA: Guantanamo: U.S. Naval Base, 30.ix.1962, R. A. Anderson, A. C. Allyn Acc. 1969-20, 1 ♀; same data, Acc. 1990-23, 1 ♂; 4.x.1962, Acc. 1990-23, 1 ♂, 1 ♀; Guantanamo, 19.ii.1958, Barry Wright, A.C. Allyn Acc. 1970-1, 1 ♂, 1 ♀; Maisi Mpio., Jaruco, 60–100 m, 26.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta.1994-17, Acc. 1994-12, 1 ♂; Maisi Mpio., Maisi, 20 m, 27.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-22, Acc. 1994-12, 1 ♂; Pacaré, sea level, 29.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-26, Acc. 1994-12, 1 ♂.

Notes. Adults have been recorded nectaring on *Bidens* L., *Lantana* L., *Stachytarpheta* Vahl, and *Turnera* Plum. ex L.

Larval Hosts. Larvae have been reared on *Hybanthus* Jacq. [Violaceae] (Hernández 2004), *Turnera ulmifolia* L., and *Passiflora* spp. [both Passifloraceae].

Distribution. The nominate subspecies occurs in the Bahamas, Cayman Islands, Cuba, Jamaica, Hispaniola, and Mona Island of Puerto Rico. A separate subspecies, *E. h. watsoni* W. Comstock, occurs on Puerto Rico, and *E. h. meridiania* inhabits southern Texas through Central and South America to Argentina.

Anartia jatrophae guantanamo Munroe, 1942
White Peacock
Figs. 17, 52 ♂

Material. CUBA: Guantanamo: U.S. Naval Base, Site 4, 19.9347, -75.0972, 19.i.2012, J. Toomey & R. Portell, 1 ♂, 3 ♀, MGCL171162, 171164, 171165, 171169; same data, 20.i.2012, 1 ♀, MGCL 171163; Site 7, vic. Stephens Ave., 19.92296, -75.12894, 23.i.2012, J. Toomey, D. Matthews, R. Portell, T. Lott, 1 ♂, MGCL 171168; Site 10, general area E of Sherman Ave. < 0.75 mi. radius from 19.91604, -75.131641, 21.i.2012, D. Matthews & T. Lott, 1 ♂, MGCL 171167; same data, 25.i.2012, 1 ♂, MGCL 171166; El Aguacate, NW Cd. Guantanamo 180 m, 25.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-15, Acc. 1994-12, 1 ♀; San Antonio del Sur, sea level, 29.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-27, Acc. 1994-12, 1 ♂, 2 ♀.

Notes. Aside from reported outbreaks of *A. monuste* noted above and *Calisto herophile*, typically present in more shaded areas, *A. jatrophae* was the most ubiquitous species during fieldwork at GTMO in January. In open areas, adults were observed to land on vegetation, including nectar plants, and bask for short periods with wings spread. Adults were observed taking nectar from *Melochia tomentosa* L. in hillside areas (Sites 10, 12) and *Stemodia maritima* L. [Plantaginaceae] (Figs. 13-14) in low moist areas near Sites 12 and 13. Additional recorded nectar sources in Cuba include *Lantana* L., *Tournefortia* L., and *Bidens* L.

Larval Hosts. *Bacopa monnieri* (L.) Pennell [Plantaginaceae], *Lippia nodiflora* (L.) Michx. [Verbenaceae] (Smith et al. 1994, Minno et al. 2005), *Ruellia tuberosa* L. and *Blechum pyramidatum* Urb. [both Acanthaceae] (Fernández 2001] and *Jatropha* L. [Euphorbiaceae] (Hernández 2004). Though oviposition was not directly observed, the number of adults observed at GTMO in association with *S. maritima* suggests this plant should be examined as a potential larval host. A related plant, *S. durantifolia* (L.) Sw., has been recorded as a larval host for *A. jatrophae* in Costa Rica (Henderson 2010).

Distribution. The species occurs throughout the West Indies and Bahamas and on the mainland in southern Florida and southern Texas through Central America and includes seven subspecies. The subspecies *A. jatrophae guantanamo* was described and named for the type locality of the city of Guantanamo (at the time, in the Oriente province). It occurs in southern Florida, throughout Cuba, Turks and Caicos, and most of the Bahamas except Great Inagua where subspecies *A. jatrophae saturata* is present. The latter subspecies is known only from Great Inagua and Hispaniola.

Anartia chrysopelea Hübner, [1831]
Cuban Peacock
Fig. 55 ♀

Material. CUBA: Guantanamo: U.S. Naval Base, Site 4, 19.9347, -75.0972, 19.i.2012, J. Toomey & R. Portell, 1 ♀, MGCL 171147; same data, 20.i.2012, 1 ♀, MGCL 171148; El Aguacate, NW Cd. Guantanamo, 180 m, 25.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-15, Acc. 1994-12, 1 ♀.

Notes. Recorded nectar sources in Cuba are *Stachytarpheta* Vahl*, Eupatorium* L.*, Ixora* L.*,* and *Bidens* L. The individuals from Site 4 were netted in flight after nectaring on heather-like (small purple flowers) within a ravine area. Though noted as common, as in *A. jatrophae*, by Smith et al. (1994) and Hernández (2004), this species was only seen at one GTMO location in January and represented by only one specimen at MGCL from previous field work by Miller et. al.

Larval Hosts. *Lippia* L. [Verbenaceae].

Distribution. This species is endemic to Cuba and the Isla de la Juventud but is an occasional stray to southern Florida, first noted by Anderson (1974).

Siproeta stelenes biplagiata (Fruhstorfer, 1907)
Malachite
Fig. 59 ♀

Material. CUBA: Guantanamo: U.S. Naval Base, GTMO Naval Base, Site 7, vic. Stephens Ave., 19.92296, -75.12894, 23.i.2012, J. Toomey, D. Matthews, R. Portell, T. Lott, 2 ♂, MGCL171160, 171161; same location, 25.i.2012, D. Matthews & T. Lott, 1 ♀, MGCL171159; Baracoa, Boca de Yumuri, 60-100 m, 27.vi.1994, L. D. & J. Y. Miller, & L. R. Hernández, sta. 1994-20, Acc. 1994-12, 1 ♂; Maisi Mpio., Maisi, 20 m, 27.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-22, Acc. 1994-12, 1 ♂, 1 ♀; San Antonio del Sur, sea level, 29.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-27, Acc. 1994-12, 1 ♂.

Notes. Adults have been recorded nectaring on *Antigonon* Endl., *Cordia* L., and *Tournefortia* L. but are more frequently encountered where they are attracted to rotting fruit. The three specimens collected at GTMO in January were all near shaded areas of a plant nursery.

Larval Hosts. Recorded feeding on *Blechum brownie* Juss. in Cuba as well as *B. blechum* (L.) Millsp., *B. killipii* Leonard, *B. pyramidatum* (Lam.) Urb. and *Ruellia coccinea* Vahl elsewhere in the species range. *Blechum pryamidatum* is found in disturbed or cultivated fields throughout Cuba (Leon & Alain 1957).

Distribution. The subspecies *S. stelenes biplagiata* is found throughout Cuba and migratory movements within the country have been noted (Smith et al. 1994). It is also present in the Cayman Islands and in southern Texas and southern Florida, Mexico, Central and South America to the Amazon (Warren et al. 2012). The nominate subspecies is restricted to the insular faunas of Hispaniola, Jamaica, Puerto Rico, St. Kitts, and St. Croix.

Junonia genoveva (Cramer, 1780)
Mangrove Buckeye
Figs. 61 ♂, 62 ♀

Material. CUBA: Guantanamo: U.S. Naval Base, Site 4, 19.9347, -75.0972, 19.i.2012, J. Toomey & R. Portell, 3 ♀, MGCL 171170–171172; Site 10, general area E of Sherman Ave. < 0.75 mi. radius from, 19.91604, -75.131641, 21.i.2012, D. Matthews & T. Lott, 1 ♀, MGCL 171177; same location; 24.i.2012, nectaring on *Melochia tomentosa*, D. Matthews & T. Lott, 2 ♀, MGCL 171175, 171176; Site 14, salt flat , vic. chapel, W of Sherman Ave., 19.92045, -75.138971, 23.i.2012, D. Matthews, T. Lott, J. Toomey & R. Portell, 2 ♂, MGCL 171173, 171174; Maisi Mpio., Jaruco, 60-100 m, 26.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta.1994-17, Acc. 1994-12, 1 ♂; Los Camerones, Minas Amores road, 60 m, 12.vii.1995, L. D. & J. Y. Miller, M. J. Simon & L. R. Hernández , sta. 1995-18, Acc. 1995-14, 3 ♂, 1 ♀.

Notes. There is considerable variation in wing maculation of this species and congeners. GTMO material includes individuals with smooth forewing tornal margins (Fig. 61), but one individual exhibits a somewhat scalloped forewing tornal margin as well as a small third eyespot on the hindwing (Fig. 62). Variation of the hindwing undersurface is also apparent with median band variably expressed (Fig. 62). Adults collected in the vicinity of mangroves (Site 14) were netted as they came to rest on bare ground. On higher ground, individuals were found nectaring on *Melochia tomentosa* L.

Larval Hosts. There is disagreement in various literature accounts as to the distinguishing features of this species vs. *J. evarete* and their respective larval hostplant associations (cf. Smith et al. 1994, Minno et al. 2005, Warren et al. 2012) which stems from confusion over type specimens of *J. genoveva*. Both species are likely to be present at GTMO, but the species associated with *Stachytarpheta jamaicensis* (L.) Vahl (treated herein as *J. evarete zonalis* C. Felder & R. Felder) may be more common in the wet season, as *Stachytarpheta* Vahl and other herbaceous plants observed in January were in generally poor condition without new growth and past flowering. *Blechum* P.Browne, *Ruellia* L., and *Stemodia* L. have also been recorded as hosts under both names. The species which feeds exclusively on black mangrove, *Avicennia germinans* L. [Acanthaceae], is here treated as *J. genoveva* following Warren (2012).

Distribution. Although *J. genoveva* is restricted to coastal areas where black mangroves are present, both species occur in these areas and are widely distributed along the coasts of Central America, the Bahamas, West Indies, and southern Florida. Segregate populations are recognized for Caribbean populations as well as eastern vs. southwestern Mexican coasts (Warren 2012); however, additional studies are needed to further clarify segregate and subspecies distributions.

Antillea pelops anocaona (Herrich-Schäffer, 1865)
Antillean Crescent
Figs. 64 ♂, 65 ♀

Material. CUBA: Guantanamo: U.S. Naval Base, Site 4, 19.9347, -75.0972, 19.i.2012, J. Toomey & R. Portell, 1 ♂, 2 ♀, MGCL171149–171151; 2 km W of Yateritas, sea level, 29.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-28, Acc. 1994-12; 1 ♂, 1 ♀.

Notes. Adults are known to nectar on *Cordia* spp. [Boraginaceae] (Hernández 2004) and *Alternanthera axillaris* (Hornem.) D. Dietr. [Amaranthaceae] in Cuba. Specimens were

netted in flight after nectaring on heather-like (small purple flowers).

Larval Hosts. Fernández (2004) collected larvae on *Blechum pyramidatum* (Lam.) Urb. and *Justicia comata* (L.) Lam. [both Acanthaceae]. In Puerto Rico, the larvae of the nominate subspecies feeds on *J. martinsoniana* R.A. Howard [Acanthaceae] in Puerto Rico.

Distribution. The subspecies *A. pelops anocaona* is restricted to Cuba. The nominate subspecies occurs on Hispaniola, Puerto Rico, and St. Kitts and *A. pelops pygmaea* is known from Jamaica.

Hypna clytemnestra iphigenia Herrich-Schäffer, 1862
Silver-studded Leafwing
Fig. 63 ♂

Material. CUBA: Guantanamo: U.S. Naval Base, 7.x.1962, R. A. Anderson, Acc. 1990-23, 1 ♂.

Notes. Adults are attracted to rotting fruit. Swarms have been reported in Cuba but the species is generally uncommon and limited to woods near coastal areas (Hernández 2004). The current status at GTMO is unknown and previous fieldwork by Miller et al. resulted in one male specimen from Granma Province (El Naranjo, Pico Turquino Natl. Park, 900 m, 4.vii.1995) (Fig. 63).

Larval Hosts. The life history in Cuba is unknown. Caldas (1991) discovered larvae feeding on *Croton floribundus* Spreng. in Brazil.

Distribution. The species ranges from Mexico to Bolivia. Three subspecies are treated by Warren (2012) with *H. clytemnestra iphigena* restricted to Cuba and no other insular populations present in the West Indies.

Anaea troglodyta cubana (H. Druce, 1905)
Florida Leafwing
Figs. 57 ♂, 60 ♀

Material. CUBA: Guantanamo: U.S. Naval Base, 4.x.1962, R. A. Anderson, Acc. 1990-23, 1 ♀ ; same location, 11.x.1962, R. A. Anderson, Acc. 1990-23, 1 ♂; Baracoa, Boca de Yumuri, 60-100 m, 27.vi.1994, L. D. & J. Y. Miller, & L. R. Hernández, sta. 1994-20, Acc. 1994-12, 1 ♂.

Notes. Adults are known to nectar on *Lantana* L.

Larval Hosts. Larvae feed on the leaves of *Croton* L. [Euphorbiaceae] and construct tubular shelters (Fernández 2004). In Cuba, *Croton sagranus* Müll. Arg. is used with *C. argenteus* L. and accepted as an alternate food plant. In southern Florida, larvae feed on *C. linearis* Jacq. [Euphorbiaceae] (Minno et al. 2005).

Distribution. Seven subspecies are described from the West Indies, with the only mainland population (*A. troglodyta floridalis*) from southern Florida. The subspecies *A. troglodyta cubana* occurs on Cuba, Isla de la Juventud, and Grand Cayman.

Calisto herophile Hübner, [1823]
Cuban Calisto
Figs. 18, 58 ♂

Material. CUBA: Guantanamo: U.S. Naval Base, Site 4, 19.9347, -75.0972, 19.i.2012, J. Toomey & R. Portell, 1 ♀, MGCL171198; Site 10, general area E of Sherman Ave. <

0.75 mi. radius from, 19.91604, -75.131641, 19.i. 2012, D. Matthews & T. Lott, 5 ♂, MGCL171178, 171187, 171188, 171190, 171194; same data, 21.i.2012, D. Matthews & T. Lott, 6 ♂, 2 ♀, MGCL 171182–171186, 171192, 171195, 171197; 22.i.2012, 2 ♂, 3 ♀, MGCL 171181, 171191, 171193, 171196, 171199; 24.i.2012, 1 ♂, MGCL 171189; Site 14, salt flat vic. chapel, W of Sherman Ave., 19.92045, -75.138971, 23.i.012, D. Matthews & T. Lott, 2 ♂, MGCL 171179, 171180; U.S. Naval Base, 14.vii.1972, R. A. Anderson, Acc. 1995-23, 3 ♂, 5 ♀; same data, 15.vii.1972, 6 ♂, 1 ♀; U. S. Naval Base, east side of bay, 1.x.1985, B. I. Crother, Gonzales Colln. 1995-8, 1 specimen (no abdomen); same data, 9.x.1985, 2 ♂; 2 km W of Yateritas, sea level, 29.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-28, Acc. 1994-12, 1 ♂, 2 ♀; El Aguacate, NW Cd. Guantanamo 180 m, 25.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-15, Acc. 1994-12, 1 ♀; Alto de Codillo, 300 m, 10.vii.1995, 2 ♀; Maisi Mpio., Jaruco, 60-100 m, 26.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta.1994-17, Acc. 1994-12, 2 ♀; Minas Amores road, 20 m, 12.vii.1995, L. D. & J. Y. Miller, & L. R. Hernández, sta. 1995-19, Acc. No. 1995-14, 1 ♂; same data, 60 m, Los Camerones, 1 ♂, 6 ♀; mtns. E of upper Rio Toa, 250 m, 13.vii.1995, L. D. & J. Y. Miller, M. J. Simon & L. R. Hernández, sta. 1995-20, Acc. 1995-14; 6 ♂, 2 ♀; Puerto Caleta, sea level, 26.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-18, Acc. 1994-12, 1 ♂.

Notes. This species is very common and was encountered in several locations at GTMO. It has been collected during both wet and dry periods of the year in the Guantanamo Province. Adults were active in full sun but more frequently seen in areas with a variety of herbaceous forbs and grasses with partial shade. No adults were observed nectaring at GTMO though some were attracted to an area dominated by *Canavalia rosea* (Sw.) DC. (Site 13, Figs. 5-6) in full sun where grasses were also present. *Bidens alba* DC., *Eupatorium* L., and *Stachytarpheta jamaicensis* (L.) Vahl are noted as nectar sources in the Bahamas (Smith et al. 1994) and 26 species have been recorded as nectar sources in Cuba (Fernández 2007).

Larval Hosts. The life history and immatures are illustrated and described in detail by Núñez Aguila et al. (2012). Larvae have apparently not been collected on the natural hosts but reared from eggs obtained by contained females. A variety of grasses have been successfully used as food plant for rearings, including *Saccharum officinarum* L. (sugar cane), *Zea mays* L. (corn), and *Stenotaphrum secundatum* (Walter) Kuntze.

Distribution. Bahamas and Cuba including Isla de la Juventud.

HESPERIIDAE

Phocides pigmalion batabano (Lucas, 1857)
Mangrove Skipper
Figs. 70 ♂, 83d

Material. CUBA: Guantanamo: U.S. Naval Base, Site 9, vic. W.T. Sampson Elem. School, 19.93218, -75.122749, 19.i.2012, J. Toomey, nectaring on *Bouganvilla*, 2 ♂, MGCL 170973, 170974; Site 7, vic. Stephens Ave., 19.92296, -75.12894, 23.i. 2012, D. Matthews, R. Portell, J. Toomey, T. Lott, 1 ♂, MGCL 170975; Site 11, E of Sherman Ave., nr. Library, 19.91368, -75.139947, 22.i. 2012, nectaring on *Jasminum fluminense*, D. Matthews & T. Lott, 1 ♂, MGCL 170976; U.S. Naval Base, 13.vii.1972, R. A. Anderson, Acc. 1998-18, 1 ♀; same data, 9.i.1980, 1 ♀.

Notes. Several individuals were seen flying in the vicinity of flowering mangroves but did not stop to nectar. Specimens collected while nectaring on *Bougainvillea* Comm. ex Juss. and *Jasminum* L. were inland, about 0.25 miles from mangrove areas. The specimen from Site 9 is distinctly marked from a bird encounter (Fig. 83d).

Larval Hosts. *Rhizophora mangle* L. (red mangrove).

Distribution. The species *P. pigmalion* ranges from southern Florida to Argentina. The subspecies, *batabano*, is restricted to Cuba, including Isla de la Juventud, Andros (Bahamas), and Little Cayman Island.

Polygonus leo histrio Röber, 1925
Hammock Skipper
Fig. 67 ♂

Material. CUBA: Guantanamo: U.S. Naval Base, 12.vii.1972, R. A. Anderson, Acc. 1998-18, 1 ♂, 1 ♀; Baracoa, Boca de Yumuri, 60–100 m, 27.vi.1994, L. D. & J. Y. Miller, & L. R. Hernández, sta. 1994-20, Acc. 1994-12, 1 ♂.

Notes. No specimens were observed in January 2012.

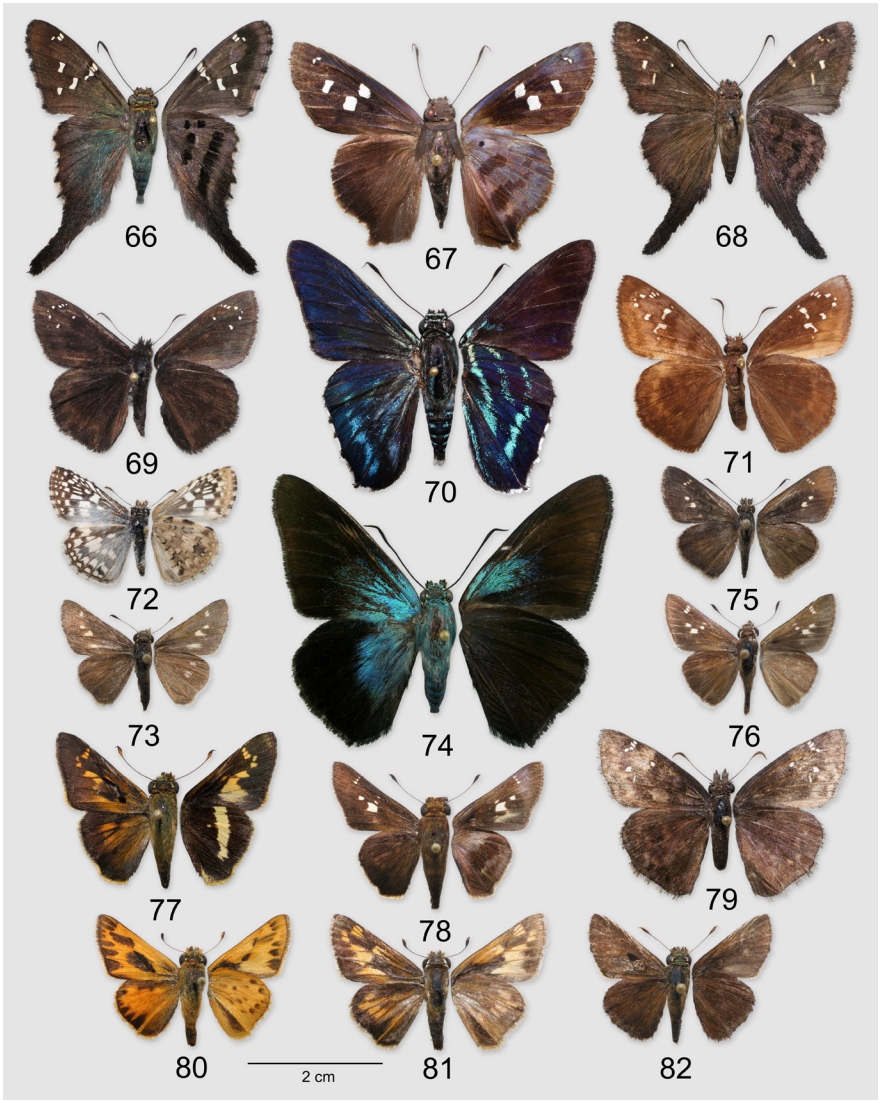
Larval Hosts. Species of *Piscidia* L. and *Lonchocarpus* Kunth [Fabaceae] (Smith et al. 1994, Hernández 2004). The life history was first described by Dyar (1897) (syn. *P. lividus* Hübner, 1816).

Distribution. Florida, Cuba, Bahamas.

Urbanus proteus domingo (Scudder, 1872)
Long-tailed Skipper
Fig. 66 ♂

Material. CUBA: Guantanamo: U.S. Naval Base, Site 4, 19.9347, -75.0972, 19.i. 2012, J. Toomey & R. Portell, 1 ♂, MGCL171036; Site 7, vic. Stephens Ave., 19.92296, -75.12894, 23.i. 2012, D. Matthews, R. Portell, J. Toomey, T. Lott, 3 ♂, MGCL171037, 171039, 171040; Site 10, general area E of Sherman Ave. < 0.75 mi. radius from, 19.91604, -75.131641, 22.i. 2012, D. Matthews & T. Lott, 1 ♂, MGCL171043; U. S. Naval Base, 15.vii.1971, R. A. Anderson, FSCA, 1 ♂; Guantanamo, LeMoult, A.C. Allyn Acc. 1968-1, 2 ♂; Baracoa, Boca de Yumuri, 60-100 m, 27.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-20, Acc. 1994-12, 1 ♂; Baracoa, Minas Amores, sea level, 28.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-23, Acc. 1994-12, 6 ♂; Puerto Caleta, sea level, 26.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-18, Acc. 1994-12, 1 ♂; Maisi Mpio., Maisi, 20 m 27.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-22, Acc. 1994-12, 1 ♂.

Notes. Several of the GTMO specimens were collected nectaring on *Melochia tomentosa* L. Other nectar sources reported for the subspecies include the genera *Ageratum* L., *Bauhinia* L., *Bidens* L., *Cordia* L., *Gliricidia* Kunth., *Lantana* L., *Lippia* L., *Stachytarpheta* Vahl, *Tournefortia* L., *Urena* L., *Waltheria* L., and *Wedelia* Jacq. (Smith et al. 1994, Hernández 2004). Of these, *Gliricidia sepium* (Jacq.) Kunth ex Walp. and *Lippia* are present on the base (Site 7), but no *Urbanus* were noted on the flowers. *Stachytarpheta* was also present but past flowering with dried inflorescence stalks.



Figures 66-82. Hesperiidae: **66)** *Urbanus proteus domingo* ♂; **67)** *Polygonus leo histrio* ♂; **68)** *Urbanus dorantes santiago* ♂; **69)** *Ephyriades b. brunnea* ♂; **70)** *Phocides pigmalion batabano* ♂; **71)** *Ephyriades b. brunnea* ♀; **72)** *Pyrgus oileus* ♂; **73)** *Panoquina p. panoquinoides* ♀; **74)** *Astraptes x. xagua* ♀; **75)** *Cymaenes t. tripunctus* ♀; **76)** *Lerodea e. eufala* ♂; **77)** *Atalopedes m. mesogramma* ♂; **78)** *Nyctelius n. nyctelis* ♂; **79)** *Erynnis zarucco* ♀; **80)** *Hylephila phyleus* ♂; **81)** *H. phyleus* ♀; **82)** *Wallengrenia misera* ♂.

Larval Hosts. Larvae feed on various legumes (Fabaceae) including *Desmodium* Desv., *Vigna* Savi, and *Phaseolus* L.

Distribution. *Urbanus proteus* occurs in the southern United States and ranges south to Argentina. The subspecies *domingo* is limited to the Bahamas and Antilles.

Urbanus dorantes santiago (Lucas, 1857)
'Cuban' Dorantes Longtail
Fig. 68 ♂

Material. CUBA: Guantanamo: U.S. Naval Base, Site 10, general area E of Sherman Ave. < 0.75 mi. radius from, 19.91604, -75.131641, 24.i. 2012, D. Matthews & T. Lott, 1 ♂, MGCL171042; same location, 25.i. 2012, 3 ♂, MGCL 171038, 171041, 171044; Guantanamo, ex. coll. LeMoult, A.C. Allyn Acc. 1968-1, 4 ♂ (genit. SRS 628, 636, 653, 1 not dissected), 3 ♀ (genit. SRS 627, 635, 652); 2 km E of Yateritas, sea level, 10.vii.1995, L. D. & J. Y. Miller, M. J. Simon & L. R. Hernández, sta. 1995-13, Acc. 1995-14, 1 ♂, 1 ♀; Maisi Mpio., Maisi, 20 m, 27.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-22, Acc. 1994-12, 2 ♂; Baracoa, Boca de Yumuri, 60–100 m, 27.vi.1994, L. D. & J. Y. Miller, & L. R. Hernández, sta. 1994-20, Acc. 1994-12, 6 ♂, 1 ♀; Baracoa, Minas Amores, sea level, 28.vi.1994, L. D. & J. Y. Miller, L. R. Hernández, sta. 1994-23, Acc. 1994-12, 3 ♂.

Notes. Observed nectaring on *Melochia tomentosa* L. at GTMO. Numerous nectar plants are known, including several genera of Asteraceae.

Larval Hosts. Larvae feed on several genera of Fabaceae, including *Clitoria* L., *Desmodium* Desv., *Phaseolus* L., and *Vigna* Savi.

Distribution. This subspecies occurs in Cuba and in the Bahamas on North Andros, Mangrove Cay, and Grand Bahama Islands.

Astraptes xagua xagua (Lucas, 1857)
Antillean Flasher
Figs. 19, 20, 74 ♀, 83 a-c

Material. CUBA: Guantanamo: U.S. Naval Base, Site 4, 19.9347, -75.0972, 19.i.2012, J. Toomey & R. Portell, 2 ♀, MGCL 170981, 170982; Site 7, vic. Stephens Ave., 19.92296, -75.12894, 23.i.2012, nectaring on *Gliricidium sepium*, D. Matthews, R. Portell, J. Toomey, T. Lott, 5 ♂, 2 ♀, MGCL170977, 170983–170987, 170989; Site 11, E of Sherman Ave., nr. Library, 19.91368, -75.139947, 21.i.2012, nectaring on *Bouganvilla*, D. Matthews, 1 ♀, MGCL 170978; Site 12, E. of Sherman Ave., 19.91661, -75.132414, 25.i.2012, nectaring on *Melochia tomentosa*, D. Matthews & T. Lott, 2 ♀, MGCL170979, 170980; Guantanamo, ex. colln. LeMoult, A.C. Allyn Acc. 1968-1, 5 ♂, genit. preps. SRS 701 and 702; 2 km W of Yateritas, sea level, 29.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-28, Acc. No. 1994-12, 1 ♂; 2 km. E Yateritas, sea level, 10.vii.1995, L. D. & J. Y. Miller, M. J. Simon & L. R. Hernanadez, sta. 1995-13, Acc. 1995-14, 1 ♀.

Notes. This species was previously encountered and collected in the Guantanamo Province, where it was observed perching on broad leaves with the wings partly open in the mornings and taking nectar at *Eupatorium* L. in the afternoon (Smith et al. 1994). At GTMO, all specimens collected were actively seeking nectar. Along with several other butterfly species, two females were collected while nectaring on *Melochia tomentosa*

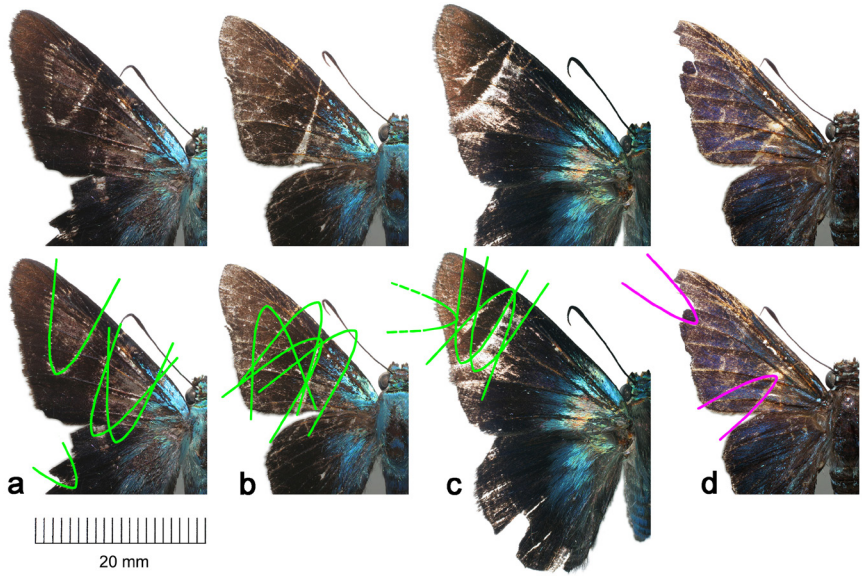


Figure 83. Wing damage on GTMO Hesperiidae, showing flycatcher beak marks. Images below with beak outlines traced to show multiple contact areas. **a)** *Astraptes x. xagua*, specimen MGCL 170984; **b)** same species, MGCL 170987; **c)** same species, also with beak notch in hindwing, MGCL 170977; **d)** *Phocides pigmalion batabano*, MGCL 170974.

L. [Malvaceae]. One female (MGCL 170980) (Figs. 19-20) was photographed before collection. For *A. x. xagua*, the most notable nectar plant was *Gliricidia sepium* (Jacq.) Kunth ex Walp. [Fabaceae]. This tree is native to Mesoamerica but is cultivated as a living fence and ornamental in tropical regions around the world. Both males and females were attracted to the flowers of a tall specimen in excess of nine meters. Dozens of individuals were spotted working branches near the top of the tree and a few were netted as they came to nectar at lower branches. Hymenoptera, hummingbirds, and another hesperiid, *Nyctelius n. nyctelius* (Latreille), were likewise observed at the same tree. Of the seven specimens of *A. x. xagua* collected on *Gliricidia* Kunth., three bear distinct bird beak marks on the forewings (Fig. 83), and two others have notched hindwings. Beak marks have been studied as indicators of both missed prey, and rejection after taste (Shapiro 1974, Kassarov 1999). Given the known avian fauna of GTMO and the shape of the beak marks, one or more of three common flycatcher species at GTMO are likely predators (*Myiarchus sagrae*, *Tyrannus caudifasciatus*, and *T. dominicensis*) (D. Steadman, pers. comm.). Of seven species collected by Anderson at GTMO in 1972 and 1980, one specimen bears similar beak marks (Anderson, pers. comm.).

Larval Hosts. Unknown. Related species feed on Fabaceae. One female at GTMO circled and landed momentarily on *Centrosema virginianum* (L.) Benth. but oviposition was not observed.

Distribution. Cuba and Andros Island, Bahamas.

Ephyriades brunnea brunnea (Herrich-Schäffer, 1865)
'Cuban' Florida Duskywing
Figs. 69 ♂, 71 ♀

Material. CUBA: Guantanamo: U.S. Naval Base, Site 7, vic. Stephens Ave., 19.92296, -75.12894, 23.i.2012, D. Matthews, R. Portell, J. Toomey, T. Lott, 1 ♂, MGCL 171005; Site 10, general area E of Sherman Ave. < 0.75 mi. radius from, 19.91604, -75.131641, 25.i.2012, D. Matthews & T. Lott, 1 ♂, MGCL 171006; Guantanamo, ex. colln. LeMoult, A. C. Allyn Acc. 1968-1, 1 ♀; 2 km W of Yateritas, sea level, 29.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-28, Acc. 1994-12, 1 ♀; Baracoa, Boca de Yumuri, 60-100 m, 27.vi.1994, L. D. & J. Y. Miller, & L. R. Hernández, sta. 1994-20, Acc. 1994-12, 2 ♂, 1 ♀; Baracoa, Minas Amores, sea level, 28.vi.1994, L. D. & J. Y. Miller, L. R. Hernández, sta. 1994-23, Acc. 1994-12, 1 ♀; Maisi Mpio., Maisi, 20 m, 27.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-22, Acc. 1994-12, 1 ♀; mtns. E of upper Rio Toa, 250 m, 13.vii.1995, L. D. & J. Y. Miller, M. J. Simon & L. R. Hernández, sta. 1995-20, Acc. 1995-14, 1 ♂.

Notes. Recorded nectar sources in Cuba include *Alysicarpus* Neck. ex Desv., *Bidens* L., *Lantana* L., *Lippia* L., *Melochia* L., *Psychotria* L., and *Tournefortia* L.

Larval Hosts. Larvae feed on species of Malpighiaceae. *Malpighia punicifolia* L. is a host in Jamaica, *M. glabra* L. is used in Florida, and *M.* sp. and *Stigmaphyllon* A.Juss. from Cuba.

Distribution. Four subspecies are known from the Caribbean Region, with the nominate subspecies from Cuba, Isla de la Juventud, and the Bahamas.

Erynnis zarucco (Lucas, 1857)
Zarucco Duskywing
Fig. 79 ♀

Material. CUBA: Guantanamo: U.S. Naval Base, Site 10, general area E of Sherman Ave. < 0.75 mi. radius from, 19.91604, -75.131641, 24.i.2012, D. Matthews & T. Lott, 1 ♀, MGCL171004; Baracoa, Las Vertientes, 280 m, 27.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-21, Acc. 1994-12, 1 ♂; Minas Amores road, 20 m, 12.vii.1995, L. D. & J. Y. Miller, & L. R. Hernández, sta. 1995-19, Acc. No. 1995-14, 1 ♂; Maisi Mpio., Maisi, 20 m, 27.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-22, Acc. 1994-12, 3 ♂; Puerto Caleta, sea level, 26.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-18, Acc. 1994-12; 3 ♂, 1 ♀.

Notes. The adult collected was attracted to *Melochia tomentosa* L. at Site 10. Another individual was observed perching on *Stemodia maritima* L. in an open area near Site 12. *Alysicarpus vaginalis* (L.) DC., *Bidens* L., and *Lantana* L., and *Melochia parvifolia* Kunth are previously recorded nectar sources in Cuba (Smith et al. 1994; Hernández 2004).

Larval Hosts. All recorded larval food plants are legumes [Fabaceae]. In Cuba these include *Acacia grandiflora* (L'Hér.) Willd., *Gliricidia sepium* (Jacq.) Kunth ex Walp., *Indigofera suffruticosa* Mill., *Sesbania emerus* Urb., and *S. grandiflora* (L.) Pers. Additional host genera identified from outside of Cuba are: *Baptisia* (L.) Vent., *Galactia* P. Browne, *Robinia* L., and *Lespedeza* Michx.

Distribution. Southeastern United States, Cuba, and Hispaniola.

Pyrgus oileus (Linnaeus, 1767)
Tropical Checkered Skipper
Fig. 72 ♂

Material. CUBA: Guantanamo: U.S. Naval Base, Site 4, 19.9347, -75.0972, 19.i.2012, J. Toomey & R. Portell, 1 ♀, MGCL 170997; same location, 20.i.2012, R. Portell, D. Matthews, T. Lott, J. Toomey, 1 ♂, 1 ♀, MGCL 170998, 170999; Site 5, wash off Kittery Rd., 19.91809, -75.10183, 21.i.2012, D. Matthews, R. Portell, J. Toomey, T. Lott, 1 ♀, MGCL 171045; Site 7, vic. Stephens Ave., 19.92296, -75.12894, 23.i.2012, D. Matthews, R. Portell, J. Toomey, T. Lott, 1 ♂, 1 ♀, MGCL 171001, 171000; Site 10, general area E of Sherman Ave. < 0.75 mi. radius from, 19.91604, -75.131641, 19.i.2012, D. Matthews & T. Lott, 4 ♂, 3 ♀, MGCL 170990-170996; same location, 24.i.2012, D. Matthews & T. Lott, 1 ♂, 1 ♀, MGCL 171002, 171003; Guantanamo, 22.ii.1958, Barry Wright, A. C. Allyn Acc. 1970-1, 1 ♂; 2 km E of Yateritas, sea level, 10.vii.1995, L. D. & J. Y. Miller, M. J. Simon & L. R. Hernández, sta. 1995-13, Acc. 1995-14, 1 ♀; El Aguacate, NW Cd. Guantanamo, 180 m, 25.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-15, Acc. 1994-12, 4 ♂, 3 ♀; Maisi Mpio., Jaruco, 60–100 m, 26.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta.1994-17, Acc. 1994-12, 1 ♂; Maisi Mpio., Maisi, 20 m, 27.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-22, Acc. 1994-12, 1 ♂; San Antonio del Sur, sea level, 29.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-27, Acc. 1994-12, 1 ♂.

Notes. Adults were common at several localities, especially in partly shaded hillside areas with low vegetation including scrub mallows [Malvaceae]. Individuals regularly perched on leaves with wings outstretched in full sun. Adults were not observed nectaring at GTMO but have been recorded in Cuba on *Bidens* L., *Blechum* P.Browne, and *Stachytarpheta* Vahl.

Larval Hosts. Several genera of Malvaceae are recorded as hosts throughout the species' range and include *Abutilon* Mill., *Althaea* L., *Malva* L., *Malvastrum* A. Gray, and *Sida* L.

Distribution. Antilles, Great Inagua, southern United States south to Costa Rica.

Panoquina panoquinoides panoquinoides (Skinner, 1891)
Obscure Skipper
Fig. 73 ♀

Material. CUBA: Guantanamo: U.S. Naval Base, Site 10, general area E of Sherman Ave. < 0.75 mi. radius from 19.91604, -75.131641, 22.i.2012; D. Matthews & T. Lott, 1 ♀, MGCL 171028.

Notes. This is one of very few Cuban records and the only specimen from Cuba in the MGCL collections. Recorded nectar sources in Cuba include *Cordia* L., *Eupatorium* L., *Lippia* L., and *Stachytarpheta* Vahl. Several composite genera are recorded elsewhere in the West Indies.

Larval Hosts. Larvae feed on grasses [Poaceae] including *Cynodon dactylon* (L.) Pers. and *Saccharum* L. but there are records of other hosts in Jamaica including *Melanthera* Rohr [Asteraceae] (Smith et al. 1994).

Distribution. Antilles (except Grenada and the Grenadines), Bahamas, southern United States (Florida, Texas), Mexico (Yucatan), Belize, Costa Rica, Brazil, and Peru.

Cymaenes tripunctus tripunctus (Herrich-Schäffer, 1865)
Three-spotted Skipper
Fig. 75 ♀

Material. CUBA: Guantanamo: U.S. Naval Base, Site 7, vic. Stephens Ave., 19.92296, -75.12894, 23.i.2012, D. Matthews, R. Portell, J. Toomey, T. Lott, 9 ♂, MGCL 171018–171026; Site 10, general area E of Sherman Ave. < 0.75 mi. radius from, 19.91604, -75.131641, 22.i.2012, D. Matthews & T. Lott, 1 ♂, MGCL171035; same location, 24.i.2012, 1 ♀, MGCL 171034; 25.i.2012, D. Matthews & T. Lott, 1 ♀, MGCL 171032; 2 km W of Yateritas, sea level, 29.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-28, Acc. 1994-12, 3 ♂; Baracoa, Minas Amores, sea level, 28.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-23, Acc. 1994-12, 4 ♂, 3 ♀; Baracoa, Naranjal, sea level, 28.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-25, Acc. 1994-12, 4 ♂, 2 ♀; El Aguacate, NW Cd. Guantanamo, 180 m, 25.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-15, Acc. 1994-12, 4 ♂; Minas Amores road, 20 m, 12.vii.1995, L. D. & J. Y. Miller, & L. R. Hernández, sta. 1995-19, Acc. No. 1995-14, 2 ♂, 2 ♀; mtns. E of upper Rio Toa, 250 m, 13.vii.1995, L. D. & J. Y. Miller, M. J. Simon & L. R. Hernández, sta. 1995-20, Acc. 1995-14, 1 ♂; Puerto Caleta, sea level, 26.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-18, Acc. 1994-12, 1 ♀; San Antonio del Sur, sea level, 29.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-27, Acc. 1994-12, 1 ♀.

Notes. GTMO males were collected as they landed on grass blades while actively patrolling along a hedge row at Site 7.

Larval Hosts. *Panicum maximum* Jacq. and *Saccharum officinarum* L. (Smith et al. 1994). Reared by Dethier (1939, 1942).

Distribution. Southern Florida, Bahamas, Greater Antilles, Virgin Islands, Cayman Islands.

Lerodea eufala eufala (W. H. Edwards, 1869)
Eufala Skipper
Fig. 76 ♂

Material. CUBA: Guantanamo: U.S. Naval Base, Site 10, general area E of Sherman Ave. < 0.75 mi. radius from, 19.91604, -75.131641, 21.i.2012, D. Matthews & T. Lott, 1 ♂, MGCL 171027; same location, 22.i.2012, D. Matthews & T. Lott, 2 ♂, MGCL 171029, 171030.

Notes. Though continental populations are abundant and widespread, this species has been noted as rare in Cuba, occurring only in the Guantanamo area and a few locations in the provinces of Matanzas and Pinar del Río (Hernández 2005). Five specimens were also collected in La Habana province (Jardin Botanical Nacional, 22.vi.1994) by J. Y. & L. D. Miller [MGCL].

Larval Hosts. Larvae are known to feed on various genera of Poaceae including *Panicum* L. (Warren et al. 2012), *Saccharum* L., *Stenotaphrum* Trin. (Smith et al. 1994), *Oryza* L., and *Zea* L. (Hernández 2004).

Distribution. Southern United States, south though Central and South America to Argentina.

Hylephila phyleus (Drury, 1773)
Fiery Skipper
Fig. 80 ♂, 81 ♀

Material. CUBA: Guantanamo: U.S. Naval Base, GTMO Naval Base, Site 13, E of Sherman Ave., 19.91412, -75.134887, 21.i.2012, nectaring/perching on *Canavalia rosea*, D. Matthews & T. Lott, 3 ♂, 1 ♀, MGCL 171008-171010, 171016; same location/data, 22.i.2012, 1 ♂, MGCL 171007; 24.i.2012, 1 ♂, MGCL 171011; Minas Amores road, 20 m, 12.vii.1995, L. D. & J. Y. Miller, & L. R. Hernández, sta. 1995-19, Acc. No. 1995-14, 1 ♀; Mouth of Rio Toa, sea level, 13.vii.1995, L. D. & J. Y. Miller, M. J. Simon & L. R. Hernanadez, sta. 1995-21, Acc. 1995-14, 1 ♀.

Notes. Both males and females were observed to both perch and nectar on the legume, *Canavalia rosea* (Sw.) DC. (Figs. 5-6). All adults collected were at a large patch of this sprawling plant (Figs. 5, 6) with robust pink to purple flowers which was checked at different times over the course of several days. While *Calisto* were spotted in this location early in the morning, the skippers were not active until close to noon. Typical nectar sources for this species include various genera of Asteraceae and Plantaginaceae but include other Fabaceae such as *Acacia farnesiana* (L.) Willd. (Hernández 2004) and monocots such as the emergent aquatic *Pontederia cordata* L. (Smith et al. 1994).

Larval Hosts. Several genera of Poaceae are recorded hosts, including *Cynodon* Rich., *Digitaria* Heist. ex Fabr., *Panicum* L., *Paspalum* L., *Saccharum* L., and *Stenotaphrum* Trin. (Smith et al. 1994).

Distribution. Southern United States as far north as Connecticut, Central and South America to Argentina.

Wallengrenia misera (Lucas, 1857)
Cuban Broken-dash
Fig. 82 ♂

Material. CUBA: Guantanamo: U.S. Naval Base, Site 7, vic. Stephens Ave., 19.92296, -75.12894, 23.i.2012, D. Matthews, R. Portell, J. Toomey, T. Lott, 1 ♂, MGCL 171017; Site 10, general area E of Sherman Ave. < 0.75 mi. radius from, 19.91604, -75.131641, 21.i.2012, D. Matthews & T. Lott, 1 ♂, MGCL 171031, same location, 25.i.2012, D. Matthews & T. Lott, 1 ♂, MGCL 171033; Guantanamo, ii, Wm. Schaus colln., 3 ♂ [USNM]; same location, iv, Wm. Schaus colln., 1 ♂ [USNM]; same location, ii, (no Schaus label) 1 ♂ [USNM].

Notes. While no particular nectar source was noted for the GTMO specimens, Hernández (2004) lists several genera including *Stachytarpheta* Vahl, *Bidens* L., *Eupatorium* L., *Lantana* L., *Lippia* L., and *Tournefortia* L. *Stachytarpheta jamaicensis* (L.) Vahl [Verbenaceae] was observed at GTMO and abundant on the Ridge Trail and at Site 5 but all inflorescence shoots were brown and completely dry in January.

Larval Hosts. Larvae feed on various grasses and were reared and described by Dethier (1939).

Distribution. Cuba and the Bahamas. In Cuba, the species has been collected on the Isla de la Juventud, La Habana, and on the eastern end in Guantanamo and the neighboring provinces of Granma and Santiago, Cuba.

Atalopedes mesogramma mesogramma (Latreille, [1824])
Mesogramma Skipper
Fig. 77 ♂

Material. CUBA: Guantanamo: U.S. Naval Base, Site 7, vic. Stephens Ave., 19.92296, -75.12894, 23.i.2012, nectaring on *Bouganvilla*, D. Matthews, R. Portell, J. Toomey, T. Lott, 1 ♂, MGCL 170988; Site 13, E. of Sherman Ave., 19.91412, -75.134887, 21.i.2012, nectaring/perching on *Canavalia rosea*, D. Matthews & T. Lott, 1 ♂, MGCL 171012; Guantanamo, LeMoult, A. C. Allyn Acc. 1968-1, 1 ♂; Baracoa, Las Vertientes, 280 m, 27.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-21, Acc. 1994-12, 1 ♀; Baracoa, Minas Amores, sea level, 28.vi.1994, L. D. & J. Y. Miller & L. R. Hernández, sta. 1994-23, Acc. 1994-12, 3 ♂, 2 ♀.

Notes. Adults were collected and observed nectaring on *Canavalia rosea* (Figs. 5-6) and *Bouganvilla.*

Larval Hosts. Fernández (2001) reared larvae and directly observed oviposition on several species of grasses [Poaceae] including *Paspalum conjugatum* P.J.Bergius, *Cynodon dactylon* (L.) Pers., and *Dichanthium* Willem. Fernández also indicates larvae were reared (presumably on substitute food plants) on S*orghum sudanense* (Piper) Stapf., *Brachiaria mutica* (Forssk.) Stapf, *Eleusine indica* (L.) Gaertn. and *Paspalum fimbriatum* Kunth.

Distribution. The nominate subspecies is found in Cuba and the Bahamas (Andros and New Providence Islands), whereas *A. m. apa* (Comstock) occurs on Hispaniola and Puerto Rico.

Nyctelius nyctelius nyctelius (Latreille, [1824])
Violet-banded Skipper
Fig. 78 ♂

Material. CUBA: Guantanamo: U.S. Naval Base, Site 7, vic. Stephens Ave., 19.92296, -75.12894, 23.i.2012, D. Matthews, R. Portell, J. Toomey, T. Lott, 2 ♂, MGCL 171013, 171014; Site 10, general area E of Sherman Ave. < 0.75 mi. radius from, 19.91604, -75.131641, 21.i.2012, D. Matthews & T. Lott, 1 ♂, MGCL 171015; Guantanamo, 19.ii.1958, Barry Wright, A. C. Allyn Acc. 1970-1, 1 ♀.

Notes. One of the individuals collected at Site 7 was nectaring on *Gliricidia sepium* (Jacq.) Kunth ex Walp. Numerous other nectar sources are known including *Ageratum* L., *Antigonon* Endl., *Callicarpa* L., *Cordia* L., *Lantana* L., *Stachytarpheta* Vahl, *Tournefortia* L., and *Zinnia* L.

Larval Hosts. Larvae are grass feeders and have been reared on *Panicum* L., *Oryza* L. and *Saccharum* L..

Distribution. The nominate subspecies ranges from southern Texas through Central and South America to Argentina. In the West Indies, it occurs in the Greater Antilles and Virgin Islands but is replaced by the subspecies *N. nyctelius agari* (Dillon) in the Lesser Antilles.

BIOGEOGRAPHY OF GUANTANAMO BUTTERFLIES

The biogeographic origins of West Indian Lepidoptera have been reviewed several times in the literature (Fox 1963; Brown 1978; Clench 1964; Miller and Miller 1989, 2001;

Table 1. Butterfly species known from the Guantanamo Province but not occurring within GTMO boundaries or not currently represented by voucher specimens from GTMO in the collections at MGCL. Species names preceded by an asterisk (*) are likely to occur in GTMO based on elevation and habitats present.

FAMILY	SPECIES/SUBSPECIES	COMMON NAME	MILLER STATION NUMBERS OR REFERENCE CITATION
Papilionidae	**Parides g. gundlachianus* (C. Felder & R. Felder, 1864)	Cuban Cattleheart	1994-18
Papilionidae	**Papilio aristodemus temenes* Godart, 1819	Schaus' Swallowtail	Hernández 2004
Papilionidae	**Papilio caiguanabus Poey, [1852]*	Poey's Swallowtail	Hernández 2004
Papilionidae	**Papilio thoas oviedo* Gundlach, 1866	'Cuban' Thoas Swallowtail	Hernández 2004
Pieridae	*Kricogonia cabrerai* Ramsden, 1920	Cuban Sulphur	Warren et al. 2012
Pieridae	**Kricogonia lyside* (Godart, 1819)	Lyside Sulphur	Hernández 2004
Pieridae	*Pyrisitia larae* (Herrich-Schäffer, 1862)	Confusing Yellow	1995-18
Pieridae	*Pyrisitia n. nise* (Cramer, 1775)	Mimosa Yellow	1995-18
Pieridae	*Pyrisitia d. dina (Poey, 1832)*	Dina Yellow	1994-21
Pieridae	**Pyrisitia proterpia* (Fabricius, 1775)	Tailed Orange	Hernández 2004
Pieridae	**Eurema lucina* (Poey, [1852])	Smudged Yellow	Hernández 2004
Pieridae	*Aphrissa neleis* (Boisduval, 1836)	Pink-spot Sulphur	Warren et al. 2012
Pieridae	*Ganyra menciae* (Ramsden, [1914])	Cuban White	Warren et al. 2012
Pieridae	**Nathalis i. iole* Boisduval, 1836	Dainty Sulphur	Hernández 2004
Pieridae	*Melete salacia cubana* Fruhstorfer, 1908	Black-striped White	1995-19
Lycaenidae	**Strymon bazochii gundlachianus* M. Bates, 1935	Lantana Scrub-Hairstreak	Alayo and Hernández 1987
Lycaenidae	*Nesiostrymon c. celida* (Lucas, 1857)	Caribbean Hairstreak	1994-23
Riodinidae	**Dianesia carteri ramsdeni* (Skinner, 1912)	Caribbean Metalmark	Skinner 1912
Hesperiidae	*Chiomara mithrax* (Möschler, 1879)	Mithrax Duskywing	type locality, Guantanamo (Warren et al. 2012)
Hesperiidae	**Pyrrhocalles antiqua orientis* Skinner, 1920	Caribbean Skipper	type locality, Guantanamo (Warren et al. 2012)

Table 1. Continued.

FAMILY	SPECIES/SUBSPECIES	COMMON NAME	MILLER STATION NUMBERS OR REFERENCE CITATION
Hesperiidae	*Gesta gesta* (Herrich-Schäffer, 1863)	Impostor Duskywing	1994-17
Hesperiidae	*Astraptes cassander* (Fabricius, 1793)	Cuban Flasher	1994-18
Hesperiidae	*Burca b. braco* (Herrich-Schäffer, 1865)	Braco Skipper	1994-18, 1994-22
Hesperiidae	**Burca c. concolor* (Herrich-Schäffer, 1865)	Concolorous Skipper	1994-17, 1994-24
Hesperiidae	*Choranthus radians* (Lucas, 1857)	Radians Skipper	1995-20
Hesperiidae	**Euphyes s. singularis* (Herrich-Schäffer, 1865)	Singularis Skipper	1994-25
Hesperiidae	**Euphyes c. cornelius* (Latreille, [1824])	Cornelius Skipper	1994-23
Hesperiidae	*Holguinia holguin* Evans, 1955	Holguin Skipper	1994-23
Hesperiidae	*Rhinthon cubana* (Herrich-Schäffer, 1865)	Cuban Skipper	Hernández 2004
Nymphalidae	**Agraulis vanillae insularis* Maynard, 1889	Gulf Fritillary	1994-17, 18, 20, 22, 26, 28, 1995-12
Nymphalidae	*Eueides isabella cleobaea* Geyer, 1832	Isabella's Longwing	MGCL specimen (Warren et al. 2012)
Nymphalidae	*Memphis e. echemus* (E. Doubleday, [1849])	Cuban Leafwing	MGCL specimen (Warren et al. 2012)
Nymphalidae	*Marpesia e. eleuchea* Hübner, 1818	Caribbean Daggerwing	1995-13
Nymphalidae	*Atlantea perezi* (Herrich-Schäffer, 1862)	Cuban Checkerspot	MGCL specimen (Warren et al. 2012)
Nymphalidae	*Danaus gilippus berenice* (Cramer, 1779)	Queen	live adult image (Warren et al. 2012)
Nymphalidae	**Lycorea halia demeter* C. Felder & R. Felder, 1865	Tiger Mimic-Queen	Hernández 2004
Nymphalidae	*Greta cubana* (Herrich-Schäffer, 1862)	Cuban Clearwing	Hernández 2004
Nymphalidae	**Junonia evarete zonalis* C. Felder & R. Felder, [1867]	Tropical Buckeye	live adult image (Warren et al. 2012)
Nymphalidae	**Junonia c. coenia* Hübner, [1822]	Northern Buckeye	Hernández 2004
Nymphalidae	*Calisto brochei* Torre, 1973	Broche's Calisto	Núñez Aguila et al. (2012)
Nymphalidae	*Calisto occulta* Núñez, 2012	Cryptic Calisto	Núñez Aguila et al. (2012)

Miller and Miller 1998; Smith et al. 1994). The southern tip of Florida is faunistically similar to an Antillean island rather than continental and has been included in reviews (Scott 1972; Riley 1975) due to the presence of Cuban and Bahamian endemic species. Thus, the butterfly fauna of the Greater Antilles has been derived from the U.S., Central America, and the western Caribbean Basin, with South America via Trinidad originally thought to be the major route for the Lesser Antilles. As we have indicated in the individual species treatments above, most butterflies are clearly associated with specialized food plants, and it is necessary to also examine the presence of individual food plant data in order to obtain a more complete picture (Brown and Heineman 1972; Scott 1972; Riley 1975; Smith et al. 1994; Hernández 2004). Due to this close association, it is generally accepted that the diversity of modern butterflies and their associated larval hostplants arose in the mid-late Cretaceous (Raven and Axelrod 1974; Common 1975, 1990; Powell 1980; White 1990; Labandeira and Sepkoski 1993). Clearly some of the North American and South American components of the butterfly fauna arrived in the West Indies via dispersal, but others are not as easily explained. Cuba and Hispaniola harbor the greatest percentage of endemic butterfly species and this is supported by other West Indian fauna and flora (Woods and Sergile 2001). This may reflect in part their status as the largest Antillean islands (Alayo and Hernandez 1987; Schwartz 1989; Smith et al. 1994; Hernández 2004). Given the complex geological history with points of accretion of these islands during the Tertiary, especially for eastern Cuba (Pindell and Dewey 1982; Burke 1988; Iturralde-Vinent et al. 2006; Pindell et al. 2006), each harboring distinct faunas and floras, Miller and Miller (1989, 2001) proposed a combination vicariance/dispersal model for the current distribution of modern butterflies.

The origins of fauna and flora are generally explored by reviewing the fossil record and the historical geology of an area in conjunction with the current distribution of species to determine their evolutionary history. Based on the fossil record in the Florissant Shale beds of Colorado, we know that a number of modern butterfly genera were already established by the Eocene and Oligocene (Brown 1978; Carpenter 1930; Miller and Brown 1989) and are present in the mid-Miocene amber deposits of the Dominican Republic (Grimaldi 1995; Grimaldi and Engel 2004).

Several models for the historical geology of the Gulf of Mexico and Caribbean evolution have been proposed over the years and have been the subject of controversy (Iturralde-Vinent and MacPhee 1999; Iturralde-Vinent et al. 2006; Pindell and Dewey 1982; Pindell and Barret 1990; Pindell et al. 2006; Giuta et al. 2006; van Hinsbergen et al. 2009). During the Jurassic and early Cretaceous, Pangea began to separate and it is generally agreed that the opening of the Gulf of Mexico and the Atlantic dates roughly from this period and that the floors of both are comprised of marine crustal oceanic basalt by the end of that period (Perfit and Heezen 1978; Case et al. 1984; Perfit and Williams 1989). North and South America were completely separated early in the Cretaceous, but a connection was re-formed later derived from a series of volcanic islands connecting southern Mexico and northern South America. Smith et al. (1988, 1994), and Miller and Miller (1989, 2001) used the models proposed by Pindell and Dewey (1982) and later Pindell and Barret (1990) in their discussion on the emergence of a proto-Caribbean arc formed in the early Cretaceous in the Pacific Ocean moving through the gap between the two continents into the Gulf of Mexico. This was a time of geological complexity. For example, the position of this arc in combination with the Yucatan Peninsula, Florida, and South America is subject to interpretation. In addition, the Jamaican and southern Hispaniolan blocks were believed further to the west than the

remainder of the proto-Caribbean arc which was moving eastward with respect to the North and South American plates. During the Oligocene to Pliocene, the proto-Caribbean arc fragments and small blocks moved about and were accreted onto the islands as we know them today. Both Hispaniola and Cuba are products of accretion and fragmentation but are also beneficiaries of the same earlier block (Pindell and Dewey 1982; Iturralde-Vinent et al. 2006). Guantanamo Province is an example of this accretion today.

Although this paper is focused on the butterfly fauna of GTMO and Guantanamo Province, the affinities of butterflies extend beyond the island of Cuba to other regions within the Caribbean basin, especially the Bahamas. Burke (1988) published accounts of the geological history between these islands and Cuba. The Bahamas were originally derived from the rifting of Pangea which resulted in the opening of the North Atlantic basin in addition to volcanic activity due to the collision of the North American and Caribbean plates. He also suggested that Cuba overrode the Bahama Rise during the mid-Tertiary and the distribution patterns of some Greater Antillean lepidopteran species reflect this today. L. D. Miller et al. (1992), Miller and Simon (1998a,b) and Hernandez et al. (1998) reviewed the distribution patterns of butterflies in the southern Bahamas, noting their close ties with Cuba and postulating a very large emergent Bahama Bank during the Pleistocene glacial maxima, with the subsequent reflooding of the bank to result in the patterns evident today. Further information on the biogeographical patterns of the West Indian butterfly fauna can be found in Miller and Miller (2001).

Several of the butterfly species collected thus far are those which would be considered as widespread (present throughout the islands and on to the North American continent). These include *Phoebis sennae, Ascia monuste, Ministrymon azia, Euptoieta claudia, Siproeta stelenes biplagiata, Erynnis zarucco, Pyrgus oileus, Panoquina p. paniquinoides, Lerodea e. eufala, Hylephila phyleus,* and *Nyctelius n. nyctelius*. Of these, *P. sennae* and *A. monuste* are known to be migratory. Populations of *M. azia* become established in certain areas and are opportunistic on occasion, being present one or two years and then as the result of changes in weather patterns or availability of nectar or larval hostplant resources simply disappear.

There are a few species strictly associated with Central and South America**.** These include *Eurema e. elathea, Strymon istapa,* and *Hypna clytemnestra iphigenia. Eurema elathea* is widely distributed in the Bahamas, Cuba, and elsewhere in the West Indies. *Strymon istapa* Reakirt ([1867]) (= *cybira* Hewitson, 1874) was originally considered a subspecies of *S. columella*, a species which is widely distributed in southeastern North America, Central and South America. *Strymon istapa* was recently raised to full specific rank. *Hypna clytemnestra* is widely distributed in Mexico to northern Argentina with the subspecies *H. c. iphigenia* described from Cuba.

There are a number of lycaenids and nymphalids that are shared with southern Florida. These include *Strymon martialis*, *S. limenia*, *Chlorostrymon maesites*, *Electrostrymon a. angelia*, *Cyclargus ammon*, *Leptotes cassius theonus*, *Euptoieta claudia*, *Anartia j. guantanamo*, and *Junonia genoveva*. In 1974, Anderson collected both *S. limenia* and *E. a. angelia* on Big Pine Key and at Key West. The hardwood hammock and other tropical habitats were intact at that point, but *S. limenia* has not been observed since then. This species may have just been a transient at the time. Elsewhere in the West Indies, *S. limenia* is generally found in weedy areas or along forest edges. Despite the review of Turner and Parnell (1985) on the proper identification of *J. evarete* and *J. genoveva* in Jamaica, there

is still a lot of confusion on the identification of both species due to polymorphism and availability of larval plants. Additional observations on the life history of both these species are required.

Several butterflies collected at GTMO are widely distributed throughout the West Indies. These include *Phoebis agarithe antillia*, *Allosmaitia coelebs*, *Strymon martialis* (part), *S. limenia*, *Urbanus proteus domingo*, and *Cymaenes t. tripunctus*.

Cuba overrode the Bahamas in the mid-Tertiary and the water levels were low during this period. During the Pleistocene, there was a reflooding of these banks and the Bahama Islands which has resulted in what we see today. As a consequence, there are a number of butterflies shared throughout the Bahamas and Cuba today. These include *Glutophrissa drusilla poeyi, Hemiargus ceraunus filenus*, *Heliconius charithonius ramsdeni, Calisto herophile, Phocides pigmalion batabano*, *Polygonus leo histrio*, *Urbanus dorantes santiago*, *Astraptes x. xagua, Ephyriades b. brunnea, Wallengrenia misera,* and *Atalopedes m. mesogramma.* The fact that these butterflies are recognized at the subspecific level is indicative of the historically close alignment of the lepidopteran fauna between these two geologically different areas.

The only riodinid in the West Indies, *Dianesia carteri,* is found in the Bahamas and Cuba. Although both *Dianesia c. carteri* (Bahamas), and *D. c. ramsdeni* (Cuba) are generally found in virgin or suboptimal pinelands, *D. c. carteri* may often be observed in more xeric rocky habitats with native Palmae, Orchidaceae and Bromeliaceae and rivers nearby. The life history and associated hostplant remains unknown. The genus *Wallengrenia* is widely distributed throughout North and South America, but the taxonomic diversity is expanded markedly in Central America and the West Indies through a series of vicariant events. Thus, the distribition of *Wallengrenia misera* in Cuba and Bahamas is thought to have originated from Oligocene connections with Cuba (Miller and Miller 2001).

There were many taxa collected which are endemic only to Cuba. These include *Aphrissa statira cubana*, *Pseudochrysops bornoi yateritas*, *Allosmaitia c. coelebs*, *Libytheana motya*, *Dryas iuila nudeola*, *Anartia chryopelea*, *Antillea pelops anocoana*, and *Anaea troglodyta cubana*. With the exceptions of the subspecies, *D. iulia nudeola* and *Anaea troglodyta cubana*, which exhibit subtle differences from the nominate species, the wing coloration and markings on these endemic taxa are quite distinct. However, there are some taxa that are shared with Hispaniola at the specific level. These include *Antillea pelops pelops* (St. Kitts, Hispaniola, and Puerto Rico), *A. p. pygmaea* (Jamaica), *Allosmaitia c. fidena*, *Pseudochrysops b. bornoi*, and *Strymon toussainti*. *Libytheana motya* is endemic to Cuba, but *L. terena* has been collected on Hispaniola and Puerto Rico with a single specimen collected near Santiago de Cuba (Alayo and Hernández 1987; Hernández 2004).

Papilio demoleus is not native to the western hemisphere and was first reported in the eastern Dominican Republic by Guerrero et al. (2004) and eventually traced to a southeast Asian population. Subsequently, it has been reported in Jamaica (Garraway and Murphy 2006), Puerto Rico (Homziak and Homziak 2006), and Cuba (Lauranzón Meléndez et al. 2011; Barro and Núñez 2011). This species has a very unique flight pattern compared with the other swallowtails found in the Bahamas. J. Y. Miller observed a specimen of *P. demoleus* on North Andros Island, Bahamas in 2007 (Miller 2012), but the species has not become established there.

Pyristia lisa is a pierid which is widely distributed in North America, Bermuda, and in the northern Bahamas. The differences between the nominate subspecies and *P. lisa euterpe* are the smaller size, and the somewhat reduced black borders on the forewing margins

with a light dusting of grey scales along the male basal forewing. W. P. Comstock (1944) reviewed populations of *P. l. euterpe* and determined that narrow borders comprised 60% of the populations in Cuba, 75% in Hispaniola, with 90% in Puerto Rico which suggests clinal variation. This situation will be examined further in our studies.

DISCUSSION

The Naval base at Guantanamo Bay contains a variety of habitats (e.g., rounded and steep-sided scrub hills, mudflats, saltflats, marshes, and mangroves, etc.) and thus far includes 51 butterfly taxa. The goals of this project are to complete a biodiversity survey of the lepidopteran fauna and a comparative analysis of the species present on the base and collected elsewhere in the province. The affinities of the butterflies were analyzed at specific/subspecific level to determine the potential biogeographic patterns. The specimens collected in GTMO in January, 2012, in conjunction with material collected during three field trips in 1994-95 by L. R. Hernandez, L. D. and J. Y. Miller, and M. J. Simon, also provide us with flight times during different months of the year as well as other species which potentially might be present at GTMO as listed in Table 1. Guantanamo province was a separate island block during the Cretaceous (Iturralde-Vinet et al. 2006), but portions of the southern part of the province in the Sierra Maestra indicate that they are of Paleocene-Eocene age. There is geological evidence that during the Pleistocene, the water levels were considerably lower and part of Cuba overrode the Bahamas which resulted in a major exchange of flora and fauna. This explains in part the resultant affinities of the butterfly fauna present on these islands today.

Of the species collected thus far, we have limited or no life history information from Cuba on *Chlorostrymon maesites*, *Pseudochrysops bornoi yateritas*, *Libytheana motya*, *Euptoieta claudia*, and *Hypna clytemnestra iphigenia*. As with other members of *Libytheana* in the islands, *L. motya*, is probably associated with a *Celtis* ssp. The life history of a skipper species, *Astraptes xagua*, is also still unknown though larvae are suspected to feed on Fabaceae. In addition to searching for larvae and hosts, as mentioned above, we anticipate finding additional species at GTMO based on previous collecting in the province, particularly in the Guantanamo Bay area just outside of the boundaries of the base. A generally common species, *Agraulis vanillae*, was not found at GTMO although it has been collected in the province by Miller et al. in 1994 and 1995 and has been recorded from the town of Guantanamo by Barry Wright (15.ii.1958, 4 specimens, MGCL). Seventeen other butterflies likely to occur at GTMO are marked with an asterisk in Table 1. Among these are several Papilionidae and Pieridae, families poorly represented in our collections from recent fieldwork. Additional sampling during the wet season may result in more records for these groups.

In addition to previous collections on the base by Richard Anderson, we are aware that Colonel Stanley S. Nicolay (USMC) collected butterflies at GTMO in the 1950s or 60s (Richard Anderson, pers. comm.). As records of this material are found in other institutions, these will be incorporated into a list covering all Lepidoptera from GTMO and may give insight into any changes in faunal composition over several decades. As our work continues, the natural areas, preserved and protected by limited access within the boundaries of GTMO, offer an exceptional opportunity to examine and compare the lepidopteran fauna of this unique semi-arid environment to other Caribbean and Central American faunas in the context of both recent and geologic timeframes.

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