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Review and comments on the current status of
Choranthus richmondi L. Miller (Lepidoptera: HesperIIDae)
in the Bahamas

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Review and comments on the current status of *Choranthus richmondi*
L. Miller (Lepidoptera: HesperIIDae) in the Bahamas

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Abstract. Originally described from Great Guana Cay, Exuma Islands, Bahamas, *Choranthus richmondi* L. Miller, was also recorded from North Andros Island. Three specimens were collected on South Andros Island, Bahamas, in March 2014, representing a new record for this island. Photographs of adults, a complete diagnosis, genitalia illustrations, and a description of the habitat, nectar sources, and potential hostplant are presented. The male genitalia are illustrated for the first time.

Key Words. Lucayan Archipelago, West Indies, HesperIIDae, genitalia.

Introduction

One of the more elusive skippers in the Bahama Islands is *Choranthus richmondi*, which was described by L. D. Miller (1965) in a review of the West Indian genus *Choranthus* Scudder. Originally described from two females from Whitepoint, Great Guana Cay and Bitter Guana Cay, Exuma Islands, Bahamas, Great Bahama Bank, this hesperiid is infrequently encountered. We have observed this species periodically on N. Andros Island but have never collected it. Based on the unusually high rain frequency in the spring of 2014 in Florida and east into the Bahamas, we visited S. Andros, Bahamas, 27 March-1 April, 2014, as part of a continuing biodiversity survey of the Lepidoptera of the Lucayan Archipelago. Despite high winds on the southern end of the island, there were a number of skippers in flight visiting several nectar sources. It was not until we began to process the material that we noticed these small, rather unusual skippers. We identified two males and a single female of *C. richmondi*. The dorsal and ventral surfaces of both sexes were illustrated in Smith et al. (1994) and more recently, the female holotype is illustrated and available on the Butterflies of America website (Warren et al. 2014). However, there are some differences in the coloration among the illustrations and the new material. A diagnosis is presented here based on these recently collected specimens. Upon dissection of the female genitalia, additional features were noted that were not illustrated in the original description. In addition, the male genitalia is illustrated and described for the first time.

Materials and Methods

Specimens were collected on South Andros Island, Bahamas using hand nets. The specimens examined, including some comparative types of other species, are deposited in the collections of the McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, Gainesville, Florida (MGCL). In addition, wing morphology and maculation patterns of type specimens available online from the American Museum of Natural History (AMNH) and the Carnegie Museum of Natural History (CMNH), as well as published works listed in the references cited, were consulted. Identifications are based on the genitalia dissected with standard techniques, preserved in vials with glycerin, and compared with reference to published illustrations.

***Choranthus richmondi* L. Miller, 1965**

Fig. 1–10

Diagnosis Male (Fig. 1–4). Forewing length males: 15.0, 15.4 mm: Head, vertex dark brown shading to metallic green with a row of buff scales posteriad; eye ring buff; buff, olive green and fuscous hair tuft between base of antenna and frons; palpi above fuscous admixed with dark brown; below buff with a few dark brown setae; antennae above, dark brown with a few buff fulvous scales on the proximal nine segments with club and apiculus ferruginous dark brown; below dark brown with buff fulvous scales at end of segments gradually shading to buff and fulvous scales on the segments and especially near base of club with a few buff and fulvous scales near the base of the apiculus. Thorax above, tegulae fuscous with dull fulvous olivaceous scales and setae dorsad and laterally with additional darker fulvous olivaceous setae on the metathorax; prothorax, mesothorax and metathorax above dark fuscous brown admixed with olivaceous and darker fulvous scales and setae; below olivaceous mixed with buff scales, legs reddish-fulvous. Abdomen dorsal, dark brown sprinkled with a few dull fulvous setae, A1–A3 shading to bright fulvous on A10; dark brown with additional dull fulvous setae along lateral line; below buff, almost pale fulvous shading to bright fulvous on A10.

Forewing above, ground color fuscous brown, with fulvous from base to three-fourths distad along the costa and extending posteriad to the anal margin; veins, darkened fuscous brown with the exception of subcosta extensive dark brown at origins of radial veins near end cell, and fuscous flare extending from cell end in R_5-M_1 to lateral margin; a prominent blackish brown angular brand in M_3-Cu_1 consisting of dense erect black androconial setae with raised longer fuscous spatulate scales along the anterior portion near end cell; brand in Cu_1-Cu_2 contains dense black erect androconial setae; proximal area in Cu_2-2A to the anal margin darker. Broad, darker fuscous brown marginal band extends from apex to anal angle and is diffuse along the proximal margin.

Hindwing, ground color dark fuscous brown, especially along the costal, lateral, and anal margins with dull fulvous extending from the base of cell to submargin in $Rs-M_1$, to anal margin proximad, with dull fulvous nearly to the margin in Cu_2-2A ; veins darkened in fulvous area especially along cubitus of cell. Elongate reddish fulvous setae in cell extend posteriad on wing into Cu_2-2A . Forewing below with coloration and pattern similar to above but paler, veins not as darkened but with dark brown in the triangular area from above extending into base of cell; brown marginal band overscaled with dull fulvous, paler from M_1-M_2 to Cu_2-2A . Hindwing dark fuscous brown heavily sprinkled with reddish fulvous along costa and with fulvous scales present over the entire wing, appearing olivaceous with a brighter fulvous ray more prominent in Cu_2-2A and along anal margin.

Fringes: forewing above fuscous at apex with few pale fulvous scales along lateral and anal margins shading to more fulvous at anal angle; hindwing dark brown fuscous along costa shading to fuscous with a few fulvous scales along lateral margin and with fulvous scales at anal angle and along anal margin. Below, forewing fuscous admixed with fulvous along lateral margin, fulvous at anal angle and fuscous along anal margin; hindwing fuscous with a few reddish fulvous scales along costa, fuscous and fulvous scales along lateral margin with fulvous at anal angle and along anal margin.

Diagnosis Female (Fig. 5–6). Forewing length 16.1 mm. Head with the metallic green not as prominent posteriad of vertex as in male and with buff and fulvous scales posteriad; thorax similar but tegulae dark brown edged in buff fulvous scales; antenna similar but below dark brown with pale fulvous to buff on segments; below thorax clothed in fuscous scales and buff and olivaceous scales; legs with buff scales especially along exterior margin. Abdomen above dark brown fuscous with a few fuscous, olivaceous, and dull fulvous scales and setae on A1; below almost devoid of scales, perhaps due to partly worn condition, with a few fuscous brown scales on A1 and reddish fulvous on A10.

Forewing: ground color dark fuscous brown with fulvous areas reduced and not as bright as in male but with veins darkened, especially at origins of radial veins at end of cell, and along the cubitus, across end of cell into the diffuse fuscous brown band along margin. Hindwing pattern similar to male but darker especially in $Sc + R_1 - Rs-Rs-M_1$ with dull fulvous areas considerably darker and veins darkened. Below, forewing ground color is fuscous dark brown lightly sprinkled with dull fulvous scales especially on the hindwing. Forewing with bright fulvous along the costal margin extending to R_5-M_1 , with veins

darkened; proximal triangular patch dark brown, larger than in the males and extending anteriorly into the cell. Hindwing, fuscous dark brown sprinkled with dull fulvous scales, especially in Cu_2-2A .

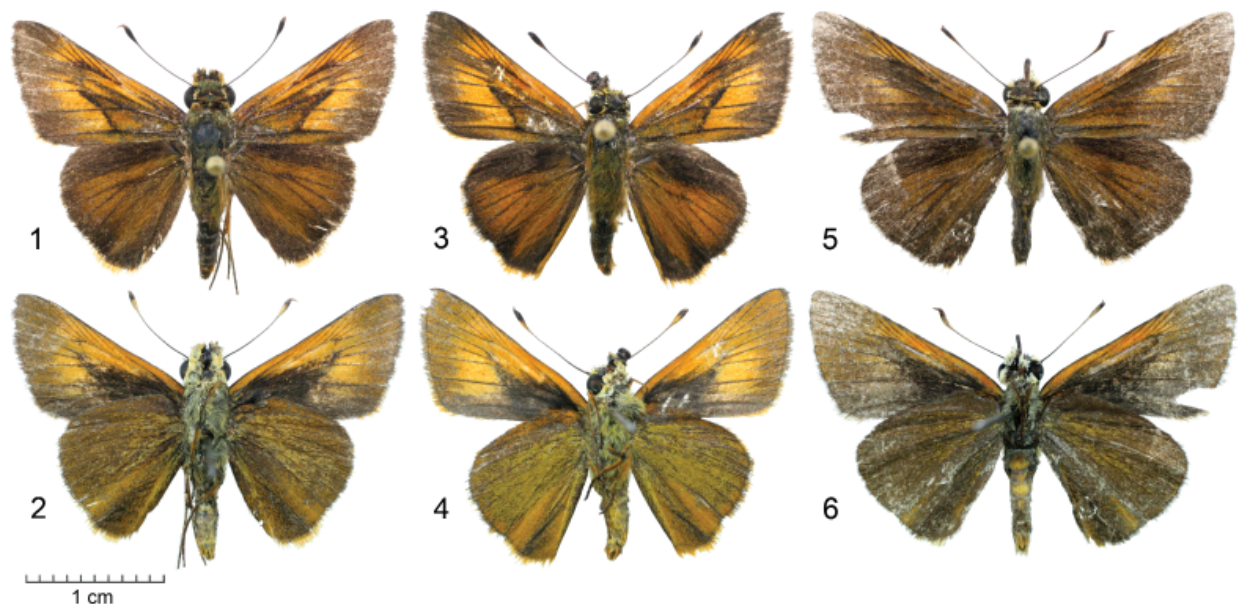
Male genitalia (Fig. 7): In lateral view the socii are heavily sclerotized, erect, expanding into a broad fan which is reflexed ventrad along distal margin; uncus quadrate distad with bulbous points on either side; there is a medium sclerotized, rectangular gnathos; saccus shortened and square on anterior margin; valva as well as the entire genital capsule heavily ornamented with setae, especially on tegumen, sacculus, ampulla, and inner margin of the valvula; the ampulla is slightly produced with prominent, blunt cut in the cucullus; juxta lightly sclerotized, rectangular posterior margin with minute setae in lateral view; exterior surface of valva covered in setae; penis with a series of minute spines near attachment of the anellus along the dorsal surface and ventral views; aedeagus with enlarged sclerotized curved cornutus.

Female genitalia (Fig. 8): As illustrated by Miller (1965) with a fork-shaped lamella antevaginalis, but with extension posteriad on either side which is lightly sclerotized and reflexed, terminating in a smooth angular plate; lamella postvaginalis lightly sclerotized plate slightly indented centrad; ductus bursae opaque, membranous, covered with folds extending into the bursa copulatrix; both ductus bursae and the posterior portion of the bursa copulatrix covered in fine spicules even into the folds; inception of ductus seminalis one-quarter below the antrum.

Material Examined BAHAMAS: South Andros Island, S of Mars Bay Settlement, 23.839084°, -77.518757°, 29.iii.2014, J. Miller, M. Simon, R. Rozycki, D. Matthews: 1 male, MGCL 234721; 1 male, MGCL 234741 with genitalia vial M-7640; 1 female MGCL 234720 with genitalia vial M-7642.

Discussion

These recently collected specimens of *C. richmondi* are a bit worn with Fig. 3–4 the best representative of the males. All of the specimens were missing some of the prominent fulvous overscaling on the ventral surface of the hindwing. Based on the locality records in collections, this species has multiple broods with records from January, July, October and now March. The first author was somewhat puzzled by the coloration of the ventral surface when compared with the type figures online (Warren et al. 2014) taken by N. Grishin in 2010, the latter of which is bright fulvous below. The latter does not compare



Figures 1–6. *Choranthus richmondi* L. D. Miller. 1) Dorsal view, male, MGCL 234721. 2) Ventral view, same specimen. 3) Dorsal view, male, MGCL 234741. 4) Ventral view, same specimen. 5) Dorsal view, female, MGCL 234720. 6) Ventral view, same specimen.

favorably with the original description by Miller (1965), nor the illustrations in Smith et al. (1994), and those illustrated in Figures 1–6. The specimens of *C. richmondi* that were recently collected are not as heavily overscaled with fulvous, especially in Cu_2 -2A. Upon closer examination at high magnification with a Wild M5 dissecting microscope, the undersurface of the both wings in both sexes is double scaled with dentate fuscous scales comprising the upper layer, and smaller, curved, reflective scales below (Fig. 9.) In addition, there are elongate fulvous piliform scales in the fulvous areas of the cell and especially on the hindwing in Cu_2 -2A. Thus, the coloration of *C. richmondi* is far more complex than previously believed. The stigma of *C. richmondi* includes a complex of dense, black, erect androconial scales in both M_3 - Cu_1 and Cu_1 - Cu_2 with spatulate scales along the cubitus near the end of the forewing cell (Fig. 10). Examination of both *Choranthus radians* (Lucas) and *Parachoranthus magdalia* (Herrich-Schäffer) revealed a similar pattern but the spatulate scales are not as well developed in *C. radians*.

Based on the female genitalia, *C. richmondi* is very closely aligned with *C. radians* and both species are recorded in the Bahamas. The folds in the ductus bursae were evident in the original illustration, but the spicules on either the ductus or corpus bursae were not evident. This slide was made using a synthetic resin (Harleco), which had an advantage in that it could be dissolved in xylene if other diagnostic characters require examination at a later date. Unfortunately, it was yellow in coloration and features such as fine spicules may not have been evident. In *C. radians*, the spicules are reduced to fine sclerotized points in the same areas of the ductus and corpus bursae.

The male genitalia of *C. richmondi* and *C. radians* are different, especially in the development of the socius, which is more enlarged, erect and dorsally recurved in *C. richmondi*. The gnathos is fused,

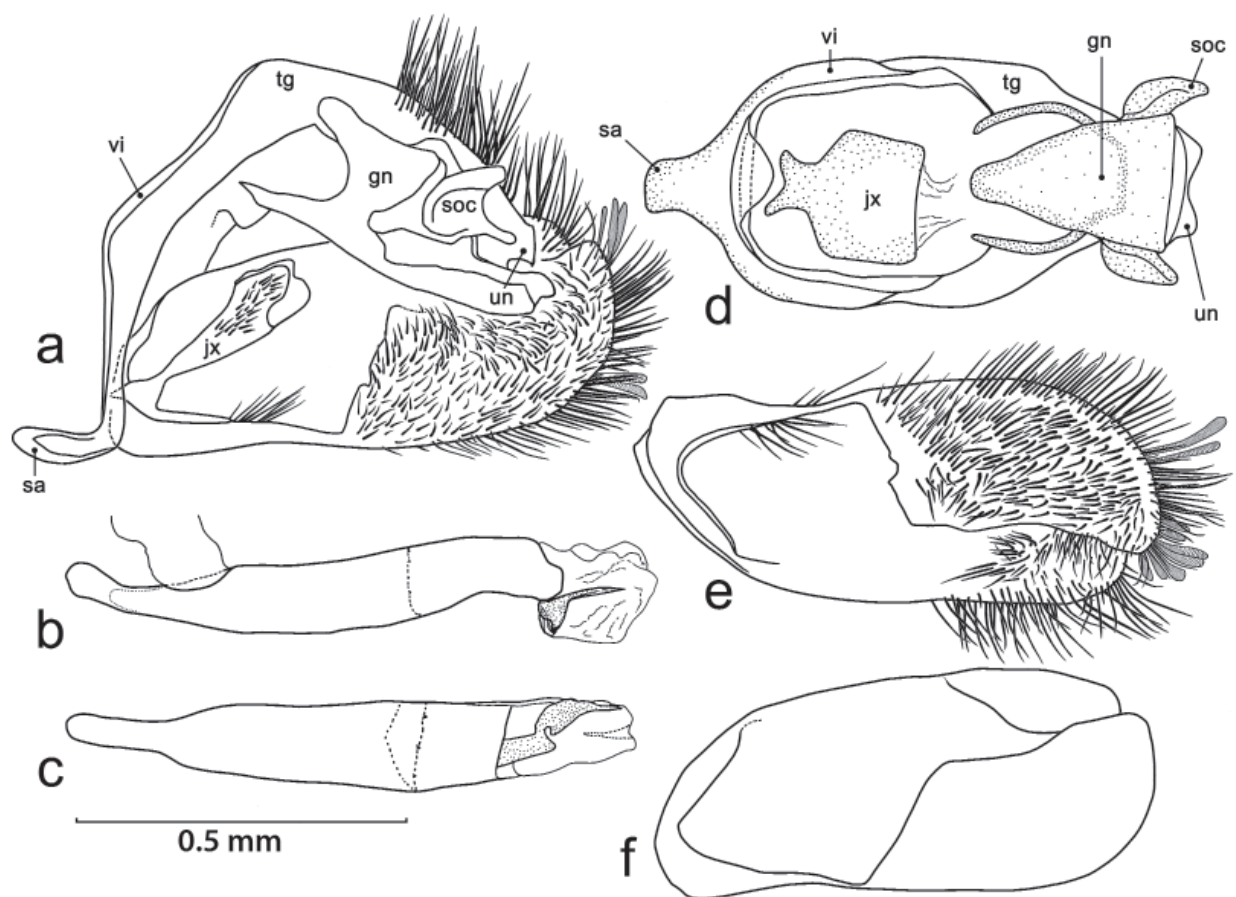


Figure 7. Male genitalia of *Choranthus richmondi*. **a)** Lateral view illustrating the uncus (un), tegumen (tg), socii (soc), gnathos (gn), vinculum (vi), juxta (jx) and saccus (sa). **b)** Penis, lateral view. **c)** penis, ventral view. **d)** Ventral interior view. **e)** Complete interior view of the valve with setae and scales. **f)** Interior view of valve without setae and scales.

and the prominent juxta is quite distinct in both species. As with other species in the genus, the saccus is foreshortened and the uncus is square on the posterior margin.

The specimens illustrated were collected at the south end of S. Andros, with high prevailing winds in rocky karst limestone adjacent to saltwater to the east. The elevation was about 1.5–2.4 m (5–8 ft) and this site probably floods during high tides. Winds were extremely high both days that we collected in the area. Although both J. Y. and L. D. Miller had observed a few *Choranthus richmondi* in an overgrown patch of *Wedelia* Jacq. on N. Andros, we were never able to collect it despite returning to the area along with M. J. Simon over a number of years. During our observations in June 2003 on N. Andros, we saw these skippers weaving slowly in and around the vines of these flowering plants so that they blended somewhat into the patch. On S. Andros, there are a few *Casuarina* L. trees near the south end point of the road where the vegetation was 0.6–2.4 m (2–8 ft.) in the immediate area and gradually increased in stature along the road as we walked to the north. There were several potential nectar resources in bloom. Those especially attractive to skippers in the rocky open areas included *Borrichia arborescens* (L.) DC. (Fig. 15), *Suriana maritima* L. (Fig. 12–13), and *Angadenia sagraei* (A.DC.) Miers. (Fig. 14) and further north, bordering higher vegetation, *Melochia tomentosa* L., *Cordia bahamensis* Urb., and *Neurolaena lobata* (L.) Cass. Other skippers in flight included *Phocides pigmalion* (Cramer), *Epargyreus zestos* (Geyer), *Ephyriades brunnea* (Herrich-Schäffer), *Pyrrhocalles antiqua eleutheræ* (H. Bates), *Euphyes c. cornelius* (Latreille), *Atalopedes m. mesogramma* (Latreille, [1824]), and *Wallengrenia misera* (Lucas). We collected in the area two days and did observe some bright orange skippers the first day

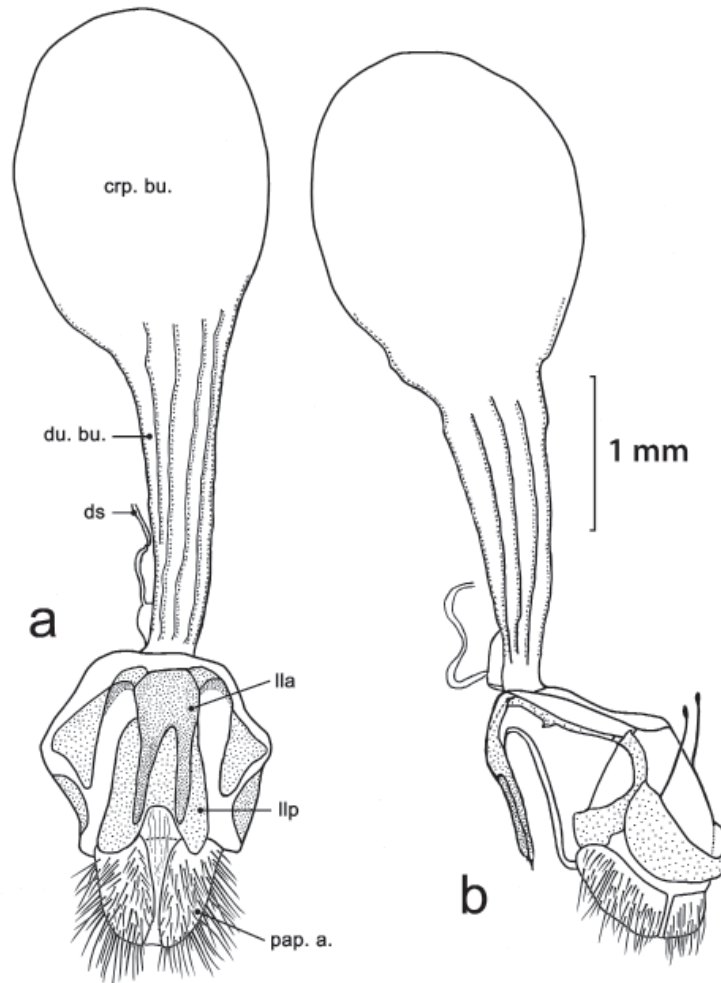


Figure 8. Female genitalia of *Choranthus richmondi*. **a)** Ventral view with papillae anales (pap. a.), lamella antevaginalis (lla), lamella postvaginalis (llp), ductus bursae (du. bu.), ductus seminalis (ds), and corpus bursae (crp. bu.). **b)** Lateral view.

perching on *Suriana maritima* L. (bay cedar) where there were numerous specimens of *E. c. cornelius*. The life history of *C. richmondi* is unknown. Minno (1990) described *Choranthus maria* from the Dominican Republic based on a single female reared from larvae found feeding on palm leaves (*Sabal* Adans.). There are some low growing palms in the vicinity of this area on S. Andros, most likely *Coccothrinax argentea* (Lodd. ex Schult. & Schult.f.) Sarg. ex Becc., which might serve as a potential larval hostplant. Other *Choranthus* species have been associated with sugar cane and grasses (Jones and Wolcott 1922) and palms (Comstock 1944) as larval hostplants thus far.

Biogeographical Significance

The Lucayan Archipelago includes the Bahamas, Turks, and Caicos Islands in the Caribbean basin. These low lying islands, with a maximum elevation of 63 m (207 ft.), are derived from carbonate platforms of the Bahama Banks and reside on the North American Plate along with Cuba, as opposed to the adjacent Caribbean Plate. The historical geology and biogeography of the entire Caribbean Basin is complex and our knowledge of the area has improved markedly with additional studies and publications (Miller and Miller 2000), especially those of Ituralde-Vinent and MacPhee (1999) and more recently Ituralde-Vinent (2006). Ituralde-Vinent reviewed the paleogeography of the Caribbean, especially that of Greater and Lesser Antilles and the Bahamas Bank through time, including late Eocene/Early Oligocene (35–33 Mya) when Cuba was essentially four small islands. There were periods of accretion and pieces fragmented off what is now eastern Cuba and Hispaniola. Some of these were exchanged and eventually amalgamated between the two islands.

Miller (1965) reviewed and discussed the current distribution and biogeographic implications of genus *Choranthus* throughout its potential range. He proposed that the ancestral stock probably arose in Cuba or perhaps in Hispaniola and was dispersed north to the Bahamas, eastward to Puerto Rico and the Virgin Islands, and southeast into Jamaica. The genus today is comprised of nine species. *Choranthus lilliae* E. Bell is restricted to Jamaica; it is very local, and infrequently encountered. There are two species thus far restricted to Puerto Rico and the Virgin Islands: *C. vitellius* (F.) and *C. borincona* (F. Watson). In addition, there are two species found in the Dominican Republic (*C. schwartzi* Gali, *C. maria* Minno), with another, *C. haitensis* Skinner, widely distributed throughout Hispaniola. Both *C. maria* and *C. haitensis* are associated with lower elevation grassland (below 500 m/1,640 ft.). There are a number of microhabitats at different elevations in the Dominican Republic with *C. schwartzi* collected at a series of localities on the edge of Corillera Central (500–1000 m/1640–3280 ft.) while *C. melissa* Gali is restricted to the Sierra de Baoruco/Massif de la Selle in southwestern Dominican Republic. Although the wing maculation patterns of *C. richmondi* and *C. schwartzi* may appear similar, the male and especially the female genitalia are distinct. Only characters of the tegumen and valvae differentiate the males, with the blunt cut on the margin of the cucullus more prominent than in *C. richmondi*. The female of *C. melissa* is unknown (Gali 1982), but there are again features of the male genitalia which are similar to *C. richmondi*. The socii are markedly reduced and the prominent sclerotized gnathos, which is squared off on the posterior margin, present. The juxta is also enlarged. Comparison of the wing maculation and coloration of *C. schwartzi* and *C. maria* proved interesting. The wing coloration of both species is quite similar on the dorsal surface. Below, there is dark fuscous brown at the end of the forewing discal cell in both species with this marking more prominent in *C. maria*. Both species also have a diffuse fuscous brown crescent overscaled with fulvous on 2A in the marginal band. On the hindwing, there is a similar patch near the end of the cell and the wing is heavily overscaled with fulvous from Cu_1 - Cu_2 to the anal margin. *C. maria* is represented by a unique female holotype while both sexes are known in *C. schwartzi*. In reviewing the female genitalia of both species, they are quite similar with the forked projection of the lamella antevaginalis markedly reduced in comparison with *C. richmondi* and the lateral projections terminating in a reduced squared process with minute setae on either side in *C. maria*. Also, the lightly sclerotized lamella postvaginalis of *C. maria* arises near the antrum as a stalk-like structure that terminates in a recurved spinous process similar to *C. schwartzi*. The ductus bursae and corpus bursae have similar folds as in *C. richmondi*, but instead of spicules as *C. richmondi*, there are minute nodes on both structures in *C. schwartzi* and *C. maria*. These similarities in the female genitalia between *C. maria* and *C. schwartzi* suggest that these taxa might be synony-

mous. Minno collected larvae of *C. maria* along the northern coast near Sosua, now a thriving tourist area. *Choranthus* is distributed widely throughout the Dominican Republic. Given the number of microhabitats available on Hispaniola, it is appropriate to obtain additional specimens of *C. maria*, especially males, before any changes in the status of *C. maria* are made.

Choranthus radians is found throughout Cuba and also recorded from Cat Island, Bahamas, along with another Cuban hesperiid species, *Eantis munroei* E. Bell. Both most likely arrived on Cat Island due to a tropical storm or hurricane. *Choranthus richmondi* was originally described from Whitepoint, Great Guana Cay (CMNH), and Bitter Guana Cay, Exuma Islands (AMNH). Clench (1977) discovered a small population of this species near Stafford Creek, North Andros, flying low in the understory of a more xeric pine forest. This habitat is quite a departure from the one in which we collected on S. Andros. Similarly, we have collected the allied taxon, *Parachoranthus magdalia*, near a blue hole on North Andros in addition to widely separated localities throughout Cuba. It is likely *C. richmondi* and *Parachoranthus magdalia* (Herrich-Schäffer) have been widely dispersed in the Caribbean via tropical storms and hurricanes. So far, *Choranthus richmondi* appears to be endemic to the Bahamas, but given the records of both *P. magdalia* and *C. richmondi* on N. Andros, there will probably be other populations of *C. richmondi* discovered elsewhere in the Bahamas and possibly in Cuba. Further study of *Choranthus* in the Bahamas and Greater Antilles is desirable to better understand the distribution, biodiversity and origin of this genus.

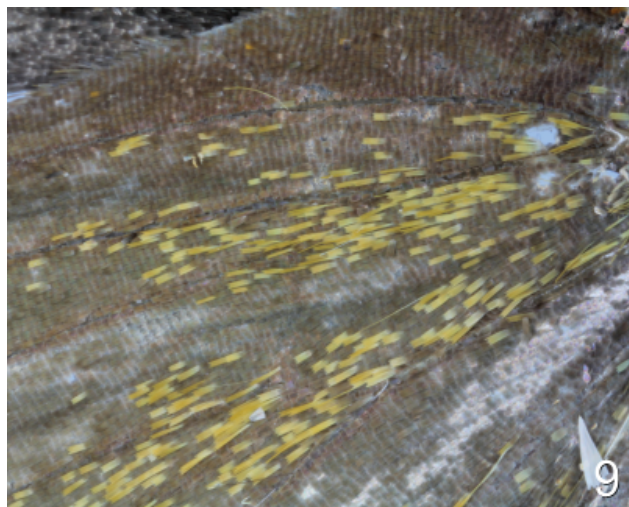


Figure 9–10. Wings of *Choranthus richmondi*. **9)** Hindwing ventral surface of female. **10)** Forewing stigma on dorsal surface of male.

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Figures 11–15. Habitat and nectar sources, March 2014, south of Mars Bay Settlement, South Andros Island, Bahamas. **11)** View of low vegetation at collecting locality including *Coccothrinax* palm. **12)** Bay cedar shrub, *Suriana maritima*. **13)** Flower of *S. maritima*. **14)** Flowers of *Angadenia sagraei*. **15)** Flowers of *Borrchia arborescens*.

