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Photo: Juan Liberata

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New host species records of a parasitic fly (Diptera: Hippoboscidae) in montane forests of Hispaniola

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Abstract Hippoboscids or louse flies (Diptera: Hippoboscidae) are obligate hematophages highly specialized for an ectoparasitic life in the feathers or fur of avian or mammalian hosts, respectively. As part of an existing avian monitoring program in the Dominican Republic, two cases of parasitism by louse flies in a Black-faced Grassquit (*Melanospiza bicolor*) and a Green Heron (*Butorides virescens*) were reported. In the laboratory, the flies were examined and identified as the species *Ornithoctona erythrocephala*. This is the first time this hippoboscid has been observed parasitizing these two bird species, and indeed the first record of it parasitizing a species of the family Thraupidae.

Keywords Caribbean, Dominican Republic, ectoparasite, Hippoboscidae, Hispaniola, *Ornithoctona erythrocephala*

Resumen Nuevos registros de especies hospederas de una mosca parásita (Diptera: Hippoboscidae) en bosques montanos de La Española • Los hipobóscidos o moscas piojo (Diptera: Hippoboscidae) son hematófagos obligados altamente especializados para una vida ectoparásita en las plumas de las aves o el pelaje de los mamíferos hospederos. Como parte de un programa de monitoreo de aves que existe en la República Dominicana, se reportaron dos casos de parasitismo por moscas piojos en *Melanospiza bicolor* y *Butorides virescens*. En el laboratorio, las moscas fueron examinadas e identificadas como la especie *Ornithoctona erythrocephala*. Esta es la primera vez que se observa que este hipobóscido parasita a estas dos especies de aves y, de hecho, el primer registro de que parasita una especie de la familia Thraupidae.

Palabras clave Caribe, ectoparásito, Hippoboscidae, La Española, *Ornithoctona erythrocephala,* República Dominicana

Résumé Nouvelles mentions d'espèces hôtes d'une mouche parasite (Diptera : Hippoboscidae) dans les forêts de montagne d'Hispaniola • Les hippobosques ou mouches plates (Diptera : Hippoboscidae) sont des espèces hématophages obligatoires hautement spécialisées pour une vie ectoparasitaire dans les plumes des oiseaux ou la fourrure des mammifères. Dans le cadre d'un programme de suivi de l'avifaune en République dominicaine, deux cas de parasitisme par des hippobosques ont été signalés sur un Sporophile cici (*Melanospiza bicolor*) et un Héron vert (*Butorides virescens*). En laboratoire, les mouches ont été examinées et identifiées comme appartenant à l'espèce *Ornithoctona erythrocephala*. C'est la première fois que cet hippobosque est observé comme parasite de ces deux espèces d'oiseaux et comme parasite d'une espèce de la famille des Thraupidae.

Mots clés Caraïbes, ectoparasite, Hippoboscidae, Hispaniola, *Ornithoctona erythrocephala*, République dominicaine

Hippoboscids or louse flies (Diptera: Hippoboscidae) are obligate hematophages highly specialized for an ectoparasitic life in the feathers or fur of its bird or mammalian hosts, respectively (Wood 2010). Hippoboscids that parasitize wild animals will occasionally bite and feed on humans (Oboňa *et al.* 2019). Louse flies can directly affect the health of their animal hosts by consuming blood as a food source, sometimes causing anemia and other hematological changes (Al-Saffar and Al-Mawla 2008), and indirectly as vectors of several pathogens such as bacteria, blood protozoans, and filarial nematodes (Lloyd 2009). In fact, these flies may also play a role in the transmission of West Nile virus in North America (Farajollahi *et al.* 2005). In addition, hippoboscids often carry phoretic lice and mites, which may themselves be obligate ectoparasites of the same hosts (Main and Anderson 1970).

Observations

As part of an existing monitoring program, we captured birds at three sites along an elevational gradient in the montane tropical wet forests of the Cordillera Central in the Dominican Republic, near the town of Jarabacoa, La Vega Province, during two sampling periods in January 2019 and 2020. The three sites monitored included Rancho Baiguate (19°06'47.5"N, 70°37'17.0"W, 533 m above sea level [asl]), Vera del Yaque (19°05'25.0"N,

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70°41'26.0"W, 750 m asl), and La Felita (19°03'13.0"N, 70°51'46.0"W, 1280 m asl). We sampled sites on 3–5 January 2019 and 5–7 January 2020, with bird banding work conducted during the morning hours. We operated eight mist nets at each site, opening nets at sunrise and keeping them open for 4–5 hours on days without precipitation or strong winds. In 2019, we captured 34 individuals comprising 14 different species. In 2020, we captured 39 individuals comprising 17 different species. In addition to marking and measuring individuals, we inspected each bird's plumage and body condition and searched for the presence of ectoparasites by thoroughly blowing on the bodies of all birds. In addition to louse flies, we recorded multiple instances of botflies on adult birds (Quiroga *et al.* 2020).

We noted two cases of parasitism by louse flies in a Black-faced Grassquit (*Melanospiza bicolor*; Fig. 1) and a Green Heron (*Butorides virescens*; Fig. 2). The former was captured at our highest elevation site (La Felita) in 2019 and the latter was captured at the lowest elevation site (Rancho Baiguate) in 2020. In both cases, we found a large green fly adhered to the body of the bird, partially concealed between the body feathers. We initially found the flies situated around the scapulars of the Green Heron and on the breast of the Black-faced Grassquit; however, the flies were freely moving around both birds and their location changed as we blew on the feathers. During our 2019–2020 sampling, we caught a total of five Black-faced Grassquits and only one Green Heron. Thus, the prevalence of flies was one out of five Black-faced Grassquits (20%) and one out of one Green Heron (100%). Both birds were aged as definitive cycle basic according to the Johnson *et al.* (2011) system for aging birds, meaning both birds were at least second year, in full adult plumage (Pyle 2008). Collected specimens were temporarily stored in sealed plastic tubes and subsequently preserved in 70% ethanol until they could be examined.

In the laboratory, we examined and identified the flies to species with the keys provided by Maa (1969), Wood (2010), and Santos Murgas *et al.* (2014), which allowed us to identify two females of the species *Ornithoctona erythrocephala* (Fig. 3). Distinctive characteristics of this louse fly include: apex of antennal appendage recurved, not twisted outward but forming large deep dorsal concavity; post (upper) orbit distinctly shorter than greatest width of inner orbit; ocelli well-developed; wing-membrane entirely bare and over 8 mm long; fore basitarsus with ventral comb at base; abdomen with pair of large plates representing sternite 5 in males, absent in females.

Voucher specimens are deposited in the Laboratory of Entomology (UAFAM, Jarabacoa, Dominican Republic).

Fig. 1. Black-faced Grassquit (*Melanospiza bicolor*) caught during banding efforts. The actual Black-faced Grassquit with the louse was not photographed (Holly M. Garrod).

Discussion

The species of the genus *Ornithoctona* are found on birds in various families; however, adults are reportedly most common on hawks (Wood 2010). Of the 12 species in this genus

Fig. 2. Green Heron (*Butorides virescens*) found with louse fly (Holly M. Garrod).

Fig. 3. *Ornithoctona erythrocephala*, habitus in dorsal view of the female specimen collected from the Black-faced Grassquit (Mikel A. González).

worldwide (Maa 1969), six have been recorded from the New World (Nartshuk *et al.* 2018) and only two from the Dominican Republic: *Ornithoctona fusciventris* and *O. erythrocephala* (Bequaert 1957). The impact of Hippoboscidae flies on birds has been largely neglected, especially in the Dominican Republic where no record on this family has been published since the middle of the 20th century, and only five species are described (Pérez-Gelabert 2020). In fact, few studies have documented the presence or influence of bird ectoparasites in the country (Latta and O'Connor 2001, Latta 2003, Quiroga *et al.* 2020). However, more detailed documentation of Hippoboscids have been conducted on nearby islands, such as Cuba (Gregor *et al.* 1973).

Ornithoctona erythrocephala is widespread across the Nearctic and Neotropical regions, including the West Indies, ranging from northern Canada to central Chile (Maa 1969). This louse fly, which can be found at high altitudes (Vélez *et al.* 2020), is a polyxenous ectoparasite with a wide range of hosts, with 76 genera, 25 families, and 14 orders of birds previously documented (Nartshuk *et al.* 2018). The species is believed to breed primarily on large-bodied birds such as Accipitridae, Falconidae, Columbidae, and Psittacidae (Maa 1969). Although it has been found before in Ardeidae, and more specifically in the genus *Butorides* (Maa 1969), this is the first time that *O. erythrocephala* is observed parasitizing a Green Heron, known locally in the Dominican Republic as "coco." In the case of the Black-faced Grassquit, locally known as "juana maruca," this is the first report of an association between this bird species and the louse fly; indeed, according to Nartshuk *et al.* (2018), this parasite has not been previously reported in association with any species of the family Thraupidae. The Black-faced Grassquit is a close relative of Darwin's finches on the Galápagos Islands. Accidentally introduced to the Galápagos Islands and first discovered in Darwin's finch nests in 1997, larvae of the myiasis-causing fly *Philornis downsi* (Diptera: Muscidae) cause high in-nest mortality and are considered the biggest threat to the survival of all Galápagos land birds (Kleindorfer and Dudaniec 2016). Understanding parasite prevalence and effects on hosts within the host-parasite native range in the Dominican Republic is vital for monitoring biodiversity and for providing a useful baseline to compare patterns in geographic areas if parasites undergo range expansion.

Although *O. erythrocephala* lacks veterinary importance as it has not been reported as a vector to date (Lloyd 2009), it is clear that hematophagous parasites always cause some degree of irritation and injury to their hosts. In this sense, this species can establish phoretic associations with epidermoptid mites of the genera *Myialges* and *Histiogaster*, which may burrow into birds' skin, causing mange lesions that are often extensive, resulting in scruffiness and feather loss (Philips and Fain 1991).

Among other avian ectoparasites in the Caribbean, host associations are perhaps best documented for botflies (*Philornis* spp.), with a broad range of taxa and life history stages known to be afflicted (Arendt 1985, Snyder *et al.* 1987, Schubert 2018, Quiroga *et al.* 2020). In some cases, these ectoparasites have been demonstrated to have potentially devastating effects on the survival and population stability of threatened species (Hayes *et al.* 2018). The more sublethal and perhaps cryptic effects of hippoboscid flies and other ectoparasites such as lice, mites, and ticks remain largely unknown in Caribbean birds.

Despite their high profile, diversity, and conservation value, the natural history and ecology of Caribbean birds remain understudied relative to those of temperate and continental Neotropical ecosystems (Latta 2012); this situation extends to the study of their ectoparasites. Consequently, both birds and their associated ectoparasites deserve to be studied in more detail in the Dominican Republic. To achieve a better understanding of host-parasite systems, the promotion of classical disciplines such as ornithology and the involvement of new approaches such as One Health entomology will be essential (Alarcón-Elbal and Sandiford 2021).

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Title Page Illustration

Investigators Holly Garrod, Spencer Schubert, and volunteer Anatheydi Castillo (far left) banding and examining a Hispaniolan Woodpecker (*Melanerpes striatus*) captured in a mist net. Jarabacoa, Dominican Republic, 4 Jan 2019. Photo: Juan Liberata.

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