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NECTAR-FEEDING AND POLLINATION BY THE CUBAN GREEN WOODPECKER (*XIPHIDIOPICUS PERCUSSUS*) IN THE WEST INDIES

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Consumo de nectar y polinizacion por el Carpintero Verde (*Xiphidiopicus percussus*) en las Indias Occidentales.

Key words: Picidae, Cuban Green Woodpecker, *Cordia sebestena*, Hispaniolan Woodpecker, pollination, ornithophily, Caribbean, West Indies.

INTRODUCTION

Woodpeckers (Picidae) feed mainly on insects and other arthropods, though many species, to a lesser or greater extent, also rely on plant material such as fruits, berries, seeds and tree sap (Winkler & Christie 2002). In addition, some of the smaller and medium-sized woodpecker species have been reported to drink nectar and pollinate ornithophilous flowers (Winkler & Christie 2002, Rocca *et al.* 2006). In the Neotropics, recent observations suggest that woodpeckers may be more important pollinators than previously thought (Rocca *et al.* 2006, Rocca & Sazima 2008, 2010). Woodpeckers have been observed drinking nectar in both the American mainland (e.g., Wunderle 1978, Fleming *et al.* 2001, Molina-Freaner & Eguiarte 2003, Rocca *et al.* 2006, Rocca & Sazima 2008, 2010) and on the nearby continental islands of Trinidad & Tobago, which biogeographically are part of South America (Lack 1976, Feinsinger *et al.* 1979, Raffaele *et al.* 1998). However, in the West Indies, some 7000 islands and islets situated in the north-eastern part of the Neotropics, woodpeckers have not been reported as pollinators. The Antillean Piculet (*Nesoctites micromegas*), endemic to Hispaniola, has been described to "probe flowers" (Latta *et al.* 2006), but this has been in the search for insects (Latta pers. com.); the Hispaniolan Woodpecker (*Melanerpes striatus*) has been reported to investigate flowers for insects and to possibly also drink nectar, but this remains unconfirmed (Short 1974; though see Discussion). Considering that pollination systems being often generalized on islands - e.g.,

lizards are frequent pollinators on islands but not on the mainland (Olesen *et al.* 2002, Olesen & Valido 2003, Sazima *et al.* 2005, 2009, Timmermann *et al.* 2008) - it is surprisingly that none of the West Indian woodpeckers have been confirmed to feed on nectar and act as pollinators. I here report the endemic Cuban Green Woodpecker (*Xiphidiopicus percussus*) drinking nectar and probable pollinating the Geiger Tree *Cordia sebestena* (Boraginaceae). I describe the behavior of the Cuban Green Woodpecker while foraging for nectar, present the floral features of *C. sebestena*, and discuss whether other woodpecker species in the West Indies may also opportunistically feed on floral nectar, acting as potential pollinators.

RESULTS AND DISCUSSION

Nectar-feeding. Observations were conducted between the carpark and the beach at Villa Las Brujas at Cayo Las Brujas (22°37'N, 79°10'W), one of the northern offshore islands of Cuba. On 31 March 2010 at 13:53 h, I observed the Cuban Green Woodpecker drinking nectar from 10–15 flowers from different inflorescences of one individual plant of *C. sebestena*. The woodpecker was perched on the same or a nearby branch as the inflorescences, probing flowers above and adjacent, as well as inverting while probing flowers underneath. It inserted the bill into the floral tube then drank nectar for one to several seconds, touching anthers and stigma with the bill. I also observed the Cuban Emerald (*Chlorostilbon ricordii*) probing several flowers, hovering in front of the flowers while inserting its bill into the floral tube, and the Cuban Bullfinch (*Melopyrrha nigra*) eating the lower part of five-six flowers. There were no aggressive interactions between the woodpecker and the other nectar-feeding birds.

In order to measure the floral phenotype of *C. sebestena* (see below) I returned to Villa Las Brujas on 28 July 2010. On this occasion, I did not observe any nectar-feeding birds at 07:30 h when I sampled the flowers, but when I passed at 10:00 h I again observed the Cuban Green Woodpecker drinking nectar from flowers of *C. sebestena* (Fig. 1). It visited several flowers from three *C. sebestena* plants dispersed c. 3–4 m apart. The woodpecker probed six to seven flowers in one plant, it then flew to a second plant probing four flowers, and finally probed five flowers in a third plant before flying away. As on my previous visit, the Cuban Green Woodpecker drank nectar by inserting its bill into the floral tube touching anthers and stigma, and hence acts as a pollinator of *C. sebestena*.

Plant species. The small tree *C. sebestena* is native to Cuba and most of the northern West Indies, as well as parts of tropical North, Central, and South America (Feuillet 2010). It naturally grows at coastal habitats, but is throughout the tropics also used as an ornamental tree (Solá 2001) and is almost certainly planted at Villa Las Brujas. It blooms yeararound with an abundance of conspicuous flowers (Solá 2001). I characterized the floral phenotype on un-bagged flowers (N = 11) sampled at 7:30 h in the morning. The flowers are tubular (internal corolla length = 28.5 ± 1.8 mm; internal corolla width = 6.3 ± 1.0 mm), showy orange with no obvious scent. They produce a significant amount of dilute nectar (volume = 12.6 ± 6.1 μl; concentration = 14.4 ± 1.5%). Hence, the flowers of *C. sebestena* have several features that correspond to the classic ornithophilous syndrome (Faegri & van der Pijl 1979, Askins *et al.* 1987), though with a more dilute nectar than most hummingbird-pollinated plants in the West Indies (Dalsgaard *et al.* 2009). Dilute and copious nectar is characteristic of plants attractive to passerine and other nectar-feeding birds other than hummingbirds, such as woodpeckers (Rocca *et al.* 2006).

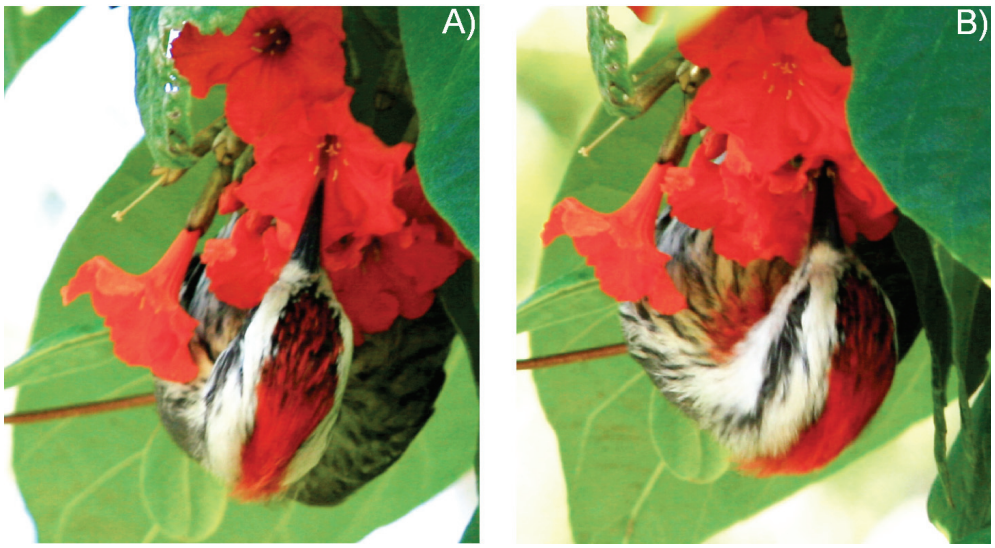

FIG. 1. The Cuban Green Woodpecker drinking nectar from two flowers of *Cordia sebestena* by inserting A) the tongue; and B) the tip of the bill into the floral tube (photos: Bo Dalsgaard).

Conclusions. In the Neotropical mainland and nearby continental islands of Trinidad & Tobago, pollination of woodpeckers has been reported for a total of 12 species within the genera *Melanerpes*, *Celeus*, *Colaptes*, *Centurus*, and *Campephilus* (Rocca & Sazima 2010). The herein reported observations further expand nectar-feeding among Neotropical woodpeckers to include the genus *Xiphidiopicus* and geographically by including the West Indies. It is worth noticing that most nectar-feeding woodpeckers are small to medium-sized species within the genera *Melanerpes* (four species) and *Celeus* (three species). As these genera are placed in distantly related clades within Picidae, nectar-feeding behavior have evolved more than once in the evolution of woodpeckers (Rocca & Sazima 2010). These genera are also known to include fruit in their diet, and it has been suggested that changing from utilizing fruit and fruit-juice to drinking nectar is a relatively easy behavioral step (Rocca *et al.* 2006). The Cuban Green Woodpecker is a medium-sized woodpecker placed in its own genus, *Xiphidiopicus*, closely related to *Melanerpes* woodpeckers (Winkler & Christie 2002). Although it mainly feeds on insects it also eats fruits (Garrido & Kirkconnell 2000, Winkler & Christie 2002), and it is therefore not surprisingly that it occasionally drinks floral nectar.

In order to further document nectar-feeding and pollination among West Indian woodpeckers, I reviewed the literature and contacted numerous ornithologists and pollination biologists with expertise in the West Indies (see Acknowledgments). Of these, only Joseph M. Wunderle had occasionally seen the Hispaniolan Woodpecker feeding on nectar from *Erythrina* sp. flowers, and it was impossible to determine whether it touched the reproductive parts of the flowers, i.e., whether it pollinates (Wunderle pers. com.). Also of interest is that Pascal Villard studied the Guadeloupe Woodpecker (*Melanerpes herminieri*), for three years, without observing it

licking tree sap or nectar (Villard 1999), and for one week observed each of the four Greater Antillean *Melanerpes* woodpeckers without seeing them drinking nectar either (Villard pers. com.). Hence, although the Hispaniolan Woodpecker has been seen drinking nectar, the Cuban Green Woodpecker is the only woodpecker confirmed to act as a pollinator in the West Indies. However, the West Indian woodpeckers, and especially the Greater Antillean *Melanerpes*, are reported to be highly generalized, utilizing a wide array of food resources including insects, spiders, snails, crabs, frogs, lizards, geckos, eggs, and various plant materials, including fruits, seeds, tree sap, and even juice from sugar canes (Winkler & Christie 2002). Given this, and the observations by Joseph M. Wunderle, it would not be surprising if some of them occasionally exploit floral nectar and act as pollinators, just as in the case of the Cuban Green Woodpecker.

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