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TWO NEW RECENT COUNTRY RECORDS OF MORMOOPID BATS (CHIROPTERA: MORMOOPIDAE) FROM LONG ISLAND, THE BAHAMAS

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The Caribbean is home to a large diversity of bats, spanning nine families and at least 60 genera. Within The Bahamas, there are 10 species of bats that have established populations: *Artibeus jamaicensis*, *Chilonatalus tumidifrons*, *Eptesicus fuscus*, *Erophylla sezekorni*, *Lasiurus minor*, *Macrotus waterhousii*, *Monophyllus redmani*, *Nyctiellus lepidus*, *Noctilio leporinus*, and *Tadarida brasiliensis*. There are also three that are documented as single specimens and were presumably vagrants: *Glossophaga soricina*, *Lasionycteris noctivagans*, and *Lonchorhina aurita* (Buden 1986, Speer et al. 2015).

The family Mormoopidae is not currently extant in The Bahamas but is represented in the fossil record. *Pteronotus macleayii* is known from New Providence (Morgan 1989), *P. parnellii parnellii* is known from New Providence and Great Abaco (Olson and Pregill 1982, Morgan 2001, Soto-Centeno and Steadman 2015), and *P. quadridens* is known from fossils on Great Abaco, North Andros, and New Providence (Morgan 2001, Dávalos and Turvey 2012). *Mormoops blainvillei* is known from fossils on Little Exuma, Great Abaco, and New Providence (Koopman 1951, Olson and Pregill 1982, Morgan 2001) and *M. megalophylla* was found on Andros and Great Abaco (Morgan 2001). Extant populations of all these species are found in the Greater Antilles, except for *M. megalophylla*, which is extirpated from the Caribbean (Dávalos and Turvey 2012).

Long Island, an inhabited island in the central part of The Bahamas archipelago, is approximately 130 km long and 6 km wide (Fig. 1). It is about 265 km southeast of the Bahamian capital of Nassau and is part of the Great Bahama Bank, which during the last glacial period (80–10 ka) would have formed one large island along with Andros, Bimini, the Berry Islands, Cat Island, Eleuthera, the Exumas, New Providence, and Ragged Island. It is the south-easternmost island of any significant size on the Great Bahama Bank. There are six species of bats that have known established populations on Long Island: *E. fuscus*, *E. sezekorni*, *L. minor*, *M. waterhousii*, *N. lepidus*, and *T. brasiliensis* (Speer et al. 2015).

On 6 January 2017, we were hand-netting bats in Great Lakes cave (22.92 °N, 74.86 °W), which is found on the south end of the island, approximately 22.5 km southeast of Clarence Town, near Mortimer's settlement. This cave has also been referred to as Mortimer's Cave by previous researchers (Speer et al. 2015). We were opportunistically sampling bats in this cave, and other caves throughout Long Island. As we were hand-netting near the entrance of the cave, we captured one individual each of the sooty mustached bat, *Pteronotus quadridens*, and the Antillean ghost-faced bat, *Mormoops blainvillei*, almost simultaneously within the first 10 minutes of netting (Fig. 2). The *P. quadridens* was an adult male with a forearm length of 40 mm and weighing 7 g. *Pteronotus quadridens* might most likely be confused with *P. macleayii*, but the short forearm length and small size indicated it was indeed *P. quadridens* (Pavan 2019). The *M. blainvillei* was an adult female with a forearm length of 47 mm and weighing 9.5 g. We easily identified this species because it is the only *Mormoops* in the Greater Antilles and much smaller than *M. megalophylla*, the only other species in the genus (Pavan

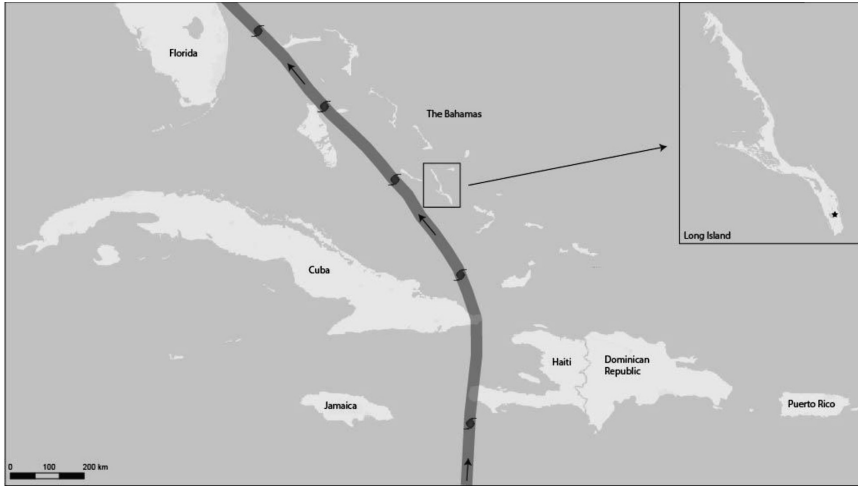


Figure 1. The Greater Antilles and The Bahamas. Black box is Long Island and inset in upper right is a close-up of Long Island with the location of Great Lakes cave indicated by the star. Gray line shows the general path of Hurricane Matthew in 2016 with directional arrows.

2019). Following capture, we sent photos of these bats to a colleague who confirmed our identifications (J. A. Soto-Centeno, pers. comm.). We also captured and released 11 *T. brasiliensis*, 17 *M. waterhousii*, and 7 *E. sezekorni* during the visit. We captured *Nyctiellus lepidus* during a visit to this cave in 2012, but we did not see it during this trip. We did not net or see any other species at that cave, and did not see any more individuals of the two newly recorded species in the several hours we were in the cave.

We hand-netted all bats sampled, and we recorded identification, sex, weight, forearm length, ear length, hindfoot length, and tragus length for each individual. We used a 4-mm biopsy punch to take a genetic sample from the wing membrane. We released all bats except the two new records after handling; we collected the *M. blainvillei* and *P. quadridens* individuals and deposited them in the Florida Museum of Natural History (catalog numbers UF 33956 and UF 33957, respectively). We handled all bats according to the guidelines for the use of wild mammals in research (Sikes et al. 2016). This research was approved by the University of Florida's Institutional Animal Care and Use Committee (protocol #201609641).

The southern end of Long Island is approximately 211 km from Cuba, the closest island in the Greater Antilles that has both *M. blainvillei* and *P. quadridens*. We believe the bats may have been brought from Cuba by Hurricane Matthew, which passed through the Caribbean in late September-early October 2016 (Fig. 1). Matthew was a Category 4 hurricane when it landed on Cuba and Category 3 when it passed through the southern Bahamas, strengthening to a Category 4 again by the time it passed the northern Bahamas with winds topping out at 145 mph. Both *M. blainvillei* and *P. quadridens* are typically known to roost in hot caves, although their presence as fossils in The Bahamas suggests that they may have been able to adjust to the cooler cave roosts found there (Soto-Centeno et al. 2015). Yet their current extirpation implies that the long-term conditions may not have been favorable for their continued presence. This, along with the fact that the distance between the islands is so great, and that two unusual species were found in the same cave at the same time, suggests that it is highly unlikely this was an intentional dispersal event.



Figure 2. The two individuals captured in Great Lake cave on Long Island, The Bahamas, in January 2017. Top: sooty mustached bat (*Pteronotus quadridens*). Bottom: Antillean ghost-faced bat (*Mormoops blainvillei*). Photo by VLM.

Hurricane-influenced disturbances on bat populations are not uncommon, where they can suppress populations, cause mortalities, and alter genetic diversity (Gannon and Willig 1994, Jones et al. 2001, Rodríguez-Durán and Vázquez 2001, Fleming and Murray 2009, Pederson et al. 2009). Further, there are several examples in the West Indies where a hurricane is the only likely explanation for the documented presence of unlikely bat species in new areas (Kwiecinski and Coles 2007, Gannon and Willig 2009, Pederson et al. 2009, Rivas-Camo 2020). Hurricane-assisted records such as these are important to document the role such storms may play in assisting species to colonize new areas and altering genetic diversity in existing populations.

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