Vocalizations of *Molossus molossus*

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Abstract:

Roost communication, emergence, and echolocation calls of *Molossus molossus* were recorded and analyzed using Avisoft software and equipment. This was done at two different sites on the Archbold Tropical Research and Education Center. It appears that communication sounds in the roost follow the same general pattern as seen in *Tadarida brasiliensis*, also a member of Molossidae. The information found in this study is a good start in beginning to recognize and understand vocalizations of *M. molossus* on the island of Dominica.

Introduction:

Not many call types of this bat species have been studied in this region. This is important given that with any animal, bat dialects vary between regions. Echolocation calls of this species in Dominica were recorded ranging from 30.70kHz to 53.65 kHz. (Biernat, et. al 2000) Distress calls of the *M. molossus* were also recorded and analyzed on the Archbold Tropical Research and Education Center using the same equipment during the same time period as this study (Moore, et al. 2007).

Dr. M. Smotherman (2007) provided information on sounds of *T. brasiliensis* and *Molossus*. There is a member of *Molossus* that is known to flip their echolocation call while foraging just before the feeding buzz. There is a song pattern individual bats produce that has been recorded in the roosts of *T. brasiliensis.* This pattern usually starts off with an introductory syllable and always consists of alternating individual syllables and echolocation calls followed by a buzz.

Roosting, emergence, and echolocation calls of *Molossus molossus* were recorded and analyzed using Avisoft software and equipment. *M. molossus,* commonly known as the velvety free-tailed bat, is a moderately small bat weighing less than 20 grams. This insectivorous species is widespread throughout the new world including the Lesser Antilles. The foraging echolocation calls used by this species is known to have an unusual sequence of paired pulses. (Gannon et al. 2005)

Materials and Methods:

A laptop computer equipped with the Avisoft SASLab and UltraSoundGate recording software, an Avisoft microphone (CM16), the UltraSoundGate 116, and cord used to connect the UltraSoundGate to the microphone were used to gain and analyze the recordings. The Avisoft recorder was configured to record when triggered which was set between 15 and 250 kHz. The recorder was also configured with a sampling rate of 214285 Hz, the buffer was set at 0.200 s, and a 16 bit format.

The recordings were taken at two different locations on the Archbold Tropical Research and Education Center, at the stream house (N15º20’46.4” W61º22’6.7”) and on the back porch (N15º20’47.6” W61º22’08.1”). On the nights where recordings were taken at the stream house, the microphone was held up to the area above the corner bathroom where the bats had been seen emerging and could be heard at during the day. The first nights recordings were taken from the stream house. An aerial insect net was used to catch an individual emerging from the stream house in order to confirm that it was in fact a *Molossus molossus*. When recordings were taken on the porch a tripod was

set up holding the microphone upward in order to detect and record the bats flying overhead.

Table 1			
Date:	**Location:**	**Type of Sound Recorded:**	**Time:**
5-25-2007	Stream House	Roost communication & Emergence	6:11-6:56 pm
5-26-2007	Stream House	Roost communication & Emergence	6:22-6:45 pm
5-28-2007	Stream House	Roost communication	6:04-6:57 pm
5-29-2007	Stream House	Roost communication	6:09-7:11 pm
6-1-2007	Stream House	Roost communication & Emergence	5:58-6:46 pm
6-3-2007	Stream House	Roost communication	1:16-1:23 pm
6-5-2007	Porch	Echolocation & Feeding Buzzes	8:14-8:40 pm

Results:

<u>Communication Sounds in the Roost:</u>

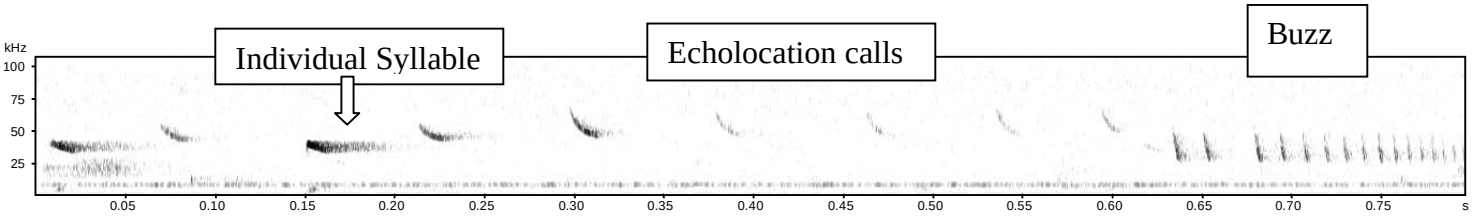

Figure 1 (Roosting sounds from 5-25-2007)

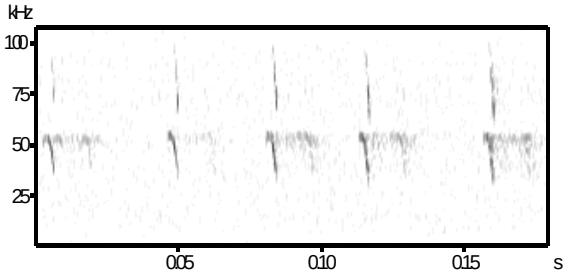

Figure 2 (echolocation sounds from 5-26-2007)

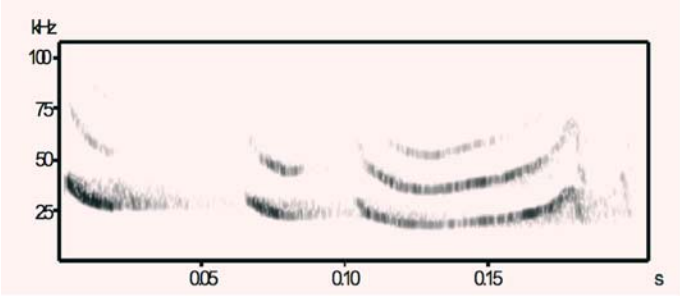

Figure 3 (sounds from 5-25-2007)

Emergence Sounds:

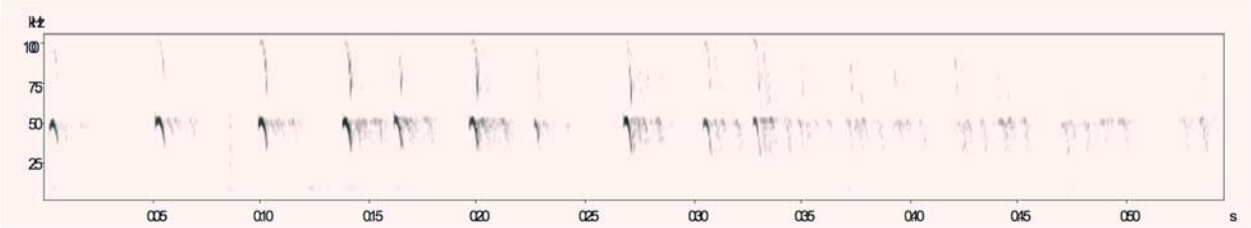

Figure 4 (emergence echolocation calls from 5-25-2007)

Echolocation Sounds and Feeding Buzzes:

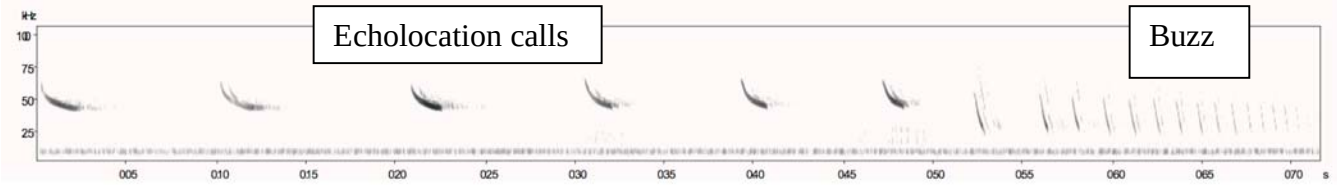

Figure 5 (Echolocation and Feeding Buzz from 6-5-2007)

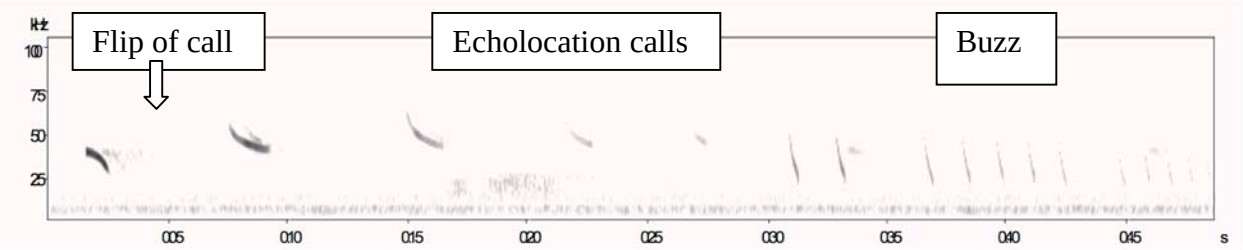

Figure 6 (Echolocation and Feeding Buzz from 6-5-2007)

Discussion:

Roost Communication:

The most continuous and clear roost communication sounds were recorded on the night of May 25, 2007. These continuous sounds did prove to follow the same pattern as their fellow family member *T. brasiliensis*, (Figure 1). There were some possible introductory syllables, but the recordings were too cluttered due to overlapping calls. It seems the microphone may have been picking up multiple conversations at once. The other nights spent recording at the stream house produced somewhat sporadic sounds, echolocation calls, and emergence sounds.

Figures 2 and 3 are examples of other sounds recorded in the roost, though I am not sure how to interpret them. Figure 2 does resemble the sounds recorded as the bats emerged from the roost (Figure 4).

Emergence Echolocation:

The sounds recorded while the bats were emerging did not resemble the echolocation type sounds found in the songs recorded from the roost. Also, when the bats emerged from the stream house it was fairly light outside so the calls may have not been used for flight.

Echolocation and Feeding Buzzes:

Although it is not definite that the bat sounds recorded as the bats were flying overhead are indeed *M. molossus*, the examples presented do seem to follow descriptions and resemble echolocation sounds from the songs recorded in the roost. The echolocation calls in figure 6 shows the flip in echolocation sounds just before the feeding buzz as described by Dr. M. Smotherman. Both examples have the paired pulses as described earlier (Gannon et al. 2005). Although the echolocation call frequencies do

go higher than shown by the Biernat 2000 study, a different type of equipment was used and the paper does not explain in what situation the echolocation calls were recorded.

Conclusion:

In conclusion, this study has produced a basis for the beginnings of a library of sounds for *M. molossus*. It was interesting to see that sounds in the roost followed the same pattern as sounds produced by *T. brasiliensis.* Although I cannot be completely sure, it seems that at least one of the echolocation and feeding buzz recordings belong to a *M. molossus*.

Resources:

Biernat, Angelica, M. Kirk, S. Noyaert, and A. Skeeles. 2000. Echolocation Call Sequences of the Dominican Bats Molossus molossus and Tadarida brasiliensis. Dominca Study Abroad Project Reoport, Texas A&M University.

Gannon, Micheal R., A. Kurta, A. Rodriguez-Duran, and M.R. Willig. 2005. Bats of Puerto Rico. 132-140.

http://www.avisoft.com/SASLabPro.pdf

Moore, Jessica L., M. Kohut, and J. Comte. 2007.

Smotherman, Michael, 2007, Personal communicatipn

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