

***Molossus molossus* Distress Sounds**

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Abstract:

During late May and early June of 2007 we looked at the sounds produced by *Molossus molossus* at two different sites on the Archbold Tropical Research and Education Center in Dominica. Distress calls of male and female *M. molossus* were recorded and analyzed using Avisoft software and equipment. Several other distress calls of various species have been looked at on the island of Dominica before but never that of *M. molossus* (Bennett & Swick 2001). The male and female distress calls differed from each other in shape and frequency.

Introduction:

This study was conducted on the island of Dominica at the Archbold Tropical Research and Education Center in late May and early June of 2007.

Using the UltraSoundGate Avisoft recorder and the Avisoft SASLab software we recorded and analyzed sounds produced by *Molossus molossus* under stressed conditions. These sounds were recorded at the stream house and where the trail intersects with the Checkhall River on the Archbold Tropical Research and Education Center property.

Molossus molossus is a moderately sized insectivorous bat. The more commonly known name is the velvety free-tailed bat. They weigh less than 20 grams, and its total length ranges from 99 to 104mm. The forearm measurements range between 38mm and 40mm. This bat is known to occur throughout the Lesser Antilles region. (Gannon et al. 2005)

A previous study done at the Archbold Research and Education Center found that the distress call of the *Tadarida brasiliensis* ranged from 33 to 55 kHz, while that of *Natilis stramineus* ranged from 55 to 70 kHz (Bennett & Swick 2001). From our knowledge the distress calls of *M. molossus* have never been studied in Dominica. This study will be a great basis for knowledge of the sounds of this species.

Methods and Materials:

Using the Avisoft UltraSoundGate Recorder and the Avisoft SASLab Software along with a Dell[®] laptop computer we were able to record and analyze the distress sounds of each bat. On May 30, 2007 a mist net was set up where the trail from the Archbold Research center meets the Checkhall River (N15°20'44'' W61°22'8.6''). A 12m mist net was stretched across the river using 2 bamboo poles, rope and several rocks. On the nights of June 4, 2007 and June 6, 2007, a 6 meter mist net supported by packing tape was used to catch bats on the porch at the Archbold Research Stream House (N15°20'46.4'' W61°22'6.7''). At each location the bats were weighed, measured and sexed. The distress calls were recorded promptly after the bat was taken out of the net along with the time. A 300 gram Pesola scale was used to weigh the bat. The scale was tared to the weight of a sock, and a standard 12 inch ruler to measure the bats forearm.

During the recording process, the software program automatically records as a waveform and then the SASLab program converts the sounds into a spectrogram. Using the recordings, we compared the frequencies, the duration of the calls and the shape of the calls between males and females. The UltraSoundGate recorder was configured at a sampling rate of 214285 Hz, the buffer was set at 0.200 s and a 16 bit format was used.

Bat #	Site	Date	Time
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Table 1

1	Checkhall River	5/30/2007	6:55PM
2	Checkhall River	5/30/2007	7:20PM
3	Checkhall River	5/30/2007	7:25PM
4	Checkhall River	5/30/2007	7:25PM
5	Streamhouse	6/4/2007	6:29PM
6	Streamhouse	6/4/2007	7:40PM
7	Streamhouse	6/6/2007	6:47PM
8	Streamhouse	6/6/2007	6:49PM
9	Streamhouse	6/6/2007	6:50PM
10	Streamhouse	6/6/2007	7:25PM

Results:**Table 2**

Bat #	Weight	Forearm Length	Sex
1	14.5g	3.8cm	Male
2	18g	3.75cm	Female
3	15.5g	3.9cm	Female
4	16g	3.6cm	Female
5	16.5g	3.9cm	Female
6	16.9g	3.7cm	Female
7	10.7g	3.8cm	Female
8	12.5g	3.1cm	Female
9	12.7g	3.7cm	Female
10	12g	3.6cm	Male

The following are the distress sounds produced by each individual bat. The bats not represented either only produced echolocation sounds or produced no sounds at all.

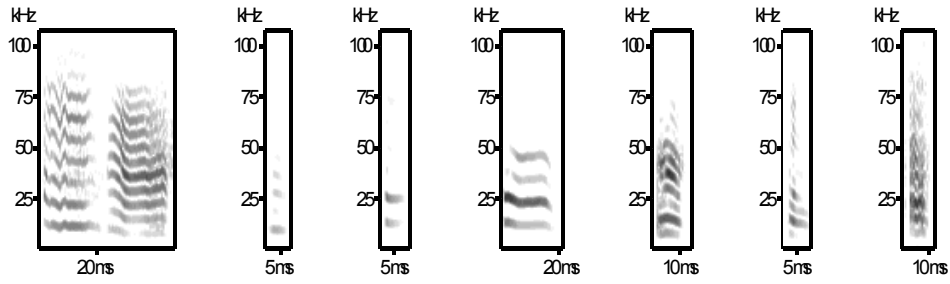


Figure 1 (Bat #1, Male)

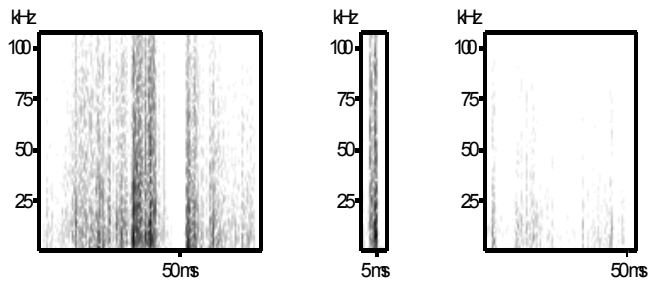


Figure 2 (Bat #2, Female)

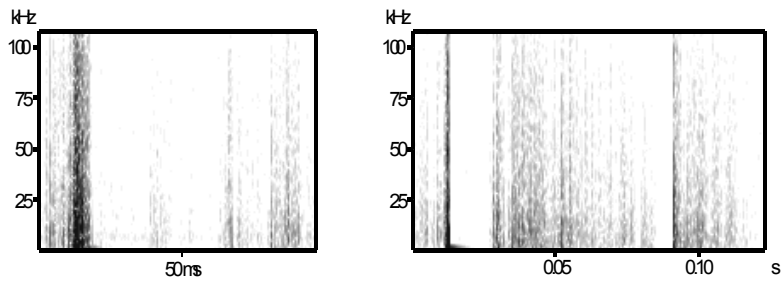


Figure 3 (Bat #3, Female)

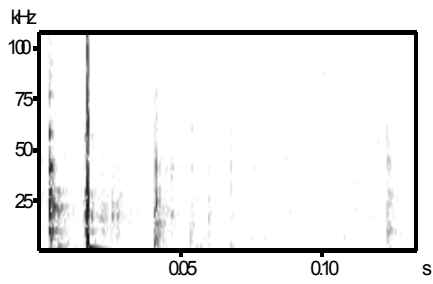


Figure 4 (Bat #4, Female)

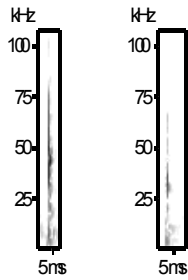


Figure 5 (Bat #6, Female)

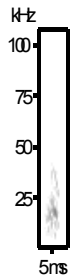


Figure 6 (Bat #7, Female, the rest of the calls were echolocation sounds)

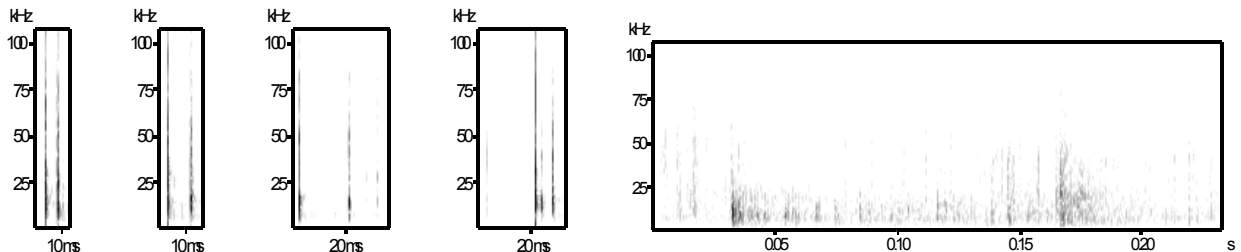


Figure 7 (Bat #9, Female, the rest of the calls were echolocation sounds)

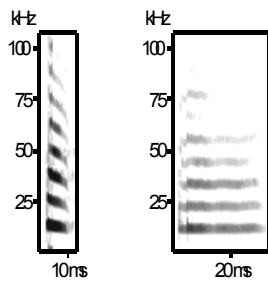


Figure 8 (Bat #10, Male)

Discussion:

The sounds emitted by the male and female bats are extremely different. The male's call is a combination of several discrete frequencies made at once while the

female's call is a single sound made at a wide range of frequencies. The highest sound emitted by a female at one time ranged from 0 kHz to at least 100 kHz. The recognizable higher level of frequency distinguishes the female call from the male sound.

In reference to the Bennett and Swick study done in 2001 our *M. molossus* distress calls were at a much higher frequency and a much wider range than the other bats studies on the island of Dominica. It is surprising that the *M. molossus* distress sound was more comparable to that of the *N. Stramineus*, and not the *T. brasiliensis* a fellow Molossidae. The recording equipment used in the past may not have been as sensitive as the Avisoft.

Resources:

Bennett, M., and H. Swick. 2001. Echolocation Calls of Dominican Bats. 1-2.

Dominica Study Abroad Project Report, 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>

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