OBSERVATIONS ON A COLONY OF BIG-EARED BATS, *PLECOTUS RAFINESQUII*[1]

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Colonies of big-eared bats, *Plecotus rafinesquii,* are so uncommonly found that our limited observations of a small colony are worthy of recording. A small colony occupies an unused cistern, now far removed from any buildings, about one mile northeast of Reelfoot Lake, Obion County, western Tennessee. The bats were first discovered in the cistern in May 1950, but they were present "many years" before that, according to local residents. During the months we have visited the cistern—February, March, April, May, and September—from 1 to 64 *Plecotus rafinesquii,* and only this species, have been present.

The cistern is located in slightly rolling country among the bluffs back from Reelfoot Lake. The immediate area has a sparse second growth of trees, most of which are under 30 feet high. To the north there is a thicket of blackberries but no trees. The mouth of the cistern projects 2 feet above ground level and is 30 inches in diameter. It is always open. The cistern is about 25 feet deep and "bells-out" inside (see Fig. 1). The cistern is built of bricks and stone but the inner face is smoothed with cement. Water, always present in the bottom, fluctuates in depth but is always less than 8 inches deep in our exerience.

Plecotus rafinesquii hang in the top-half of the cistern in the warmer parts of the year (May 25, September 2 and 3). In the colder months they hang in the bottom half. On the occasion when 64 bats were present, most of them hung in three clusters, 4½ to 6½ feet above the water (see Fig. 1) with about 20 in each cluster. Two or three individuals were hanging separately higher on the walls. On cold days, these bats are apparently in hibernation, for they are cold to the touch, their ears are rolled down, and the bats are so sluggish that bands could be attached to most individuals before they aroused.

The hibernating chamber must become cold at certain times and must receive considerable light since there is no cover on the cistern. On the night of March 21, 1960, the temperature outside the cistern was as low as 8°F; earlier in the winter the temperature was lower. On April 2, 1961, at 8:30 a.m., the temperature near the bottom of the cistern was 49°F; at ground surface, 51°F. We do not know if the temperature drops below freezing within the cistern but suspect that it must on occasions. Light filters in the top of the cistern, especially on bright days, and it must be considerably lighter here than just inside the entrance of most caves.

Big-eared bats must move in and out of this colony during the winter months. For example, on February 14, 1961, about 50 *Plecotus* were present of which 13 had bands previ-

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ously affixed. On April 1, 1961, one and one-half months later, only 3 of the banded bats were present yet it was too cold for them to be active within the cistern. On April 1, the ground surface temperature was about 34°F.; earlier on February 14, it was about 60° F. On the latter date, the bats were active within the cistern and it appeared as if they might be copulating.

Some *Plecotus* use the cistern more than one winter, but new individuals move in with the "resident" bats on succeeding years. On March 21, 1960, 60 bats were banded in the cistern. About 11 months later, on February 14, 1961, of about 50 bats present, only 13 had been banded previously. On April 1, 1961, of 28 bats, 11 had been banded a little over a year before. However, among these 11, only 3 were from the 13 wearing bands observed on February 14. On April 4, 1962, of 3 bats present, one was banded 2 years earlier and one was banded one year earlier. It appears that throughout the cold period of late winter and early spring, there is a movement of bats in and out of this colony.

A colony of *Plecotus rafinesquii* can be greatly reduced or depleted in size and it will successfully rebuild. Early in our observations, most of the colony was removed. On May 25, 1950, only 1 bat was present and it was removed; on September 2, 1950, 16 bats were present and 15 were removed; on May 31, 1951, 28 bats were present and 25 were removed. Within a year's time, 41 of 45 bats were removed and preserved as skins. Nevertheless, on March 21, 1960, 9 years later and the time of our next thorough survey, the largest concentration of bats ever noted, 64 in all, was present.

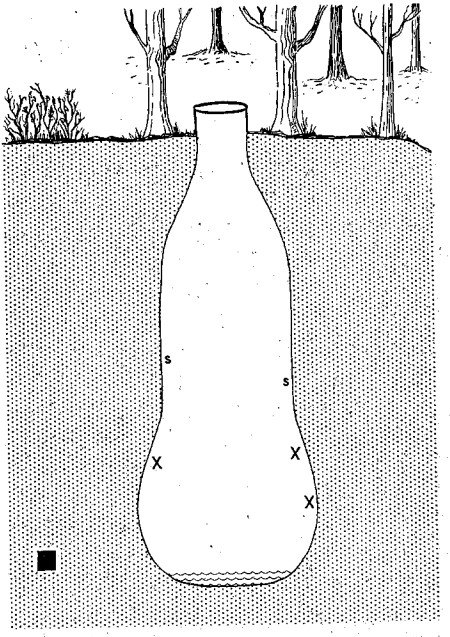

FIG. 1.—Cross section of abandoned cistern which houses *Plecotus rafinesquii*. The position of the 3 large clusters, X, and single individuals, s, of bats as on March 21, 1960, is shown. The black square indicates one square foot. Drawing by H. C. Henrikson.

Nine bats were taken from the cistern to Cincinnati, Ohio, on August 4, 1957, banded, and released. This was 345 miles away from the cistern. None was ever recovered back at the cistern or, so far as we know, anywere else.

Six of the eleven big-eared bats taken in the cistern on September 2 and preserved as skins and skulls appear to be young of the year. However, these young, thought to be about 3 months old, have the epiphyses of the fingers nearly closed and are as large as winter-taken specimens. These 6 differ from adults

primarily in having shorter fur with the hairs on the back lacking the glossy brown tips. An age of 3 months is estimated for these young on the basis of specimens in the collection from Mammoth Cave, Kentucky, one of which appears to be about 2 weeks old, collected June 17, and another taken on July 6 which could be about 5 weeks old. The birth date for both of these was near June 1.

Twenty-eight adults (14 males, 14 females) from the one locality near Reelfoot Lake, only 164 miles southwest of the type locality of *Plecotus rafinesquii rafinesquii,* provide the following averages and extremes, all in millimeters. Measurements of the skull are taken according to Handley (1959:98), with the males listed first. Total length, 97.8 (94-102), 99.6 (93-105); tail length, 49.8 (46-53), 50.3 (47-54); hind foot length, 10.7 (9-12), 11.2 (9.5-12); ear from notch, 33.5 (29-35), 34.1 (27-37); length of forearm, 43.0 (41.8-44.4), 43.3 (41.7-45.0); tragus (as taken by collector), 12.8 (10-16), 13.6 (11-16); greatest length of skull, 16.14 (15.8-16.5), 16.35 (16.1-16.65); zygomatic breadth, 8.80 (8.4-9.1), 8.87 (8.5-9.15); interorbital breadth, 3.57 (3.45-3.7), 3.60 (3.45-3.7); breadth of braincase, 7.85 (7.6-8.8), 7.90 (7.7-8.1); depth of braincase, 6.03 (5.9-6.25), 6.03 (5.85-6.25); maxillary toothrow length, 5.32 (5.25-5.45), 5.35 (5.2-5.5); postpalatal length, 5.98 (5.7-6.1), 6.04 (5.8-6.4); palatal breadth, 6.12 (5.85-6.3), 6.15 (6.0-6.35). All specimens have a well-developed secondary cusp present on the first upper incisor except for one specimen. In this, the incisor is much as in *Plecotus townsendii.*

Summary

Big-eared bats, *Plecotus rafinesquii,* may use as roosting places certain cavities that are well lighted and become cold during the winter. Such is the case for big-eared bats inhabiting an abandoned, unused, uncovered cistern in westernmost Tennessee. Only *Plecotus rafinesquii* occupies this cistern and in numbers varying from 1 to 64 individuals. They are present in winter, spring, and summer, and probably throughout the year. During the winter, bats move in and out of the hibernating chamber, with individuals from different localities taking places of those moving out. The same individuals may be present for parts of two consecutive winters, but not continuously in the winter nor in the summer. When only about 3 months old, big-eared bats are adult-size.

Literature Cited

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