

Progress Report on the Geological and Biological Study of Mount Emory Cave,
Big Bend National Park, Texas 2003

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Mount Emory Cave is located on the upper flanks of the highest mountain in Big Bend National Park, Texas, at an elevation of 2,149 m. It was entered twice for this study, one in January 2002 and again in April 2003.

Geology:

The cave is tectonically formed in the Oligocene-age Burro Mesa Riebeckite Rhyolite (BMRR) as a series of rifts along stress-release fractures that parallel the topographic contours of a mountaintop ridge. Meter and decimeter scale undulations in the passages and walls occur along variable-scale columnar joints. The cave has a known vertical range of 58 m; its lower limits coincide with the base of the jointing. The cave's passages total 287 m in traverse length and generally narrow with greater penetration into the mountain.

X-ray diffraction and scanning electron microscopy was used to quantify the BMRR as about 45% (by weight) quartz and 55% albite feldspar with small amounts of weathered clay and hematite. Analyses were also performed on three types of secondary deposits. A sub-millimeter thick water-deposited white coating on many cave walls and breakdown is kaolinite, a weathering product of the feldspar. Pale brown rimstone-like features, generally about 1 cm in length and <1 mm high were mostly quartz, weathered feldspar, and kaolinite. They were water-deposited but their geometry is not always perpendicular to overall water flow patterns probably due to adhesion by the clays. Dark bluish-gray and pale brown coatings along fractures were predominantly weathered feldspar and clay; the darker color is consistent with organic staining. No unusual minerals were found for the geologic setting.

Biology:

Mount Emory Cave has long been identified as an important Texas bat cave. The cave seasonally (summer) houses the northern-most population of Mexican long-nosed bats (*Leptonycteris nivalis*), the only known colony of this nectar-feeding bat in the United States. It is unknown at this time whether or not this is a maternity colony.

The following four bat species have previously been documented using Mount Emory Cave in Big Bend National Park: *L. nivalis*, Townsend's big-eared bat (*Corynorhinus townsendii*), fringed myotis (*Myotis thysanodes*), and long-legged myotis (*M. volans*). More recent trips (27 January 2002 and 18 April 2003) did not record either *Myotis* species, but they may have been roosting in inaccessible areas of the cave, or may be there only seasonally like the *Leptonycteris*.

No roost stains were noted on the hard, dark rhyolite of the cave, but there is abundant evidence of bats in the form of guano. Faint yellow "nectar splats" from the pollen-laden guano of *Leptonycteris* can be seen on passage walls throughout all portions of the cave visited. This implies that the bats are at least flying through all these passages. Since we have avoided being in the cave during the (potential) roosting season, we do not know if the *Leptonycteris* are roosting elsewhere in the cave, other than the "ladder room" where they have traditionally been seen.

Coatings of dry, dusty guano are testimony to historic and continued use from both *Leptonycteris* and *Corynorhinus*. There is essentially guano spread throughout the entire cave. *Corynorhinus* guano was most heavily concentrated in the second room ("ladder room") and the lowest levels of the rift entered in 2003, with parts of the floor covered with at least one-inch-thick guano that had turned to a hard crust. The lower rift in particular caused the surveyors mild distress as clouds of guano dust were kicked up during traverse of the passage. Fresh guano and numerous wrappers (discarded insect parts) were also present, particularly in the portions of the cave closest to the entrances. *Leptonycteris* guano was commingled with the insectivorous bat guano as it filtered through the breakdown false floors to the lowest levels. Some of the guano was identified as *Myotis* but could not be distinguished to species.

Previous research surmised that no bats hibernated in the cave because of its high elevation and constant breeze. To the contrary, on 27 January 2002, more than 90 *Corynorhinus townsendi* were found hibernating throughout the cave. Temperatures recorded appeared ideal for hibernation. During the April 2003 survey, approximately a dozen hibernating bats were seen in the cave. All of the hibernating individuals seen up close were *C. townsendi*, but several bats were roosting too high for positive identification and may be other species.

Brian Keeley of Bat Conservation International placed an inexpensive temperature datalogger (Onset Computer Corporation HOBO H8) near the top of the "ladder room" and also outside the cave in late June of 2001. Both dataloggers failed almost immediately, but this was not discovered until 2002. Kennedy replaced these loggers with more robust, weather-resistant dataloggers (Onset HOBO PRO) during the 2002 trip. During the 2003 trip, he replaced the "ladder room" logger, and added two more at lower levels of the cave. The outside logger was not relocated, and should be replaced during the summer telemetry work in the area. All in-cave dataloggers are HOBO PROs, and are mounted directly to the cave walls by phillips-head screws in plastic anchors in drilled holes. The datalogger from 2002 also failed shortly after installation, giving us no long-term temperature data as yet.

Ringtail (*Bassariscus astutus*) scat was found on the sloping ledges above the ladder in the "ladder room". A Say's phoebe (*Sayornis saya*) nest was found just inside the entrance to the cave. Two dead, mummified mice (*Peromyscus* sp.) were discovered on guano-covered ledges down several rope drops. Extensive collections of invertebrates were made, including ectoparasites from two male *Corynorhinus* that were hand-captured and released.

There is a notable invertebrate community present in this cave, consisting of organisms with varying levels of cave adaptation. The community relies on troglonexes, including the bat populations, pack rats, and moths and flies as nutrient sources. Unlike many caves in Texas where cave crickets are the primary nutrient source, there were no *Ceuthophilus* crickets seen, possibly because the setting of the cave is too extreme for this group. Low humidity, improper surface vegetation, or high elevation may account for their absence. Organisms collected await definitive identification my taxonomist but include:

At least 4 species of spiders
Mites

Harvestmen (*Leiobunum?*—not troglobitic)

1 pseudoscorpion

Large beetle (darkling?)

1 fly (heliomyzid?)

1 moth (very common in cave)

psocoptera (winged and wingless)

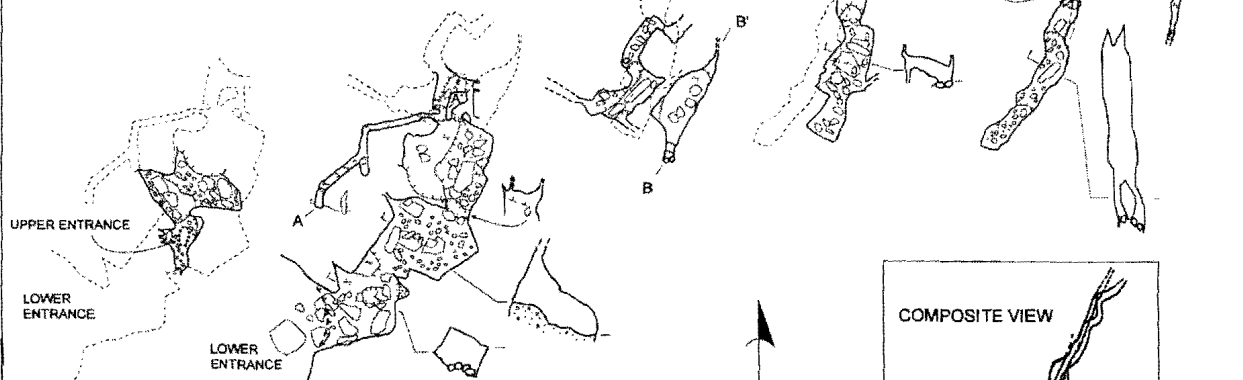
bat parasite – Streblidae or Nycteribiidae (taken from male *Corynorhinus townsendi*)

Proposed work for 2004:

The draft map of the cave, shown below, was plotted on a topographic map and the cave was found to extend about halfway through a ridge of Mount Emory. The strong airflow in the cave suggests that continued exploration to the northeast may extend through the ridge and exit via a currently undiscovered entrance in a large cliff. Significant additions to understanding the cave's geology are not expected, although possible, but additional biological collections may yield at least new records for the cave. If a third entrance is found, it will be important in the management of the listed and non-listed bats, and in understanding their entry, emergence, and roosting behavior in the cave.



PLAN SECTIONS

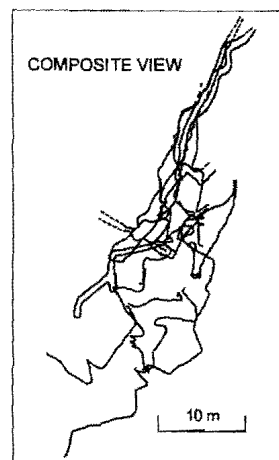


MT. EMORY CAVE

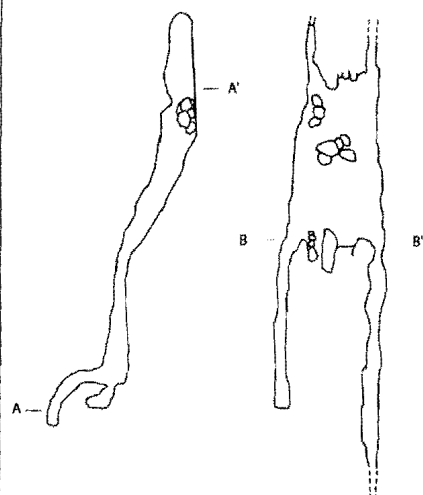
BIG BEND NATIONAL PARK
BREWSTER COUNTY, TEXAS
LENGTH: 287 m, DEPTH: 58 m

SUUNTO & TAPE SURVEY, 26 JANUARY 2002 AND 18 APRIL 2003 BY:
RANDY BROWN, JIM KENNEDY, CHRIS KREJCA, VIVIAN LOFTIN, MARY KAY MANNING,
LINDA PALIT, ROBERTA PRATT, PHILIP RYKWALDER, PETER SPROUSE, AND GEORGE VENI

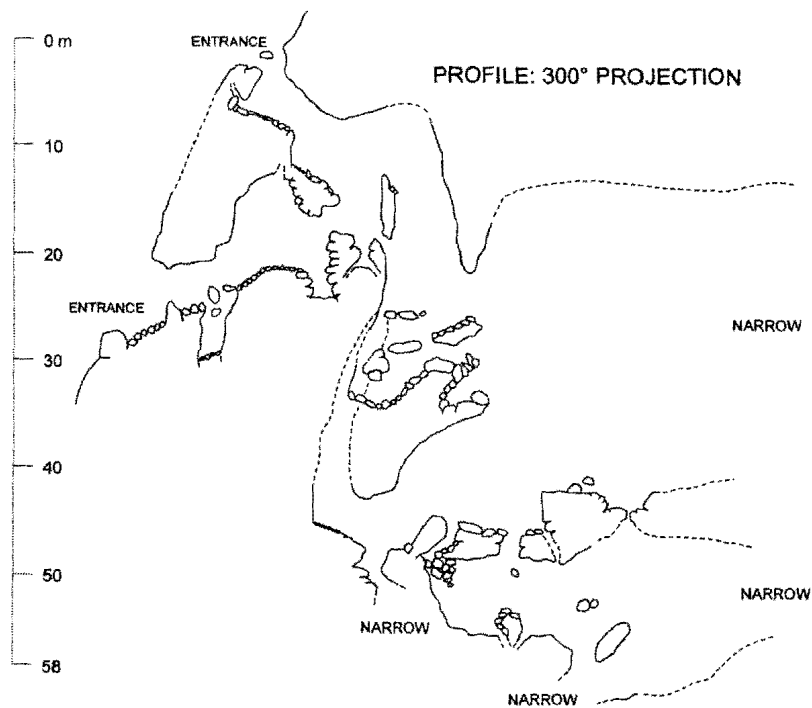
THE CAVE IS DEVELOPED IN THE OLIGOCENE BURRO MESA REIBECKITE RHYOLITE



MAJOR CROSS SECTIONS



PROFILE: 300° PROJECTION



DRAFTED BY BEV SHADE, 2003