Observations on Frenchman's Cave, Nova Scotia, and Its Fauna

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ABSTRACT

Caves have received little attention in Nova Scotia until recently, although several are known, particularly in the gypsum and anhydrite of the Windsor group. Frenchman's Cave at St. Croix, Hants County, was examined in 1963-1964 during investigations on microarthropods and bats. A total of 37 species of animals have been identified to date from the cave, including 19 insects, 10 arachnids, three diplopods, and five mammals. The only possible troglobite is a staphylinid beetle, *Quedius spelaeus*. Although the cave was probably formed by rapid solution in geologically recent times, presently stoping is the major factor shaping its topography.

Introduction

Caves have received little attention in Nova Scotia, possibly because the majority are small in size and relatively prosaic. The first speleological study in Nova Scotia was conducted by Prest (1912), who investigated Five Mile River Cave, Frenchman's Cave, and Miller's Creek Cave for possible anthropological significance. Prest discussed the general topography of the caves, and included maps and measurements, but did not remark on their biota. Nothing was written again until Taschereau (1963) compared his observations with those of Prest and discussed the structural changes that occurred in the 51-year interval. The only biological investigation of these caves to date is that of Calder and Bleakney (1965), who studied the microarthropod ecology of Frenchman's Cave. Except for studies on bats by Bleakney (1965), the fauna of the others has been neglected.

Most caves in Nova Scotia are located in gypsum and anhydrite of the Windsor group of Mississippian age (Taschereau, 1963). Taschereau noted that glaciation probably collapsed earlier caves, or filled them with glacial fluvial, lacustrine clays, sands, and gravels. Because most biospeleological studies in North America have been conducted south of the maximum extent of glaciation, detailed studies on the biota of recently formed northern caves could contribute to the understanding of cave community development and speciation of cavernicoles. The present fauna in Frenchman's Cave consists primarily of pre-adapted epigean species, rather than the highly adapted and modified troglobites frequently encountered in older caves south of glacial action.

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Observations

Frenchman's Cave at St. Croix, Hants County, has been studied more than any other cave in Nova Scotia. The entrance lies 35 feet from the top of a 55 foot deep sinkhole. The sinkhole has a diameter of 86 feet at the top, but a talus slope reduces this to 40 feet at the bottom. The vertical

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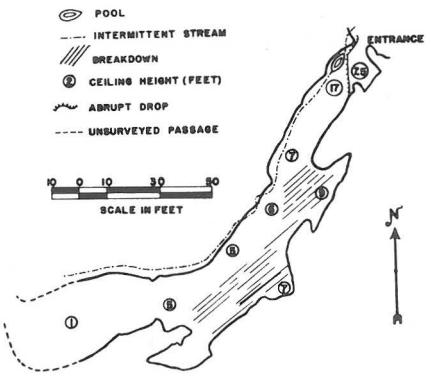

Figure 1.

Map showing the general topographic features of Frenchman's Cave, St. Croix, Nova Scotia.

walls of gypsum on two sides of the sinkhole suggest that it may have once formed part of the cave proper. A small stream runs into the cave in a westerly to southwesterly direction, undercutting the west wall (fig. 1). According to Prest (1912), this stream became a torrent in rainy weather. No evidence of this was observed in any of the visits by us, several of which were made during heavy rains. No doubt the stream is largest in spring when it is swelled by meltwater.

The location, size, and shape of the cave suggests rapid solution in geologically recent times. It is presently above the water table for the most part, and stoping has replaced solution as the predominant shaping force. The gypsum walls of the cave are soft and wet, and breakdown litters the floor. During the 1964 study, a large block fell from the ceiling 145 feet from the entrance. Water seeps through fissures in the ceiling even in dry weather. Wet weather increases the seepage and danger of cave-ins. The spring thaw is undoubtedly the most critical period for rockfalls in the cave.

The cave can be readily penetrated to a length of 145 feet. By crawling in the stream bed one can reach 165 feet, but at this point the ceiling, less than a foot high, decreases progressively inward and laterally. The cave ends with a wall of gypsum to the west, but the stream turns northwest and continues on. The ceiling becomes too low to permit further exploration. Mr. Gordon Allen, a farmer in the vicinity, told us that passage to deeper regions was once feasible, but the mud and gravel carried in by the stream has now made this impossible.

Records indicate that temperature fluctuations in the deeper regions of the cave are less marked than those near the entrance. A range from 32° F to 44° F was recorded at a station 145 feet from the entrance, while a range from 28° F to 51° F was recorded at a station 28 feet from the entrance during 1964. Relative humidity rarely falls below 85% anywhere in the cave.

In winter, deep snow accumulates at the bottom of the sinkhole and ice makes the entrance to the cave hazardous. Hoarfrost forms on the rocks and ceiling about the entrance due to freezing of outward moving moist air from within the cave. Ice stalactites and stalagmites form in the cave from the entrance to a depth of approximately 70 feet, decreasing progressively in size with increasing distance from the outside. The stalactites are fewer and smaller than the stalagmites because the warm air moving out of the cave is bouyed up by cold air from outside. Warmer temperatures prevent ice formation deeper in the cave. It is not known when ice first forms in the cave. Well developed ice formations were observed on 18 January 1964, indicating that ice had been present for some time. Ice was present in the cave until 9 June 1964.

A temperature cline exists from top to bottom of the sinkhole outside the cave. This is particularly noticeable on hot days in summer, when the colder air lies at the bottom of the sinkhole. On 28 July 1964, a range from 85° F at the top to 57° F at the bottom was recorded.

To date, 37 species have been identified from faunal collections in Frenchman's Cave (table 1). Perhaps the most interesting of these is the staphylinid beetle *Quedius spelaeus,* a widespread species known only from caves (M. W. Sanderson, personal communication). Collections of several taxa, including Oligochaeta, Isopoda, Chilopoda, Corrodentia, Pauropoda, and Symphyla, have not been examined. Identification of the Acarina collection is incomplete.

Table 1.

Fauna identified from Frenchman's Cave, Nova Scotia.

ARTHROPODA

Insecta

Collembola

Onychiurus armatus
Tullbergia iowensis
Folsomia fimetaria
Isotoma notabilis
Entomobrya nivalis
Pseudosinella alba
Heteromurus nitidus
Megalothorax minimus
Arrhopalites pygmaeus
Ptenothrix marmorata

Diptera

Smittia sp.
Trichocera sp.
Scoliocentra fraterna
Leptocera (Limosina) sp.
Bradysia sp.
Megaselia (Aphiochaeta) meconicera

Coleoptera

Quedius spelaeus
Brathinus nitidus
Aphodius leopardus

Arachnida

Araneae

Meta menardi

Acarina

Alliphis sp.
Geholaspus sp.
Zerconopsis sp.
Parasitus sp.
Veigaia sp.
Bryobia praetiosa
Pygmephorus sp.
Eugamasus sp.
Arctoseius sp.

Diplopoda

Proteroiulus fuscus
Ophyiulus pilosus
Diploiulus latestriatus

CHORDATA

Mammalia

Chiroptera

Myotis lucifugus
Myotis keeni
Pipistrellus subflavus

Rodentia

Erethizon dorsatum

Carnivora

Procyon lotor

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