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# INVERTEBRATES FROM PORCUPINE (*ERETHIZON DORSATUM*) ROCK DENS FROM GREENE COUNTY, CATSKILL MOUNTAINS, NEW YORK

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**ABSTRACT.** Invertebrates were collected from four ground-level porcupine dens. These dens are used mostly in winter. They were under flat rocks or in rock crevices but the openings were typically large enough that one could crawl into them. A number of kinds of invertebrates were found, some of the more interesting being the mites *Acotyledon paradoxa, Bakerdania* sp., *Calvolia* sp., *Coccotydeus* sp., *Eucheyletia bishoppi*, and *Dermacarus* sp. and related glycyphagids. These invertebrates are entirely different from parasites found on the porcupine, and must have entered directly from the environment or were present all year.

**Keywords:** Porcupine, *Erethizon dorsatum*, invertebrates, mites, Acarina

## INTRODUCTION

Although porcupines spend much time in trees, they often use underground dens. The dens studied were mostly under slab rock, and the openings were large enough that a person could climb into them. The porcupines in this study had been studied by Roze (1989, 2009) for several years. Roze had placed radio transmitters on them to trace them to their dens. On the floor of the dens were detritus and porcupine feces. These dens appeared to produce an environment favorable for various kinds of invertebrates; therefore collections were made from four of the dens for analysis. The fauna of porcupine underground dens from New York State had not been previously studied. Calder & Bleakney (1965) have studied the microarthropod fauna of a porcupine cave in Nova Scotia.

The objectives of this paper were to determine the invertebrate fauna of these dens and to observe if seasonal differences occurred. Additionally, we wanted to determine if parasites found on porcupines were also found in dens.

## MATERIALS AND METHODS

The dens were from Prattsville, Greene County, in the Catskill Mountains of New York, the same area where Roze (1989, 2009) did his studies on this species. Six collections were made: one in December 1991; one in January 1992; and two in May, one in July, and one in August, all in 1992. Greater numbers of samples were taken in winter when the porcupines most often use their dens. All four dens were sampled in midwinter, and two of the four were sampled in spring and summer (Table 1). A pint of nest material was gathered each time a den was visited.

Material collected was sifted through a Berlese funnel, and the smaller items were mounted on microscope slides in PVA and ringed with Euparal. Individuals on slides were identified using a 20 to 70 power zoom dissecting microscope. After initial identification by Whitaker, some slides were sent to Alex Fain (Institut Royal des Sciences naturelles de Belgique, Brussels, Belgium) for verification/identification as needed.

Large numbers of mites were collected and many were not identified. Those mites at least identified to family or genus and the other invertebrates are indicated in Table 1.

## RESULTS

Most organisms in samples from den floors of *Erethizon dorsatum* were Acarina, mostly mites and one tick (Table 1). Also found were one spider, one flea, one fly larva (Chironomidae), and 23 springtails (Collembola). Some of the more interesting invertebrates are indicated below.

***Acotyledon paradoxa* (Acaridae, Rhizoglyphinae).**—Oudemans (1903) described the genus

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Table 1.—Invertebrates from porcupine dens from Prattsville, Greene County, Catskill Mountains, New York.

| | Dec/Jan | May/July | Total |
|---|---|---|---|
| Mites | | | |
| *Acotyledon paradoxa* Oudemans 1903 | 18 | 0 | 18 |
| *Eucheyletia bishoppi* Baker, 1949 | 0 | 8 | 8 |
| Amerosiidae | 12 | 18 | 30 |
| *Androlaelaps* sp. | 0 | 1 | 1 |
| *Bakerdania* sp. | 1 | 0 | 1 |
| *Calvolia* sp. | 7 | 0 | 7 |
| *Coccotydeus* sp. | 103 | 0 | 103 |
| *Dermacarus* sp. and related forms (Glycyphagidae) | 16 | 3 | 19 |
| *Hypoaspis* | 9 | 18 | 27 |
| Laelapidae, and other larger mites | 0 | 72 | 72 |
| Oribatoidea | 29 | 47 | 76 |
| *Tarsonemus* sp. | 23 | 2 | 25 |
| Ticks | | | |
| *Ixodes* sp. | 0 | 1 | 1 |
| Insects | | | |
| Collembola (Springtails) | 23 | 0 | 23 |
| Coleoptera: Staphylinidae | 0 | 2 | 2 |
| Diptera: larvae (Chironomidae) | 0 | 1 | 1 |
| Hymenoptera: Ant | 0 | 2 | 2 |
| Flea (Siphonaptera) | 0 | 1 | 1 |
| Other Coleoptera | 0 | 4 | 4 |
| Beetle larvae | 0 | 2 | 2 |
| Other Invertebrates | | | |
| Nematodes | 0 | 150+ | 150+ |
| Spider | 0 | 1 | 1 |

*Acotyledon* for a new species, *A. paradoxa*. It was described from a single hypopus (non-feeding form) from a bat from Russia. Zachvatkin (1941) discovered additional hypopi and also protonymphs of this species.

This genus has undergone a complex series of name changes and many species have been placed in this genus, but finally it appears that *Acotyledon* is a good genus with *A. paradoxa* as the type. The genus has been a catch-all that included many species belonging to a number of other genera. *Acotyledon*, now, besides *A. paradoxa* and *A. neotoma*, probably includes a few species described in the Russian literature from stored products (Ashfaq et al. 1986).

Fain & Philips (1978) indicate habitats of the species include wheat and granaries, nests of owls including a nest box containing a screech owl and red squirrel (*Tamiasciurus hudsonicus*), and nests of *Peromyscus leucopus*. Barry OConnor (Pers. Comm.) has observed this species a number of times in tree holes (with or without vertebrate hosts) and in habitats such as hay, straw, and grain. Thus, it is not surprising that this species is associated with porcupine dens. Among the mites of this species were 11 hypopi, four tritonymphs, two males, and one female. All were found only in winter, probably because this is the season that porcupines used the dens.

**Amerosiidae.**—Mites of this family inhabit many terrestrial and above-ground substrates such as manure, moss, compost, forest humus, rotting wood, bracken fungi, stored foods, and the nests of mammals, birds, and social insects (Krantz & Walter 2009). It is not surprising that amerosiids are found in porcupine dens. Some amerosiids feed on fungi whereas others have mouthparts with which they can feed on pollen and nectar. Some species occur on insects. Many species are phoretic.

***Androlaelaps* sp. (Laelapidae).**—Many species of this genus are mammal parasites, while some are free-living. One, *A. fahrenholzi*, is found on more North American hosts than any other ectoparasite.

***Bakerdania* sp. (Pygmephoridae).**—This genus has a relatively large number of species, many described by S. Mahunka. Only one

species of *Bakerdania* has been described from North America, although we have a number of undescribed species found on various mammal hosts.

***Calvolia* sp. (Winterschmidtiidae).**—One species, *C. lordi*, is virtually cosmopolitan (Krantz & Walter 2009). Among the *Calvolia* were one tritonymph, three males, and one female.

***Coccotydeus* sp. (Tydeidae).**—These mites are very small and are plant feeders (Fain, Pers. Comm.). All 103 individuals were found in winter.

***Dermacarus* sp. (Glycyphagidae).**—Most members of this genus live as hypopi on various species of mammals, whereas the adults usually live in nests or detritus. A number of members of this genus and related forms were found among the material from porcupine dens.

***Eucheyletia bishoppi* (Cheyletidae).**—This mite has been found on species of *Microtus, Sorex*, and *Tamias*. It seemed unexpected to find this species in porcupine dens, but other mammal species may have entered the dens.

***Hypoaspis* sp. (Laelapidae).**—This genus has had a confused history and has been divided into several closely related genera. Members of the genus *Hypoaspis* may be found in litter or soil substrates, but also in mammal or arthropod nests or directly associated with insects. The mites in the dens may belong in one of the new genera.

**Oribatoidea.**—There are many species of oribatoid mites in several families. They live in many situations, but most species live in the soil, and the detritus in the den is essentially soil.

***Tarsonemus* sp. (Tarsonemidae).**—The Tarsonemidae constitute a very large family of which about half the species are in the genus *Tarsonemus*. One species of *Tarsonemus* is found under the elytra of beetles. *Tarsonemus* species are common in house dust.

## DISCUSSION

Parasites found previously from the porcupines themselves were *Ischrypoda armatus* (Laelapidae) and three species of chigger mites (Trombiculidae): *Euschongastia decipiens* (Allred & Beck 1966; Wrenn & Loomis 1974), *E. radfordia* (Brennan & Beck 1955), and *Neotrombicula harperi* (Lawrence et al. 1965). Porcupine ectoparasites encountered in the NY study area include the scabies mite, *Sarcoptes scabiei* (Payne & O'Meara 1958; Roze 1989, 2009), the tick *Ixodes cookei*, and the louse *Eutrichophilus setosus* (Roze 1989, 2009). None of these species were found in the porcupine dens we examined.

As might be expected, the fauna of the porcupine dens included a wide variety of forms, especially mites, but also insects and other invertebrates. Many of the mites were fungivores. There was essentially no relation between the items in the dens and those on the animals. Finding a single chironomid in this situation seems peculiar, as chironomid larvae are usually numerous when they occur.

Amerosiidae, *Dermacarus* and relatives, *Hypoaspis*, oribatoids, Coleoptera (including larvae), and Nematoda were found in all seasons. These latter forms are likely present throughout the year. The following were found only in winter: *Acotyledon*, *Bakerdania*, *Calvolia*, Coccotydeidae, and Collembola; whereas *Eucheyletia*, *Androlaelaps* and the one tick were found only in the warm season. *Tarsonemus* was found almost entirely in winter (23) with only two in the warm season.

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