Patterns of Cavernicoic Diversity and Abundance in Pulaski County, Missouri

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Introduction
Located in the Upper Prairie section of the Ozark Natural Division of Missouri, Fort Leonard Wood (Fig. 1), a military installation in Pulaski County, contains more than 65 caves (Fig. 2), spring, rock shelters and other karst features in the rolling hills and along clear rocky streams and the Big Piney River. A partial inventory of these caves by Osch et al. (1996) has been updated by the present study, which includes intensive study of nearly all of the caves at this military installation.

Materials and methods
Using a variety of sampling methods (pitfall trapping, hand collections, copped traps, baited jar traps, Berlese leaf litter extraction, sight records), we inventoried 64 sites between March 2003 and September 2005. Along with cave invertebrate collections, we recorded detailed microclimatic, temperature, light, and relative humidity data. In addition, we inventoried plants in the vicinity of many of the cave entrances.

Results
Nearly 64% of the taxa occurred at five or fewer sites, while only 9.4% (12) taxa occurred at more than 25 of the 64 sites (Fig. 5). We made 2,259 cave fauna observations during 108 site visits, documenting the presence of 13,975 individual organisms belonging to 155 taxa in 89 families, 42 orders, and 13 classes of organisms.

Overall, the number of individuals of a taxon recorded was a good predictor of the number of sites at which the taxon occurred (Fig. 6). There were differences among sampling methods in their effectiveness for capturing taxa (Fig. 7), so the use of multiple sampling methods enhanced our study. Capture efficiency for pitfall traps was relatively low in comparison to hand collections but has value for monitoring caves because repeatability is less affected by the user. However, pitfall trapping on its own is not an adequate method for sampling the overall invertebrate assemblage of a cave.

A total of 796 (Jackknife 2 estimator) to 94.4 (Chao 1 estimate) percent of the cavernicoic fauna, with varying degrees of success in the different ecological groups (Fig. 9).

In addition to overall trends, we found many interesting organisms, including troglodites sp. 1 (Fig. 10) formerly thought to be a single cave endemic in extreme south-central Missouri. We also collected a new species of subterranean bat (Myotis) that is currently being undescribed. Other taxa awaiting analysis by taxonomic experts include glabular springtails, , troglotipes sp. 1 (Fig. 11), cave adapted millipedes (Fig. 12), an undescribed diplurid (Insecta: Diplura: Campodeidae, Fig. 13), and thysanurans (Fig. 14).

Discussion
In spite of continued efforts by cave biologists interested in understanding the dynamics of cave ecosystems and the implications of human activities for the conservation of cave fauna (Elliott 2000), additional basic research elucidating the details of life histories, community structure, and ecosystem function is needed to support effective cave conservation and management.

Literature Cited


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For further information
Please contact gmtaylor@illinois.edu or 217.528-5582 for more information about this and other projets relating to cave biology in Illinois, Missouri, Texas, California, and Nevada. A pdf version of this paper is available at http://netfiles.uiuc.edu/taylor/MJ06209.pdf