Peck, Stewart B.—The Cave Fauna of Alabama: Part I. The Terrestrial Invertebrates (Excluding Insects). *NSS Bulletin* 51: 11-33.

THE CAVE FAUNA OF ALABAMA: PART I. THE TERRESTRIAL INVERTEBRATES (EXCLUDING INSECTS)

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Results are presented from a survey of the non-insect terrestrial invertebrates inhabiting about 250 caves in Alabama. A summary is given of the geology and physiography of the cave regions of Alabama, and a history of cave biology studies.

Some 178 species of free-living terrestrial non-insect invertebrates are known from cave habitats in Alabama. Twenty-nine of these species are troglobites and 62 are troglophiles. The troglobites include three snails, one terrestrial isopod, seven pseudoscorpions, seven spiders, two harvestmen, and nine millipedes. These numbers will grow as collections are studied and more caves are surveyed for their terrestrial invertebrate faunas. Analysis of the fauna will appear in a later paper.

INTRODUCTION

The Southern Appalachian mountains, running in a series of parallel valleys and ridges, extend from the Virginias into Alabama. They contain an immensely rich biota. These unglaciated highlands, plateaus, and valleys with deep soils, support an outstanding flora and fauna equalled in diversity by few other temperate regions of the world.

Alabama lies in the southeastern corner of the United States, at the southern end of the Appalachian Mountains. Over 2,000 caves are now known in Alabama, distributed around the state, but mostly in rocks of Paleozoic age along the flanks of the Cumberland Plateau. The purpose of this series of reports is to provide a summary of what is known of the invertebrates inhabiting these caves. Much has been published, and the literature has not been summarized. Additional unpublished records have been accumulated by many collectors. Because of the richness of the fauna, the report will be presented in three parts. The first part covers the terrestrial invertebrates, excluding the insects. These will be summarized in the second part. The third part will provide an evolutionary summary and discussion of the terrestrial fauna. The aquatic fauna and the vertebrates may be covered by other authors.

These reports are not intended to be the last word, but to be progress reports, indicating both what is now known and where there is a lack of knowledge. A majority of Alabama caves remain to be studied by biologists. Although we may now know the major components of the taxonomic groups and their geographic distributions in Alabama caves, there are undoubtedly new species yet to be found, and refinements yet to be made in understanding the details of their distributions.

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I present this study on the terrestrial invertebrates of the caves of Alabama as a contribution towards a comprehensive understanding of the North American cave faunas. The study is based on extensive field work by myself and many others, on a complete literature review, and on contributions from the records and collections of zoologists working on Alabama cave faunas.

I wish to dedicate this series to the late Dr. Walter B.

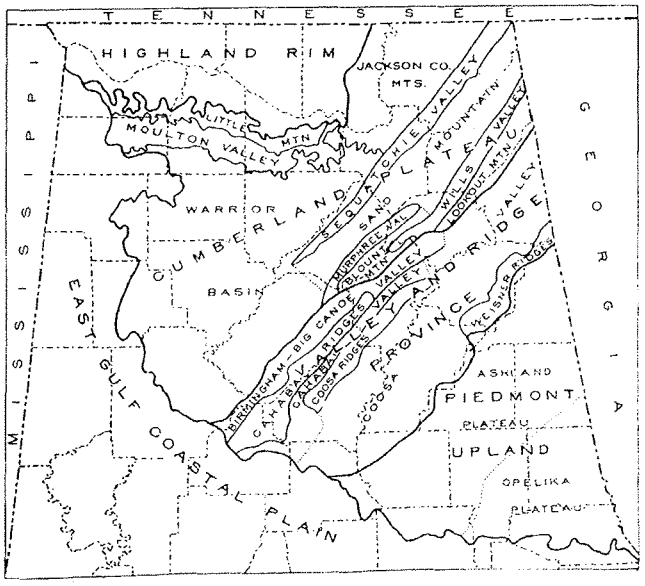


Figure 1. **Physiographical divisions of northern Alabama (from Johnston, 1930). Most Alabama caves occur here. Very few occur in Cretacous or Tertiary rocks in southern Alabama.**

Jones, State Geologist of Alabama and director of the Alabama Museum of Natural History. He pioneered the systematic study of Alabama caves and initiated and sponsored the sampling and study of their invertebrates.

GEOLOGY AND PHYSIOGRAPHY

An introduction to the regional geology and geomorphology can be found in King (1977) and Thornbury (1965). Since the distributions of caves and some cave animals are controlled by regional geology, it is necessary to present a summary of the geology of Alabama. Details can be found in the volume of Alabama geology by Adams et al. (1926) and on physiography by Johnston (1930). The best overview has been presented by Veitch (1967) and a summary from this rare work is presented as follows. The physiographic divisions of northern Alabama are shown in Figure 1.

Physiography

A geological and geographical view of Alabama extends back 500 million years, to the Paleozoic seas of a great trough called the Appalachian Geosyncline. Intermittently, for 300 million years, the deposits to become the Appalachians formed beneath its shallow, shifting seas. Gradually, at the end of the Paleozoic Era, the sea was destroyed by lateral compressions that lifted, folded, and faulted its deposits, raising mountains that persisted until the end of the Mesozoic Era when Cretaceous seas again prevailed over parts of their eroded roots. Then, probably beginning in late Cretaceous times, when the area to become Alabama was a low plain with rivers meandering across flat and folded sedimentary and metamorphic rocks alike, the land was again arched upward. The seas receded slowly southward and erosion began shaping the topography of today.

The Coastal Plains (Fig. 1) are composed of flat-lying sedimentary rocks which lie unconformably on the eroded Paleozoic rocks of the Appalachian Highlands. Their northern boundary is the Fall Line of the Atlantic states which runs through Alabama from Columbus, Georgia, west to Tuscaloosa, and then northward to the northwest corner of the state. The northernmost of these rocks are Upper Cretaceous. Lying unconformally upon them are Cenozoic rocks. Together they cover over half the state, forming a rolling, hilly upland, often with incised stream valleys. They are a succession of sandstones, limestones, shales, and marls, often thin-bedded, sometimes poorly consolidated. Caves are few, scattered, and small.

North of the Coastal Plains in east-central Alabama are the Piedmont Uplands; a triangular area with Columbus, Georgia; and Clanton and Cleburne Counties at its corners. It is a stream-cut upland of caveless Precambrian metamorphic and igneous rocks whose general structure reaches along the seaward flank of the Appalachians into Pennsylvania.

Above the Piedmont Uplands is the Valley and Ridge Province, a highly folded and faulted area of Paleozoic rocks running through and south of Birmingham, and reaching northward along the western flank of the Appalachians into Pennsylvania. Its disrupted strata form hills and valleys running northeastward: the Weisner Ridges, Coosa Valley, Coosa Ridges, Cahaba Valley, Cahaba Ridges, and the Birmingham-Big Canoe Valley. In the south, around Birmingham, their relief is about 500 ft (150 m); to the north it approaches 1000 ft (300 m). Its rocks are Paleozoic limestones, dolomites, sandstones, and shales, sometimes metamorphosed. Caves are generally few and scattered, but may be large.

The Cumberland Plateau, north of the Valley and Ridge Province, is a part of the Appalachian Plateaus that reach north to the St. Lawrence River, and in which so many eastern American caves are found. In Alabama, the Cumberland Plateau forms a rough inverted triangle with Tuscaloosa at its apex and its base along the Tennessee-Alabama state line. The southeastern side of the Cumberland Plateau is composed of folded Paleozoic rocks forming synclinal plateaus and anticlinal valleys running southwest. The Sequatchie Valley, which contains the Tennessee River northeast of Guntersville, is the first of these; to the southeast, in order, are Sand Mountain, Wills Valley, and Lookout Mountain. In the north the mountains dominate the landscape; to the south they diminish and finally disappear to the northeast of Birmingham. Caves occur in the sides and floors of the valleys.

The remaining parts of the Cumberland Plateau are composed of flat-lying Mississippian and Pennsylvanian rocks that dip gently southward and pass beneath the rocks of the Coastal Plains. They form four physical districts, three of which contain well over half of Alabama's caves: the Jackson County Mountains, the Warrior Basin, and Little Mountain. The remaining district, the Moulton Valley, between Little Mountain and the Warrior Basin, is too low to contain caves. The Jackson County Mountains lie east of Huntsville and north of the Tennessee River. They are the edge of the Cumberland Plateau itself, stream cut, and sandstone capped. Streams running down to the Tennessee River have cut deeply into the original plateau surface, forming a maximum relief of 1000 ft (300 m) in the steep-sided valleys to the north. Along the Tennessee River the valleys are wider and the original surface cut into monadnocks such as Monte Sano. These isolated portions are given mountain names such as Keel Mountain or Green Mountain. Little Mountain (locally better known as Brindley Mountain) is developed by the resistant Hartselle Sandstone where it is exposed south of the Tennessee River westward from Morgan County. Its northern edge forms a scarp over-

looking the Tennessee River and its surface is a rolling upland cut by streams, which slopes southward to pass under the limestone of the Moulton Valley. Along its northern flanks there are many incised sink valleys with many caves, such as the well-known Newsome Sinks. The Warrior Basin is a dissected plateau with a prominent scarp as its northern boundary, its surface developed in the same Pottsville Formation that caps the Jackson County Mountains. It overlooks the Tennessee River between Guntersville and US-231, then falls back from the river, passing between Falkville and Cullman, and reaches westward toward the state of Mississippi.

The Highland Rim portion of the Interior Low Plateaus is best developed in Tennessee, but extends into and across northwestern Alabama. It is a rolling upland with a total relief of about 400 ft (120 m), at an average elevation of about 600 ft (180 m). North of the Tennessee River several south-flowing streams occupy entrenched meanders with cliff-like walls, and limestone cliffs as high as 200 ft (65 m) border the river. Both north and south of the Tennessee River the underlying Tuscumbia (= Warsaw) Limestone contains many springs, sinks, and caves.

Geology of the Cumberland Plateau

The flat-lying rocks of the Cumberland Plateau bear more detailed mention because they contain most Alabama caves. They are a succession of Mississippian and Pennsylvanian limestones, sandstones, and shales, with limestone predominating. The topography is controlled by their southward slope of about 50 feet per mile and by their relative resistance to erosion. The plateau-like tops of the Jackson County Mountains, Sand and Lookout Mountains, and the steep, north-facing scarp of the Warrior Basin are the result of the resistant Pottsville sandstones. Where the cap has been destroyed by erosion, as in the river valley west of Huntsville and from Morgan County westward, the land is lower and there is less relief. A formation of lower resistance, the Hartselle Sandstone, has formed a second, north-facing scarp. These two formations, easily identifiable both by being sandstone and by their unmistakable physical features, serve as markers for a general identification of the cave-bearing limestones beneath them.

The first (lowest) horizontal formation to crop out over a wide area is the Ft. Payne Chert, a generally dark, shaley and sandy limestone that weathers to crinoidal chert. It is exposed over much of the area east of Huntsville and north of the Tennessee River, as well as in the areas of disturbed strata where it forms conspicuous ridges. Above the Ft. Payne chert is a succession of limestones totalling over 1000 ft (300 m) in thickness. In the western part of the state they are interspaced with several local sandstones and often contain shaley or sandy members. The most prominent of these is the Hartselle Sandstone which extends eastward past Huntsville. These grade out eastward, however, and east of Keel Mountain (Huntsville) these formations are almost entirely limestone. The lower formation of these is the Tuscumbia Limestone—more properly differentiated as the Warsaw and St. Louis Limestones—which lies unconformably upon the Ft. Payne. It is a light, thick-bedded, coarse-grained, and fossiliferous limestone. It forms most of the Tennessee River valley west of Huntsville and the lower slopes and valleys of the Jackson County Mountains.

Unconformably upon the Tuscumbia is the St. Genevieve Limestone, thick-bedded, dark to light grey, and oolithic. Its oolithic nature is a visual differentiation between it and the underlying St. Louis. It crops out on the slopes of Little Mountain and on the lower-middle slopes of the Jackson County Mountains. On Monte Sano it is 75 ft (23 m) thick, its bottom 200 ft (61 m) above the valley floor; it is 75 to 100 ft (23 to 30 m) thick in the Jackson County Mountains, thinner to the west. Above the St. Genevieve is the Gasper Formation, a thick-bedded, light grey, usually oolithic limestone that is visually similar to the St. Genevieve. It crops out on the middle slopes of the Jackson County Mountains and on the upper slopes of Little Mountain where it underlies the Hartselle Sandstone. The St. Genevieve and Gasper are now often combined as the Monteagle Limestone. The Hartselle Sandstone above the Gasper is generally thick-bedded and well cemented. It is about 200 ft (61 m) thick in the western part of the state, thins to about 10 ft (3 m) on Monte Sano, and disappears east of Keel Mountain. In Morgan County it is about 50 to 100 ft (15 to 30 m) thick.

Above the Hartselle, or the Gasper where the Hartselle is absent, is the Bangor Limestone. It is a dark blue, thick-bedded, oolithic, very thick limestone that forms the upper slopes of the Jackson County Mountains, where it is about 400 ft (122 m) thick; the upper slopes of Sand and Lookout Mountains, where it is up to 700 ft (213 m) thick; and the lower and middle slopes of the Warrior Basin scarp, where it is about 500 ft (152 m) thick. The floor of Newsome Sinks is formed in the Bangor and the pits of Jackson County descend through it. Above the Bangor is the Pennington Formation, a shaley limestone 50 to 200 ft (15–61 m) thick, often interbedded, and identified, by red shale members. Upon the Pennington, forming the plateau-like surfaces of the Jackson County Mountains, Sand and Lookout Mountains, and the Warrior Basin, is the resistant Pottsville Formation, a succession of thin-bedded sandstones and shales, often interbedded with coal members.

These same formations also occur in the northern parts of the Valley and Ridge Province, though most of that area is composed of older Paleozoic rocks. Where they are found they are tilted, folded, and faulted and usually of small and interrupted extent. Sand and Lookout Mountains have the same sequence of rocks but on their margins in the Sequatchie, Wills, and Shinbone Valleys there are older rocks in the exposed roots of anticlinal folds.

The effects of geology and geography on the distributions

of cave organisms will be presented in part III of this series.

Caves

Over 2000 caves are now known in Alabama. Most of them are in Madison, Morgan and Jackson Counties, in the northeastern corner of the state. Their location is controlled by geology. Counties in which caves have been studied for invertebrates are shown in Figure 2. Data on cave locations and descriptions can be found in Jones and Varnedoe (1968, 1980), Varnedoe (1973, 1975, 1981) Veitch (1967), and the publications of the Huntsville Grotto. Cave origins in the Cumberland Plateau of Alabama have been discussed by Wilson (1977). Anyone interested in studying these caves should contact the Huntsville Grotto or the National Speleological Society, Cave Avenue, Huntsville, Alabama 35810.

Information on caves in adjacent states can be found in Knight et al. (1974) for Mississippi, and Barr (1961) and Mathews (1971) for Tennessee.

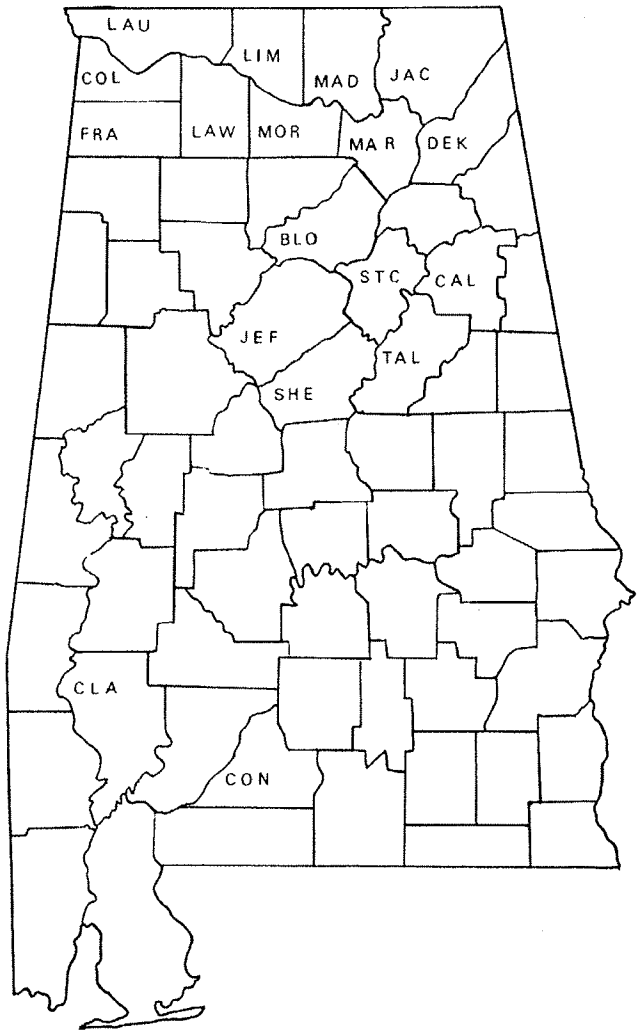


Figure 2. **Counties in Alabama from which terrestrial cave invertebrates are known. Abbreviations are the first letters for the following counties; Blount, Calhoun, Clarke, Colbert, Conecuh, DeKalb, Franklin, Jackson, Jefferson, Lauderdale, Lawrence, Limestone, Madison, Marshall, Morgan, Shelby, St. Clair, and Talladega.**

CAVE FAUNAS

One of the most fascinating aspects of cave faunas is their evolutionary adaptation to life in rigorous subterranean environments. General background information on the evolution and ecology of cave animals can be found in Barr (1968), Barr and Holsinger (1985), Culver (1982), Holsinger (1988), and Howarth (1983).

Regional cave faunal surveys have been made for much of the southeastern United States. Examples are: Florida (Peck 1970), Georgia (Holsinger and Peck, 1971), and Tennessee and Virginia (Holsinger and Culver, 1988). The present report is a contribution to an understanding of the cave invertebrates of Alabama, at the junction of the southern Appalachians and the Gulf Coastal Plain.

History of Alabama Cave Biology

The rich fauna of the southern Appalachians has long been recognized by biologists. The habitat offered by the caves of the region is no exception. The recognition of the richness of Alabama cave fauna goes back to what has been called the "early period" of American cave biology by Barr (1966), when Cope and Packard (1881) published descriptions of a new crayfish, amphipod, isopod, and cricket from Nickajack Cave, in Marion County, Tennessee, and Jackson County, Alabama. They pointed out that the fauna seemed to indicate membership in a different faunal region from that of Mammoth Cave, in Kentucky.

No other studies of Alabama cave faunas appeared until the initiation of the work on cave carabid beetles by J. Manson Valentine in the "middle period" of American biospeleology (Barr, 1966). He and Walter B. Jones, then State Geologist of Alabama and Director of the Alabama Museum of Natural History, initiated the first broad collecting program of the cave faunas of Alabama and other states. Their collections provided material for numerous specialists who have contributed to the knowledge of the systematics of Alabama cave faunas.

In 1965 John Cooper organized the project "Biological Survey of Alabama Caves" which attempted to involve local cavers in helping to collect the fauna (Cooper and Cooper, 1966). Some of the records presented here were made by these people.

Dr. Jones discontinued active collecting of cave fauna in

1955 when the number of known Alabama caves stood at 170. Since then William W. Varnedoe and other members of the Huntsville Grotto of the National Speleological Society have coordinated the cataloging of Alabama cave locations and descriptions, as the Alabama Cave Survey.

The literature on the cave fauna of Alabama is scattered. To ease the task of later students who need a complete bibliography of the fauna, I have included all appropriate references. This list will serve as a starting point for future studies on the identification and distribution of the cave fauna.

It should be noted that the Alabama House of Representatives and Senate passed a cave conservation law in 1988. In addition to other protection measures, it makes illegal the collecting, killing, or harming of cave life, except for recognized scientific purposes (Churchill and Moss, 1988).

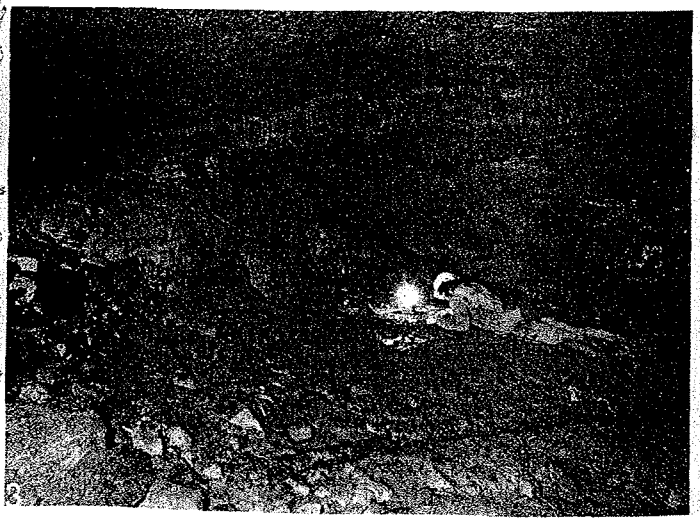
Field Study

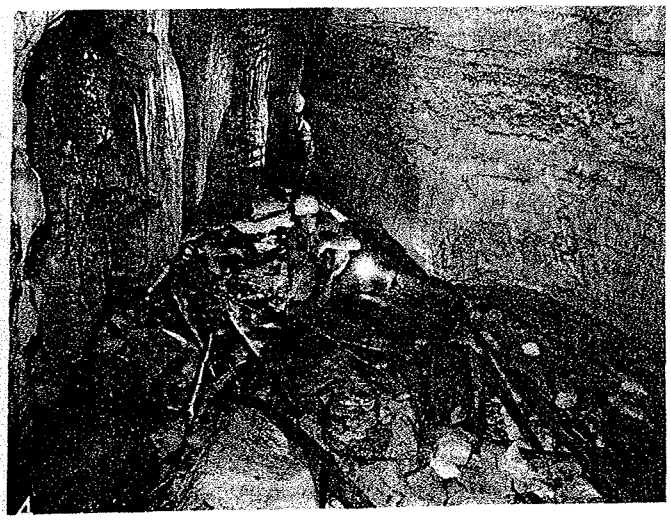
Collecting efforts in Alabama caves have been as extensive and as intensive as possible. In addition to direct visual searching I have used Tullgren funnel extraction of arthropods from organic debris and have extensively used dung and carrion baits.

Since 1963, I have devoted some 50 weeks of full-time field work to Alabama cave faunas. A total of 543 research visits have been made to 213 caves in 14 Alabama counties. Collecting by others brings the total to about 250 caves that have received some biological study. Faunas of the dark zone of the caves received emphasis. Entrance and twilight zone faunas are under-represented in this study as are cave litter and soil faunas and parietal (wall-inhabiting) faunas. The latter have been emphasized in studies of cave faunas in other areas (Peck, 1988; Peck and Christiansen, 1989).

ANNOTATED FAUNAL LIST

Cave-inhabiting animals usually fall into one of the four ecological-evolutionary categories commonly used in cave biology (Barr, 1968). (1) *Troglobites* are obligatory cave species which are morphologically specialized for, and restricted to, cave habitats, and are unable to live in non-cave habitats. (2) *Troglophiles* are facultative cave species, which frequently inhabit caves and complete their entire life cycles there, but many occupy ecologically similar (cool, moist, and dark) habitats outside of caves. (3) *Trogloxenes* are species which often occur in caves but are incapable of completing their entire life cycle in caves. They must at some time leave the cave, usually for feeding purposes. (4) *Accidentals* are species which accidentally wash, wander, or fall into caves and can exist there only temporarily. Although these may serve as food sources for regular cave inhabitants, the accidentals are of no importance in distribution or evolutionary analysis of cave fauna. I have listed most species judged to be accidentals (but excluded obvious herbivores such as leaf hoppers), even though this category could potentially, through time, come to embrace much of the fauna in the area containing the cave. In many cases, it is still too early to judge the relative degree of cave association of many species. I think it better to include the species than to lose the information. By so doing, patterns of cave association that are not yet apparent may emerge through the compilation of additional data (as was found for cantharid beetle larvae, Peck, 1975b), and the category to which the species is assigned may be changed.





Figures 3 and 4. **Invertebrate habitats in caves in Madison County, Alabama. (3) Barclay Cave. Invertebrates are concentrated on organic debris and under rocks on a silt terrace above the seasonally flooded end of the cave. (4) Cold Spring Cave. Invertebrates occur on rotting wood at the base of the entrance slope of this small cave.**

The ecological term *endogean* or *edaphobite* may also be used for cave animals. These are species that normally live in soil, such as earthworms, and their occurrence in caves is usually sporadic.

Many of the species found in the following list are still inadequately known in their distribution outside Alabama and in their ecology; their assignment to one of the above ecological-evolutionary categories should be considered tentative and subject to readjustment when additional information is available. The following abbreviations, placed after the organisms' names, have been employed: TB = troglobite; TP = troglophile; TX = trogloxene; ED = edaphobite; AC = accidental.

Some of the taxa found in this list are still poorly known and, therefore, could not be determined to species. Other forms, such as millipedes, are not being studied and specific names are not available. Still other material represents undescribed species, for which names and descriptions have not been published. Because of these reasons, this list should be regarded as subject to later refinement. However, considering the number of sites sampled, the data given in this list are believed to form a nearly complete picture of the invertebrate fauna of the caves of the region.

Because of space limitations, we do not give supporting data for species records presented here, such as date of collection, collector's name or collection containing the specimens. Records not found in the references listed for each species should generally be assumed to be new records made by me or provided by the specialists acknowledged at the end of the paper. Unpublished records made by other collectors are followed by the initials of the collector. These initialed collectors are listed in the acknowledgements.

Published cave names that do not agree with present usage are placed in parentheses following the currently accepted cave names. Sometimes, there is more than one cave in a county with the same name. When this occurs, the Alabama cave survey number (e.g., AL 60) is used to indicate the identity of the cave.

Where species names and names of higher taxa do not correspond to those given in some of the older literature, it is because we have used names based on more recent revisional studies. Where more recent studies have shown older literature locality records to be based on inaccurate identifications, I have not listed the erroneous localities.

The higher taxa have been listed in generally accepted phylogenetic sequence. Genera within families, and species within genera have been listed in alphabetical order. Localities are listed alphabetically by county within the state, and by cave within the county.

Counties are useful geographical units under which caves can be grouped. They may or may not have natural physiographic boundaries that relate to cave faunas. The Alabama counties mentioned in the following faunal listing are shown in Figure 2. Some new records are given for poorly known invertebrates in adjacent states, to help document their distributions.

Notes on some cave localities.

Two caves listed below have been destroyed. Town Creek Cave (AL 40) has been flooded, and Toll Gate Natural Well (AL 61) has been filled in.

Nickajack Cave has its sole entrance in Tennessee, but it extends under Jackson County, Alabama, so has been included as an Alabama cave site. The entrance passage is now flooded by a TVA impoundment, but the terminal rooms, in Alabama, should be above the water level.

Early collections by Walter B. Jones were made in the following caves which can no longer be identified or located; Spring AL 31; Terrill AL 32, Kelly Natural Well AL 49, Ingram AL 70, Clemons AL 73, Wolf Den AL 83, Dickey AL 84, Spring AL 85, Pack Rat AL 89 caves.

Phylum Annelida
Class Oligochaeta
Order Opisthopora

Family Lumbricidae

Allolobophora trapezoides (Duges), ED. Dekalb County; Cherokee Cave. This species is European in origin. It has been recorded from caves in Arkansas, Kentucky, Tennessee, and West Virginia (Gates, 1959).

Bimastos tumidus (Eisen), ED. Colbert County; McKinney Pit. Dekalb County; Cherokee Cave. Madison County; Shelta Cave. This is an endemic American species. It has been recorded from caves in Virginia and Tennessee (Gates, 1959).

Dendrobaena rubida (Savigny), ED. Calhoun County; Weaver Cave. Dekalb County; Manitou Cave. Jackson County; Salt River Cave. This species is European in origin. It is known from many caves in Europe and the United States (Gates, 1959).

Octolasion tyrtaeus (Savigny), ED. Dekalb County; Cherokee and Section 26 Caves.

Family Megascolecidae

Diplocardia caroliniana Eisen, ED. Marshall County; Cathedral Caverns. These are very abundant worms in the silt banks along the cave stream (Gates, 1959).

Pheretima diffringens (Baird), ED. Blount County; Bangor Cave. Calhoun County; Weaver Cave. This species is Asiatic in origin (Gates, 1959).

Family Sparganophilidae

Sparganophilus sp., ED. Calhoun County. Weaver Cave. Material unidentifiable to either family or genus. Blount County; Bangor Cave (5 juveniles). Conecuh County; Sanders Cave (2 juveniles). Dekalb County; Sequoyah Caverns. Jackson County; Jess Elliott (10 juveniles) and

Salt River Caves (9 juveniles). Morgan County; Cave Spring Cave.

Phylum Mollusca
Class Gastropoda

Land snails can often be found in the cool and moist twilight zone of caves, where they may feed on dead organic matter, or rasp films of algae and other plants from moist rock surfaces. Hubricht (1985) has given an overview of the distribution of all native eastern species of land snails. In an attempt to determine which species can maintain themselves in the dark of caves, collections reported here are only from the dark zone. Dead shells are often washed into the dark zone.

Order Archeograstopoda

Family Helicinidae

Helicina orbiculata (Say), AC. Jefferson County; Cedar Pole Cave (immature, dead). This species is widespread in the southeastern United States, but is otherwise recorded from caves only in Texas (Reddell, 1965).

Order Stylommatophora

Family Carychiidae

Carychium exile (H.C. Lea), AC. Marshall County; Cathedral Caverns (dead) and Guffey Cave. The species is widespread in the southeastern United States. It is reported from caves in Kentucky and Tennessee (Hubricht, 1964, 1965).

Carychium mexicanum Pilsbry (= *C. floridanum* Clapp), AC. Clarke County; Cave 2 mi SE of Gainstown (L. Hubricht). A widespread southeastern species.

Family Endodontidae

Discus patulus (Deshayes), TP. Blount County; Bangor Cave (L. Hubricht). Jackson County; Indian Rocks Cave. Lauderdale County; Collier Cave (dead). Madison County; Aladdin Cave. This is a wide ranging southeastern species (Archer, 1941c, Hubricht, 1960; 1964).

Helicodiscus barri Hubricht, TB. Colbert County; Georgetown (immature) and McKinney Caves. Lauderdale County; Collier Cave. Madison County; Byrd Spring and Shelta Caves. The species is known only from the dark zone of caves, where it often feeds on guano. It is also reported from caves in Tennessee and Georgia (Hubricht, 1962, 1964, 1985).

Helicodiscus fimbriatus (Wetherby), AC. Jackson County; House of Happiness Cave. Madison County; Burwell Cave (dead).

Helicodiscus hadenoecus Hubricht, TP. Madison County; Aladdin and (Chapman Mountain) Cave Spring (AL 60) Caves. This species is known from caves in Kentucky and Tennessee, from cricket guano, but is also found in soil and deep in rock slides. (Hubricht, 1962, 1964, 1985).

Helicodicus inermis H. B. Baker. TP. Clarke County; Cave 2 mi SE Gainestown (L. Hubricht). Conecuh County; Sanders Cave. Dekalb County; Kelly Girls and Lykes Caves. Jackson County; Guess Creek, Indian Rocks, Rainbow, Russell, and Williams Saltpeter Caves. Madison County; Shelta Cave. Morgan County; Royer Cave. This is a wideranging southeastern species, in many habitats, and is also recorded from caves in Tennessee and Virginia (Holsinger and Culver, 1988; Hubricht, 1964, 1985).

Helicodiscus notius notius Hubricht, TP. Blount County; Bangor and Bryant Caves. Dekalb County; Bartlett Cave (dead). This is a wide-ranging southeastern subspecies, also recorded from a cave in Tennessee and Kentucky (Hubricht, 1962, 1964, 1965, 1985).

Family Polygyridae

Mesodon appressus (Say), TP, Figure 5. Marshall County; Merrill (immature) and Painted Bluff Caves. The species ranges from Virginia to Indiana and south to northern Alabama. It is recorded from caves in Tennessee, Virginia and Kentucky (Hubricht, 1964).

Mesodon inflectus (Say), AC? Madison County; Shelta Cave. The species ranges widely in the southeast, and is known from 50 counties in Alabama, but is recorded from caves only by this record and two from Kentucky (Hubricht, 1964).

Mesodon perigraptus (Pilsby), AC. Blount County; Horseshoe Crump Cave. Jackson County; Cornelison Cave.

Mesodon sargentianus (Johnson and Pilsby), TP. Jack-

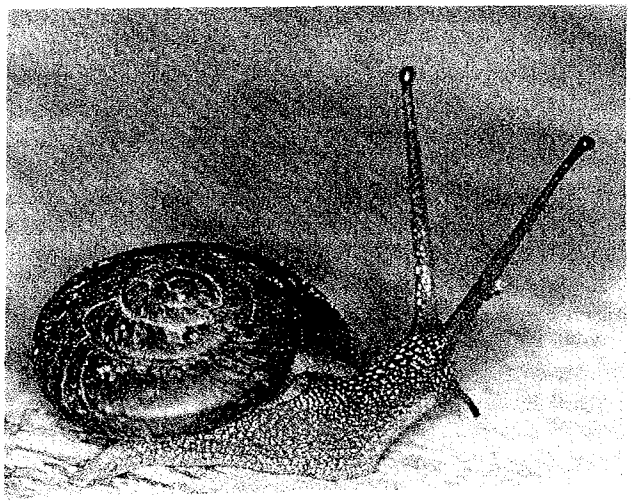


Figure 5. **The troglophilic snail *Mesodon appresus*. Its eyes are at the tips of its tentacles. Most snails in Alabama caves live in the twilight zone.**

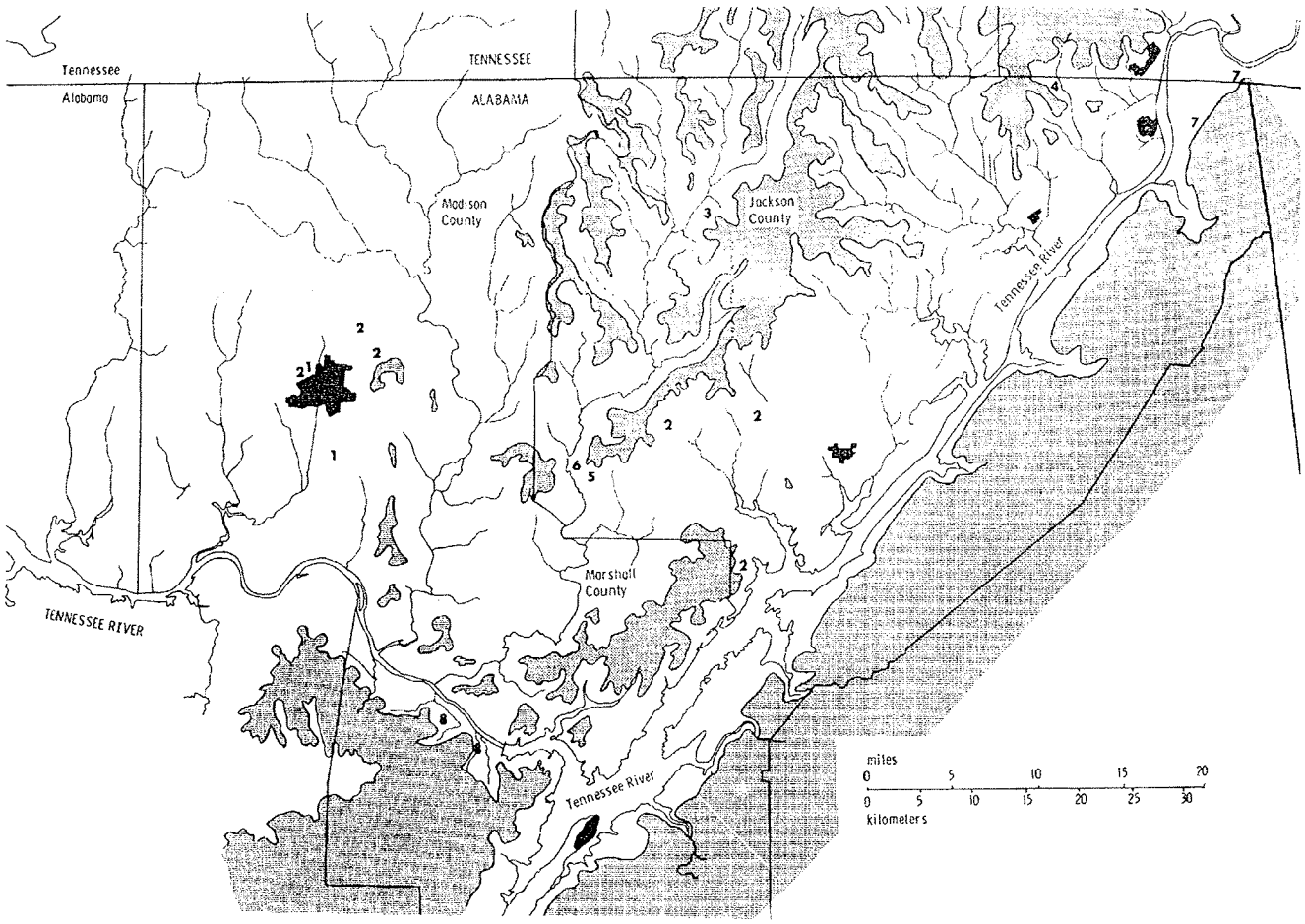


Figure 6. **Distribution of some troglobitic invertebrates in northeastern Alabama. Stippling represents the Pottsville sandstone remnants of the cap rock of the Cumberland Plateau, locally called the Jackson County Mountains. Caves do not exist under this cap rock. Consequently, these plateau remnants, as well as the large rivers and streams and their alluviated valleys, represent barriers to subterranean terrestrial dispersal. One and two are the land snails (1). *Helicodiscus barri* and (2). *Glyphyalina specus.* (3). *is a terrestrial isopod, Miktoniscus* sp. 4–8 are pseudoscorpions (4). *Apochthonius russelli,* (5). *Lissocreagris eurydice,* (6). *Lissocreagris mortis,* (7). *Lissocreagris nickajackensis,* (8). *Alabamocreagris pecki.***

son County; Crossing, House of Happiness, Nat, Mink (Out) entrance of Gross-Skeleton, Sheldons (immature) and Pig Pen Caves. Madison County; Aladdin (immature), Hurricane, Jacks and Scott Caves. The species occurs only in Jackson and Madison counties, Alabama (Hubricht, 1985).

Polygyra fatigitata (Say), AC. Lauderdale County; Collier Cave (dead). This is the only Alabama record for the species, otherwise known only from Indiana, Kentucky and Tennessee (Hubricht, 1985).

Stenotrema spinosum (Lea), AC. Lauderdale County; Key Cave (J.E. Cooper).

Stenotrema turbinella (Clench and Archer), AC. Dekalb County; Manitou Cave. The species occurs only in northern Alabama and adjacent parts of Tennessee and Georgia (Hubricht, 1985).

Family Zonitidae

Gastrodonta interna (Say), AC. Madison County; Aladdin Cave. Shelby County; Anderson Cave. This is a wide-ranging southern species, known to occur in over 30 Alabama counties (Hubricht, 1985).

Glyphyalinia cryptomphila (Clapp), TP? Blount County; Bangor Cave. This is a widespread species, sometimes found in caves (Hubricht, 1985).

Glyphyalinia indentata (Say), TP. Calhoun County; Daugette Cave No. 1. Colbert County; McKinney Pit (dead). Conecuh County; Sanders Cave. Dekalb County; Cherokee and Talley Caves. Jackson County; Cornelison Cave. Lauderdale County; Collier Cave (dead). Madison County; Barclay, Burwell (dead) and Hurricane Caves. The

species is widely distributed in the southeastern states, and occurs in almost every county in Alabama.

Glyphylinia pecki Hubricht, TB. Jefferson County; Cedar Pole and Crystal (McClunney) Caves. The species is known only from these caves (Hubricht, 1966, 1985).

Glyphyalinia latebricola Hubricht, TP. Jackson County; Doug Green and Swaim Caves. This species is otherwise known only from under rocks on Burwell Mountain, near Jeff, Madison County (Hubricht, 1968, 1985).

Glyphyalinia sculptilis (Bland), AC. Shelby County; Anderson Cave.

Glyphyalinia specus Hubricht, TB? Jackson County; Hall, Mink (Out) entrance of Gross-Skeleton Cave, and Schiffman Caves. Madison County; (Chapman Mountain) Cave Spring (AL 60), Cold Spring, and Shelta Caves. The species is known only from the dark zones of caves, but over a wide range in Tennessee, Kentucky and West Virginia (Hubricht, 1985).

Ventridens gularis (Say), AC. Madison County; Burwell Cave (dead). The species ranges widely in the southeast, and is known from over 30 Alabama counties (Hubricht, 1965, 1985).

Zonitoides arboreus (Say), TP. Blount County; Bangor Cave. Conecuh County; Sanders Cave (dead). Jackson County; Cross, Indian Rocks, and Hall Caves. Madison County; Aladdin and Shelta Caves. Marshall County; Cave Mountain Cave. Morgan County; Royer Cave (dead). St. Clair County; McGlendon Cave. The species is widespread throughout the United States. It is known from caves in Kentucky, Tennessee, Texas, and Virginia and I report it here from Bat Cave, Alachua County, Florida (Archer, 1941c, Hubricht, 1964, 1965, 1985; Reddell, 1965).

Phylum Arthropoda
Class Crustacea
Order Isopoda

Cave-inhabiting terrestrial isopods of North America are reviewed by Schultz (1981). Most are litter or soil inhabiting species that are scavengers in moist caves; only a few are troglobites. Troglobitic *Amerigoniscus* are known from Georgia and Tennessee, and so might be expected in Alabama (Vandel, 1977).

Family Porcellionidae

Porcelio laevis Latreille, TP. Jackson County; Nickajack Cave. The species is introduced from Europe, and is widespread in North America. It usually occurs in drier areas in cave habitats (Vandel, 1950).

Family Cylisticidae

Cylisticus convexus (DeGeer), TP. Limestone County; Rockhouse Cave. Marshall County; Painted Bluff Cave. The species is introduced from Europe, and is widespread. It is known from caves in Georgia, Indiana, Kentucky, Tennessee, Texas, and Virginia (Schultz, 1970).

Family Ligidae

Ligidium elrodii (Packard), TP. Marshall County; Green Bar Cave. This widespread forest litter species seems to have differentiated into local subspecies populations in caves in Virginia, Tennessee, and Georgia (Schultz, 1970). It is probably more frequently found in caves rather than forests at lower elevations and in more southern parts of its range.

Family Trichoniscidae

Miktoniscus medcofi Van Name (= *M. alabamensis* Muchmore), TP. Jackson County; Hall, Moody, Schiffman Cove, and Two Way Caves. Madison County; Shelta Cave. Marshall County; Guffey and Steves Caves. This eyed and pigmented species is widespread in the eastern United States, from Florida to Ohio. It occurs in caves over much of its range (Muchmore, 1964; Schultz, 1976; Vandel, 1965) and more frequently in caves than in forests at lower elevations and the more southern parts of its range.

Miktoniscus morganesis Schultz, TP. Morgan County; Cave Spring Cave (type locality). The species is reported only from this cave (Schultz, 1976).

Miktoniscus sp, TB? Marshall County; Buds Cave. This seemingly undescribed species is eyeless and without pigment. Additional specimens are needed.

Class Arachnida
Order Scorpiones

Family Vejovidae

Vejovis carolinianus (Beauvois), AC. Jackson County; Sheldons Cave (in a dry crawlway).

Order Pseudoscorpiones

Cave-inhabiting pseudoscorpions of North America are reviewed by Muchmore (1981). About 150 species (30% of the North American fauna) have been found in cave habitats. Many more species of these secretive and hard-to-find predators remain to be discovered.

Family Chernetidae

Hesperochernes cf. *mirabilis* (Banks), TP. Blount County; Catfish and Horse Caves. Colbert County; McCluskey and McKinney Caves. Dekalb County; Cherokee and Dunham Caves. Jackson County; Bucks Pocket, Doug Green, Pig Pen, Swaim Caves, and Two Way. Jefferson County; Cedar Pole and Crystal Caverns Cave. Lauderdale County; Basket, Colliers, Slough, Bone, and Key Caves. Madison County; Burwell (Burnett), Hurricane, and Spook Caves. Marshall County; Cave Mountain, Dunham, Merrill, Painted Bluff, Steves, and Warrenton Caves. Members

of this genus are most often found in Alabama caves in association with bat guano and raccoon dung, and in decaying debris in pack rat nests (Muchmore, 1974).

Family Chthoniidae

Aphrastochthonius tenax Chamberlin, TB. Blount County; Bangor (type locality) and Catfish Caves. The genus is not closely related to any other in the family, and may be a distributional relict. Other than for Alabama species, the genus is known to contain 10 species living in caves or hypogean situations in New Mexico, California, Cuba, Mexico and Guatemala (Chamberlin and Malcolm, 1960; Chamberlin, 1962; Muchmore, 1972, 1984, 1986).

Aphrastochthonius pecki Muchmore. TB. Jefferson County; Crystal Caverns (type locality). Known only from this cave (Muchmore, 1968).

Apochthonius russelli Muchmore, TB. Jackson County; Russell Cave (Pig entrance) (type locality). The genus contains many undescribed species and is widespread throughout much of the United States. It occurs commonly in forest litter. Troglobitic species occur in California, Oregon, West Virginia, Virginia, Indiana, Missouri, Ohio (unpubl.) and Arkansas (Benedict, 1979; Benedict and Malcolm, 1973; Muchmore, 1976, 1980).

Apochthonius spp., TP. Colbert County; McKinney Cave. Jackson County; Paint Rock and Reece Caves. Madison County; Burwell, Ellis, Hutton (WBJ), and Spook Caves. Morgan County; Vandever Cave. St. Claire County; McGlendon Cave. This is undetermined material (Muchmore, 1976).

Chthonius tetrachelatus (Preyssler), TP? Lawrence County; Saltpeter Cave (WBJ). Limestone County; Rockhouse Spring Cave. Marshall County; Painted Bluff Cave. The species is widely distributed in the eastern United States but has not been previously reported from Alabama (Hoff, 1958).

Kleptochthonius multispinosus Hoff, AC. Marshall County; Griffiths Cave. The species is widespread in the southeastern states and has previously been found in Alabama forests (Hoff, 1958; Malcolm and Chamberlin, 1961).

Kleptochthonius sp., TP? Jackson County; McFarland Cave. Madison County; Spook Cave. St. Claire County; McGlendon Cave. Many cave restricted species of this genus occur in Tennessee, Kentucky, Virginia, and West Virginia (Muchmore, 1965).

Tyrannochthonius spp., TB, TP. Blount County; Bangor and Ingram Caves. Jackson County; Cave Stand entrance of Gary Self Pit, Crossings, Driftwood, Fern, House of Happiness, Jess Elliott, Indian Rocks, Mink (Out) entrance of Gross-Skeleton, Paint Rock, Reese, Salt River, and Two Way Caves. Madison County; Aladdin, Barclay, Burwell, Byrd, Spring, Cave Spring (AL 60), Big (Huntsville) Spring, Matthews, Shelta, Sinks, Twin, and Varnedoe (RG) Caves. Marshall County; Cave Mountain, Eudy, Gamble, Guffey, Honeycomb, Line Point, and Keller Caves. Some 11 species and subspecies remain to be described from Alabama Caves (Chamberlin and Malcolm, 1960). The only named species of this genus in the United States is *T. floridensis* from forests in Florida and Alabama (Muchmore, 1985).

Family Neobisiidae

Trisetobisium fallax (Chamberlin), TP. Colbert County; Gist Cave (type locality). Lawrence County; Thomas Cave. The species is also known from a forest in North Carolina (Chamberlin, 1962; Curcic, 1982).

Lissocreagris eurydice (Muchmore), TB. Jackson County; Kennamer Cave (type locality). Known only from this cave. Troglobites are those listed here and species in Nevada, California, Oregon, Washington, and Texas (Muchmore, 1969). The species listed here in this family were formerly in the genus *Microcreagris* and have been placed in this or other newly formed genera (Curcic, 1984).

Lissocreagris mortis (Muchmore), TB. Jackson County; Fern Cave (the Morgue entrance) (type locality). Known only from this cave (Muchmore, 1969).

Lissocreagris nickajackensis (Muchmore), TB. Jackson County; Nickajack and Horseskull Caves (type locality). Known only from these caves, the first now flooded by a TVA impoundment (Muchmore, 1966, 1969).

Lissocreagris persephone (Chamberlin), TP? Marshall County; Davidson (type locality), Driftwood, Gamble, and Keller Caves (Chamberlin, 1962; Curcic, 1984; Muchmore, 1969).

Lissocreagris pluto (Chamberlin), TP? Marshall County; Terrell Cave (type locality). Known only from this cave (Chamberlin, 1962; Curcic, 1984).

Lissocreagris pumila (Muchmore), TP? Blount County; Bryant Cave (type locality). The species is also known from litter in Blount County and a cave in Chatooga County, Georgia (Muchmore, 1969).

Lissocreagris subatlantica (Chamberlin), TP? Colbert County; Dickey and Spring (type locality) Caves. Morgan County; Anvil Cave. The species is also known from litter in Shelby and Blount Counties, and from a cave in Georgia (Chamberlin, 1962; Curcic, 1984; Muchmore, 1969).

Lissocreagris sp., TP? Blount County; Catfish Cave. Marshall County; Hampton (Hampden), Kellers, and Old Blowing Caves. Undetermined material.

Alabamocreagris pecki (Muchmore), TB. Marshall County; Beech Spring and Old Blowing Caves (type locality). Known only from these caves (Curcic, 1984; Muchmore, 1969).

Novobisium ingratum (Chamberlin), TP? Jackson County; McFarlen Cave (type locality). The species is also known from an epigean locality in Putnam County, Tennessee (Chamberlin, 1962; Curcic, 1984; Muchmore, 1967).

Order Araneae

Family Agelenidae

Calymmaria cavicola (Banks), TP. Blount County; Bangor and Randolf Caves. Colbert County; Gist, Little Bear, McCluskey, and Wolf Den Caves. Jackson County; Engle Double Pit (McFarlen Blowing entrance), Roadside, Gary Self Pit (Rousseau entrance), and Tony Caves. Lauderdale County; Bat Cave. Madison County; Aladdin, Cave Spring (AL 60), Herrin, Kelly Natural Well, Moon, Natural Well, Scott, and Toll Gate Natural Well Caves. Marshall County; Honeycomb, Honeycomb School, and Town Creek Caves. Morgan County; San Souci Cave. The species is widely distributed in the Appalachian region, both in and out of caves.

Cicurina breviaria Bishop and Crosby, TP? Jackson County; Copper as (= Pack Rat) Cave (WBJ). The species is recorded from Tennessee caves (Barr, 1961).

Cicurina minima Chamberlin and Ivie, TP. Calhoun County; Weaver Cave (Lady) (WBJ). Jefferson County; Pinson (Hickman) Cave (WBJ). Lawrence County; Thomas Cave (WBJ).

Cicurina sp., TP. Jefferson County; Cedar Pole Cave, and Crystal (McClunney) Cave. This species is eyeless and is undescribed.

Coras lamellosus Keyserling, TP? Marshall County; Town Creek Cave (WBJ).

Tegenaria domestica Clerck, TP. Blount County; Horseshoe-Crump Cave. Calhoun County; Meadows, and Weaver Caves. Jackson County; Sauta Cave (Barr and Reddell, 1967). Madison County; Candlestand (Goat) Cave. Though it has a predilection for dark sheltered places it is rarely found in caves.

Family Araneidae

Allepeira conferta (Hentz), AC. Colbert County; Georgetown Cave. This species is abundant in shaded gullies in central Alabama (Archer, 1941a).

Aranea cavatica (Keyserling), AC. Jackson County; (Honey [Clear] Creek) Saltpeter Cave (A 74). This species is also recorded as occurring in unspecified cave entrances on Monte Sano, Madison County (Archer, 1940a, 1940b).

Azilia vagepicta Simon, TP. Blount County; Cedar Grove River Cave. Colbert County; Wolf Den Cave. Jackson County; Small Cave. Marshall County; Merritt and Town Creek Caves. The species is also known in caves in Jackson County, Florida (Archer, 1940a, 1940b, 1941a; Peck, 1970).

Eustala anastera (Walckenaer), AC? Reported as occurring in caves and their entrances, but no locations are given for it (Archer, 1940b).

Leucauge venusta (Walckenaer), TP? Morgan County; Baz, Cave Spring and Trinity Caves. This is a widespread species recorded from caves and their entrances (Archer, 1940b).

Mangora placida Hentz, AC. New records. Morgan County; Cave Spring Cave (WBJ & AFA).

Meta menardi (Latreille), TP. Dekalb County; Sequoyah Cave. Jackson County; Gary Self Pit (Cave Stand entrance), Gross-Skeleton, Hambrick (WBJ), (Honey Creek) Saltpeter, Horseshoe, Pack Rat (WBJ), Rainbow, and Small Caves. Lawrence County; Thrasher (WBJ) and Thomas (WBJ) Caves. Limestone County; Rockhouse Cave. Madison County; Henson (WBJ), and Jett Sinkhole (WBJ) Caves. Marshall County; Bishop MacHardin and Merritt Caves. Morgan County; Houston (WBJ) and Power Line (WBJ) Caves. This species is widespread in the eastern United States, and often occurs in caves. It reaches its southern limit in northern Alabama (Archer, 1940a, 1940b; and Barr, 1961).

Neoscona benjamina (Walckenaer), AC. The species is mentioned as frequenting caves and their entrances, but no locations are cited (Archer, 1940b).

Tetragnatha versicolor Walckenaer, AC. Calhoun County; Weaver Cave. This species forms webs over streams at cave entrances (Archer, 1940b).

Theridiosoma radiosum (McCook), TP? Calhoun County; Weaver Cave. Colbert County; Gist Cave. Madison County; Hering Cave. Morgan County; Cave Spring Cave. The species is recorded as living in caves with permanent streams, and is recorded from Tennessee caves (Archer, 1940a, 1940b; Barr, 1961).

Wixia ectypa (Walckenaer), AC. This species is adventitious in cave entrances on Monte Sano, Madison County (Archer, 1940a, 1940b).

Family Clubionidae

Anahita punctulata (Hentz), TP? Colbert County; Gist Cave (WBJ & AFA), and Spring Cave (WBJ & AFA). Jackson County; Engle Double Pit (McFarlen Blowing entrance Cave (WBJ & AFA). Madison County; Kelly Natural Well (WBJ). Marshall County; Bishop Cave (WBJ & AFA). Morgan County; Bat (WBJ), and Trinity Caves (WBJ & AFA).

Anyphaena celer (Hentz), AC. Morgan County; Cave Spring Cave (WBJ & AFA).

Anyphaenella albens (Hentz), AC. Morgan County; Cave Spring Cave (WBJ & AFA).

Aysha gracilis (Hentz), AC. Morgan County; Cave Spring Cave (WBJ & AFA).

Chiracanthium inclusum (Hentz), DC. Marshall County; Honeycomb Cave (AFA).

Liocranoides unicolor Keyserling, TB? Blount County; Bangor (WBJ), Bryant, Cedar Grove River, Horseshoe-Crump, and Randolph Caves. Calhoun County; Weaver (Lady) Cave (WBJ & AFA). Colbert County; Dickey (WBJ & AFA), Georgetown, Gist (WBJ & AFA), McKinney (WBJ & AFA) Caves. Dekalb County; Cemetery, Manitou, Se-

quoyah, Stanley Carden, and Talley Caves. Jackson County; Clemons (WBJ & AFA), Cornelison No. 1, Crossings, Driftwood, Gamble, Geiger, Gross, House of Happiness, Indian Rocks, Jess Elliott, Keel (WBJ & AFA), Kyles, McFarland, Engle Double Pit (McFarlen Blowing entrance), Nat, Out, Paint Rock, Pig Pen, Rousseau Salt River, Schiffman, Sauta, Sheldons, Talley Ditch, Tupelo, and Wynne Caves. Jefferson County; Crystal (McClunney) Cave. Madison County; Aladdin, Byrd Spring, Cave Spring AL60, Hurricane, Morring, Taploe, Toll Gate Natural Well (WBJ & AFA), Glover (Water) Caves. Limestone County; Rockhouse Cave. Marshall County; Cave Mountain, Davidson, Dunham, Gamble, Hambrick, Honeycomb School (AFA), Keelers, Line Point (WBJ), Painted Bluff, Steves, Walnut, and Warrenton (WBJ) Caves. Morgan County; Cave Spring, Horseback, and Talucah Caves. This large, pale hunting spider is also recorded from caves in Tennessee (Barr, 1961). It was described from Mammoth Cave, Kentucky.

Family Ctenidae

Ctenus hibernalis Hentz, AC. Marshall County; Painted Bluff Cave. Shelby County; Lous Crawl Cave.

Family Hypochilidae

Hypochilus thorelli Marx, AC. Jackson County; (Clear Creek) Saltpeter (AFA), McFarland (WBJ & AFA) Caves. Madison County; Clark Bluff, Hurricane, Morring Caves. Marshall County; Painted Bluff Cave. This very primitive spider is widely distributed in the southeast along the Cumberland Plateau from southern Kentucky and adjacent Virginia to northern Alabama. It makes its webs in shady and protected places and is also known from caves in Tennessee (Archer, 1940a; Barr, 1961; Forster et al., 1987).

Family Dictynidae

Dictyna florens Ivie and Barrows, AC. Morgan County; Cave Spring Cave (WBJ & AFA).

Family Leptonetidae

In this family of minute spiders, 44 species occur in North America, with 15 in the southeastern states, and 9 of these in caves (Gertsch, 1974). Many of the Alabama species are called troglophiles, but if cave-restricted and showing various stages of eye loss, they may be nascent troglobites. Searching in litter and talus slopes may reveal some of these species outside caves. The rich Alabama fauna suggests that more species remain to be discovered.

Leptoneta alabama Gertsch, TP. Calhoun County; Kilgore (near Weaver Station, unknown to Alabama Survey), Lady and Weaver Caves. Dekalb County; Cemetery Cave. Marshall County; Painted Bluff Cave (type locality). Known only from these caves (Gertsch, 1974).

Leptoneta jonesi Gertsch, TP. Jefferson County; Crystal (McClunney) Caverns (type locality). Known only from this cave (Gertsch, 1974).

Leptoneta serena Gertsch, TB. Lauderdale County; Collier Cave (type locality). Known only from this cave (Gertsch, 1974).

Leptoneta credula Gertsch, TP. Lauderdale County; Bat Cave (type locality). Known only from this cave (Gertsch, 1974).

Leptoneta blanda Gertsch, TP. Blount County; Ingram Cave (type locality). Known only from this cave (Gertsch, 1974).

Leptoneta barrowsi Gertsch, TP. Blount County; Bangor Cave (type locality). Known only from this cave (Gertsch, 1974).

Family Linyphiidae

Centromerus denticulatus (Emerton), TP. Jackson County; Crossings Cave. Marshall County; Bishop Cave. This is a wide-ranging species (Van Helsdingen, 1973) also known from caves in Georgia (Horseshoe Cave, Walker County) and Tennessee (Round Mountain Cave, Franklin County, and Quarry Cave, Bradley County).

Centromerus latidens (Emerton), TP. Blount County; Cedar Grove River Cave. Calhoun County; Weaver (Lady) Cave (WBJ & AFA). Jackson County; Paint Rock Cave. Limestone County; Indian Cave. Madison County; Barclay, Burwell, Hutton (WBJ), Jacks (WBJ), Matthews, Natural Well (WBJ), Sinks (TCB) Toll Gate Natural Well (WBJ) caves. Marshall County; Davidson, Griffith (WBJ), and Hampton caves. Morgan County; Horseback and Royer (WBJ) caves. Shelby County; Anderson Cave. Talladega County; DeSoto (Kymulga) Cave (WBJ & AFA). The species is also known from caves in Florida and Kentucky. It is widely distributed in eastern North America and is often found in forest litter (Van Helsdingen, 1973).

Centromerus cornupalpis (O.P.-Cambridge), AC. Blount County; Bangor Cave. This is a widespread species, rarely found in caves (Van Helsdingen, 1973), but records are known for caves in Tennessee.

Eperigone eschatologica Crosby, AC. Marshall County; Quarry Cave.

Eperigone maculata (Banks), AC. Jackson County; Tony Sinks (Cox) Cave (WBJ). Madison County; Barclay Cave.

Eperigone tridentata (Emerton), AC. Calhoun County; Weaver Cave (WBJ & AFA).

Islandiana muma Ivie, TP (or TB?). Colbert County; Wolf Den Cave. Lawrence County; Ivy Hollow Cave. This species is otherwise recorded only from one cave in Virginia (Ivie, 1965).

Lephthyphantes sabulosa (Keyserling), TP. Madison County; Jacks Cave (WBJ), Kelly Natural Well, Toll Gate Natural Well (WBJ & AFA) (Archer, 1940a).

Meioneta spp., AC. Conecuh County; Sanders Cave. Dekalb County; Stanley-Garden Cave. Two undescribed species are represented in this collection.

Phanetta subterranea (Emerton), TB. Colbert County; Georgetown, Keeton, McKinney and McKinney Pit Caves. Dekalb County; Lykes, Section 26, and Sequoyah Caves. Jackson County; Tony Sinks (Cox) (WBJ & AFA), (Honey [Clear] Creek) Saltpeter (WBJ & AFA), Horseshoe, Jess Elliott, Keel (WBJ & AFA), McFarland Engle Double Pit, (McFarlen Blowing entrance) (WBJ & AFA), Moody, Paint Rock, Sheldons, Swaim and Tate Caves. Jefferson County; Crystal (McClunney) Caverns. Lawrence County; Ivy Hollow Cave. Lauderdale County; Bat (WBJ), Collier, and Key Caves. Limestone County; Indian and Rockhouse Caves. Madison County; Hurricane, Scott and Shelta (WBJ) Caves. Marshall County; Beech Spring, Cathedral Caverns, Honeycomb (AFA), Line Point (WBJ) and Merrill Caves. Morgan County; Bat (WBJ), Cave Spring (WBJ), Horseback, Hughes and Talucah Caves. St. Clair County; Mclendon Cave (WBJ). This species is widespread throughout the eastern United States. It is known only from cave habitats (Archer 1940a; Barr, 1961).

Porrhomma cavernicolum (Keyserling), TB. Limestone County; Spence Cave. The species is at the southern margin of its distribution in northern Alabama.

Taranucnus durdenae Ivie, AC. Jackson County; Rainbow Cave. Madison County; Green Grotto.

Tapinocyba sp., AC. Blount County; Catfish Cave.

Family Lycosidae

Arctosa sublata Montgomery, AC. Dekalb County; Talley Cave.

Pirata sp., AC. Blount County; Bangor Cave. Madison County; Barclay Cave.

Family Micryphantidae

Ceraticelus fissiceps (O.P. Cambridge), AC. Colbert County; Wolf Den Cave (WBJ & AFA). Morgan County; Cave Spring Cave (WBJ & AFA).

Origanates rostratus (Emerton), AC. Jackson County; McFarland Cave (WBJ & AFA).

Family Mimetidae

Mimetus notius Chamberlin, AC. This species is predatory on other species and wanders into cave entrances. Archer (1940a).

Mimetus puritanus Chamberlin, AC. This species is recorded from an overhanging ledge at the entrance of Cave Spring Cave, Morgan County (Archer, 1941b).

Family Nesticidae

Gaucelmus augustinus Keyserling, TP. Blount County; Dixon and Catfish Caves. Clarke County; Broadenax and McVay Caves. Colbert County; Wolf Den Cave. Jefferson County; Crystal Caverns. Lawrence County; Ivey Hollow Cave. Marshall County; Line Point and Lower 4 Lane Caves. Morgan County; Lipscomb, and Lost Mule Caves. The species is distributed from Florida and the Gulf States, through Texas, to Mexico and Panama, and the West Indies. In the United States it is most often found in caves (Gertsch, 1984). Other members of the genus occur in Mexico, Central America, and the West Indies.

Eidmanella pallida (Emerton), TP. Blount County; Bangor and Bryant Caves. Calhoun County; Lady, Millers, and Weaver Caves. Conecuh County; Sanders Cave. Limestone County; Carruth Cave. Jackson County; Limrock Blowing Cave. Madison County; Byrd Spring, Matthews, and Shelta Caves. Marshall County: Line Point. Morgan County; Talucah Cave. The species is widespread in North America from Eastern Canada southward to Costa Rica. It has spread with commerce to Hawaii and Europe. It is frequently found in caves and has been listed under the generic name *Nesticus*.

Nesticus barri Gertsch, TB. Jackson County; Boxes, Cornellison, Driftwood, Fern, Gross-Skelton, Guess Creek, Hall, Upper Rainbow (Happy Hollow), Horseskull, Indian Rock, Isbell Spring, Jess Elliott, Kennamer, Kyle, Larkin, Limrock Blowing, Montague, Moody, Nickajack, Mink (Out) entrance of Gross-Skeleton, Pigpen, Rainbow, Ridley, Russell (Pig entrance), Salt River, Sheldons, Schiffman, Steele Saltpeter, Tally Ditch, Tate, Tumbling Rock, and Wynne Caves. Marshall County; Bishop, Cathedral (= Bat), Devils Dungeon, Guffey, Honeycomb, Kellers, Kristys, MacHardin, Porches Spring, Royal Shaft, and Quarry Caves. The species also occurs in caves in adjacent Franklin and Marion Counties, Tennessee (Gertsch, 1984). The Nickajack and Horseskull records are on the other side of the Tennessee River from all other records and should be reconfirmed. The record (Gertsch, 1984) from Tuckalechee Caverns, Blount County, Tennessee, must be an error because troglobitic *Nesticus* do not have such a distribution. Currently, 14 species of cavernicolous *Nesticus* are known in the southern Appalachians, and another 10 are epigean species. Others are likely to be found (Gertsch, 1984).

Nesticus jonesi Gertsch, TB. Morgan County; Cave Spring Cave (type locality). Known only from this cave (Gertsch, 1984).

Family Oxyopidae

Oxyopes salticus Hentz, AV. Morgan County; Bat (WBJ), Cave Spring (WBJ), and Trinity (WBJ) Caves.

Family Pholcidae

Pholcus sp., TP. Jackson County; Sheldons Cave. Marshall County; Dunham, Painted Bluff and Porches Spring Caves. This species is undescribed. Archer (1940a) reports

P. phalangioides from caves and their entrances "all over the state," and Barr (1961) records it from Tennessee caves.

Family Pisauridae

Dolomedes vittatus Walckenaer, AC. Marshall County; Line Point Cave (WBJ). Madison County; Cave Spring AL 60 (WBJ & AFA) and Scott Caves. Morgan County; Cave Spring Cave (WBJ & AFA). This fishing spider occasionally wanders along streams into caves.

Pisaurina micra Walckenaer, AC. Madison County; Kelly Natural Well (WBJ). Morgan County; Cave Spring Cave (WBJ & AFA).

Family Salticidae

Stoidis aurata (Hentz), AC. Talladega County; DeSoto (Kymulga) Caverns. (WBJ & AFA).

Family Symphytognathidae

Maymena ambita (Barrows), TP. Madison County; Aladdin, Cave Spring AL 60, and Jacks Caves. Marshall County; Line Point, Rockhouse, and Warrenton Caves. This species is recorded by Gertsch (1960) from a cave in Tennessee and caves in Kentucky, and in epigean sites in Tennessee and Alabama. This is disjunct, for the genus otherwise occurs in Mexico and the Caribbean.

Family Theridiidae

Achaearanea globosa (Hentz), AC. Madison County; Buford Cave. This species is a common and widespread species that occurs at cave entrances. Archer (1946) recorded it as *Hentzieclypus globosus.*

Achaearanea porteri (Banks) TP. Blount County; Bangor Cave (WBJ). Calhoun County; Lady Cave. Colbert County; Dickey and Spring Caves. Jackson County; McFarland Cave. Lauderdale County; Key Cave. Madison County; Buford Cave. Jackson County; Sauta Cave (JMV; TCB). Lauderdale County; Collier Cave (WBJ). Limestone County; Rockhouse Cave. Marshall County; Hambrick Cave. Morgan County; Trinity Cave (AFA). This species is also known from other north Alabama localities that are not caves, but only sheltered areas. This species was listed by Archer (1946) as *Theridion redemptum* Gertsch and Muliak.

Achaearanea rupicola (Emerton), TP. Madison County; Buford Cave, Moore Cave. Marshall County; Honeycomb School Cave. Jackson County; Saltpeter Cave AL74 (AFA). This species occurs in numerous habitats in north Alabama, as well as caves and their entrances. Archer (1946) listed the species as *Theridion rupicola.*

Achaearanea tepidariorum (C. Koch), TP. Calhoun County; Weaver Cave (WBJ & AFA). Colbert County; Bridge Cave (WBJ). Lauderdale County; Gravelly Springs Cave (WBJ). Madison County; Candlestand (Goat), Keel and Scott Caves. Marshall County; Hambrick Cave. Morgan County; Cave Spring, Bat, Sans Souci, and Trinity Caves. The species is statewide in distribution and is often associated with buildings as well as caves and their entrances. Archer (1940a, 1946) lists the species in the genus *Theridion.*

Argyrodes partita (Walckenaer), AC. Morgan County; Bat (WBJ), Cave Spring (WBJ), and Trinity Caves (WBJ). This species was listed by Archer (1940a) as *A. cancellatus.* It is recorded as living symbiotically in the webs of other spiders in cave entrances.

Argyrodes rufa (Walckenaer), AC. Morgan County; Cave Spring Cave. The species is statewide and occurs in many habitats, in addition to caves and their entrances. It lives in the webs of other spiders, and is listed as *A trigonum* by Archer (1946).

Conopistha nephilae (Taczanowski), AC. Madison County; Caves on Monte Sano. This species is recorded from webs of *Aranea cavatica* at cave entrances. It is nearly statewide in distribution (Archer, 1946).

Paidisca marxi (Crosby), AC. Colbert County; Spring Cave. Jackson County; McFarland Blowing Cave. This is a widespread, but secretive species (Archer, 1946). It also occurs in Griers Cave, Randolf County, Georgia.

Theridion flavonotatum Becker, AC. Morgan County; Cave Spring Cave. A statewide species, it commonly occurs in forests (Archer, 1946).

Theridion glaucescens Becker, AC. Morgan County; Cave Spring Cave. This species is widespread in forests and within buildings (Archer, 1946).

Theridion kentuckyense Keyserling, AC. Colbert County; Wolf Den Cave (WBJ & AFA).

Theridion lyricum Walckenaer, AC. Colbert County; Wolf Den Cave. A statewide species, often associated with buildings (Archer, 1946).

Theridula opulenta (Walckenaer), AC. Morgan County; Cave Spring Cave. This species is widespread in the southern two-thirds of Alabama. It is listed by Archer (1946) as *T. ventillans* Keyserling.

Tidarren sisyphoides (Walckenaer), AC. Madison County; Shelta Cave. This species is widespread in the state, and is frequently associated with cave entrances (Archer, 1946). Archer (1940a) reported it from cave entrances as *T. fordum.*

Family Uloboridae

Uloborus globosus Walckenaer, AC. The species is reported as occurring in cave entrances in Jackson, Lawrence, Madison, Marshall, and Morgan Counties (Archer, 1940a).

Class Arachnida
Order Opiliones

Cave-Inhabiting harvestmen of North America are reviewed by Goodnight and Goodnight (1960, 1981).

Family Sabaconidae

Sabacon jonesi Goodnight and Goodnight, TP. Madison County; Natural Well. The species is reported only from this locality (Goodnight and Goodnight, 1942). Shear (1975) indicates that this may be a synonym for the widely distributed species *S. cavicolens* (Packard), which is occasionally found in caves, especially in the southern part of its range, as far west as Arkansas (Peck and Peck, 1982).

Family Ceratolasmetidae

Hesperonemastoma pallidimaculosa (Goodnight and Goodnight), TB. Marshall County; Rockhouse Cave (type locality). Morgan County; Lamons Cave (TK). The species is eyeless, and known only from these localities (Goodnight and Goodnight, 1945; Gruber, 1970). Its sister species may be *H. inops* (Packard) of Kentucky. See Shear (1986) for notes on family names of this and the preceding family.

Family Gagrellidae

Leiobunum sp., TX. Cooper and Cooper (1966) reported amazingly large concentrations of harvestmen on the walls and ceilings of Alabama caves. Although no specific cave names were given, the animals were reported to be known from many caves. The animals in question were not identified but they are surely members of the genus *Leiobunum,* which are well known for their populous aggregations (Cockerill, 1988) and their very long, thin legs. Cooper and Cooper are probably incorrect in listing these animals as troglophiles, they are more likely trogloxenes, which leave the caves at night to feed as predators in nearby forests or fields.

Family Cladonychidae (= Erebomastridae)

Thermomaster brunnea (Banks) (? = *Phalangodes archeri* Goodnight and Goodnight), AC. Jackson County; McFarland and Engle Double Pit (McFarlen Blowing entrance) Caves. Madison County; Aladdin Cave. The species is a forest litter inhabitant, and also occurs in forests at higher elevations in Georgia, Tennessee, and North Carolina (Briggs, 1969; Goodnight and Goodnight, 1942, 1960).

Family Phalangodidae

Bishopella jonesi Goodnight and Goodnight, AC. Jackson County; McFarland Cave (type locality). This seems to be an otherwise unknown forest litter species (Goodnight and Goodnight, 1942).

Bishopella laciniosa (Crosby and Bishop), TP. Blount County; Horseshoe-Crump, and Ingram Caves. Calhoun County; Lady and Weaver Caves. Colbert County; Dickey, Galleymore (= Gilleymore), Georgetown, Gist, McCluskey, McKinney, McKinney Pit, and Wolf Den Caves. Dekalb County; Cherokee, Kelly Girls, Manitou, Sequoyah, Section 26, and Talley Caves. Cherokee County; Wright Cave. Jackson County; Gary Self Pit (Cave Stand entrance), Clear Creek Saltpeter, Cornellison No. 1, Devils Stairstep, Forty Eight Ten, Gross-Skeleton, House of Happiness, Jess Elliott, Indian Rock, Isbell Spring, Kyle, McFarland, Engle Double Pit (McFarlen Blowing entrance), Nickajack, Mink (Out) entrance of Gross-Skeleton, Putman, Rainbow, Sauta, Tumbling Rock, and Williams Saltpeter Caves. Jefferson County; Cedar Pole and Crystal (McClunney) Caves. Lauderdale County; Basket, Butler, and Collier Caves. Lawrence County; Ivy Hollow Cave. Limestone County; Pope Cave. Madison County; Shelta Cave. Marshall County; Dunham, Gamble, Griffith, Hampton, Honeycomb, Line Point, MacHardin, Steves, and Terrill Caves. Morgan County; Cave Spring, Inge, Roper, Royer, and Talucah (Bat) Caves. St. Clair County; Mclendon and Terrell No. 1 Caves. This species is also known from higher elevation forest litter collections from Alabama, Georgia, North and South Carolina, and Tennessee, and cave collections from Georgia, Tennessee and Jackson County, Florida (Barr, 1961; Crosby and Bishop, 1924; Goodnight and Goodnight, 1942, 1960; Holsinger and Peck, 1971; Peck, 1970). The proper genus for this species may be *Phalangodes.*

Crosbyella spinturnix (Crosby and Bishop), TP. Calhoun County; Daugette Cave No. 1. Shelby County; Anderson Cave. Talladega County; DeSoto (Kymulga) Caverns. The species is reported from forest litter localities in Alabama, Arkansas, Louisiana, Mississippi, and Florida, and caves in Arkansas, Georgia and Florida (Crosby and Bishop, 1924;

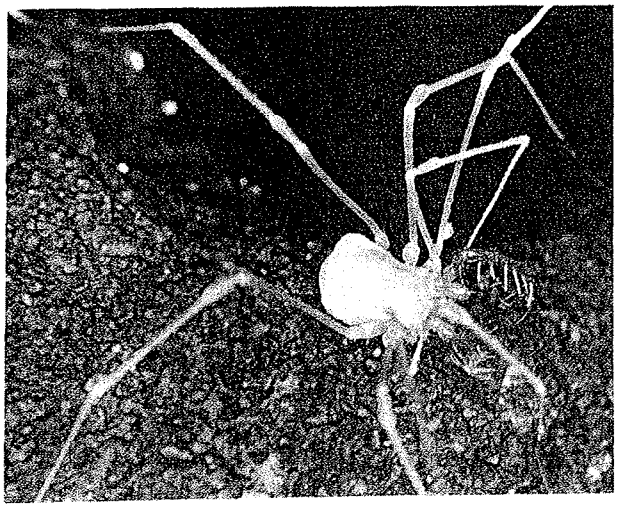


Figure 7. **The troglobitic harvestman *Phalangodes appalachius.* This elegant species is known from only one Alabama cave, but from many others in Tennessee. In forest-dwelling species, eyes are present on a tubercle at the front of the head.**

Goodnight and Goodnight, 1942; Holsinger and Peck, 1971; Peck, 1970; Peck and Peck, 1982). The proper genus name for this species may be *Phalangodes.*

Phalangodes (= Tolus) appalachius (Goodnight and Goodnight), TB, Figure 7. Jackson County; Jess Elliott Cave (T. C. Barr). The species occurs in Tennessee along the western Cumberland escarpment northeast to Overton County. Known Tennessee records (TCB) are Coffee County; Lusk Cave. Franklin County; Walker Spring and Wet Caves. Grundy County; Big Mouth; Crystal, and Wonder Caves. Marion County; Monteagle Saltpeter Cave. Overton County; Mill Cave. Putnam County; Bridge Creek Cave. Van Buren County; Big Bone and McElory Caves. Warren County; Cumberland Caverns. This species is probably the sister species to *P. armata* Tellkampf, a troglobite of south-central Kentucky and adjacent north-central Tennessee. Goodnight and Goodnight (1981) hint that these two taxa should be synonomized, resulting in a disjunction of distribution difficult to explain for a troglobite.

Order Acarina

Mites ectoparasitic on bats in Alabama are reviewed by Brennon and White (1960).

Unidentified material. Blount County; Bryant Cave (debris), Jackson County; Coon Creek Cave (guano), Doug Green Cave (debris), Limrock Blowing Cave (*Neotoma* nest), Sauta Cave (guano). Jefferson County; Crystal (McClunney) Caverns. Madison County; Barclay Cave. Marshall County; Dunham Cave (*Neotoma* nest), Painted Bluff Cave (guano), Porches Spring Cave.

Comments. Many species of mites have been encountered in Alabama caves. The above is a partial listing of collections and observations.

Family Rhagidiidae

Robustocheles (Lewia) hilli (Strandtmann), TP. These mites have been seen in several Alabama caves, but specimens are not available to confirm the above identification. This is the most frequent cave rhagidiid, and is known from caves in Arizona, Georgia, Kentucky, Tennessee, Virginia, West Virginia, and Washington State; and epigean sites elsewhere. Other genera and species also occur in caves (Zacharda, 1985; Zacharda and Elliott, 1981).

Class Diplopoda

A review of the cavernicolous millipedes of the United States is given by Shear (1969).

Order Cambalida

Family Cambalidae

Cambala annulata (Say), AC. Talladega County; DeSoto (Kymulga) Caverns. The species is distributed in eleven eastern states, but is rarely found in caves (Chamberlin and Hoffman, 1958; Hoffman, 1958; Loomis (*Cristula*), 1943; Shelley, 1979).

Cambala minor (Bollman), TP. Blount County; Catfish and Randolph caves. Colbert County; McCluskey, McKinney, McKinney Pit, and Murrells Caves. Dekalb County; Cemetery, Lois Killian, and Steward Spring (JAC) Caves. Cherokee County; Wright Cave. Jackson County; Limrock Blowing and Talley Ditch caves. Lauderdale County; Butler No. 1, Collier, and Key Caves. Lawrence County; Ivy Hollow Cave. Limestone County; Forked Stream Cave (not in Alabama Survey). Madison County; Matthews, Barclay, and Byrd Spring Caves. Marshall County; Old Blowing Cave. Morgan County; Royer Cave. Talladega County; Dulaney Cave (WBJ). The species is widespread in epigean localities in the eastern states and is known from many caves in Arkansas, Illinois, Indiana, Missouri, Oklahoma, Tennessee, Virginia and West Virginia (Causey, 1959; Shelley, 1979).

Cambala ochra Chamberlin (= *Cambala* or *Troglocambala loomisi* Hoffman), TP. Conecuh County; Sanders (= Turks or Brooklyn) Cave (type locality for *T. loomisi* Hoffman). The species ranges from southern Indiana, through central Kentucky, and the Cumberland Plateau of Tennessee to the Gulf Coastal Plain and east Texas (Shelley, 1979). There seem to be no other cave populations, although this one was very abundant, feeding on bat guano (Causey, 1964; Hoffman, 1956).

Order Chordeumatida

Family Cleidogonidae

Cleidogona sp., AC. Colbert County; McKinney Pit. Jackson County; Nat Cave. Probably an epigean species washed into the caves.

The *eburnea* species group

Pseudotremia eburnea Loomis, TB. Jackson County; Nickajack Cave. Marshall County; Davidson Cave. The species is otherwise known from Cricket Cave (type locality) Walker County and Case Caverns, Dade County, Georgia. *P. aeacus* Shear is also known from caves in Dade County, Georgia (Loomis, 1939; Shear, 1972). This and the following species belong in this group with many epigean and cave species in Alabama, Tennessee, Georgia, and North Carolina.

Pseudotremia nyx Shear, TB. Marshall County; Cathedral Caverns (type locality). Known only from this cave (Shear, 1972).

The *cottus* species group

Pseudotremia minos Shear, TB. Jackson County; Russell Cave (type locality). Known only from this cave (Shear, 1972). This is the only troglobite in this group, which occurs otherwise in eastern Tennessee.

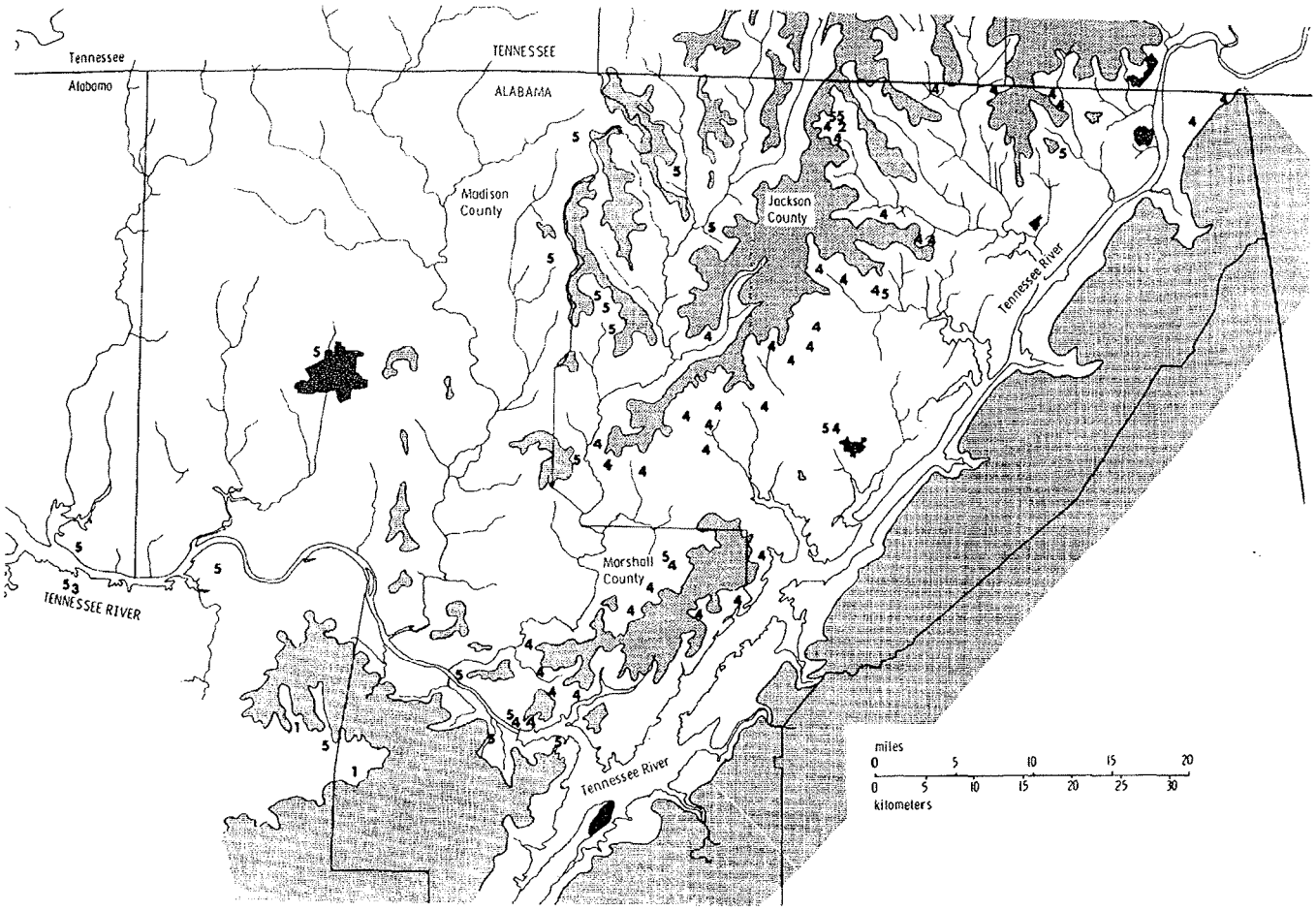


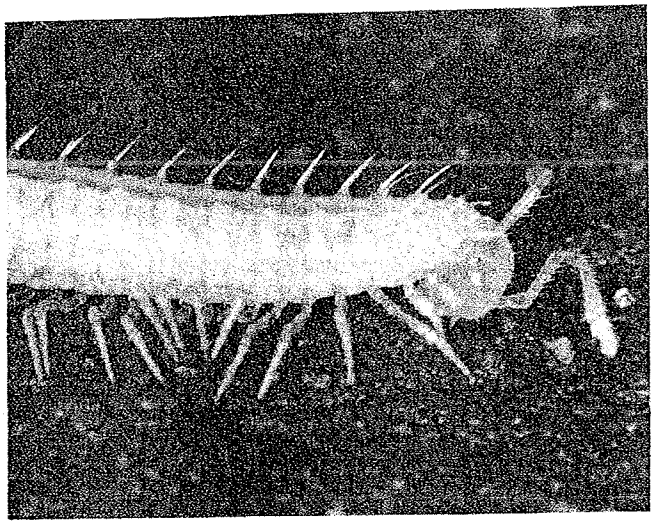
Figure 8. **Distributions of some troglobitic invertebrates in northeastern Alabama. One and two are harvestmen, (1). *Hesperonemastoma pallidimaculosa,* (2). *Phalangodes appalachius.* All the others are spiders. 3. *Nesticus jonesi.* 4. *Nesticus barri;* limited to the eastern flanks of the Jackson County Mountains. 5. *Phanetta subterranea;* this species has a wider distribution to the west, south and east in Alabama and in other states.**

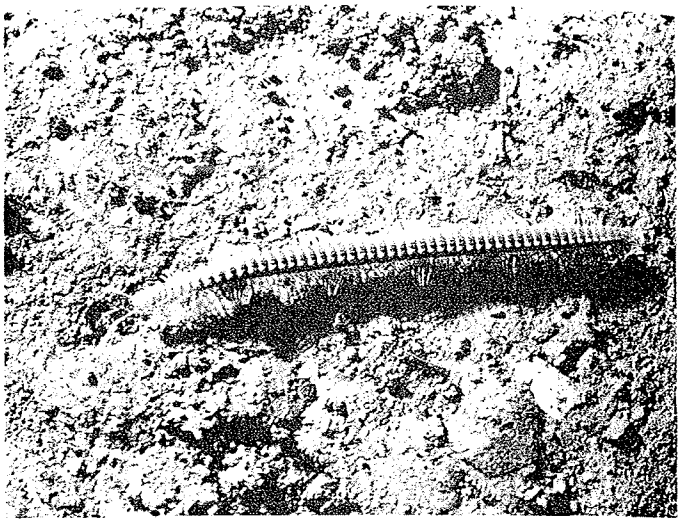
Pseudotremia spp., TP and TB. Colbert County; Georgetown, Keeton, and McKinney Pit Caves. Dekalb County; Cherokee, Kelly Girls, Section 26, Sequoyah, and Stanley-Garden (JEC) Caves. Jackson County; Cagle, Horseshoe, Horseskull, Long Island Saltpeter (WT), McFarland, Rainbow, Ranie Willis, Ridley, Roadside, Russell (Pig Entrance), Salt River, Sheldons, Steele Saltpeter, Talley Ditch, The Morgue (WT), The Sinks, Vandever, Williams Saltpeter, and Wynne Caves. Lauderdale County; Basket and Collier Caves. Limestone County; Rockhouse Cave. Madison County; Barclay, Chapman (WT), Cold Spring, and Sinks Caves. Marshall County; Beech Spring, Bishop, Dunham, Eudy (WT) Hampton, King School (JEC) Ledbetter, (RG), Merrill, Merritt, Old Blowing and Terrill (WT) Caves. Morgan County; Cave Spring, Horseback, Intreken, Laughlin Spring (JEC), and Vandiver Caves. This interesting material remains to be studied. It may help to understand the trends in cave evolution in this genus (Causey, 1959, 1960; Loomis, 1943; Shear, 1972).

Family Trichopetalidae

Scoterpes austrinus austrinus Loomis, TB. Dekalb County; Manitou Cave (Type locality). Also reported from White River Cave, Floyd County, Georgia (Loomis, 1943; Shear, 1972). The subspecies *A. austrinus nudus* Chamberlin is recorded only from Kingston Saltpeter Cave, Bartow County, Georgia.

Scoterpes spp., TB, Figure 9. Blount County; Bangor, Bryant, Catfish, and Randolph Caves. Calhoun County; Green Valley Cave (LG); Colbert County; McKinney Cave. Dekalb County; Bartlett, Cherokee, Kelly Girls, Killian, Lykes, Sequoyah, and Stanley-Garden Caves. Jackson County; Bell Spring, Bucks Pocket, Buds, Cagle, Crossing,





Figures 9 and 10. **The two most common troglobitic millipedes in Alabama caves. 9. *Scoterpes* sp. Note the upraised hairs on each body segment. These millipeds are generally 1-2 cm long. 10. *Tetracion jonesi*. These large millipeds may be up to 8 cm long. At the sides of each body segment are glands that produce a white noxious chemical defensive substance. They may be the most abundant scavenger species in many Alabama cave communities (see Peck 1976).**

Driftwood, Guess Creek, Henshaw Spring, Horseshoe, Jess Elliott, Kennamer, Kyles, Larkins, Limrock Blowing, McFarland, Moody, Paint Rock, Rainbow, Roadside, Gary Self Pit (Rousseau entrance), Russell (Pig entrance), Salt River, Sheldons, Slippery Pole, Talley Ditch, Tate, Tumbling Rock, and Two Way Caves. Jefferson County; Cedar Pole and Crystal (McClunney) Caves. Limestone County; Indian and Rockhouse Caves. Madison County; Aladdin, Barclay, Burwell, Byrd Spring, Cave Spring (AL60), Ellis, Hering (Herrin), Oakwood, Shelta, Glover (Water) and Vann (New Hope Cave Spring) Caves. Marshall County; Cathedral Caverns, Gamble, and Steves Caves. Morgan County; Royer and Talucah Caves. Shelby County; Anderson Cave. St. Clair County; Mclendon Cave. This rich material awaits study, to unravel the course of evolution in this cave restricted genus. Records of *S. copei* from caves in Dade County Georgia, and Franklin and Hamilton Counties, Tennessee, are errors, because that species is limited to caves in south-central Kentucky. This group offers a substantial challenge to a student of cave-faunal evolution in the southeast (Causey, 1959, 1960; Chamberlin, 1946; Loomis, 1939, 1943; Shear, 1969, 1972).

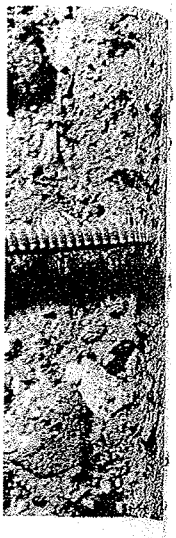
Trichopetalum syntheticum Shear, TB. Jackson County; Crossings Cave (type locality). Marshall County; Buds Cave. Known only from these caves (Shear, 1972). The genus contains more species in caves and forests in the central Appalachians. The distribution on both sides of the Tennessee River is puzzling.

Order Callipodida

Family Lysiopetalidae

Abacion magnum Loomis, AC. Jackson County; Kyle Cave. Madison County; Sneed Spring Cave. Marshall County; Honeycomb Cave. Shelby County; Lous Crawl Cave. This genus of large millipedes, with chemical defenses which ooze from their lateral crests, shares a common ancestor with the troglobitic genus *Tetracion* (Chamberlin, 1946; Loomis, 1943). The record of *A. lactarium* (Say) (Loomis, 1943) from Kingston Saltpeter Cave, Bartow County, Georgia, is probably this species.

Tetracion jonesi Hoffman, TB, Figure 10. Dekalb County; Kelly Girls Cave. Jackson County; Beanfield, Bell Spring, Blue River (WT); Doodlebug Hole (Blowing entrance) (JEC). Borderline (WT), Bouldin, Boxes Cove, Bucks Pocket, Buds, Cagle, Cornellison No. 1, Crossings, Doug Green, Driftwood, Dripping Spring, Engle Double Pit (McFarland Blowing entrance), Fourth of July, Forty Eight Ten, Gary Self (RG), Geiger, Guess Creek, Hall, Upper Rainbow (Happy Hollow), Henshaw Spring, Horseshoe, House of Happiness, Indian Rocks, Isbell Spring, Jess Elliott, Kennamer, Larkin, Kyle, Limrock Blowing, Little Sink, McFarland, Merritt, Moody, Moon Spring, Nat, Mink (Out) entrance of Gross-Skeleton, Paint Rock, Pigpen, Putman, Rainbow, Ranie Willis, Roadside, Salt River, Sauta, Sheldon, Small, Steele Saltpeter, Swaim, Tate, Talley Ditch, Tumbling Rock, Two Way, Tupelo and



Williams Saltpeter Caves. Madison County; Aladdin, Burwell, Cave Spring AL 60, Vann (New Hope Cave Spring), Candlestand (Goat), Hurricane, Jacks, Scott, and Glover (Water) Caves. Marshall County; Beech Spring, Bishop, Cave Mountain, Clark Bluff, Dunham, Keller, Kirkland, Line Point, MacHardin, Merrill, Old Blowing, Painted Bluff, Steves, Walnut, and Warrenton Caves. Morgan County; Hughes Cave. There is interesting variation between and within populations of these large-sized and very common millipedes. Populations east and south of the Tennessee River may differ. An analysis of this variation might give interesting conclusions on the evolution of this species. Two subspecies have been named (*T. j. jonesi* from Cathedral Caverns, Marshall County; and *T. jonesi antraeum* from Barclay Cave, Madison County, Hoffman, 1956). The species extends into caves in Franklin County, Tennessee. Another species, *T. tennesseensis* Causey, occurs in Cumberland Plateau caves in Tennessee. The millipede is chemically defended against predation by cave-inhabiting salamanders (Peck, 1974; Peck and Richardson, 1976). The defense chemical contains p-cresol (M. Blum pers. comm.).

Order Julida

Family Nemasomatidae

Ameractis satis Causey, TB or EB? Jackson County; Coon Creek and Indian Rock Caves. Marshall County; Dunham Cave (in packrat nest). The genus and species were previously recorded only from caves in five Tennessee counties (Causey, 1959, 1960).

Order Polydesmida

All members of this order are eyeless scavangers in litter and soil. In this case eyelessness is not an indication of cave adaptation.

Family Platyrhacidae

Euryurus leachii Author, AC. Conecuh County; Sanders Cave. Jackson County; Gross-Skeleton Cave. Jefferson County; Crystal Caverns. Madison County, Shelta Cave. Marshall County; Honeycomb Cave. This usually epigean species may be abundant in caves on rotting wood (Loomis, 1943). The name *E. erythropygus* (Brandt), was erroneously applied in the past.

Family Eurydesmidae

Brachoria sp., AC. Jackson County; Pigpen Cave.

Pachydesmus crassicutis Wood, AC. Jackson County; Mink (Out) entrance of Gross-Skeleton Cave. Madison County; Cave Spring Cave.

Family Polydesmidae

Pseudopolydesmus sp., ED or AC. Blount County; Bangor Cave. Colbert County; McCluskey Cave. Dekalb County; Little Creek (JEC) and Goat House (RG) Caves. Jackson County; Driftwood, Ranie Willis, Gary Self Pit (Rousseau entrance) Caves. Madison County; Barclay Cave. Marshall County; Beech Spring, Davidson, and Dunham Caves. Talladega County; Dulaney Cave (WBJ).

Pseudopolydesmus pinetorum (Bollman), AC. Jackson County; Larkin and Hall caves. Madison County; Cold Spring Cave, Marshall County; Gamble Cave. Creek Bed Cave, Rising Fawn, Walker County, Georgia is listed by Loomis as a site for *Polydesmus americanus* Carl (Loomis, 1939).

Scytonotus probably *granulatus* (Say), AC. Jackson County; Swaim Cave.

Family Macrosternodesmidae

Chaetaspis, near *mollis* Author, TP. Colbert County; Gallymore and McKinney Pit Caves. Jackson County; Driftwood Cave. Lauderdale County; Butler Cave. Madison County; Hurricane Cave. Morgan County; Royer Cave. Also known from Tennessee caves (Causey, 1960).

Order Spirobolida

Family Spirobolidae

Narceus americanus (Beauvois), AC. Blount County; Horseshoe-Crump Cave. Marshall County; Grant Waterfall (JEC), and Painted Bluff Caves. Jackson County; Nickajack Cave (listed as *Arctobolus marginatus* (Say) by Loomis (1939). The species ranges widely from southern Ontario and Illinois to Florida and east Texas, but is only accidental in caves (Keeton, 1960).

Class Chilopoda

Centipedes occur in caves infrequently. They are active predators on small arthropods in soil and litter habitats. A few may be troglophiles, and a very few in North America may be troglobites.

Order Lithobiomorpha

Family Lithobiidae

Lithobius atkinsoni Bollman, TP. Blount County; Bangor and Bryant Caves. Calhoun County; Daugette No. 1 and Weaver Caves. Dekalb County; Section 26 Cave. Madison County; Clark Bluff Cave. Marshall County; Gamble, Honeycomb, Keller, Painted Bluff and Steves Caves. This is a widespread eastern species (Chamberlin, 1925). Other cave records are Gerards and Milton Caves, Jackson County, Florida, and Fisher and John Hollins Caves, Cannon County, Tennessee.

Garibus, probably *alabamae* Chamberlin, AC. Madison County; Barclay Cave.

Garibius ?, sp., AC. Marshall County; Hampton Cave (two males, seemingly a new species or genus, lacking sclerotized caudal glands associated with the setigerous tibial lobe of the last legs). The same species appears to be in Jackson Cave, Cannon County, Tennessee.

Nampabius, probably *mycophor* Chamberlin, AC. Jackson County; Rainbow Cave.

Paitobius arienus (Chamberlin), AC. Jackson County; Sheldons Cave. The species also occurs in North and South Carolina (Chamberlin, 1922).

Paitobius, probably *juventus* (Bollman), AC. Marshall County; Gamble Cave.

Paitobius carolinae (Chamberlin), AC. Blount County; Horseshoe-Crump Cave.

Typhlobius coecus (Bollman), ED or TB? Blount County; Bryant Cave. Jackson County; Kennamer Cave. Morgan County; Vandiver Cave. This species is eyeless, with weak pigmentation, a large organ of Tomosvary, long antennae, and general setose body and appendages. It is otherwise recorded from North Carolina and Tennessee (Chamberlin, 1922), and here from Fox and Overall Caves, Dekalb County, Tennessee.

Watobius anderisus Chamberlin, AC. Calhoun County; Weaver Cave.

Order Scolopendromorpha

Family Scolopendridae

Scolopocryptops sexspinosa (Say), TP. Blount County; Bangor Cave. Colbert County; McCluskey and Murrells Caves. Conecuh County; Sanders Cave. Dekalb County; Manitou, Sequoyah and Talley Caves. Jackson County; Crossings, Paint Rock, and Williams Saltpeter Caves. Lauderdale County; Collier Cave. Limestone County; Rockhouse Cave (WBJ). Madison County; Barclay, Hurricane, and Shelta Caves. Marshall County; Terrill Cave.

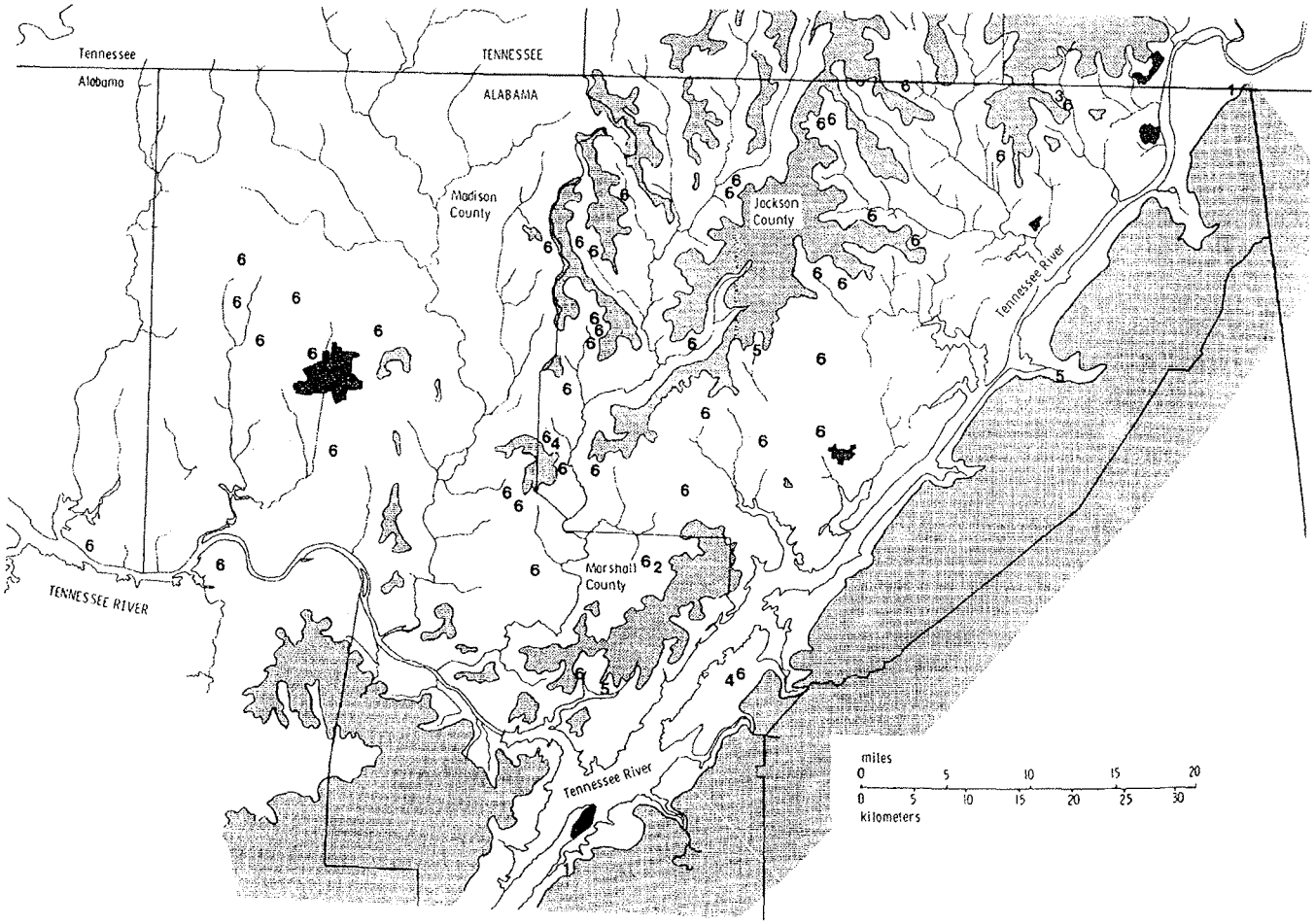


Figure 11. **Distributions of troglobitic millipeds in northeastern Alabama. 1.** ***Pseudotremia eburnea.*** **2.** ***Pseudotremia nyx.*** **3.** ***Pseudotremia minos.*** **4.** ***Trichopetalum syntheticum.*** **5.** ***Ameractis satis.*** **6.** ***Scoterpes*** **spp.; this genus is more common in caves in the Highland Rim than are any other group of troglobites.**

This is a widespread eastern species. I also have a record for Trussel Cave, Grundy County, Tennessee.

Class Symphyla

Family Scutigerellidae

Scutigerella sp., ED. Madison County; Byrd Spring Cave. Jackson County; Gary Self Pit (Rousseau entrance) Cave. Records are also from Johnson Crook Cave, Dade County and Hickman Gulf and Harrisburg Caves, Walker County, Georgia; and Round Mountain Cave, Franklin County; Tennessee. Little is known of these strange soil dwellers in the United States (Michelbacher, 1942; Edwards, 1959).

Family Scolopendrellidae

Symphylella sp., ED. Jackson County; Talley Ditch Cave.

ACKNOWLEDGEMENTS

I thank William W. Varnedoe Jr. of Huntsville and the members of the Huntsville Grotto of the National Speleological Society for providing help with locations and descriptions of Alabama caves. William Torode has been especially helpful through his energetic efforts at cave exploration and mapping. Appreciation is expressed to the landowners who allowed access to their property; in particular I thank Mr. Jay Gurley of Cathedral Caverns, Mr. Myron Raymond of Manitou Cave, Mr. Alva Hammond of Sequoyah Cave, and Mr. Herbert Olsen, Superintendent of Russell Cave National Monument.

Dr. and Mrs. Walter B. Jones receive my deepest appreciation, for without their generosity and encouragement this study could not have been conducted.

Various collections and records were contributed to the study by Allan F. Archer (AFA), John E. Cooper (JEC), Thomas C. Barr, Jr. (TCB), Tim King (TK), R. Graham (RG), Lyin Guy (LG), Walter B. Jones (WBJ), Chris Kroeger (CK), William Torode (WT), and J. M. Valentine (JMV).

The following systematists are thanked for the identifications and records they have provided: the late Nell B. Causey, Louisiana State University, millipeds; G. E. Gates, University of Maine, earthworms; W. J. Gertsch, American Museum of Natural History, spiders; Leslie Hubricht, Meridian, Mississippi, snails; A. E. Michelbacker, Symphyla; William B. Muchmore, University of Rochester, pseudoscorpions; G. A. Schultz, Hampton, New Jersey, terrestrial isopods; W. A. Shear, Hampden-Sydney College, Hampden-Sydney, Virginia, harvestmen and millipeds; Rowland M. Shelley, North Carolina State Museum, Raleigh, North Carolina, millipeds; and Andrew Weaver, College of Wooster, Wooster, Ohio, centipedes.

The manuscript was reviewed in whole or in part by J. C. Cokendolpher, H. H. Hobbs III, J. R. Holsinger, W. A. Shear, R. M. Shelley, W. Torode, and W. W. Varnedoe. W. Torode deserves special thanks for trying to see that I have used correct cave names. Field work was partially supported by operating grants from the Natural Sciences and Engineering Research Council of Canada.

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