The Cave Fauna of the Garrison Chapel Karst Area: Part I, Wayne Cave



Weingartner's cave flatworm

Sphalloplana weingartneri



Cave sheet-web spider

Porrhomma cavernicola

Final Report

Division of Nature Preserves
Indiana Department of Natural Resources
and
Indiana Karst Conservancy

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INTRODUCTION

The Garrison Chapel Karst Area is located about 7 miles southwest of Bloomington, in Monroe County. It lies on the eastern boundary of the Crawford Upland, in an area of sandstone capped ridges and limestone floored valleys. In about five square miles that comprises this karst area (fig. 1) the Indiana Karst Conservancy (IKC) owns or manages several major caves. Wayne Cave, at 4.2 miles in length, is the longest cave in Monroe County and 9th largest in Indiana. Purchased by the IKC in 2003, the 20 acre preserve contains the entrance as well as part of the known passages in Wayne Cave. Nearby, a short cave called Tiparillo Hole, consists of about 30 feet of passage at the bottom of a sinkhole. Other sites managed by the IKC in the Garrison Chapel karst are Grotto, Shaft and Coon caves. The purpose of this report was to compile a list of the cave fauna of the Wayne Cave Preserve.

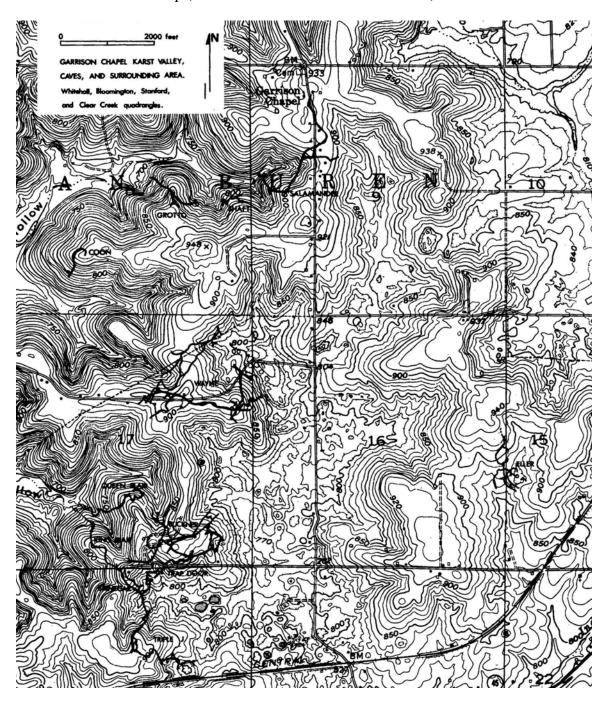
Some sampling has been conducted in caves at Garrison Chapel. The close proximity of Indiana University-Bloomington combined with the ease of entry into some of the caves has produced a few collections of a variety of invertebrates. The presence of Indiana bats has also focused attention on certain caves in the area.

Bollman (1889) reported the millipede Conotyla bollmani from Coon and Truett caves. Blatchley (1897) reported Crangonyx packardi, Caecidotea stygia, Meta ovalis, Sinella cavernarum and Amoebaleria defessa from Eller Cave. In his treatise on the fauna of Mayfield Cave, Banta (1907) summarized what was known from other Indiana caves, including Coon and Eller. Fleming (1972) listed the isopod Caecidotea stygia from Salamander Cave. Hobbs, Jr. and Barr (1972) reported the crayfish Orconectes inermis testii from Ellers, Salamander and Shaft caves, to which Hobbs, Jr. et. al (1977) added Brinegar, Buckner and Wayne Cave. In an unpublished dissertation Hobbs III (1973) reported the presence of the commensal entocytherid ostracods Sagittocythere barri (Buckner, Ellers, Salamander, Wayne caves), Donnaldsoncythere donnaldsonensis (Salamander Cave), Dactylocythere susanae (Salamander Cave) from the cave crayfish O. inermis testii. From the crayfish Cambarus laevis were Donnaldsoncythere donnaldsonensis (Buckner Cave), Dactylocythere susanae, Unacythere xania (Buckner, Wayne caves). Zhang & Holsinger (2003) reported the amphipod Crangonyx indianensis from Buckner and Salamander caves, and Crangonyx packardi from Wayne and Salamander caves. In an unpublished manuscript, Barr (email 2008) reported the presence of the cave beetle Pseudanophthalmus shilohensis mayfieldensis from Buckners, Ellers, Grotto, Mayfields, Mays, Queen Blair, Reeves, Shaft, Salamander, Strong, Truett, and Wayne caves, along with an undescribed species of the leonae group of this genus from Wayne Cave.

By far the greatest attention has been given to the bats inhabiting the area. The federal endangered Indiana bat Myotis sodalis. Brack & Duffey (2007) reported the Indiana bat from the following sites (census numbers in parenthesis): Buckner Cave (49), Coon Cave (14,099), Grotto Cave (12,891), King Blair/Brinegar Cave (218). Salamander Cave is a historic site for this species, but the bats usually roost in an area prone to flooding. Other species present in these caves are the Little brown bat Myotis lucifugus,

Big brown bat <u>Eptesicus fuscus</u>, Eastern pipistrelle <u>Perimyotis subflavus</u> and Northern bat <u>Myotis septentrionalis</u>. Of these, Grotto Cave may have the largest winter population of Little brown bats in Indiana, with over 2,000 found during the last four censuses. Detailed records and historical data are presented by Brack & Duffey (2007).

Figure 1. Overlay of cave passages in Garrison Chapel karst area including Wayne Cave in center left of map (from NSS 73 Convention Guidebook).



METHODS & MATERIALS

Terrestrial sampling was performed by collecting manually, placing pitfall traps and Berlese extraction of litter. The pitfalls consisted of four ounce glass specimen jars filled with 70% isopropyl alcohol as a preservative and baited with limburger cheese. Leaf litter was taken from the entrances for Berlese extraction. Litter was placed in a Berlese funnel, with overhead light/heat extracting the invertebrates into a vial of 70% isopropyl alcohol. Pitfall residues were screened, then transferred into petri dishes for sorting of the fauna under a dissecting microscope. Aquatic sampling was also performed manually as well as dipping water from pools and straining it through a plankton net. Specimens of each taxon were placed in 3 or 4 dram vials of 70% ethyl alcohol and labeled with collection site, state, county, miles to nearest town, date and collector.

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FAUNAL LIST

In the following list each species is placed within a hierarchical classification. For each species there is a scientific name, original author of the species, a descriptive common name and an ecological classification. Under each taxon the site where the collection was made, the habitat, and the range of the species is given. Range information not cited was taken from the works of Lewis et al. 1983-2007 and the NatureServe website (http://www.natureserve.org/).

The ecological classifications adhere to the following system:

Classification	Abbreviation	<u>Definition</u>
Troglobite	TB	terrestrial, morphologically adapted and restricted to caves,
		must feed and reproduce in the cave environment
Troglophile	TP	terrestrial, +/- morphologically adapted to caves, not
		restricted to caves, but can feed and reproduce in the cave
		environment
Trogloxene	TX	terrestrial, not usually morphologically adapted to caves,
		usually leaves the cave to either feed or reproduce
Stygobite	SB	aquatic, morphologically adapted and restricted to caves,
		must feed and reproduce in the cave environment

Stygophile	SP	aquatic, +/- morphologically adapted to caves, not
		restricted to caves, but can feed and reproduce in the cave
		environment
Stygoxene	SX	aquatic, not usually morphologically adapted to caves,
		usually leaves the cave to either feed or reproduce
Accidental	AC	fall or wash into caves with no demonstrable affiliation to
		the habitat

Accompanying each taxon identified to the species level is a S-rank and G-rank, or State rank of rarity and Global rank of rarity, according to the following system:

State/Global Rank	Number of sites	<u>Characterization</u>
S1/G1	1-5	critically imperiled
S2/G2	6-20	imperiled
S3/G3	21-100	vulnerable
S4/G4	100+	apparently secure
S5/G5		secure
SE		exotic, not native to the U.S.

PHYLUM PLATYHELMINTHES CLASS TURBELLARIA ORDER TRICLADIDA

FAMILY KENKIIDAE

Sphalloplana weingartneri Kenk SB S3/G3 Weingartner's cave flatworm

Locality: Wayne Cave

Habitat: pools

Range: endemic to southern Indiana

PHYLUM ARTHROPODA CLASS CRUSTACEA ORDER EUCOPEPODA

FAMILY CYCLOPIDAE

Diacyclops crassicaudis brachycercus (Kiefer) SP S5/G5 copepod

Locality: Wayne Cave Habitat: drip pools

Range: USA & Europe (Reid 2004)

ORDER OSTRACODA

FAMILY ENTOCYTHERIDAE

<u>Dactylocythere</u> susanae Hobbs SP/EC Susan's S3/G4 crayfish ostracod

Locality: Wayne Cave (Hobbs 1973) Habitat: ectocommensal on crayfish

Range: Indiana & Kentucky (Hobbs Jr. et al. 1977)

Sagittocythere barri (Hart & Hobbs) SB/EC S3/G4 Barr's crayfish ostracod

Locality: Wayne Cave (Hobbs 1973)

Habitat: ectocommensal on stygobitic crayfish

Range: caves in Indiana, Kentucky, Tennessee, Alabama (Hobbs Jr. et al. 1977)

Uncinocythere xania (Hart & Hobbs) SP/EC S3/G4 crayfish ostracod

Locality: Wayne Cave (Hobbs 1973)

Habitat: ectocommensal on stygobitic crayfish

Range: reported from Indiana & Missouri, poorly known (Hobbs Jr. et al. 1977)

ORDER ISOPODA

FAMILY ASELLIDAE

Caecidotea stygia Packard SB S5/G5 Northern cave isopod

Locality: Wayne Cave Habitat: streams and pools

Range: SW Ohio, Kentucky, northern Tennessee, southern Indiana, southern

Illinois, eastern Missouri

FAMILY LIGIDAE

<u>Ligidium elrodi</u> (Packard) TP/TX S4/G5 Elrod's terrestrial isopod

Locality: Tiparillo Hole Habitat: leaf litter

Range: eastern U.S. (Jass & Klausmeier 2001)

FAMILY PORCELLIONIDAE

Trachelipus rathkei (Brandt) TX SE/G5 Rathke's terrestrial isopod

Locality: Wayne Cave Habitat: leaf litter

Range: exotic, probably European in origin

FAMILY TRICHONISCIDAE

Haplophthalmus danicus Budde-lunde TP SE/G5 terrestrial isopod

Locality: Wayne Cave Habitat: leaf litter

Range: exotic, probably European in origin

Hyloniscus riparius Budde-Lund TX SE/G5 Riparian terrestrial isopod

Locality: Wayne Cave Habitat: leaf litter

Range: exotic, probably European in origin

ORDER AMPHIPODA

FAMILY CRANGONYCTIDAE

Crangonyx packardi Smith SB S4/G4 Packard's groundwater amphipod

Locality: Wayne Cave Habitat: pools, streams

Range: Indiana to Kansas (Zhang & Holsinger, 2003)

ORDER DECAPODA

FAMILY CAMBARIDAE

Cambarus laevis Faxon SP S4/G4 Karst crayfish

Locality: Wayne Cave Habitat: pools, streams

Range: southern Illinois, Indiana, Ohio, Kentucky

Orconectes inermis testii Cope SB S2/G4 Northern cave crayfish

Locality: Wayne Cave Habitat: pools, streams

Range: Monroe County, Indiana

CLASS ARACHNIDA ORDER ARANEAE

FAMILY AGELENIDAE

Cicurina pallida Keyserling TP S4/G5 Pallid funnel-web spider

Locality: Wayne Cave

Habitat: under stones, entrance room

Range: eastern U.S.

FAMILY LINYPHIIDAE

Phanetta subterranea (Emerton) TB S5/G5 Subterranean sheet-web spider

Locality: Tiparillo Hole, Wayne Cave

Habitat: under stones, crevices

Range: eastern U.S.

Porrhomma cavernicola (Keys) TB S2/G4 Cavernicolous sheet-web spider

Locality: Wayne Cave Habitat: under stones Range: eastern U.S.

FAMILY PISAURIDAE

Dolomedes scriptus Hentz TX S4/G4 fishing spider

Locality: Wayne Cave

Habitat: entrance ceiling Range: eastern U.S.

CLASS DIPLOPODA ORDER CHORDEUMATIDA

FAMILY CONOTYLIDAE

Conotyla bollmani (McNeill) TB/TP S3-4/G3-4Bollman's cave milliped

Locality: Tiparillo Hole, Wayne Cave Habitat: under stones, boards, leaf litter Range: southcentral Indiana karst

ORDER COLLEMBOLA

FAMILY ENTOMOBRYIDAE

Pseudosinella fonsa Christiansen TB S2/G2 Fountain cave springtail

Locality: Tiparillo Hole

Habitat: under stones, leaf litter

Range: southcentral & southeastern Indiana karsts, 1 cave in SW Ohio

(Christiansen & Bellinger 1998c)

Sinella cavernarum (Packard) TB S3/G4 Cavernicolous springtail

Locality: Wayne Cave Habitat: under stones

Range: eastern U.S., 1 endogean record (Christiansen & Bellinger 1998c)

FAMILY HYPOGASTRURIDAE

Ceratophysella denticulata group engadinensis vs. granulate TP

Locality: Wayne Cave Habitat: entrance leaf litter

Odontella rossi Christiansen & Bellinger TX S1/G1? Ross' springtail

Locality: Wayne Cave Habitat: entrance leaf litter

Range: previously known from the type-locality in Pennsylvania (Christiansen &

Bellinger 1998a)

Pseudochorutes aureofasciatus (Harvey) species complex TX S4/G5 springtail

Locality: Wayne Cave Habitat: entrance leaf litter

Range: United States & Canada (Christiansen & Bellinger 1998a)

FAMILY ISOTOMIDAE

Folsomia candida Willem TP S5/G5 White springtail

Locality: Tiparillo Hole Habitat: entrance leaf litter Range: U.S. and southern Canada (Christiansen & Bellinger 1998b)

Isotoma anglicana Lubbock TX S?/G5 Anglican springtail

Locality: Wayne Cave Habitat: entrance leaf litter

Range: few Indiana collections, but temperate North America, Europe

<u>Isotoma</u> (<u>Desoria</u>) near <u>canadensis</u> Brown TX

Locality: Wayne Cave Habitat: entrance leaf litter

Range: species too poorly known to characterize range.

Isotoma (Desoria) trispinata MacGillivray TX

Locality: Tiparillo Hole Habitat: entrance leaf litter

Range: U.S. and eastern Canada (Christiansen & Bellinger 1998b)

Isotoma (Desoria) undescribed species? TX/TP

Locality: Tiparillo Hole Habitat: entrance leaf litter

Range: possibly conspecific with a taxon represented in material from a cave in

Virginia (Soto email 2008)

FAMILY TOMOCERIDAE

Tomocerus bidentatus Folsom TP S4/G4 Two-toothed springtail

Locality: Tiparillo Hole Habitat: leaf litter

Range: eastern U.S. (Christiansen & Bellinger 1998c)

Tomocerus elongatus Maynard TX S4/G5 Elongate springtail

Locality: Wayne Cave Habitat: entrance leaf litter

Range: continental U.S. to Alaska (Christiansen & Bellinger 1998c)

Tomocerus flavescens (Tullberg) TP S5/G5 Golden springtail

Locality: Tiparillo Hole

Habitat: under stones, leaf litter

Range: U.S., Canada, Alaska (Christiansen & Bellinger 1998c)

FAMILY SMINTHURIDAE

Arrhopalites sp. TB cave springtail

Locality: Wayne Cave

Habitat: dark zone mud banks next to pools

Range: unknown

Ptenothrix atra Linnaeus TX S5/G5 Black springtail

Locality: Tiparillo Hole Habitat: leaf litter

Range: cosmopolitan (Christiansen & Bellinger 1998d)

ORDER ORTHOPTERA

FAMILY GRYLLACRIDIDAE

Ceuthophilus brevipes Scudder TX S4/G4 cave cricket

Locality: Tiparillo Hole, Wayne Cave

Habitat: cave walls and ceilings; woodlands Range: northeastern U.S. (Hubbell 1936)

ORDER COLEOPTERA

FAMILY CARABIDAE

Pseudanophthalmus shilohensis mayfieldensis (Krekeler) TB S2/G2 Shiloh cave beetle

Locality: Wayne Cave

Habitat: riparian, under stones and on mudbanks

Range: southcentral Indiana karst, Lawrence, Monroe, southeast Owen counties

(Barr 2004).

Pseudanopthalmus undescribed species (leonae group) TB S1/G1 Wayne cave beetle

Locality: Wayne Cave

Habitat: riparian, under stones and on mudbanks

Range: known only from Wayne Cave (Barr, email 2008)

FAMILY STAPHYLINIDAE

Aleochara lucifuga (Casey) TP S4/G4 Rove beetle

Locality: Wayne Cave

Habitat: riparian, under stones and on mudbanks

Range: eastern U.S.

Quedius erythrogaster Mannerheim TX S5/G5 rove beetle

Locality: Wayne Cave Habitat: leaf litter Range: eastern U.S.

ORDER DIPTERA

FAMILY HELEOMYZIDAE

Aecothea specus (Aldrich) TX S5/G5 heleomyzid fly

Locality: Wayne Cave

Habitat: moist walls, floor surfaces

Range: eastern U.S.

FAMILY MYCETOPHILIDAE

Macrocera nobilis TP S4/G5 fungus gnat

Locality: Wayne Cave

Habitat: larval webs under stones, crevices

Range: eastern U.S.

FAMILY PHORIDAE

Megaselia cavernicola Brues TP S5/G5 Cave hump-backed fly

Locality: Tiparillo Hole, Wayne Cave Habitat: damp areas, mudbanks

Range: eastern U.S.

FAMILY SPHAEROCERIDAE

Spelobia tenebrarum (Aldrich) TB S5/G5 Cave dung fly

Locality: Tiparillo Hole, Wayne Cave

Habitat: raccoon dung, mudbanks, damp areas

Range: eastern U.S.

ORDER SIPHONAPTERA

FAMILY CTENOPHTHALMIDAE

Epitedia wenmanni (Rothschild) PS S5/G5 Wenmann's flea

Locality: Tiparillo Hole, Wayne Cave

Habitat: ectoparasite of White footed mouse

Range: eastern U.S.

CLASS AMPHIBIA ORDER CAUDATA

FAMILY PLETHODONTIDAE

Eurycea <u>lucifuga</u> Rafinesque TP S5/G5 Cave salamander

Locality: Wayne Cave

Habitat: wall ledges, under stones, larvae in pools

Range: east-central U.S.

ORDER CHIROPTERA

FAMILY VESPERTILIONIDAE

Myotis lucifugus (LeConte) TX S5/G5 Little brown ba

Locality: Wayne Cave Habitat: passage ceiling

Range: North America south to Mexico

Perimyotis subflavus (Cuvier) TX S5/G5 Eastern pipistrelle

Locality: Tiparillo Hole, Wayne Cave

Habitat: wall ledges, under stones, larvae in pools

Range: eastern U.S. & Canada

ORDER RODENTIA

FAMILY CRICETIDAE

Peromyscus leucopus (Rafinesque) TX S5/G5 White-footed mouse

Locality: Wayne Cave
Habitat: moist areas, primarily near entrance
Range: U.S. & Canada, excluding Pacific states

DISCUSSION

A total of 47 taxa were recorded during the survey of the Wayne Cave Preserve. Of these, 14 were classified as obligate subterranean species:

Sphalloplana weingartneri Weingartner's cave flatworm

Sagittocythere barri Barr's crayfish ostracod

Caecidotea stygia Northern cave isopod

Crangonyx packardi Packard's Groundwater amphipod

Orconectes inermis Northern cave crayfish

Phanetta subterranea Subterranean sheet-web spider

Porrhomma cavernicola Cavernicolous sheet-web spider

Conotyla bollmani Bollmani's cave milliped

Pseudosinella fonsa Fountain cave springtail

Sinella cavernarum Cavernicolous springtail

Arrhopalites sp. cave springtail

Pseudanophthalmus shilohensis Shiloh cave beetle

Pseudanopthalmus undescribed species (leonae group) Wayne cave beetle

Spelobia tenebrarum Cave dung fly

Compared to other cave systems sampled in Indiana, Wayne Cave ties for 5th place in the number of obligate subterranean species present:

<u>Cave</u>	Obligate Subterranean
Binkley Cave (Harrison Co.)	19
Wesley Chapel Gulf/Elrod Cave (Orange	Co.) 18
Sullivan Cave (Lawrence Co.)	16
Marengo Cave (Crawford Co.)	15
Wyandotte Cave (Crawford Co.)	15
Wayne Cave (Monroe Co.)	14
Donnaldson Cave (Lawrence Co.)	13
Blowing Hole (Harrison Co.)	12
Tucker Lake Spring Cave (Orange Co.)	12
Buddha-Christian Cave (Lawrence Co.)	11
Patton Cave (Monroe Co.)	11
Spring Springs Cave (Orange Co.)	11
Sibert's Well Cave (Crawford Co.)	11
Black Medusa Cave (Harrison Co.)	11
Patton Cave (Monroe Co.)	11
Dillon Cave (Orange Co.)	11
Hudelson Cavern (Orange Co.)	10
Linds Cave (Harrison Co.)	10
Murray Spring Cave (Orange Co.)	10
May Cave (Monroe Co.)	10
King/Bug Ear Cave (Lawrence Co.)	10

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