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Subterranean Biodiversity of Arkansas, Part 2: Status Update of the Foushee Cavesnail, *Amnicola cora* Hubricht, 1979 (Mollusca: Gastropoda: Hydrobiidae)

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In 1978 a minute snail lacking eyes and pigment (Fig. 1) was discovered in the subterranean stream of Foushee Cave, Independence County, Arkansas, by Youngsteadt and Youngsteadt (1978) and described by Hubricht (1979) as the Foushee cavesnail, *Amnicola cora*. For the next 25 years, nothing more was known of its status or distribution. To address this and other data deficiencies, a regional inventory of subterranean habitats was initiated by a multi-agency consortium (the Ozark Subterranean Biodiversity Project), the results of which are being presented in this manuscript series. A bioinventory on 18 August 2002 of Foushee Cave by the author, David Kampwerth (U. S. Fish and Wildlife Service), R. C. Schroeder and Ed Corfey (both of the Association for Arkansas Cave Studies) confirmed the presence of this cavesnail in the type locality. Cavesnails were found in abundance, primarily on the sides of rocks (Pitkin limestone) in pools and riffles having cobble substrate. A brief visual survey (1/2 hour x 4 men = 2 man-hours) of the cave stream revealed a density range of 1 to 20 cavesnails per m², and a total population estimate of 500 individuals. Although the cave is relatively large (1900 m of

mapped passage), the available (or at least visible) stream habitat is small, and the cavesnails were apparently absent from areas close to the entrance (the twilight zone) and from stream segments with swift current.

The Foushee cavesnail population coexists with a diverse subterranean community of at least 34 other animal species, totaled from this study and Youngsteadt and Youngsteadt (1978). Nine other taxa are known from Foushee Cave that are limited to groundwater habitats (stygobites) or limited to caves (troglobites): the grotto salamander (*Typhlotriton spelaeus*), a flatworm (Tricladida), a dung fly (*Spelobia tenebrarum*), a millipede (*Causeyella* sp.), a springtail (*Schaefferia alabamensis*), a sow bug (*Miktoniscus* sp.), an undescribed dipluran (*Litocampa* sp. nov.), an amphipod (*Stygobromus* sp.) and a water slater (*Caecidottea ancyla*). Also present were potential predators of the cavesnail: the cave salamander (*Eurycea lucifuga*), the dark-sided salamander (*Eurycea longicauda melanopleura*), the slimy salamander (*Plethodon albagula*), the banded sculpin (*Cottus carolinae*), and an epigeal crayfish (*Orconectes* sp.). Other fauna identified in the two combined studies were an aquatic snail (Physidae), a terrestrial snail (*Polygyra lithica*), the eastern pipistrelle bat (*Pipistrellus subflavus*), a crane fly (Tipulidae), a humpbacked fly (*Megaselia cavernicola*), a helemyzid fly (*Amoebalaria defessa*), a long-legged fly (*Neurigonella sombrea*), a dark-winged fungus gnat (*Bradysia* sp.), a chironomid (*Cricotopus* sp.), two harvestmen (*Leiobunum* sp. and *Crosbyella spinturnix*), a soil mite (*Gaeolaelaps* sp.), a cave cricket (*Ceuthophilus gracilipes*), a colonial bat (*Myotis* sp.), a round fungus beetle (*Ptomaphagus shapardi*), a rove beetle (*Quedius* sp.), a water slater (*Lirceus bicuspidatus*), and two unidentified Araneae. This richness of species, and especially the presence of ten subterranean obligates, makes Foushee Cave one of the most biologically significant caves in the Ozark plateau ecoregion to date.

Extensive efforts to inventory cave life by the author and colleagues have failed to discover any other cavesnail populations in Arkansas. *Amnicola cora* remains the only stygobitic mollusk endemic to Arkansas; it is one of approximately 11 snails found only in Arkansas (Robison and Allen, 1995; Walsh and Coles, 2002), and one of approximately 36 hydrobiid cavesnails known in North America (Hershler and Holsinger, 1990). The national



Fig. 1. The shell of *Amnicola cora*, 2 mm in diameter.

Natural Heritage Program and The Nature Conservancy consider *Amnicola cora* to be critically imperiled (rank of G1; NatureServe, 2003) and the World Conservation Union considers this cavesnail to be vulnerable to extinction (Red List rank of VU+D2; IUCN, 2003). Other related species known from the Ozark Plateaus ecoregion are the Ozark springsnail (*Fontigens aldrichi*), the enigmatic cavesnail (*Fontigens antroecetes*), and three cavesnails endemic to Missouri – the stygian cavesnail (*Amnicola stygia*), the Tumbling Creek cavesnail (*Antrobia culveri*), and the proserpine cavesnail (*Fontigens proserpina*) (Wu et al., 1997; NatureServe, 2003). Robert Hershler of the Smithsonian Institution is revising the systematics of the family Hydrobiidae using molecular evidence. Genetic analysis of hydrobiid cavesnails is necessary because their characteristic miniaturization and anatomical simplification makes phylogenetic analysis by morphological criteria alone extremely difficult (Hershler and Holsinger, 1990). To assist in this effort, four *Amnicola cora* specimens were collected and sent to Hershler and curated (USNM 1017836).

Although *Amnicola cora* was confirmed to be locally abundant, its extreme endemism makes it vulnerable to extirpation. The landowner has controlled and limited access to the cave, which is an important strategy to abate the threat of trampling by cavers. Perhaps the greatest threat is habitat alteration, especially increased sediment and nutrient inputs. Loss of interstitial habitat by excessive sediment input is implicated in the population decline of a related species, the endangered Tumbling Creek cavesnail (USFWS, 2002). Three other hydrobiid snails – the Ouachita pebblesnail (*Somatogyrus amnicoloides*), the thicklipped pebblesnail (*S. crassilabris*), and the channelled pebblesnail (*S. wheeleri*) – each endemic to single aquatic sites in Arkansas, are thought to be extinct due to hydrologic alteration of their habitats by impoundment and hypolimnetic release (Walker, 1915; Robison and Allen, 1995).

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