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ANTRORBIS BREWERI, A NEW GENUS AND SPECIES OF HYDROBIID CAVESNAIL (GASTROPODA) FROM COOSA RIVER BASIN, NORTHEASTERN ALABAMA

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Abstract.—An aquatic cavesnail from Coosa River Basin, Alabama, representing a monotypic genus, is described (*Antrorbis breweri,* new genus, new species). Diagnostic features of the genus include a minute, planispiral to low-trochoid shell with apical microsculpture of spirally arranged low tubercles; blind, unpigmented animal; few ctenidial filaments; intestine with coils on lateral surface of style sac and in pallial roof; simple penis; capsule gland with ventral channel; and two sperm pouches. *Antrorbis* and three other North American cavesnail genera that also have a simple penis and capsule gland with ventral channel herein are placed in the Lithoglyphinae.

Among the numerous discoveries of North American nonmarine mollusks made by Leslie Hubricht is a minute planispiral snail from subterranean stream in Manitou Cave, northeastern Alabama, which he assigned (Hubricht 1940:35) to *Horatia* Bourguignat, 1887. Hubricht did not describe the snail, and its affinities were uncertain in light of the determination by Hershler & Longley (1986) that other putative North American *Horatia* are not congeneric with this European group. As part of ongoing review of North American cavesnails, the senior author recently collected live examples of the Manitou cavesnail which we describe below as a new genus and species of Hydrobiidae.

Antrorbis, new genus

Diagnosis.—A minute-sized (2.7–3.0 mm) North American group characterized by a planispiral–low-trochoid shell with apical microsculpture of spirally arranged low tubercles. Operculum paucispiral, without ventral peg. Animal blind, unpigmented. Ctenidial filaments few (7–10). Central radular teeth with single pair of basal cusps. Intestine coiling on right-lateral style sac and in pallial roof. Male with a simple penis. Females oviparous. Oviduct entering capsule gland, which has a ventral channel. Two sperm pouches present.

Type species.—*Antrorbis breweri,* new species (by monotypy).

Etymology.—Masculine, from the Classical Greek, *antrum,* a cave, and *orbis,* a circle, and referring to subterranean habitat and discoidal shell of the snail.

Discussion.—Among North American freshwater hydrobiids, the Lithoglyphinae group of epigean genera (Thompson 1984) and three subterranean forms (*Pterides* Pilsbry, 1909; *Phreatodrobia* Hershler & Longley, 1986; *Holsingeria* Hershler, 1989) share with *Antrorbis* the simple penis and capsule gland with ventral channel. *Antrorbis* resembles some *Phreatodrobia* which have planispiral to low-trochoid shells, but a number of other highly unusual features (i.e., wrinkled protoconch sculpture, absence of basal cusps on the central radular teeth, presence of an anterior coil of the capsule gland) occur among this group of Texas endemics, mitigating against a close relationship with *Antrorbis* or any other known ge-

nus. *Holsingeria* and *Pterides,* local endemics from the Powell River Basin in southwestern Virginia and Panuco River Basin in northeastern Mexico, respectively, share with *Antrorbis* the spirally arranged, tubercular protoconch sculpture; and although these three genera are well differentiated by various combinations of features from shell, operculum, intestinal coiling, and pallial oviduct complex, they appear to represent a natural group.

The heterogeneous assortment of unusual character-states exhibited by these cavesnails makes it difficult to assess affinities among them, or with other hydrobiid groups, but nevertheless we are placing them in the Lithoglyphinae, the only subfamily that agrees with them in general soft anatomical features.[1] The lithoglyphines, as previously conceived (Davis & Pons da Silva 1984, Thompson 1984), were a morphologically compact group of genera characterized by a squat shell with large aperture, which accomodates a broad foot required for holding onto hard substrate in swift current. In light of recent studies on the anatomy of hydrobiid snails, and the discovery of additional new genera, shell shape (reflecting specialization for a particular habitat) no longer can be considered a defining feature of the Lithoglyphinae. In the wake of the taxonomic changes proposed herein, the Lithoglyphinae now parallels the hydrobiid subfamilies Nymphophilinae and Littoridininae in that included genera vary from nearly planispiral to broadly trochoidal to elongate-slender in shell shape. The Lithoglyphinae are represented in South America and Europe, and are widely deployed on the North American continent where they inhabit lentic and lotic epigean habitats as well as subterranean streams. No lithoglyphines are known from brackish-water habitats. We suspect that the Lithoglyphinae are an ancient freshwater group, but the fossil record offers no useful information in this regard because the subfamily is not identifiable on the basis of shell features.

[1] The Hydrobiinae differ anatomically from this group in having a small pallial tentacle; a penial lobe; and a complex, pigmented renal oviduct.

Antrorbis breweri, new species
Manitou cavesnail
Figs. 1–5

Horatia sp.—Hubricht 1940:35.
Horatia micra.—Stein 1976:21.
"*Horatia.*"—Burch 1982:270.—Hershler & Longley 1986:153, figs. 23k, 1, 28a.

Material examined.—USNM 860429, holotype; University of Florida (UF) 135984 (4 specimens), USNM 860430 (9), paratypes, RH and party coll., 6 Jun 1988.—USNM 860431 (16), RH coll., 16 Sep 1988.—USNM 860432 (10), L. Hubricht coll., 19 Jun 1957. All material from Manitou Cave (Fig. 1), Little Wills Valley, Coosa River Basin, Fort Payne, AL (7.5 minute series), T. 7S, R. 9E, NE ¼ section 18.

Description.—Shell (Fig. 2; Table 1) discoidal, clear, transparent, 1.5–1.7 mm wide; height about half of width. Surface usually covered by moderately thick, yellow-orange periostracum. Whorls, 2.5–3.0, well rounded, sutures deeply indented. Whorl expansion rate moderate. Translation of protoconch and first teleoconch whorl highly variable, yielding impressive diversity of spire development. Aperture near-circular in outline, often slightly longer than wide, with adapical edge advanced. Inner lip thin, less curved than outer, adnate to small portion of body whorl, very slightly flared. Umbilicus broadly open. Protoconch (Fig. 3a–d), 1.25 whorls, sculptured with raised tubercles arranged in numerous spiral rows. Tubercular sculpture weak or absent on teleoconch. Teleoconch having strong collabral growth lines.

Operculum (Fig. 3e) thin, paucispiral, with 4.5 whorls. Ventral surface of operculum slightly convex, lacking peg development.

Animal with 2.5 whorls. Pigment absent, except for some small black granules scat-

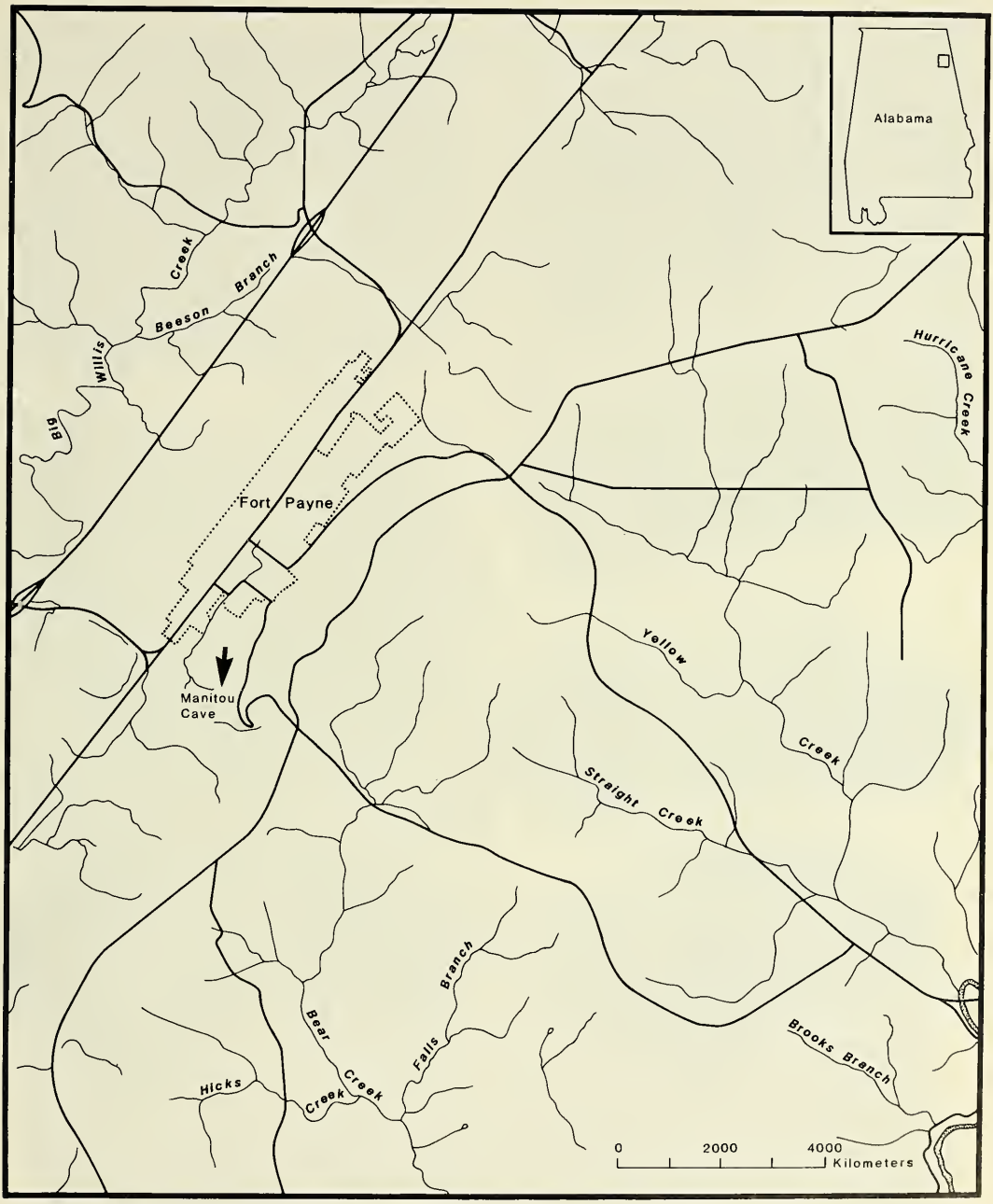

Fig. 1. Map (from Fort Payne Quadrangle, USGS 7.5 minute series, 1946 [revised 1983]) showing location of Manitou Cave.

tered on stomach and digestive gland posterior to gonad. Ctenidium with 7–10 small, triangular filaments. Osphradium filling about a third of ctenidium length.

Radular (Fig. 4) formula: 5-1-4(5)/1-1, 4-1-4(5), 20, 13-15 (from SEM micrographs of paratypes). Central teeth (Fig. 4a) broadly trapezoidal with deeply excavated basal

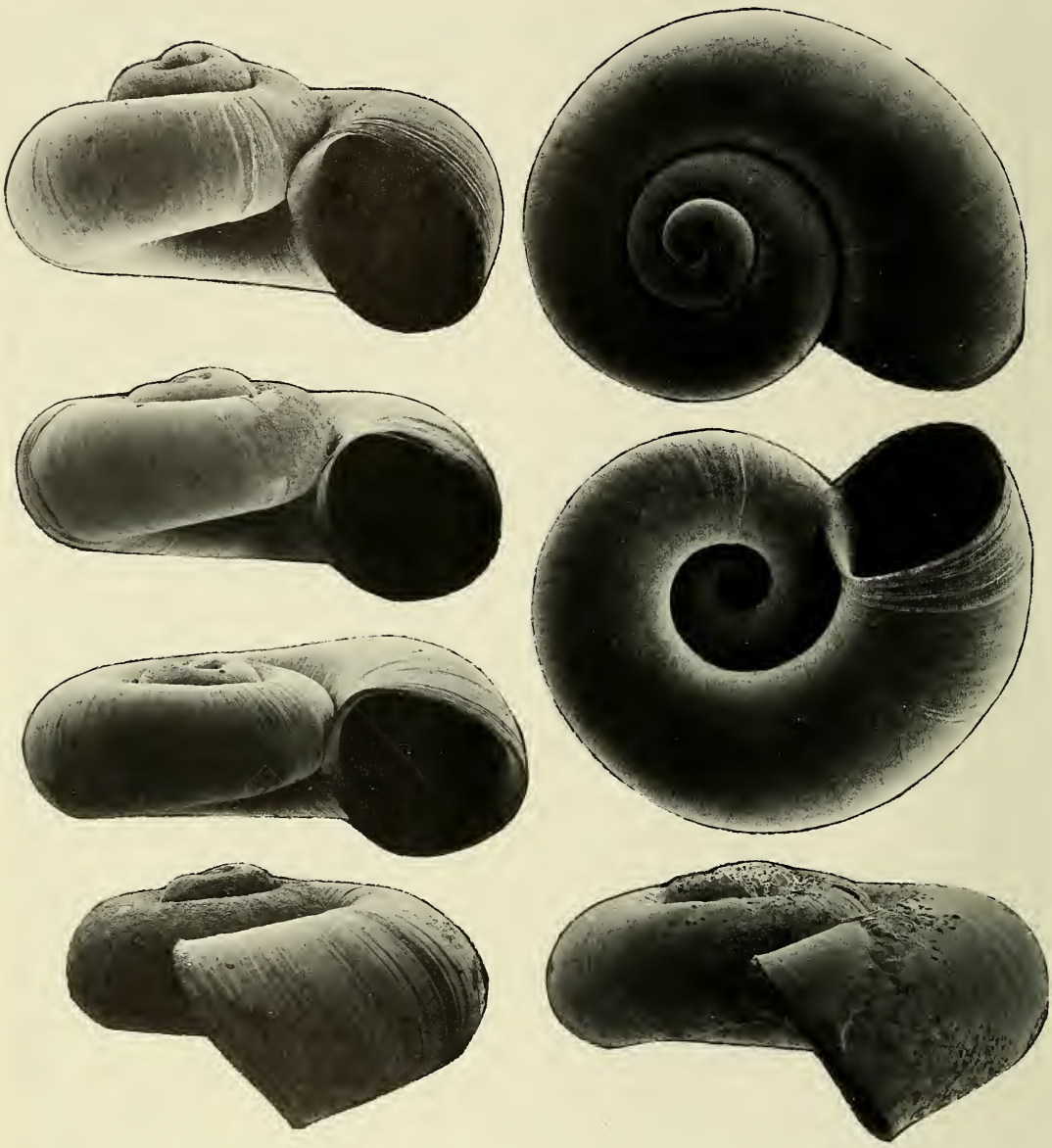

Fig. 2. SEM micrographs of shells of *Antrorbis breweri,* new species: shell at upper left, USNM 860429, holotype (shell width, 1.53 mm); all others, USNM 860430, paratypes (printed to same scale).

processes. Basal cusps of central teeth elongate, arising from edges of lateral angles. Style sac and stomach about equal in length (Fig. 5c). Stomach chambers poorly distinguishable externally; posterior caecal chamber absent. Digestive gland of 0.5–0.75 whorls, consisting of two elongate masses covered with small, lobate swellings. Posteriormost lobe terminates slightly proximal to tip of animal. Intestinal (In) coil on right lateral style sac surface a simple, "U-shape." Coil in anterior pallial roof a more complex, "reversed-S shape" (when viewed dorsally).

Testis a single, unlobed mass filling 0.5 whorl, slightly overlapping posterior stom-

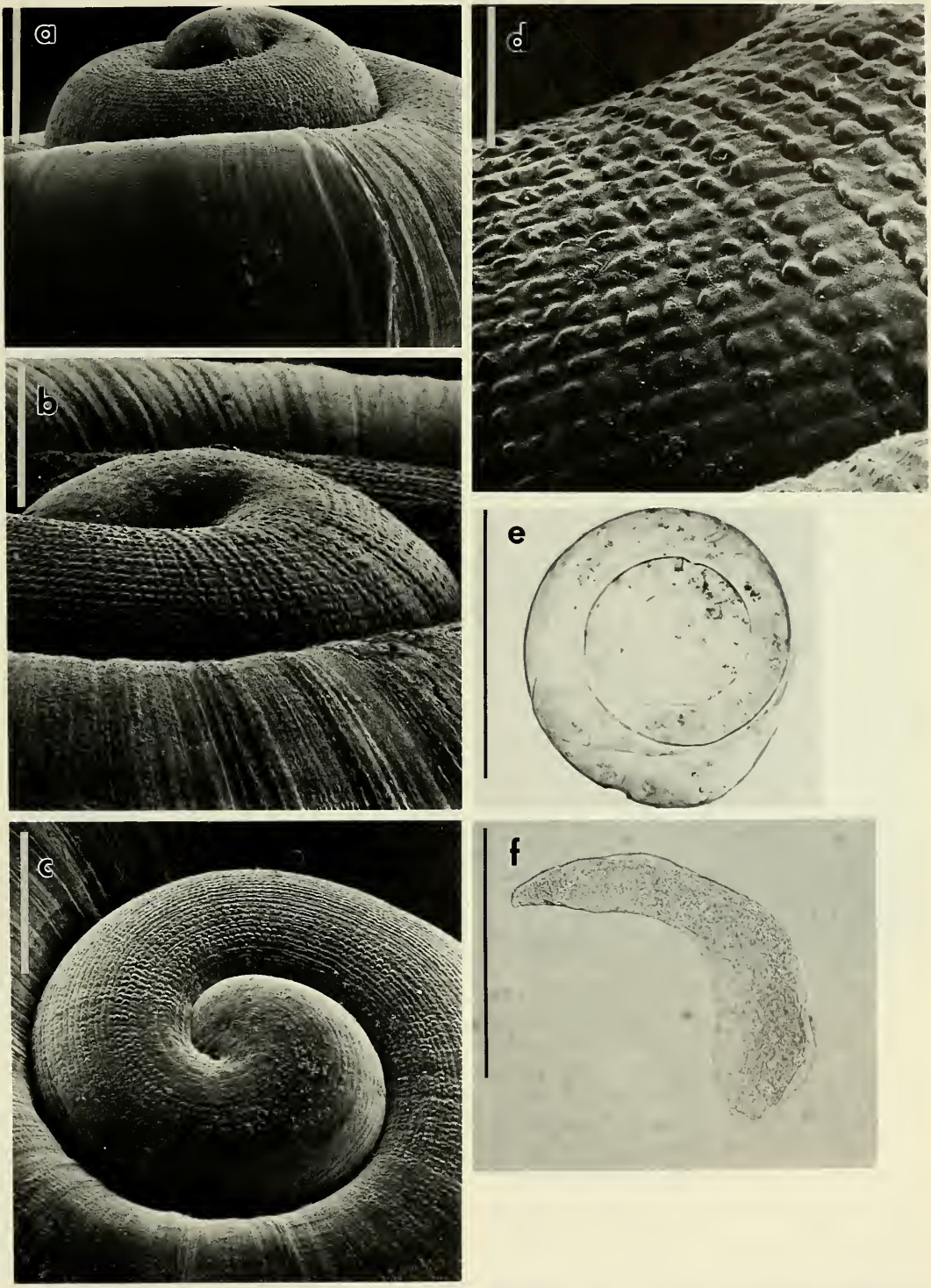

Fig. 3. Shells, operculum, penis of *Antrorbis breweri,* USNM 860430: a–d, SEM micrographs showing shell apex and microsculpture (scale bars = 200 μm, 86 μm, 176 μm, 27 μm); e, operculum (bar = 0.5 mm); f, penis (bar = 0.5 mm).

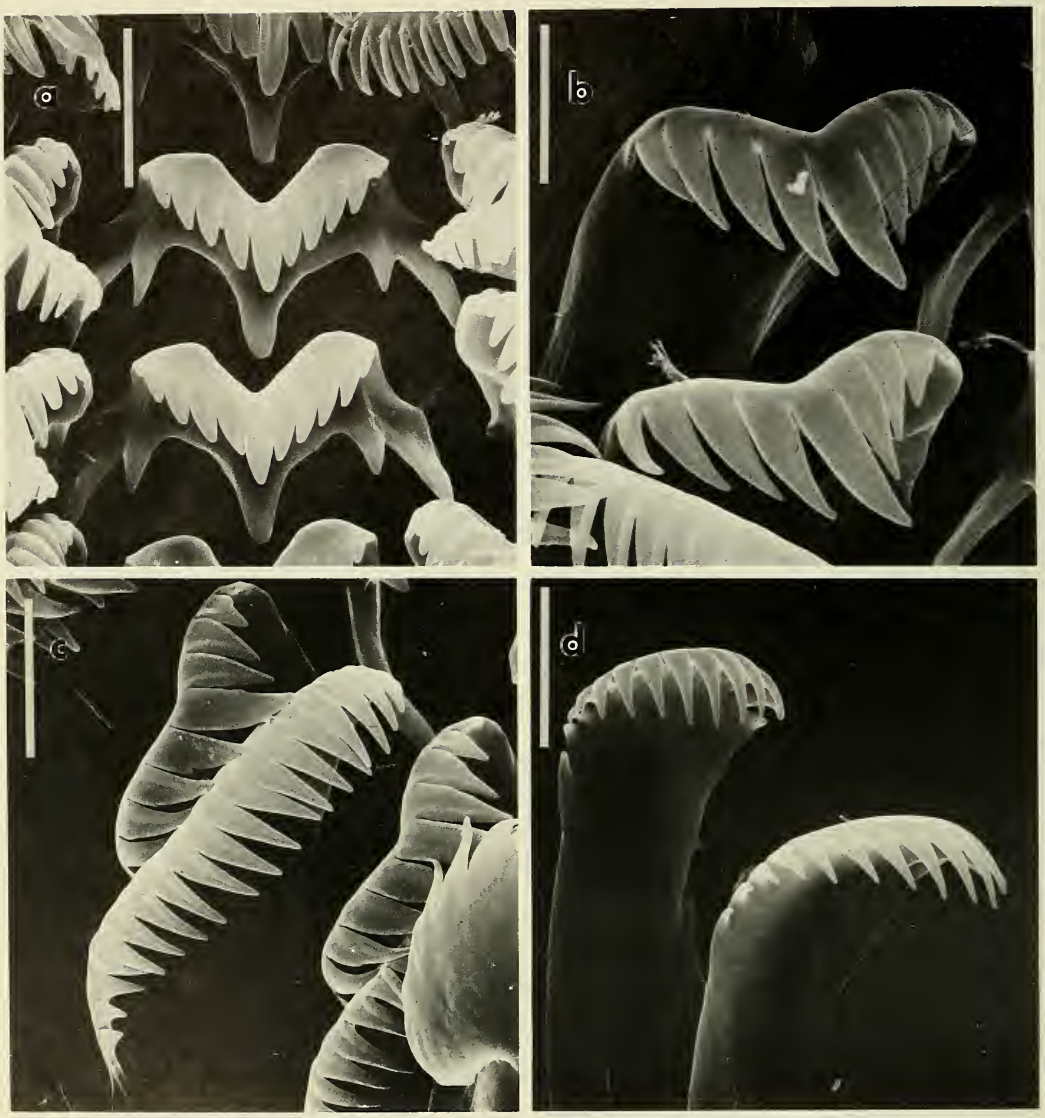

Fig. 4. Radula of *Antrorbis breweri*, USNM 860431: a, Centrals (scale bar = 6.0 μm); b, Laterals (bar = 3.8 μm); c, Inner marginals (bar = 4.3 μm); d, Outer marginals (bar = 4.3 μm).

ach. Seminal vesicle short, largely anterior to testis; connected just proximal to anterior tip of testis. Prostate gland elongate, largely pallial (ca. 80% of length); anterior vas deferens exits from prostate tip. Penis (Fig. 3f) simple, blade-like, with terminal papilla; specialized penial glands absent.

Ovary a single, unlobed mass (usually wholly posterior to stomach) filling <0.25 whorl, orange in color. Pallial oviduct (Fig. 5a) bipartite, overlapping style sac. Capsule gland (white) slightly smaller than albumen gland (clear). Oviduct (Ovi) with single, small coil on posterior left-lateral surface of albumen gland. Bursa copulatrix (Bu, Fig. 5b) pear-shaped, large, pressed against and partly posterior to albumen gland. Seminal receptacle (Sr) smaller, narrower, posi-

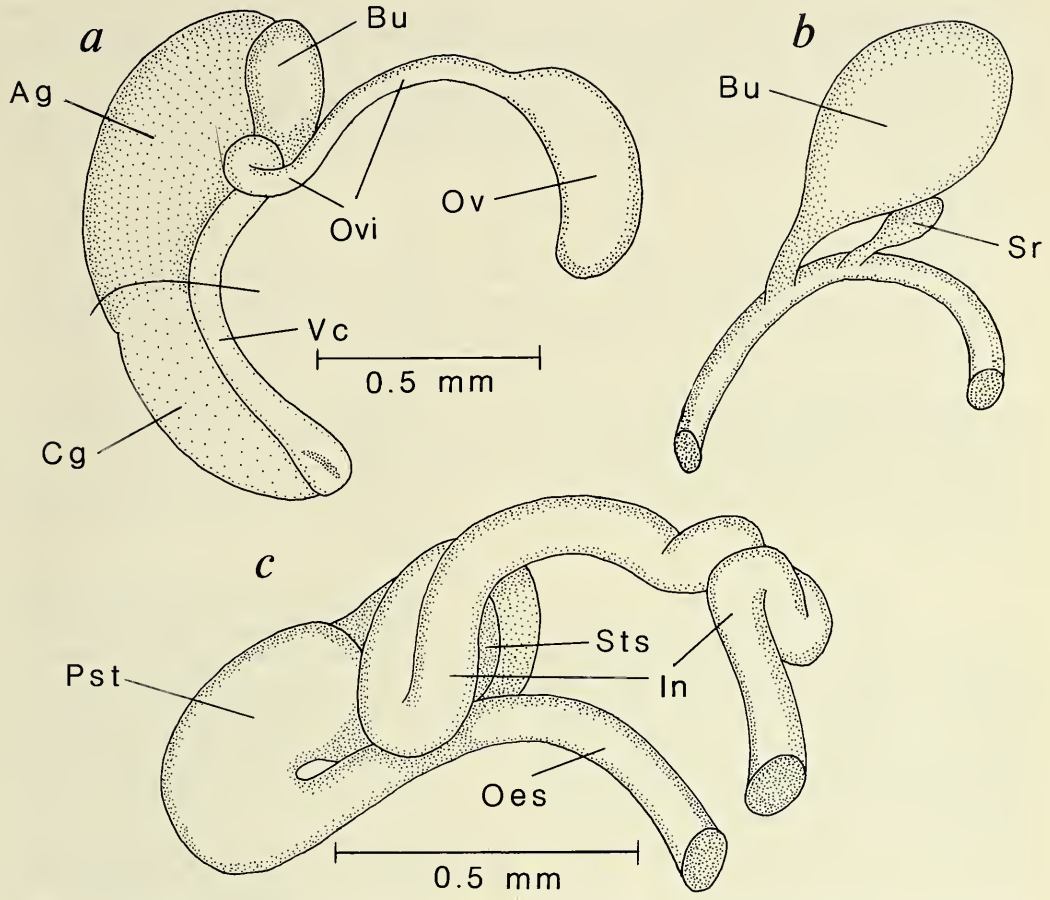

Fig. 5. Morphology of *Antrorbis breweri,* USNM 860431: a, Left lateral aspect of female reproductive system; b, Left lateral aspect of bursa copulatrix and seminal receptable (rotated and slightly enlarged relative to "a"); c, Right lateral aspect of stomach and associated structures. Ag = albumen gland; Bu = bursa copulatrix; Cg = capsule gland; In = intestine; Oes = oesophagus; Ov = ovary; Ovi = oviduct; Pst = posterior stomach; Sr = seminal receptacle; Sts = style sac; Vc = ventral channel of pallial oviduct.

tioned along posterior edge of bursa copulatrix. Ducts of sperm pouches short, entering oviduct just distal to coil. Ventral channel narrow relative to capsule gland width; opening of capsule gland broad, subterminal.

Etymology.—Named after Dr. Stephen Brewer, the current owner of Manitou Cave, in recognition of his cooperation with and interest in this study.

Habitat.—Manitou Cave, formerly a commercial cave, has been closed to the public since 1980. A large opening fitted with a metal door serves as the entrance to the cave on the side of a small hill. On ground level below the door a small (< 1 m across), cool stream emerges amongst limestone rubble. *Antrorbis breweri* was absent from the epigean spring, but was collected from the uppermost portion of cave stream. Snails were found at a point where water cascaded from several narrow openings into a shallow (1–2 cm) pool in a small (ca. 4 m^2), cement-lined, rectangular structure (which formerly served as the municipal water source for Fort Payne). Snails were collected (rarely)

Table 1.—Shell measurements (mm) of adults of *Antrorbis breweri*. WH = number of whorls; SH = shell height; SW = shell width; LBW = length of body whorl; WBW = width of body whorl; AL = aperture length; AW = aperture width.

	WH	SH	SW	LBW	WBW	AL	AW
USNM 860429 (holotype)	2.75	0.98	1.53	0.83	1.07	0.68	0.53
USNM 860430 (paratypes)	3.0	0.85	1.69	0.72	1.19	0.62	0.63
	2.75	0.88	1.67	0.77	1.15	0.61	0.61
	2.75	0.80	1.66	0.68	1.17	0.59	0.57
	2.75	0.80	1.79	0.63	1.22	0.62	0.62

from bottoms of loose bricks and natural breakdown littering the pool bottom. Other accessible reaches of cave stream were not searched. Scarcity of the snail also was mentioned by Stein (1976).

Acknowledgments

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