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ABSTRACT

Hamiota, a new genus of freshwater mussel containing four species formerly assigned to the genus *Lampsilis* Rafinesque, 1820, is described. In addition to the genus *Lampsilis*, members of *Hamiota* had previously been placed in the genera *Villosa* Frierson, 1927, and *Ligumia* Swainson, 1840. Several characters including the packaging of their larvae in a superconglutinate lure to attract host fishes, placement and shape of the marsupia, and release of glochidia through the excurrent siphon, support the recognition of these species as a distinct genus.

INTRODUCTION

Following the discovery in 1988 by Robert Butler of the first superconglutinate lure ensnared on a snag in a tributary of the Choctawhatchee River, a number of publications (e.g., Haag et al., 1995; Hartfield and Butler, 1997; O'Brien and Brim Box, 1999; Blalock-Herod et al., 2002) have confirmed through direct observation the supposition that these unique lures are produced by four species of freshwater mussels endemic to the Gulf of Mexico drainages of the southeastern United States. Herein, we confirm earlier published suggestions that these four species represent a distinct genus of freshwater mussels (Fuller and Bereza, 1973; O'Brien and Brim Box, 1999). The recognition of this genus is based on several characters including the production of the superconglutinate lure, and the unique shape and placement of the marsupia (the region of the demibranchs where female unionoid mussels brood developing larvae), and is supported by molecular evidence (Roe et al., 2001). Use of marsupial features is consistent with previous designations of unionid "divisions" initiated by Simpson (1900a) and continued by Heard and Guckert (1970). The designation of *Hamiota* increases the number of North American unionids genera to 50 (Turgeon et al., 1998).

MATERIALS AND METHODS

A list of specimens examined is included in Appendix 1. Acronyms used in the text are: Academy of Natural Sciences of Philadelphia (ANSP), Delaware Museum of Natural History (DMNH), Florida Museum of Natural History (UF), United States National Museum (USNM), University of Alabama Unionid Collection (UAUC), and Mississippi Museum of Natural Science (MMNS). Abbreviated synonymies are presented for each taxon and include novel combinations and publications with illustration. Measurements were taken to the nearest 0.05 mm using dial calipers.

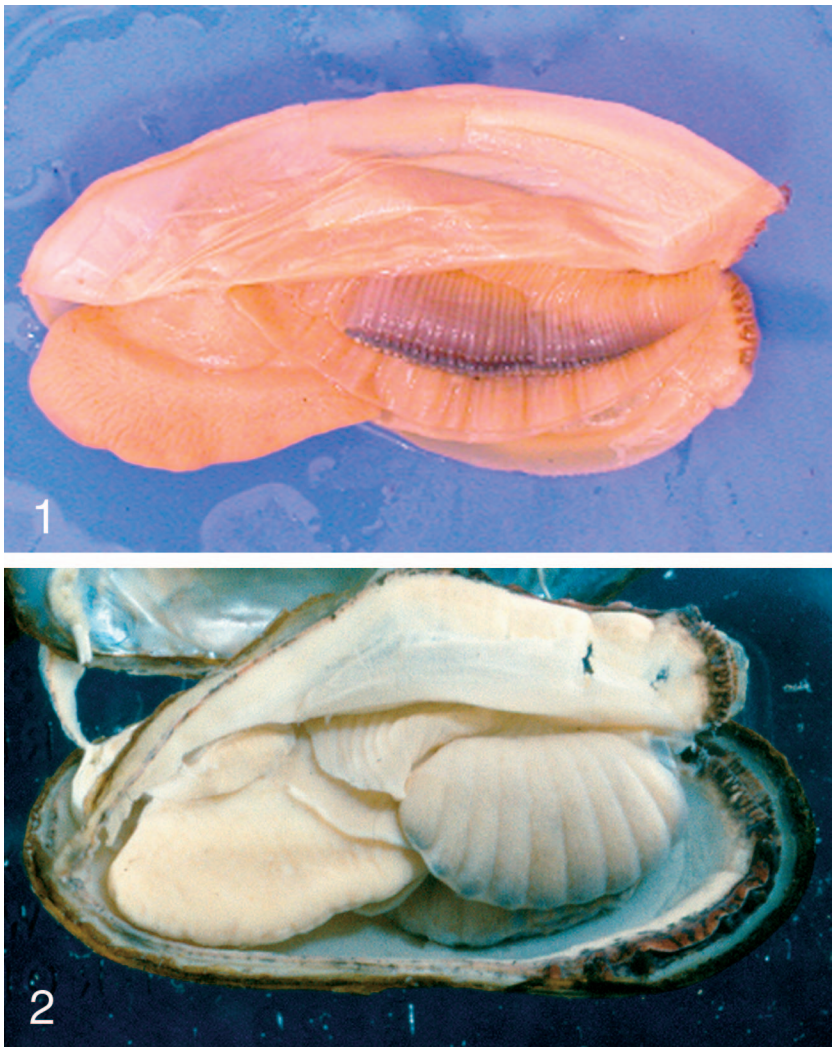
SYSTEMATICS

Family Unionidae Rafinesque, 1820
Tribe Lampsilini von Ihering, 1901

Hamiota new genus. Type species: *Hamiota subangulata* (Lea, 1840) by original designation

Diagnosis: A monophyletic group of freshwater bivalves (Roe et al., 2001) in which all of the glochidia are released simultaneously encased in mucous packages that are referred to as superconglutinates (Haag et al., 1995, fig. 1). The superconglutinate lure exits the mantle cavity via the excurrent opening and is encased within a transparent mucous tube (Hartfield and Butler, 1997; O'Brien and Brim Box, 1999). When acted upon by water currents the superconglutinate mimics the movements of a swimming fish, and has been shown to elicit attacks from fishes (Haag and Warren, 1999). The marsupium is restricted to the ventral portion of the outer demibranchs of female mussels (Figure 1). The precise shape and pigmentation of the marsupia, as well as the degree of posterior mantle margin development, varies across species.

Description: Members of this genus are small- to medium-sized freshwater bivalves, and adult valves generally are between 45–100 mm in length. Shells range from ovate to elliptical in outline, and are somewhat



Figures 1, 2. Inner mantle and outer demibranchs of gravid superconglutinate-producing mussels in the genus *Hamiota* and inner mantle and outer demibranchs typical of non-superconglutinate-producing mussels of the genera *Lampsilis, Ligumia,* and *Villosa.* **1.** Female *Hamiota australis.* **2.** Female *Villosa vibex.*

compressed to moderately inflated. Shell thickness ranges from heavy to thin. Sexes display some degree of dimorphism in shell shape. Shells of male mussels are typically more acutely pointed posteriorly, whereas shells of female mussels display an expanded posterior margin. Periostracum is typically smooth, but can be very glossy in some species. Background color ranges from dark-brown and black through chestnut-brown to straw-yellow. Black to bright green rays of variable width are often present and may be limited to the posterior slope, or cover the entire disk. Nacre color is typically white although other colors such as salmon or blue may be seen as well, particularly in the beak cavities or the posterior margins. The marsupia are often asymmetrical in shape; the anterior portion is typically broadest, tapering toward the posterior end. The ventral margin of the marsupium is darkly pigmented in gravid females. Pigmentation of marsupia varies across species and populations and colors may include purple, red, black, or white. In females, the mantle margins anterior to the branchial opening are elaborated to varying degrees. The morphology of the glochidial valves of members of *Hamiota* is similar to that of members of *Lampsilis* or *Villosa* (O'Brien and Brim Box, 1999).

Etymology: *Hamiota* = angler. Derived from the Greek word *hamus,* meaning hook. This name refers to the means by which members of this genus attract host fishes by packaging their parasitic larvae in a lure that mimics a small fish.

Remarks: Species of *Hamiota* generally have been treated as *Lampsilis* due to the similarity in shape and coloration of their shells. Some authors also have included these species in the genus *Villosa* or *Ligumia,* due to shell shape, thickness, and/or ornamentation of the mantle flap. The shells of *Hamiota* species are in-

deed similar to the shells of these genera, and the mantle flap may exhibit characters of both *Lampsilis* and *Villosa.* However, in *Hamiota,* the marsupia is restricted to the ventral half of the posterior portion of the outer demibranchs, while in *Lampsilis, Ligumia,* and *Villosa* the marsupium fully occupies the water tubes of the posterior portion of the outer demibranchs (Figure 1). Unlike members of *Lampsilis,* which release larvae through pores in the ventral edge of the demibranchs, members of *Hamiota* release the superconglutinate lure through the excurrent opening. The placement and shape of the marsupium and the extraordinary method of glochidial release and host fish attraction, the superconglutinate, are uniquely derived characters in the Lampsilini that warrant genus-level recognition.

Hamiota altilis (Conrad, 1834) new combination

Unio altilis Conrad, 1834; Conrad, 1834: 43, pl. 2, fig. 1; Chenu, 1845: 21, pl. 1, fig. 1; Reeve, 1865: pl. 23, fig. 109.
Margarita (*Unio*) *altilis* (Conrad, 1834); Lea, 1836: 24.
Margaron (*Unio*) *altilis* (Conrad, 1834); Lea, 1852a: 27.
Lampsilis altilis (Conrad, 1834); Simpson, 1900a: 529; Parmalee and Bogan, 1998: 125, pl. 47.
Unio clarkianus Lea, 1852; Lea, 1852b: 251; Lea, 1852c: 273, pl. 21, fig. 30; Lea, 1852d: 29, pl. 21, fig. 30.
Margaron (*Unio*) *clarkianus* (Lea, 1852); Lea, 1852a: 27.
Lampsilis clarkianus (Lea, 1852); Simpson, 1900a: 532.
Unio gerhardtii Lea, 1862; Lea, 1862a: 168; Lea, 1862b: 208, pl. 31, fig. 277; Lea, 1862c: 30, pl. 31, fig. 277.
Margaron (*Unio*) *gerhardtii* (Lea, 1862); Lea, 1870: 35.
Lampsilis (*Lampsilis*) *gerhardtii* (Lea, 1862); Simpson, 1900a: 532.
Unio doliaris Lea, 1865; Lea, 1865: 88; Lea, 1868: 260, pl. 32, fig. 75; Lea, 1869: 20, pl. 32, fig. 75.
Margaron (*Unio*) *doliaris* (Lea, 1865); Lea, 1870: 42.
Lampsilis (*Lampsilis*) *doliaris* (Lea, 1865); Simpson, 1900a: 533.

Description: Described by Conrad (1834) as sub-oval, thin, and inflated. The periostracum was described as "rugose" and "blackish" with rays and "numerous short vermicular lines on the posterior slope," and the nacre as whitish and iridescent. The periostracum of specimens of *H. altilis* is typically brown to chestnut-brown in color with a variable number of dark green rays. The left valve has two heavy, spatulate pseudocardinal teeth, the smaller above the larger. The right valve has two nearly equally sized triangular teeth, the larger anterior to the smaller. The lateral teeth are short but blade-like, two in the right valve, and one in the left.

The posterior mantle margin of the female is expanded into a well-developed flap with papillae along the border. Coloration, number, and size of papillae vary somewhat between populations. In general, however, the interior mantle flap is colored red to dark red or brown with darker spots, while the exterior of the flap is brown to black, often with vertical lighter bars, and with a small, but prominent dark "eye spot" on the posterior end. Small papillae are present along the mantle flap, usually becoming more robust anteriorly. In males, the mantle flap is typically not expanded and is reddish in color. Marsupia of *H. altilis* are finely tapered at each end when immature, becoming broadly rounded on the ends in most populations, tapering anteriorly in others. Marsupia color is a dark reddish-brown or black along the margin and white above. The anus is usually pigmented red and the incurrent and excurrent siphons are reddish-brown to black. The glochidia of *H. altilis* are described by Haag et al. (1999).

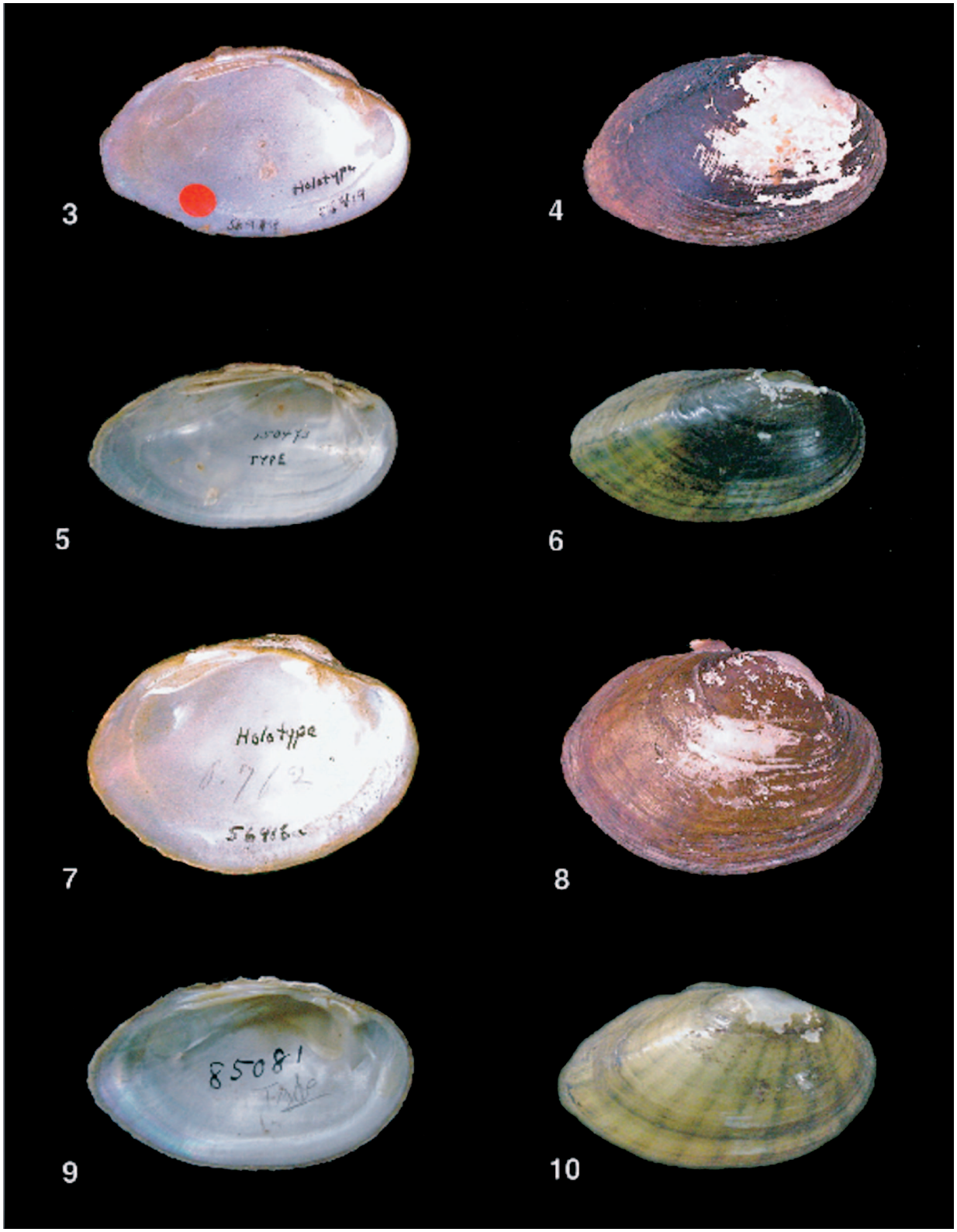
Type Material: *Unio altilis* Conrad, 1834, Lectotype ANSP 56419 (Figures 3, 4) here designated. Type locality: Alabama River, near Claiborne [Monroe Co., Alabama].
Unio clarkianus Lea, 1852, Type not found. Type locality: Williamsport, [Maury Co.], Tennessee; Georgia or Alabama.
Unio doliaris Lea, 1865, Lectotype USNM 84936, here designated. Type locality: Etowah River, Georgia.
Unio gerhardtii Lea, 1862, Holotype USNM 25711 by monotypy. Type locality: Chattanooga, Georgia.

Remarks: The most variable species included in *Hamiota, H. altilis,* is endemic to the Mobile River Basin. Some of the conchological variation is undoubtedly ecophenotypic in nature, although the extent and nature of the variation in shell shape and pigmentation has not been adequately explored.

Conrad (1834) in his original description did not identify a primary type. Johnson and Baker (1973) identified ANSP 56419 as the figured holotype, although the specimen label indicates the locality as "Ogeechee R., Ga." Johnson and Baker (1973) state that the label is in error, and "probably was mixed with ANSP 46418, which is labeled 'Claiborne, Alabama', by error." Conrad (1834) clearly indicated that the specimen(s) of *U. altilis* described were collected from the "Alabama River, near Claiborne." Conrad (1834) did not specifically designate a holotype and according to the ICZN recommendation 73F and Article 74.5 the holotype designation of Johnson and Baker (1973) is deemed invalid. In order to preserve stability of nomenclature, we herein designate specimen ANSP 56419 as the lectotype of *U. altilis.* In accordance with ICZN Article 74.7, we herein designate the specimen USNM 84936 as the lectotype of *U. doliaris* Lea in order to maintain taxonomic stability and because this specimen appears to be that figured by Lea (1868). *Hamiota altilis* is considered threatened by the United States Fish and Wildlife Service (USFWS, 1994).

Life History: Mature gravid females have been reported from March through June. *Hamiota altilis* have also been observed releasing glochidia in a superconglutinate (Haag et al., 1999). Large centrarchid fishes, including *Micropterus coosae* Hubbs and Bailey, 1940, *M. punctulatus* (Rafinesque, 1819), *M. salmoides* (Lacepéde, 1802), and *Lepomis cyanellus* Rafinesque, 1819, have been confirmed as suitable hosts (Haag et al., 1999).

Range: *Hamiota altilis* was historically reported



Figures 3–10. Type material of species of *Hamiota.* Photographs are of the interior of left valve and exterior of right valve. **3, 4.** Lectotype of *H. altilis* ANSP 56419. **5, 6.** Holotype of *H. australis* USNM 150473. **7, 8.** Lectotype of *H. perovalis* ANSP 56416. **9, 10.** Lectotype of *H. subangulata* USNM 85801.

throughout the Mobile River Basin, including the Tombigbee, Black Warrior, Cahaba, Alabama, Tallapoosa, and Coosa River drainages in Alabama, Georgia, Mississippi, and Tennessee. The species is currently restricted to localized portions of the Cahaba, Coosa, and Tallapoosa rivers and some of their tributaries (USFWS, 2003).

Hamiota perovalis (Conrad, 1834) new combination

Unio perovalis Conrad, 1834; Conrad, 1834: 43, pl. 2, fig. 2; Chenu, 1845: 21, pl. 1, fig. 2; Küster, 1861: 257, pl. 87, fig. 2; Reeve, 1866: pl. 38, fig. 209.
Margarita (*Unio*) *perovalis* (Conrad, 1834); Lea, 1836: 24.
Margaron (*Unio*) *perovalis* (Conrad, 1834); Lea, 1852a: 27.
Lampsilis perovalis (Conrad, 1834); Simpson, 1900a: 531.
Unio spillmanii Lea, 1861; Lea, 1861: 39, Lea, 1862d: 98, pl. 15, fig. 246; Lea, 1862e: 102, pl. 15, fig. 246, Reeve, 1868: pl. 82, fig. 435.
Margaron (*Unio*) *spillmanii* (Lea, 1861); Lea, 1870: 42.
Lampsilis (*Lampsilis*) *spillmani* (Lea, 1861); Frierson, 1927: 69 [misspelling].

Description: Conrad (1834) described this species as oval and inflated with a moderately thick shell. He noted two color varieties, one in which the periostracum was olivaceous and obscurely rayed with white nacre and another in which the periostracum was reddish-brown with "rose colored" nacre. The periostracum of specimens of *H. perovalis* is generally lighter in color than *H. altilis* and range from straw-yellow to light brown. The number of rays is variable and can cover the entire disk. The left valve contains two robust equal sized pseudocardinal teeth. The right valve has two pseudocardinals and the anterior tooth is smaller than the posterior tooth. The lateral teeth are elongate, two in the left, one in the right.

The mantle margins of female *H. perovalis* are expanded into well-developed flaps, pigmented red on the interior and darker red to brown or black on the exterior. No eyespot is present and short papillae are present along the mantle edge. Males possess a rudimentary mantle margin with weak pigmentation and few papillae. The marsupia of *H. perovalis* are pisciform in shape, broader anteriorly and narrowly tapering posteriorly. The marsupium is reddish or darker along the margin, often with a darker spot of pigment on the broader anterior end that resembles an eyespot in the superconglutinate lure. The anus can be pigmented red and black, and the incurrent and excurrent siphons are usually reddish or brown in color.

Type Material: *Unio perovalis* Conrad, 1834, Lectotype ANSP 56416 (Figures 7, 8), here designated. Type locality: Alabama River, at Claiborne [Monroe Co., Alabama].
Unio spillmanii Lea, 1861, Lectotype USNM 84925, here designated. Type locality: Luxpalila Creek, near Columbus, Mississippi.

Remarks: There has been some question as to the distinctiveness of *H. perovalis* from *H. altilis,* perhaps because both were described from practically the same locality. An examination of mitochondrial DNA sequences by Roe et al. (2001) recovered these two taxa as a clade, but failed to resolve them into reciprocally monophyletic groups. Hurd (1974) considered *perovalis* a junior synonym of *altilis,* as did Burch (1975). Frierson (1927) considered *U. doliaris* (Lea, 1865) a synonym of *perovalis,* although Parmalee and Bogan (1998) include *U. doliaris* as a synonym of *altilis.* Based on the collection locality and the appearance of the type specimen, we place *U. spillmanii* Lea, 1861 as a synonym of *H. perovalis.* As with *U. altilis,* Conrad (1834) did not specifically designate a holotype for *U. perovalis,* therefore, according to the ICZN Article 74.5 and recommendation 73F the holotype designation of Johnson and Baker (1973) is deemed to be in error. In an effort to maintain nomenclatural stability we herein designate ANSP 56419 the lectotype for *U. perovalis.* According to ICZN Article 74.7, the specimen USNM 84925 is here designated as the lectotype of *U. spilmanii* in order to fix the name and maintain nomenclatural stability. This species is listed as threatened by the United States Fish and Wildlife Service (USFWS, 1994).

Life History: Discharge of superconglutinates was first observed in *H. perovalis* (Haag et al., 1995). Glochidia mature and are discharged between March and June, with releases concentrated in early April (Hartfield and Butler, 1997). *Micropterus coosae, M. punctulatus,* and *M. salmoides* have been identified as suitable host fishes for the orange-nacre mucket (Haag and Warren, 1999).

Range: *Hamiota perovalis* was historically known from the Mobile Basin's Alabama, Tombigbee, Black Warrior, and Cahaba rivers and their tributaries in Alabama and Mississippi. The species has apparently become extirpated from the main channels of the larger rivers, but continues to survive in some tributaries of all four drainages (USFWS, 2003).

Hamiota subangulata (Lea, 1840) new combination

Unio subangulatus Lea, 1840; Lea, 1840: 287; Lea, 1842a: 209, pl. 13, fig. 23; Lea, 1842b: 47, pl. 8, fig. 23; Küster, 1861: 278, pl. 94, fig. 2; Simpson, 1892: 415, pl. 58, fig. 1; Reeve, 1868: pl. 65, fig. 327.
Margaron (*Unio*) *subangulatus* (Lea, 1840); Lea, 1852a: 29.
Lampsilis subangulatus (Lea, 1840); Simpson, 1900a: 556; Clench and Turner, 1956: 196, pl. 2, fig. 2.
Ligumia subangulata (Lea, 1840); Haas, 1969: 443.
Villosa subangulata (Lea, 1840); Heard, 1979: 44.
Unio kirklandianus S. H. Wright, 1897; S. H. Wright, 1897: 136.
Lampsilis kirklandianus (S. H. Wright, 1897); Simpson, 1900a: 557; Simpson, 1900b: 76, pl. 1, fig. 7.

Description: A medium-sized mussel that reaches approximately 85 mm in length (Brim Box and Williams, 2000). Specimens are generally elongate; the posterior ridge is rounded and the posterior slope is usually con-

cave. Periostracum color is variable in this species. Individuals range from straw-yellow to chestnut-brown in color with a variable number of black to bright emerald green rays of variable width. These rays emanate from the umbo and radiate across the disk. Most shells are shiny, although some populations exhibit an extremely glossy periostracum. This species has been described as one of the most beautiful of all North American freshwater mussels (S. H. Wright, 1897; Clench and Turner, 1956).

Wright (1897) described *U. kirklandianus* from the Ochlockonee River in Leon County, Florida and remarked that his specimens were more polished and had broader rays than typical of *U. subangulatus,* and that the shells were "deeper and broader." The right valve has two somewhat spatulate pseudocardinal teeth, the smaller nearly directly above the other. The left valve has two pseudocardinal teeth, the anterior one much larger than the other. Lateral teeth are thin, but not delicate, two in the left and one in the right valve. Examination of specimens from across the range of this species reveals substantial variation in shell color and size. The mantle margins in females are only slightly expanded into a modest flap. The flaps are light brown in coloration on the interior and freckled-brown on the exterior, and no eyespot is present. Short papillae are present along the margin of the flap, becoming larger anteriorly. In males, the mantle is only slightly expanded, without pigment, and with very short papillae. The marsupia are pisciform in shape, broader anteriorly and tapered behind, and darkly pigmented along the margin often with a darker spot of pigment anteriorly. The anus is unpigmented and the siphons are brownish. Glochidia were figured and described by O'Brien and Brim Box (1999).

Type Material: *Unio subangulatus* Lea, 1840, Lectotype USNM 85801 (Figures 9, 10) designated by Clench and Turner (1956). Type locality: Chattahoochee River, Columbus, [Muscogee Co.,] Georgia.
Unio kirklandianus S. H. Wright, 1897, Paratype USNM 149648. Type locality: Oclocknee River, Leon Co., Florida.

Remarks: *Hamiota subangulata* is listed as an endangered species (USFWS, 1998). The analysis of Roe et al. (2001) resolved this taxon as monophyletic and in a clade with *H. australis.*

Life History: Discharge of superconglutinate lures has been documented by O'Brien and Brim Box (1999) from late May through early June. *Micropterus punctulatus* and *M. salmoides* appear to be primary hosts for the species (O'Brien and Brim Box, 1999).

Range: *Hamiota subangulata* was found throughout the Apalachicola River Basin and the Ochlockonee River drainage (Brim Box and Williams, 2000). Currently the species continues to survive in some small streams and headwater rivers (USFWS, 1998).

Hamiota australis (Simpson, 1900) new combination

Lampsilis australis Simpson, 1900; Simpson, 1900a: 544; Simpson, 1900b: 75, pl. 2, fig. 2; Clench and Turner, 1956: 199, pl. 2, fig. 3.
Ligumia australis (Simpson, 1900); Haas, 1969: 432.
Villosa australis (Simpson, 1900); Heard, 1979: 44.

Description: Simpson (1900b) described the shells of this species as "long and elliptical . . . moderately inflated." The periostracum was described as "smooth, shinning, greenish yellow, rayed with green" and the nacre as "bright bluish white." Specimens examined were elliptical to elongate oval and often terminate in a blunt point. Specimens are almost always stained black, with some green rays visible on the posterior slope. The periostracum is often glossy. The right valve contains two pseudocardinal teeth, the smaller above the larger. The left valve has two compressed pseudocardinal teeth. Lateral teeth are elongate and slightly curved, two in the left valve and one in the right. Posterior mantle flaps are poorly developed with a streak of red stain along the margins. There is no eyespot on the mantle flap, and only a few very small papillae. The marsupia are pisciform, broadly rounded anteriorly and tapering behind (Figure 1). Color of the marsupium is white along the margin and black above. The anus is unpigmented and the incurrent and excurrent siphons are reddish in color. Glochidia were described and figured by Blalock-Herod et al. (2002).

Type Material: *Lampsilis australis* Simpson, 1900, Holotype USNM 150473 by original designation (Figures 5, 6). Type locality: Little Patsiliga Creek, southeastern Alabama.

Remarks: Fuller and Bereza (1973) stated that this species represented an "undescribed lampsiline genus" and that its marsupium allied it closely with *Ptychobranchus.* This species was incorrectly synonymized with *Ptychobranchus jonesi* (van der Schalie, 1934) by Clench and Turner (1956). The phylogenetic analysis of Roe et al. (2001) clearly placed this species with the other superconglutinate producers.

Life History: Superconglutinate releases have been documented in this species by Blalock-Herod et al. (2002). *Micropterus* spp. are likely hosts (Blalock-Herod et al., 2002).

Range: *Hamiota australis* was known historically from the Escambia, Yellow, and Choctawhatchee River systems. It continues to survive in some river and stream segments within these systems. This species is not currently protected under the Endangered Species Act.

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APPENDIX 1

SPECIMENS EXAMINED

Hamiota altilis

Alabama

Alabama River: USNM 25948; Alabama River, near Claiborne: ANSP 56419 [Lectotype *U. altilis* Conrad, 1834], ANSP 56418; Big Swamp Creek, Macon Co.: USNM 361723; Jackson Shoals, Choccolocco Creek: ANSP 103834, ANSP 103871; Beaver Creek: ANSP 103863; Coosa River: ANSP 41120, DMNH 130623; Coosa River, Coosa Valley: ANSP 103771; Higgin's Ferry, Coosa River, Chilton Co.: USNM 218118; McGowen's Ferry, near Wilsonville, Coosa River: USNM 521359; Weduska Shoals, Coosa River: ANSP 48001, DMNH 075252, DMNH 150037, DMNH 150038, USNM 348970, USNM 452169; Coosa River, [incomprehensible handwriting] Shoals, Shelby Co.: ANSP 341399; Shoal Creek, Pine Glen Recreational Area, Cleburne Co.: MMNS 7743, MMNS 8084, MMNS 8085, UAUC 120, UAUC 121, UAUC 125; Yellowleaf Creek, Jumbo, Chilton Co.: ANSP 89031; Cane Creek, West of CR 65, 2 mi. West CR 78 Jct., T15S, R11E, sec 3: UAUC 3292, MMNS 8081; Little Cane Creek, at CR 78, East of Edwardsville: UAUC 3293; Chewacla Creek at CR 22, ~4 mi. East of Tuskeegee, Macon Co.: UAUC 246, UAUC 247, UAUC 248; Uphappee Creek, 0.5 mi. upstream of Hwy. 29, Macon Co.: MMNS 8082; Cahaba River: USNM 152026; Cahaba River: ANSP 126054; Little Cahaba River, 0.5 mi. below Cahaba Beach Rd. bridge, Jefferson Co.: UAUC 149; Coosa River, Weduska Shoals, Shelby Co.: UF 3255; Coosa River at Fort William Shoals, Talladega Co.: UF 65420; Hurricane Creek, Cherokee Co.: UF 175098; Chewacla Creek, 8 mi. ESE of Tuskeegee Co. Rd. 22, Macon Co.: UF 202249; Shoal Creek, St. Clair Co.: UF 245989; Tuskeegee National Forest, Macon Co.: UF 266048; Cahaba River: UF 269576; Shoal Creek, St. Clair Co.: MMNS 8083.

Georgia

Etowah River: USNM 84936 [Lectotype, *U. doliaris* Lea, 1865]; Chattooga River: ANSP 89102; Chattooga

River, Chattooga Co.: USNM 59527; Chattanooga: USNM 25711 [Holotype, *U. gerhardtii,* Lea, 1862]; Fish Creek at Highway 278/ GA State Rt. 6, ~3.9 air mi. West of Rockmart, Polk Co.: UAUC 538, UAUC 539; Conasauga River at Tibbs Bridge Murray CR 109 (Whitfield CR100), Murray/Whitfield Co's.: UAUC 515, MMNS 8092; Conasauga River, Muskrat Midden, Tritogonia Shoals (CRM 46.70), Whitfield/Murray Co's.: UAUC 376; Conasauga River, south of state line, Murray Co.: MMNS 8090; Conasauga River: DMNH 150124, USNM 84937, USNM 348969; Etowah River: USNM 123202.

Tennessee

Conasauga River: DMNH 014683; Conasauga River, Conasauga: ANSP 341305, ANSP 347949; Conasauga River, Polk Co.: MMNS 8091.

Hamiota perovalis

Alabama

Alabama River: ANSP 56416 [Lectotype *U. perovalis* Conrad, 1834], ANSP 333496; Alabama River, Claiborne: USNM 84938; Coosa River: ANSP 56415; Coosa River, Gadsen: ANSP 126051; Coosa River, Talladega Co.: ANSP 126048; Black Warrior River: ANSP 88483; Mulberry River [Fork, Black Warrior River]: ANSP 88485; Rush Creek [Black Warrior River Dr.], FS Rt. 245, Winston Co.: MMNS 7745, MMNS 8088, UAUC 426; Flannigan Creek at FS Rd. 229, Lawrence Co.: MMNS 7744, UAUC 423, UAUC 424, UAUC 425; Toadvine, Valley Creek, Black Warrior River Dr., Jefferson Co.: UF 65302, UF 65304; Forks of the Warrior River, Walker Co.: UF 65305; North River, near Hagler's Mill, Black Warrior Dr., Tuscaloosa Co.: UF 65306; Sipsey Fork at N.F. 234, Bankhead National Forest, Winston Co.: UF 79069, UF 79072, UF 79082, UF 79085, UF 79136, UF 79137; Brushy Creek above Brushy Lake Recreational Area, Bankhead National Forest, Winston Co.: UF 79094; Capsey Creek, 50 mi. from Jct. with Brushy Creek, Bankhead N.F., Winston Co.: UF 79115; Sipsey Fork at mouth of Hurricane Creek, Bankhead National Forest, Winston Co.: UAUC 95; Brown Creek, Bankhead National Forest, Winston Co.: UAUC 1774; Alabama: ANSP 126049; North River, near Samantha [Black Warrior River], Tuscaloosa Co.: UAUC 107; Buttahatchee River, Hamilton: ANSP 100657, DMNH 075231; Tuscaloosa Co. Alabama: DMNH 146496; Black Warrior River, Jefferson Co.: UF 269609; Squaw Shoals, Black Warrior River, Jefferson Co.: UF 65298, UF 65299, UF 65300, UF 65303, UF 65307, UF 65429, UF 269518; Garden City, Mulberry Fork: UF 69207, UF 244558; Banks of Brushy Creek, at N.F. Rd. 255, Bankhead N.F, Winston Co.: UF 69269, UF 79177, UF 79178, MMNS 7748, MMNS 8089; Sipsey Fork, 1 mile N. of AL Hwy. 33 crossing, Winston Co.: UF 69279; Brushy Creek at N.F. Rd., Bankhead N.F., Winston Co.: UF 79076; Sipsey River at Sipsey Recreational Area, Bankhead N.F., Winston Co.: UF 79089; Borden's Creek, 1 mi., upstream of from Jct. Sipsey Fork, Sipsey Wilderness, Bankhead National Forest, Winston Co.: UF 79092, UF 79181; Sipsey Fork at N.F. Rd., 234, Bankhead National Forest, Winston Co.: UF 79139; Limestone Creek, 6.3 mi WNW of Monroeville, Monroe Co.: UF 197636; Blackwater Creek upstream from Harris bridge, Walker Co.: UF 266369; Sipsey River, 1.6 mi N. of Pleasant Ridge, Greene Co.: UF 197671; North River at Co. Hwy. 30, Fayette Co.: UF 197686; Sipsey River, 200 m. below Co. Hwy 23, Greene Co.: UF 197552; Sipsey River, 4–6 mi. below Co. Hwy. 2, Greene Co.: UF 197566; Sipsey River at CR 2, downstream of boat ramp, Pickens Co.: UAUC 156; Tombigbee River: ANSP 126053; Elrod, Sipsey River, Tombigbee R.: DMNH 146493; Lubbub Creek, at CR 24, 3.25 mi. Northeast of Aliceville, Pickens Co.: UAUC 67; Tombigbee River: USNM 159989; Lubbub Creek, 1.8 mi SSE of Aliceville above Hwy 14: UF 197619, UF 197632; Sipsey River, 3.6 mi. W. of Jena downstream of CR 2, Greene Co.: UF 197697; Sipsey River near confluence with Carpenter's Creek, Greene Co.: UF 197801; Sipsey River, 5.7 mi. NNE of Mantua, Greene Co.: UF 197857, UF 197862; Sipsey River, near Elrod, Tuscaloosa Co.: UF 269559, UF 65301; Trussels Creek at CR 19 bridge, Greene Co.: MMNS 8087.

Mississippi

Luxpalila Creek, near Columbus: USNM 84925 [Lectotype, *U. spillmanii* Lea, 1861], USNM 123279; Columbus, Lowndes Co.: UF 269560.

Hamiota subangulata

Alabama

Uchee Creek, Russell Co.: UAUC 116.

Florida

Chipola River, Look-Tremble Falls near Alpha, Calhoun Co.: ANSP 175750; Chipola River, near Pole Bluff landing, Calhoun Co.: ANSP 175751; Chipola River: ANSP 84324; Ochlockonee River: DMNH 150098; Ochlockonee River, Leon Co.: USNM 149648 [Paratype, *U. kirklandianus* S. H. Wright, 1897]; Ochlockonee River, Tallahassee, Leon Co.: ANSP 156892, ANSP 341307; Ochlockonee River, 7 mi. west of Tallahassee: ANSP 157553; Ochlockonee River, 10 mi. west of Tallahassee, Leon Co.: ANSP 159126; Ochlockonee River, 11 mi. northwest of Tallahassee: DMNH 119506; Ochlockonee River, 2 mi. west of Bloxham, Liberty Co.: ANSP 360553; Spring Creek, Marianna: ANSP 160210; State Rt. 167, 1 mi. north of Marianna, Chipola River, Jackson Co.: ANSP 349631; Spring Creek, Reynoldsville, Seminole Co.: UF 177; 1 mi. north Marianna, Chipola River: UF 390; 3.5 mi. east of Quincy, Little River: UF 415; ca. 2

mi. east of Clarksville, Chipola River, Calhoun Co.: UF 418; Chipola River, 9.2 km ENE Kinard, 12.5 km NW Lewis, 16.4 km N. Ida, Calhoun Co.: MMNS 8099.

Georgia

Chattahoochie River: ANSP 56477; Chattahoochie River, Columbus: USNM 85081 [Lectotype, *U. subangulatus* Lea, 1840]; ANSP 126272; Cooleewahee Creek, 0.9 mi. NE of Newton, Baker Co.: USNM 853746; Cooleewahee Creek at GA Rt. 91, Baker Co.: MMNS 8095; Abram's Inlet, Flint River: ANSP 190294; Mill Creek, Flint River, several mi. north of Albany: ANSP 267572; Kinchafoonee Creek at GA Rt. 41 crossing, just south of Preston, Webster Co.: UAUC591; Kinchafoonee Creek at GA Rt. 49 bridge ~9 air mi. northeast of Dawson, Terrell/Sumter Co's.: UAUC 602, UAUC 603, UAUC 604; Kinchafoonee Creek at GA Rt. 32, Lee Co., GA: MMNS 8096; Chickasawhatchee Creek at CR 130 bridge ~4 air mi. SW of Chickasawhatchee, Terrell Co.: UAUC 1753; Muckalee Creek at GA Rt. 195 bridge ~3.5 air mi. Northeast of Leesburg, Lee Co.: UAUC 312; Whitewater Creek on Morgan Mill Rd., Fayette Co.: UAUC 645; Ochlockonee River: DMNH 173390; Ochlockonee River, 7 mi. S. of Cairo: ANSP 194640, DMNH 048538, UF 412; Mimsville: ANSP 47892, DMNH 075151; Georgia: ANSP 126273; Calvary: ANSP 47891; Ochlockonee River, Thomas/Grady Co's. Georgia: MMNS 8101; Spring Creek at GA Rt. 84, Decatur Co.: MMNS 8094, MMNS 8100; Line Creek at GA Rt. 85/74 bridge, Coweta/Fayette Co.: MMNS 8097; Ichawaynochaway Creek at GA Rt. 216, Baker Co.: MMNS 8098.

Hamiota australis

Alabama

Andrews fish trap, Pea River, Barbour Co.: UF 65309; 7 mi. east of Brundidge, Pea River, Pike Co.: UF 123284; Bozemans landing, Conecuh River, near Crenshaw Co. line, Covington Co.: UF 65313; Lightwood Knot Creek, 1.6 mi. west of Opp, Covington Co.: ANSP#; Little Patsaliga Creek: USNM 150473 [Holotype, *Lampsilis australis,* Simpson, 1900]; West Fork Choctawhatchee River at Blue Spring State Park, Barbour Co.: UAUC 134, UAUC 511, UAUC 512, UAUC 513, UAUC 514; Little Choctawhatchie Creek, near Drian bridge, Houston Co.: UF 229532; Conecuh River on CR 28 ~1 mi. east of Goshen, Pike Co.: UAUC 510; Flat Creek at AL Hwy 153, near Flat Creek Church, Geneva Co.: UAUC 547; Five Runs Creek, Conecuh N. F., Covington Co.: MMNS 8086.

Florida

Shoal River at Hwy 85, 1 mi. south of I-10 Jct. in Crestview, Okaloosa Co.: UAUC 550, UAUC 551, UAUC 552, UAUC 643, UAUC 644; Shoal Creek, ca. 1 mi. above U. S. Highway 90, Okaloosa Co.: UF 261852; Limestone Creek, Walton: MMNS 7746, MMNS 7747.