

Separate

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8 | APPENDIX

DESCRIPTION OF A NEW SPECIES OF FRESHWATER SNAIL
CAENOGASTROPODA: PLEUROCERIDAE
FROM THE GREAT VALLEY OF VIRGINIA

Robert T. Dillon, Jr.

Pleurocera shenandoa Dillon, n. sp.

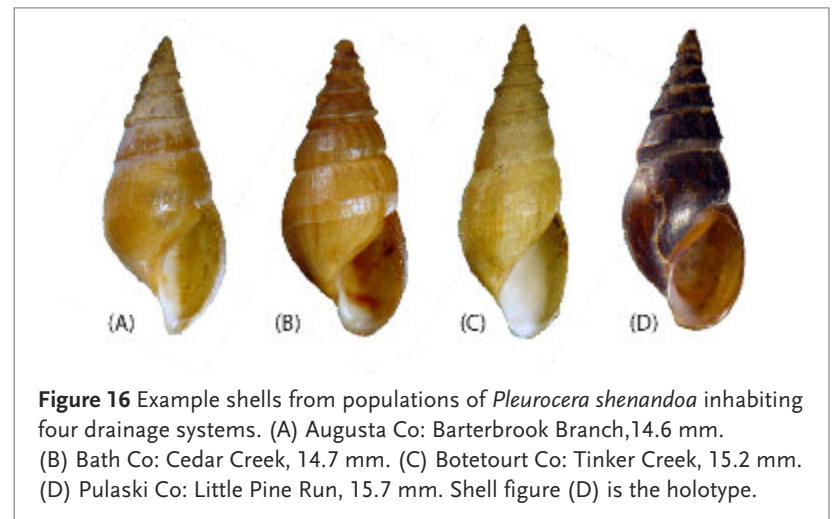


Figure 16 Example shells from populations of *Pleurocera shenandoa* inhabiting four drainage systems. (A) Augusta Co: Barterbrook Branch, 14.6 mm. (B) Bath Co: Cedar Creek, 14.7 mm. (C) Botetourt Co: Tinker Creek, 15.2 mm. (D) Pulaski Co: Little Pine Run, 15.7 mm. Shell figure (D) is the holotype.

FIGURES 5, 7, 16, 17

Goniobasis semicarinata – Dillon and Davis (1980), figs. 2i, 2j, 2k, 2l pg 85. Dillon & Frankis (2004), population Gs. Dillon et al. (2013) and Dillon (2014), *Pleurocera semicarinata* reference population SV.

DIAGNOSIS – A pleurocerid snail bearing a slender shell olive to dark brown in coloration, not black, approximately six whorls in adulthood, the earliest 4 – 5 of which demonstrate a single fine carination (Fig. 16). The body is typically light gray. The shell of *P. shenandoa* n. sp. is more weakly carinate than that of *P. proxima* (Say, 1825), bears fewer carinations than that of (typical) *P. virginica* (Gmelin, 1791), and demonstrates a lower ratio of body whorl length / total length (BWL/TL) than that of *P. simplex* (Say, 1825). It bears no costae, unlike *P. catenaria* (Say, 1822). The shell of *P. shenandoa* is most similar to that of *P. semicarinata* (Say, 1829) inhabiting drainages of the Ohio, but more consistently carinate and not as variable in BWL/TL proportion. The body color of *P. semicarinata* is orange or brown while that of *P. shenandoa* is darker (Fig. 17). There are also strikingly high levels of genetic divergence at allozyme-encoding loci among populations of all six of these species.

DESCRIPTION – Shell elongate conic, approximately 14 – 18 mm in adulthood, olive, tan or dark brown, not black. A single carination present on the juvenile shell, becoming obsolete in adulthood. Adult BWL/TL approximately 0.58 – 0.65. All anatomical features, including operculum and radula, as typical for the family Pleuroceridae (Dazo, 1965; Dillon 1984b).

DNA SEQUENCES – Genbank AY063468 (COI), Genbank AY063474 (16s rRNA) both accessioned as “*Goniobasis semicarinata*” (Dillon and Frankis, 2004).

ETYMOLOGY – Named for the Shenandoah River, originally an Oneida Iroquois chief.

TYPE LOCALITY – Little Pine Run at VA 100 Bridge, 12 km S of Pulaski, Pulaski Co, VA. Coordinates 36.9689, -80.7865.

MATERIAL – Holotype, ANSP 468648; dry paratypes ANSP 468649, USNM1474706; wet paratypes ANSP A25580 (100% ethanol).

DISTRIBUTION AND HABITAT – Inhabits small, rich, hard water creeks with rocky bottoms and good flow in the Great Valley of Virginia from Augusta County south through the drainages of the Shenandoah, James, and Roanoke Rivers to the New River drainage in Wythe County. Also ranges westward through the New River drainage from Wythe County to Greenbrier County, West Virginia.

REMARKS – Four populations of *P. shenandoa* sampled from SW Virginia were identified as distinct from six populations of *Goniobasis proxima* and two populations of *Goniobasis simplex* in the genetic and morphometric study of Dillon & Davis (1980). These four populations (MEAD, PINE, ROA, and SINK) were identified by Dillon & Davis as *Goniobasis semicarinata* on the basis of their shell morphology, despite the fact that Goodrich (1940, 1942) had restricted the range of *G. semicarinata* to Kentucky, Indiana, and Ohio only. It seemed possible to us at the time that the range of *G. semicarinata* might be found to extend up the Kanawha/New drainage through West Virginia to enter Virginia from the northwest.

Sequences for both the mitochondrial 16S and CO1 genes were obtained for a single individual sampled from the PINE population by Dillon & Frankis (2004), suggesting that PINE might be distinct from *G. proxima* and *G. catenaria*. Again, the PINE population (labeled Gs in that work) was identified as *Goniobasis semicarinata*. At no time during either of these studies were bona fide *Pleurocera*

semicarinata available for comparison with the Virginia populations. This situation was finally corrected in 2009-10 with the extension of our research program into the Ohio River drainage. We discovered no *Pleurocera* populations (of any species) inhabiting streams through most of West Virginia, suggesting to us that the Virginia populations were isolated by a minimum of 200 km from the nearest bona fide *P. semicarinata*. And the allozyme study of Dillon (2014) returned the surprising result that population PINE (labeled as reference population SV in that work) was more genetically similar to *Pleurocera canaliculata* than to nominally conspecific *P. semicarinata* populations of Kentucky and Ohio. See Essay 3(17) for additional background information.

MATERIAL EXAMINED – VIRGINIA, *Amherst County*: Beck Ck. 1 km W of Brightwell Mill 37.4625, -79.0574; *Augusta County*: stream 2.2 km S of Mint Spring 38.0507, -79.1057; Barterbrook Branch 2 km N of Stuarts Draft 38.0642, -79.0298; Barterbrook Branch 3.7 km N of Stuarts Draft 38.0689, -79.0286; tributary of South R. 0.5 km N of Waynesboro 38.0885, -78.8783; creek flowing under Rockfish Road 38.0908, -78.8784; Mill Ck at Folly Mills 38.0985, -79.0986; trib of South River at McCormick Farm, Steeles Tavern 37.9251, -79.2027; *Bath County*: Cedar Ck. 1.5 km SW of Callison 37.9682, -79.9192; *Botetourt County*: Tinker Ck. at Glebe Mills 37.4201, -79.9337; Mill Ck. 3 km W of Spec 37.4686, -79.7936; Rocky Branch 2 km W of Fincastle (VMNH01241988.2) 37.495, -79.9603; Looney Creek NE of Nace (VMNH10061985.1) 37.4998, -79.7193; Catawba Ck. at Kyles Mills 37.5498, -79.8332; mouth of Roaring Run at Strom 37.6923, -79.89; Craig County: Sinking Creek 2 km NE of Huffman 37.3568, -80.3731; Sinking Creek 1.5 km SW Huffman 37.3415, -80.4109; *Giles County*: Spruce Run at Goodwins Ferry 37.2659, -80.5999; *Montgomery County*: Elliott Creek at Rogers (VMNH09151985.2) 37.0907, -80.3877; Cold Spring 2 km SW of Roanoke County Line (VMNH01241988.3) 37.2384, -80.2246; Mill

Ck at Bennets Mill 37.2609, -80.3407; Meadow Ck. 3 km N of Graysontown 37.0658, -80.5453; Connelly's Run at Wildwood Park (VMNH05221988.1) -37.1359, -80.5671; Crab Creek 3 km W Christiansburg 37.1483, -80.4481; Toms Creek 3 km NE Longshop 37.2328, -80.5238; *Pulaski County*: Little Pine Run at VA 100 bridge 36.9689, -80.7865; *Roanoke County*: Catawba Creek at VA Tech Farm 37.382, -80.1015; *Rockbridge County*: Unnamed creek across from Natural Bridge Station (VMNH10061985.2) 37.6122, -79.4979; *Wythe County*: Cedar Run 4 km S of Grahams Forge 36.9152, -80.8699. WEST VIRGINIA, *Greenbrier County*: Greenbrier River at Keister (OSUM 1972:0063) 37.8717, -80.3449.

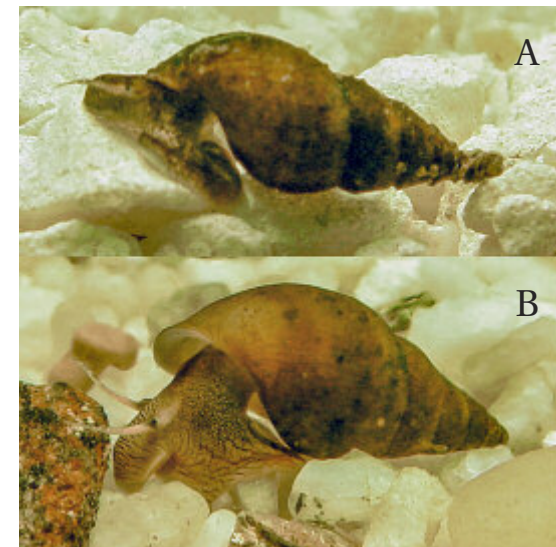


Figure 17 Comparison of body color. (A) *Pleurocera shenandoa* type population, (B) *Pleurocera semicarinata* from French Creek, Venango County, Pennsylvania.