

# MOLLUSKS OF THE CHEAT RIVER WATERSHED OF WEST VIRGINIA AND PENNSYLVANIA, WITH COMMENTS ON PRESENT DISTRIBUTIONS<sup>1</sup>

FRANK J. SCHWARTZ AND WILLIAM G. MEREDITH

*Chesapeake Biological Laboratory, Solomons, Maryland and  
Mt. St. Mary's College, Emmitsburg, Maryland*

During the course of the 1956 limnological, ichthyological, and carcinological investigations of the Cheat River watershed of West Virginia and Pennsylvania, observations and collections were made of the Mollusca present in this system. Four families of gastropods, the Planorbidae, Physidae, Viviparidae, and Pleuroceridae were represented by one species each. Only one sphaeriid pelecypod currently occupies a portion of this system.

Mollusk distribution within the entire Cheat system has never been intensively surveyed. Ortmann (1913) at one time noted 28 mollusk species common to the Allegheny and Monongahela River systems, 23 of which were in that portion of the Monongahela River system near Weston, West Virginia. Likewise, he notes 15 species at Mt. Chateau and Cheat Haven, although eight of this number occupied adjacent tributaries rather than the Cheat River itself. No gastropods of the genera *Pleurocera* or *Goniobasis* have been found in the whole of the Monongahela River system, but may have been there at one time; if so, they were probably destroyed by pollution (Ortmann 1913). Ortmann (1909, 1913) comments that gastropods had disappeared from the Ohio and Monongahela River systems by 1905. Naiads, which were once common upstream to Charleroi, Pennsylvania, had been destroyed by 1897, a few managing to persist below Pittsburgh, Pennsylvania, until 1905.

Two of the species cited herein, *Campeloma decisum* (Viviparidae) and *Leptoxis dilatata* (= *Anculosa dilatata*, Pleuroceridae), had been collected earlier. Ortmann (1913) found *Campeloma* in Shavers Fork River north of Parsons, West Virginia, and *Leptoxis* between Mt. Chateau and Parsons, West Virginia, but not throughout the remaining Monongahela River system. Ortmann (1913) attributed the lack of mollusks south of Mt. Chateau to pollution and the ruggedness of the Cheat system itself. Even today the Cheat River and many of its tributaries tumble in torrents with gradients up to 134 ft/mile.

Schwartz and Meredith (1960) established a total of 233 biological and limnological sampling stations throughout the Cheat watershed. Figure 1 shows that mollusks are restricted to the headwater tributary areas of the system.

Since oxygen content (70 to 100 percent saturation) was adequate at all times of the year, the main factors influencing distribution were pollution and low pH values. Figure 1 shows that the Cheat system from Parsons north to Rowlesburg, West Virginia, and including that part of the Blackwater River from Ben Bush downstream to Parsons, West Virginia, had a pH of 4.0 to 6.5 for periods of six to eight months, September to March. Between December and February the pH of this section of the system was usually 5.5. North of Rowlesburg, the pH was usually below 4.0. A pH range of 5.5 or below has been known to affect oxygen levels to a point that may be lethal to fishes as well as other forms of aquatic life (Baker, 1922; Ellis, 1937, 1944; Ellis, Westfall, and Ellis, 1946; Gaufin and Tarzwell, 1952; Lagler, 1950; Overstreet and Dean, 1951; Tarzwell and Gaufin, 1953). The gradual and increasing chemical paralysis of the Cheat system, observed as early as 1899 by Rhoads, was noted by Carpenter and Herndon (1929) and subsequently

<sup>1</sup>Contribution No. 206, Natural Resources Institute of the University of Maryland, Chesapeake Biological Laboratory, Solomons, Maryland.

charted by the 1948 West Virginia State Water Commission and the 1953-57 surveys of the Department of Biology, of the West Virginia University (Core et al., 1959).

#### MOLLUSCA OF THE CHEAT RIVER WATERSHED

##### *Gastropoda*

##### Planorbidae—*Helisoma anceps* (Menke)

The snail, *Helisoma anceps*, is limited in its present Cheat River distribution to the Blackwater River upstream of Davis, Tucker County, West Virginia. The annual pH of these waters is above 6.5. The numerous sphagnum bogs and rhododendron stands, which are characteristic of Canaan Valley, color the water brown. The streams of this area are slow and sluggish. *Helisoma* was not found in the Blackwater River west of Davis, West Virginia. There the stream plunges down a five-mile gorge and is joined by the polluted (annual pH 2.8 to 3.2) North Fork of the Blackwater River from Ben Bush and Douglas, West Virginia. The torrential nature of the remainder of the Cheat system undoubtedly acts as a deterrent to this slow-water species.

##### Physidae—*Physa heterostropha* (Say)

Snails of the genus *Physa* are found throughout the Blackwater River above Davis, West Virginia, sympatric with *Helisoma anceps*. A small section of this snail's range lies in Laurel Fork River along the lower gorge near Jenningston, West Virginia. *Physa heterostropha* (Say) is another slow-water species which perhaps once had a greater distribution, but has been isolated by pollution and the nature of the stream system.

##### Viviparidae—*Campeloma decisum* (Say)

*C. decisum* is a large snail which prefers lakes and relatively slow waters. It is presently confined to a very short stretch of Glady Fork River, from a point eight miles south of the Tucker-Randolph county line to its junction with Dry Fork River. Within this section, Glady Fork is a slow, twisting, wide and shallow stream studded with large islands of water willow (*Dianthera* sp.) up to 100 ft in diameter. *Campeloma*, along with *Leptoxis dilatata*, abounds in the vicinity of these islands in such numbers that it is often crowded out of the water by the huge number of individuals per stem of *Dianthera*. *Campeloma*, which Ortmann (1913) collected in Shaver's Fork was absent in 1956, except for a five-mile section near Bowden, West Virginia. This snail probably occurred in the unpolluted, from Parsons to Rowlesburg, West Virginia, Cheat River before 1870, for there are many areas along that stretch of stream which might have supported populations of *Campeloma*.

##### Pleuroceridae—*Leptoxis dilatata* (Conrad) (= *Anculosa dilatata*)

*Leptoxis* is the most wide-ranging gastropod within the Cheat River watershed. It occurs in Shavers Fork River from Parsons, West Virginia, south to the 40-ft waterfall, five miles south of Bemis, West Virginia. Likewise, it is present in the lower courses of Glady, Laurel Fork, and Gandy Fork rivers, below 3200-ft elevations. The range of *Leptoxis* approaches, but does not enter, the torrential Red Creek which passes along the Tucker-Randolph county line. Note (figure 1) the influence of the Blackwater-Blackford rivers between Hendricks and Parsons, West Virginia, on the distribution of this species. Present pH conditions (generally 3.2) undoubtedly account for the disappearance and destruction of this species, once common north of Parsons, West Virginia (Ortmann 1913). The absence of *Leptoxis* in the low gradient Dry Fork River south of Harmon, West Virginia, can be attributed to the nature of a five to seven-mile portion of the stream which was once underground (Howard 1956) and the Sinks of Gandy, a natural barrier.

*Pelecypoda*

Sphaeridae—*Sphaerium sulcatum* (Say)

This small freshwater clam abounds in a beautiful, clear, clean mountain stream, Mill Creek, a tributary of Dry Fork River, southeast of Hendricks, West

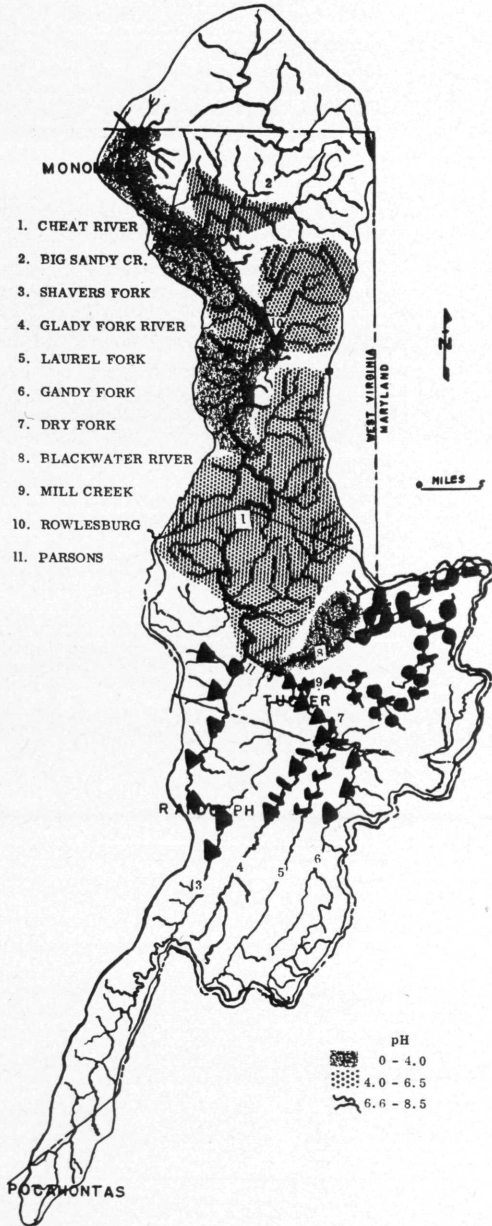


FIGURE 1. Cheat River Watershed, West Virginia, illustrating 1956 pH conditions and distributions of mollusks currently occupying portions of this system. ● *Helisoma anceps*, ■ *Physa heterostropha*, - *Campeloma decisum*, ▲ *Leptoxis dilatata*, + *Sphaerium sulcatum*.

Virginia. Ortmann (1913) noted eight species of sphaeriids in the upper Monongahela River system, but did not mention if any of them occurred in the Cheat watershed.

#### SUMMARY

During a 1956 survey of 233 sampling stations located approximately every five miles on the Cheat River and all its tributaries. Only five species of mollusks were found to inhabit this watershed which lies in West Virginia and Pennsylvania and its tributary to the Monongahela River. Four families of gastropods, each represented by one species, and one pelecypod species occupy this system. Pollution and the resulting water pH throughout the system between Parsons, West Virginia, and the West Virginia-Pennsylvania state line were the major limiting factors considered to restrict the known species to the headwater areas south of Parsons, West Virginia. It is surprising that mollusks were absent in the one possible retreat area, the headwaters of Big Sandy River north of Bruceton Mills, West Virginia. Natural barriers of waterfalls, gorges, underground streams and environment all played important roles in determining the distribution of mollusks within the Cheat River watershed. However, the constant and rapidly expanding destructive acid mine pollution exerted a much greater influence than did these natural features upon the distribution of the mollusks within the system.

#### ACKNOWLEDGMENTS

It is a pleasure to acknowledge the assistance of Dr. J. J. Parodiz of the Section of Invertebrates, Carnegie Museum, Pittsburgh, Pennsylvania, for aiding in species identification and for accepting deposits of reference material. Messrs. R. Hamilton, K. Hatfield, and J. Sawyer of the West Virginia University, Department of Biology, assisted with the field collecting. The Department of Biology, West Virginia University, provided the opportunity and made available the facilities necessary to make a survey of the Cheat River system while we were members of the staff. Support, in part, was obtained from grants established by the Isaac Walton League of Monongalia County, the West Pennsylvania Power Company, the Monongahela Power Company, and the Locksley Fuel Corporation of Morgantown, West Virginia.

#### LITERATURE CITED

- Baker, F. C.** 1922. The molluscan fauna of the Big Vermilion River, Illinois. *iii Biol. Monog.* 7(2): 1-100.
- Carpenter, L. V.,** and **L. R. Herndon.** 1929. Report of a pollution study of the Cheat River Basin, West Virginia. *St. Water Comm.* 46 p. 1 map.
- Core, E. L., B. G. Anderson, L. H. Taylor, G. H. Boer, R. L. Birch, C. Norman, F. J. Schwartz, F. D. Basnett, H. J. Rohr, I. W. A. Burley, J. W. Gorman, R. Hamilton, K. Hatfield, W. Meredith, J. Sawyer, and G. Struthers.** 1959. Biological investigations of Cheat Lake. *Rept. W. Va. Univ. Dept. Biol.* 39 p. 4 fig.
- Ellis, M. M.** 1937. Detection and measurement of stream pollution. *Bull. 22, U. S. Bur. Fish* 28: 365-437.
- . 1944. Water purity standards for freshwater fishes. *U. S. Fish and Wildl. Serv. Spec. Rept.* 2: 1-15.
- , **B. A. Westfall,** and **M. D. Ellis.** 1946. Detection of water quality. *U. S. Fish and Wildl. Serv. Res. Rept.* 19: 1-122.
- Gaufin, A. R.,** and **C. M. Tarzwell.** 1952. Aquatic invertebrates as indicators of stream pollution. *Publ. Health Repts.* 67(1): 57-64.
- Howard, M.** 1956. Parts of the fishing diaries of 1872-79 (First Installment). *Tableland Trails* 2(2): 23-38.
- Lagler, K. F.** 1950. *Studies in freshwater fisheries biology.* Edwards Co., Ann Arbor. xi+186.
- Ortmann, A. E.** 1909. The destruction of the freshwater fauna in Western Pennsylvania. *Proc. Am. Philos. Soc.* 48(191): 90-111.
- . 1913. The Alleghenian divide and its influence upon the freshwater fauna. *Proc. Am. Philos. Soc.* 52: 287-390.
- Overstreet, R.,** and **L. A. Dean.** 1951. The amiability of soil anions: Mineral nutrition of plants. *Univ. Wisc. Press.* 24 p.

- Rhoads, S. N.** 1899. On a recent collection of Pennsylvanian mollusks from the Ohio River system below Pittsburgh. *Nautilus* 12: 133-8.
- Schwartz, F. J., and W. G. Meredith.** 1960. Crayfishes of the Cheat River watershed, West Virginia and Pennsylvania. Part I: Species and localities. *Ohio J. Sci.* 60(1): 40-54.
- Tarzwell, C. M., and A. R. Gaufn.** 1953. Some important biological effects of pollution often disregarded in stream surveys. *Proc. 8th Industrial Waste Conf., Purdue Univ.* May 4-6, 1953. 38 pp.
- West Virginia State Water Commission Survey.** 1948. Stream sampling raw data, Dry Fork-Cheat River-Blackwater-Shavers Fork, Monongahela Basin, Charlestown, W. Va. 32 p.
-