



*The Freshwater Naiads
of Elk River, West Virginia
With a Comparison
of Earlier Collections*

Ralph W. Taylor

THE FRESHWATER NAIADS OF ELK RIVER, WEST VIRGINIA WITH A COMPARISON OF EARLIER COLLECTIONS

Ralph W. Taylor and Romie C. Hughart

Department of Biology Sciences
Marshall University
Huntington, WV 25701

ABSTRACT

During the summers of 1978 and 1979 an extensive survey of the freshwater mussels of the Elk River was conducted. A total of eighteen species of unionacean clams, plus the exotic Asian clam, Corbicula fluminea, were collected. A search of the collections of several museums produced evidence that earlier workers had, over the last one hundred years, taken a total of twenty-one species from the Elk River. Lampsilis orbiculata, Dysnomia torulosa rangiana, Cyclonaias tuberculata and Lampsilis ovata, which had been reported earlier, were not found and must be presumed no longer present in the Elk. Corbicula fluminea has spread throughout the Elk River. Fusconaia m. maculata, Lampsilis radiata luteola, Elliptio dilatata, Ptychobranhus fasciolaris and Actinonaias ligamentina carinata are presently the dominant species.

Information on the freshwater naiads inhabiting the streams of West Virginia is all but non-existent. Until recently, the poor roads and rugged terrain of the region have made it rather difficult to reach most parts of the state. A few hardy individuals, most notably Dr. A. E. Ortmann, carried out limited expeditions into the state around the turn of the century. Other less well-known biologists have collected in West Virginia but none of their work was published, even though, fortunately, some of their material was deposited in museums around the country. Contemporary papers by Morris and Taylor (1979) and Taylor (1980) report mussel faunas of the Kanawha and Ohio Rivers, respectively. David Stansbery and Carol Stein (Ohio State University Museum of Zoology) have collected extensively throughout West Virginia in recent years but none of their work has as yet been published. We shall in this paper report material collected in the Elk River during the summers of 1978 and 1979, and in addition compare and contrast our findings with those of other investigators. We believe this to be the first extensive survey to have been carried out on the Elk.

THE ELK RIVER

The Elk River originates in a sparsely pop-

ulated mountainous area in Pocahontas County, W. Va., and flows approximately due west for 181 miles to its confluence with the Kanawha River at Charleston, W. Va. It traverses valleys with steep, high walls. Most of the basin is heavily forested and remains essentially untainted by man. The only pollutants present are those originating in a few local industries and a small amount of human sewage. The actual amount of raw sewage discharged into the stream is not known, but it probably has a significant effect on such water quality parameters as bacterial count, plant nutrients and turbidity (W. Va. Geological and Economic Survey, 1973). There are no major cities in the Elk River basin, and mining and timbering activity is limited, hence the Elk is a stream of fairly high quality. The bottom substrate consists primarily of cobble, silt and sand. The main stem of the Elk averages a fall of 168 feet per mile. The best collecting is in or near shoal areas. The river, throughout most of the collecting area, averaged 50 meters in width and less than two meters in depth.

METHODS

Shells were hand-picked from the shallows and river banks. Only live specimens, or those which obviously had been recently killed, were

collected. Specimens were returned to the laboratory where they were cleaned, positively identified and accessioned in to the Marshall University Malacological Collections. Voucher specimens have been placed with the Ohio State University Museum of Zoology. All scientific names used in this paper are those currently being used by Stansbery (1979). A total of 15 localities were designated as collecting sites and visited at irregular intervals during the two summers.

COLLECTING SITES

Site 1 60 yards down river from the base of Sutton Dam, near Sutton (Braxton County)

Site 2 along Rt. 16, 7.5 miles east of the Braxton/Clay County line (Braxton County)

Site 3 along Rt. 16, 3.2 miles west of the Braxton/Clay County line (Clay County)

Site 4 near a small roadside park on Rt. 16, 15.3 miles west of the Braxton/Clay County line (Clay County)

Site 5 along Rt. 16, 15.9 miles west of the Braxton/Clay County line (Clay County)

Site 6 Secondary Rd. 5, 4.3 miles west of intersection with Rt. 16 (Clay County)

Site 7 Secondary Rd. 5, 4.8 miles west of the intersection with Rt. 16 (Clay County)

Site 8 Secondary Rd. 5, 6.4 miles west of the intersection with Rt. 16 (Clay County)

Site 9 Secondary Rd. 5, near Camp Elk, 8.3 miles west of the intersection with Rt. 16 (Clay County)

Site 10 Secondary Rd. 5, downstream of Camp Elk, 8.7 miles west of the intersection with Rt. 16 (Clay County)

Site 11 Secondary Rd. 5, 3.0 miles east of the intersection with Rt. 4 (Clay County)

Site 12 Secondary Rd. 5, 2.4 miles east of the intersection with Rt. 4 (Clay County)

Site 13 small roadside park on Rt. 4 at the Clay/Kanawha County line

Site 14 below the bridge at Queen Shoals (Kanawha County)

Site 15 along U.S. 119 southeast of the Rt. 4-U.S. 119 intersection at Clendenin (Kanawha County)

RESULTS

A total of 18 species of unionacean clams, plus

the exotic Asian clam *Corbicula leana*, were collected. These data are presented in Table 1. All collecting sites, with the exception of Site 1 (immediately below Sutton Dam), produced some usable material.

In order to get the most information available on previous collections made in the Elk River, the first author visited several museums (spring 1980) and searched the holdings for West Virginia material. The museums visited were as follows:

Field Museum of Natural History—Chicago

U.S. National Museum—Washington, D.C.

Carnegie Museum (Car. I.)—Pittsburgh

Ohio State University Museum of Zoology (OSU)—Columbus

Harvard University Museum of Comparative Zoology (MCZ)—Boston

The results of this search are presented in Table 2. Elk River specimens were found at the Ohio State University Museum, the Carnegie Institute Museum and the Harvard University Museum of Comparative Zoology.

In all, 21 species of unionids have been collected in the Elk River by earlier investigators. The vast majority of the museum material was collected 50 to 100 years ago, with most of the work having been done by Dr. A. E. Ortmann of the Carnegie Institute.

The only contemporary report on the mussels of the Elk River was by Bates (1971). This paper was based on limited collecting (two localities—single collection at each) and listed only eight species. The species found by Bates were: *Elliptio dilatata*, *Fusconia flava*, *Quadrula pustulosa*, *Actinonaias l. carinata*, *Lampsilis fasciola*, *Lampsilis ventricosa*, *Ligumia recta* and *Obovaria subrotunda*. With the exception of *Quadrula pustulosa* all species that Bates reported had been previously collected and were found in the museum collections.

In this paper we report *Lampsilis radiata luteola* (= *Lampsilis siliquoidea*) for the first time as appearing in the Elk River. This species, while never occurring in large numbers at any one site, nevertheless is quite widespread and was collected at 11 of the 15 designated sites.

Also reported for the first time in the Elk River is the exotic Asian import *Corbicula*

Table 1. Abundance and distribution of Elk River Mussels (R = Rare, M = Moderately Common, C = Very Common).

| Species | Site No. | | | | | | | | | | | | | | |
|--------------------------------------|----------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| <u>Strophitus u. undulatus</u> (R) | | | | | | | | | | | X | | X | | X |
| <u>Lasmigona costata</u> (M) | | X | | | | X | X | | X | | | X | X | | X |
| <u>Quadrula p. pustulosa</u> (R) | | X | | | | | X | X | X | X | | | | | X |
| <u>Amblema p. plicata</u> (M) | | X | X | | | | | X | X | X | X | X | X | | X |
| <u>Fusconaia m. maculata</u> (C) | | X | | | | | X | X | X | X | X | X | | | X |
| <u>Fusconaia flava</u> (R) | | | | | X | | | | | | | | | | |
| <u>Pleurobema clava</u> (R) | | | X | | | | | | | | | | | | |
| <u>Pleurobema sintoxia</u> (R) | | | | | | | | | | | | | X | | |
| <u>Elliptio crassidens</u> (R) | | | | | | | | | X | | | | | | |
| <u>Elliptio dilatata</u> (C) | | X | X | X | | | X | X | X | X | X | X | X | | X |
| <u>Ptychobranhus fasciolaris</u> (C) | | X | X | X | X | | X | X | X | X | X | X | X | | |
| <u>Actinonaias l. carinata</u> (C) | | X | X | | | X | X | X | X | X | X | X | X | X | X |
| <u>Obovaria subrotunda</u> (C) | | X | X | | | | | | | X | X | X | | | X |
| <u>Ligumia recta</u> (C) | | X | X | X | X | | X | X | X | X | X | X | | | |
| <u>Villosa iris</u> (R) | | X | | | | | | | | | | | | | |
| <u>Lampsilis r. luteola</u> (C) | | | | | X | X | X | X | X | X | X | X | X | X | X |
| <u>Lampsilis ventricosa</u> (C) | | X | X | | X | | X | X | X | X | X | X | | | X |
| <u>Lampsilis fasciola</u> (R) | | X | | | | | | X | X | | | | | | |
| <u>Corbicula leana</u> (C) | | X | X | X | X | X | X | X | X | X | X | X | X | X | X |

Table 2. Museum records from the Elk River (locality data are as they were recorded on original tags).

| Species | Locality | Museum | Catalog No. |
|--------------------------------|-------------------------------|---------|-------------|
| <u>Strophitus u. undulatus</u> | Gassaway | Car. I. | 61.5397 |
| | Shelton | Car. I. | 61.5399 |
| | Clay | Car. I. | 61.5398 |
| | Sutton | Car. I. | 61.5395 |
| <u>Alasmidonta marginata</u> | Gassaway | Car. I. | 61.5382 |
| | Shelton | Car. I. | 61.5383 |
| <u>Lasmigona costata</u> | Sutton | Car. I. | 61.5366 |
| | Shelton | Car. I. | 61.5368 |
| | Gassaway | Car. I. | 61.5367 |
| <u>Amblema p. plicata</u> | Mouth O'Brien Ck. | OSU | 6514 |
| | Below Sutton Dam | OSU | 24702 |
| | Mouth Twistabout Ck. | OSU | 6420 |
| | .2 mi. below Little Sandy Ck. | OSU | 23112 |
| | Sutton | Car. I. | 61.5262 |
| | Gassaway | Car. I. | 61.5265 |
| | Shelton | Car. I. | 61.5266 |
| <u>Fusconaia m. maculata</u> | Below Queen Shoals Bridge | OSU | 23227 |
| | Mouth of Laurel Ck. | OSU | 6411 |
| | Below Sutton Dam | OSU | 24703 |
| | Below King Shoals Run | OSU | 44379 |
| | Gassaway | OSU | 45026 |
| Mouth O'Brien Ck. | OSU | 45013 | |

| | | | |
|-------------------------------------|---------------------------------------|------------------|---------|
| <u>Fusconaia flava</u> | Below mouth Little Sandy Ck. | OSU | 23113 |
| | Below Blue Ck. bridge | OSU | 23034 |
| | Mouth Twistabout Ck. | OSU | 7901 |
| | Mouth Twistabout Ck. | OSU | 6418 |
| | Mouth O'Brien Ck. | OSU | 6513 |
| | Rt. 11 bridge N.E. of Clay | OSU | 44650 |
| | Frametown | OSU | 44998 |
| | Glendon | OSU | 44976 |
| | Elkhurst | OSU | 44931 |
| <u>Cyclonaias tuberculata</u> | Rt. 64 bridge 2 mi. N.W. of Kelso | OSU | 24996 |
| | Mouth Twistabout Ck. | OSU | 7905 |
| | 5.8 mi. W. of Fayetteville | Car. I. | 61.5301 |
| <u>Pleurobema clava</u> | Mouth O'Brien Ck. | OSU | 6516 |
| | Below Sutton Dam | OSU | 24704 |
| | Mouth Buffalo Ck. | OSU | 44651 |
| | 1 mi. N.E. of Clay | OSU | 44551 |
| | Frametown | OSU | 44999 |
| | Gassaway | OSU | 45027 |
| | Above Twistabout Ck. | OSU | 43882 |
| | Glendon | OSU | 44977 |
| | Shelton | Car. I. | 61.5325 |
| | Gassaway | Car. I. | 61.5324 |
| | Sutton | Car. I. | 61.5323 |
| <u>Pleurobema sintoxia</u> | At Twistabout Ck. | OSU | 43883 |
| <u>Elliptio crassidens</u> | .2 mi. below Queen Shoals | OSU | 23228 |
| | Frametown | OSU | 45000 |
| | Glendon | OSU | 44978 |
| | Gassaway | Car. I. | 61.5327 |
| | Gassaway | Car. I. | 61.5339 |
| | Shelton | Car. I. | 61.5328 |
| | Sutton | Car. I. | 61.5335 |
| | Clay | Car. I. | 61.5340 |
| | <u>Ptychobranhus fasciolaris</u> | 1 mi. N. of Clay | MCZ |
| Above Twistabout Ck. | | OSU | 6424 |
| Above Twistabout Ck. | | OSU | 7910 |
| Shelton | | Car. I. | 61.5410 |
| Shelton | | Car. I. | 61.5411 |
| Sutton | | Car. I. | 61.5406 |
| <u>Actinonaias l. carinata</u> | Gassaway | MCZ | 262800 |
| | 1 mi. N. of Clay | MCZ | 185596 |
| | Shelton | Car. I. | 61.5451 |
| | Gassaway | Car. I. | 61.5449 |
| <u>Obovaria subrotunda</u> | Below Sutton Dam | OSU | 24706 |
| Rt. 64 bridge 4 mi. E. Fayetteville | OSU | 16182 | |
| <u>Truncilla truncata</u> | Mouth O'Brien Ck. | OSU | 6527 |
| | U.S. Rt. 64 bridge E. of Fayetteville | OSU | 19062 |
| <u>Ligumia recta</u> | Mouth O'Brien Ck. | OSU | 6521 |
| | Mouth Twistabout Ck. | OSU | 7913 |
| | Shelton | Car. I. | 61.5504 |
| | Clay | Car. I. | 61.5503 |
| | Gassaway | Car. I. | 61.5502 |
| <u>Villosa i. iris</u> | Above Twistabout Ck. | OSU | 43890 |
| | Elkhurst | OSU | 44938 |
| | 1 mi. N.E. of Clay | OSU | 44558 |
| | Mouth Buffalo Ck. | OSU | 44658 |
| | 5 mi. E. of Fayetteville | OSU | 19066 |
| | Shelton | Car. I. | 61.5493 |
| | Sutton | Car. I. | 61.5492 |

| Species | Locality | Museum | Catalog No. |
|-------------------------------------|-----------------------------------|---------|-------------|
| <u>Lampsilis ventricosa</u> | 1 mi. N. of Clay | MCZ | 185597 |
| | Gassaway | MCZ | 262794 |
| | Shelton | Car. I. | 61.5538 |
| | Gassaway | Car. I. | 61.5536 |
| | Sutton | Car. I. | 61.5535 |
| <u>Lampsilis orbiculata</u> | Clay City | Car. I. | 61.5537 |
| | .5 mi. below mouth of King Shoals | OSU | 44386 |
| <u>Lampsilis ovata</u> | Shelton | Car. I. | 61.5527 |
| | Clay | Car. I. | 61.5526 |
| <u>Lampsilis fasciola</u> | Gassaway | MCZ | 262795 |
| | Mouth O'Brien Ck. | OSU | 45024 |
| <u>Epioblasma torulosa rangiana</u> | Elkhurst | OSU | 44962 |
| | Mouth O'Brien Ck. | OSU | 6526 |
| | Mouth O'Brien Ck. | OSU | 45025 |

fluminea (also referred to as *manilensis* Philippi and *leana* Prime). Thomas and Mackenthun (1964) were the first to recognize *Corbicula* in the Kanawha River at Charleston, W. Va. near the mouth of the Elk River. It has since spread into the Elk and is presently distributed throughout our study area as far upstream as Sutton Dam.

Of the 21 species reported by earlier investigators, we did not find the following six: *Alasmidonta marginata*, *Cyclonaias tuberculata*, *Epioblasma torulosa rangiana*, *Lampsilis orbiculata*, *Lampsilis ovata* and *Truncilla truncata*.

The Elk River is a stream of fairly good quality and is at the present time supporting a good population composed of a relatively large number of kinds of unionid mussels. *Fusconaia m. maculata*, *Lampsilis r. luteola*, *Elliptio dilatata*, *Ptychobranchus fasciolaris* and *Actinonaias l. carinata* are the dominant species in the Elk River. Only two specimens of *Pleurobema clava* were found in the entire study. This species is very nearly extinct in this river at this time, while fairly large collections of it were made 50 years ago. A single fresh specimen of *Elliptio crassidens* was found. It is our belief that this species is also in danger of extinction in the Elk River in the very near future.

ACKNOWLEDGMENTS

Special thanks to the museum curators who so graciously opened the collections to me. To the many others associated with the museums, I extend my heartfelt appreciation (R. W. Taylor).

Some of the material presented in this paper was submitted by the second author to the Biological Sciences Department at Marshall University as partial fulfillment of the requirements for the Master of Science Degree.

LITERATURE CITED

- Bates, J. M. 1971. *Mussel Investigations of the State of West Virginia*. U. S. Bureau of Commercial Fisheries. 91 pp.
- Morris, J. S. and R. W. Taylor. 1979. A Survey of the Freshwater Mussels of the Kanawha River of West Virginia. *The Nautilus* 92(4):153-155.
- Stansbery, D. H. 1979. Naiad Mollusks of the Ohio River Drainage System. The Ohio State University Museum of Zoology (mimeographed). 1 p.
- Taylor, R. W. 1980. *A Survey of the Freshwater Mussels of the Ohio River from Greenup Locks and Dam to Pittsburgh, Pa.* U.S. Army Corps of Engineers, Huntington/Pittsburgh Districts. 71 pp.
- Thomas, N. A. and K. M. Mackenthun. 1964. Asiatic Clam Infestation at Charleston, West Virginia. *The Nautilus* 78(1):28.
- West Virginia Geologic and Economic Survey. 1973. *The Elk River Basin: A Report on Water Pollution in the Elk River and Its Tributaries*. 39 pp.

