MUSSELS IN THE HURON RIVER ABOVE ANN ARBOR IN 1969

HENRY VAN DER SCHALIE

Museum of Zoology, Ann Arbor, Michigan

In mid-December, 1969, repairs were made to the Argo Dam at Ann Arbor, Michigan. Consequently, the water in the Huron River between the Barton and Argo dams was unusually low. Although the weather was bitter cold, it was an ideal occasion for making some observations on the mussels in an area below Barton Dam where conditions although somewhat impounded, were still shoal-like and where the original fauna was likely to be retained. The opportunity to examine the shoals directly during such a low water stage with the dams open (depth was not more than six inches over extended reaches) was of special interest, since a survey of the mussels was made in this same portion of the river more than thirty years ago (van der Schalie, 1938). Then mussels virtually paved the bottom on such shoals as usually serve as mussel beds. The study of the mussels in the whole Huron River drainage indicated that the several species form characteristic ecological assemblages, so that the kinds of lakes (river-lakes, land-locked, etc.), the creeks, small-, medium- and large-river zones each had its own typical assemblage of mussels. The need for information on *original* conditions is evident, when this information is taken in its broader context to trace former stream confluences (van der Schalie, 1945).

Some of the changes brought about in the river because of human activities were already evident a decade ago (van der Schalie, 1958) when the ruinous effects of the war economy brought about serious depletion among the 25 species of mussels that occupied long stretches of this river. It is generally conceded that mussels are sensitive to pollution and are considered good for monitoring degrees of depredation in streams and lakes. Since many live confined to a very restricted portion of a shoal, they have been used to measure fall-out (Nelson, 1934) and pesticides (Bedford, *et al.*, 1968).

Although in the early thirties the dams (Barton and Argo) had already had an adverse influence on the mussels in that region of the river, the list given here shows that at least thirteen species were found at that time. In the intervening years both pollution and especially fluctuating water levels brought about by water level regulation tended to deplete the fauna. While conditions were uncomfortable when the collections were made during the low water stage last December, it was of interest to find the few mussels that still managed to survive there. Six species were taken alive; another 4 were recorded as empty shells. Only two, *Cyclonaias tuberculata* and *Anodonta grandis*, were found in appreciable numbers. The lack of young specimens found recently also clearly indicated that this shoal no longer is healthy in appearance. This local survey was undertaken by three collectors, Curt Schneider, Daune Crankshaw and the author.

It is just this vital need for infor-

MUSSELS FOUND BELOW BARTON DAM, ANN ARBOR: 1938 vs 1969

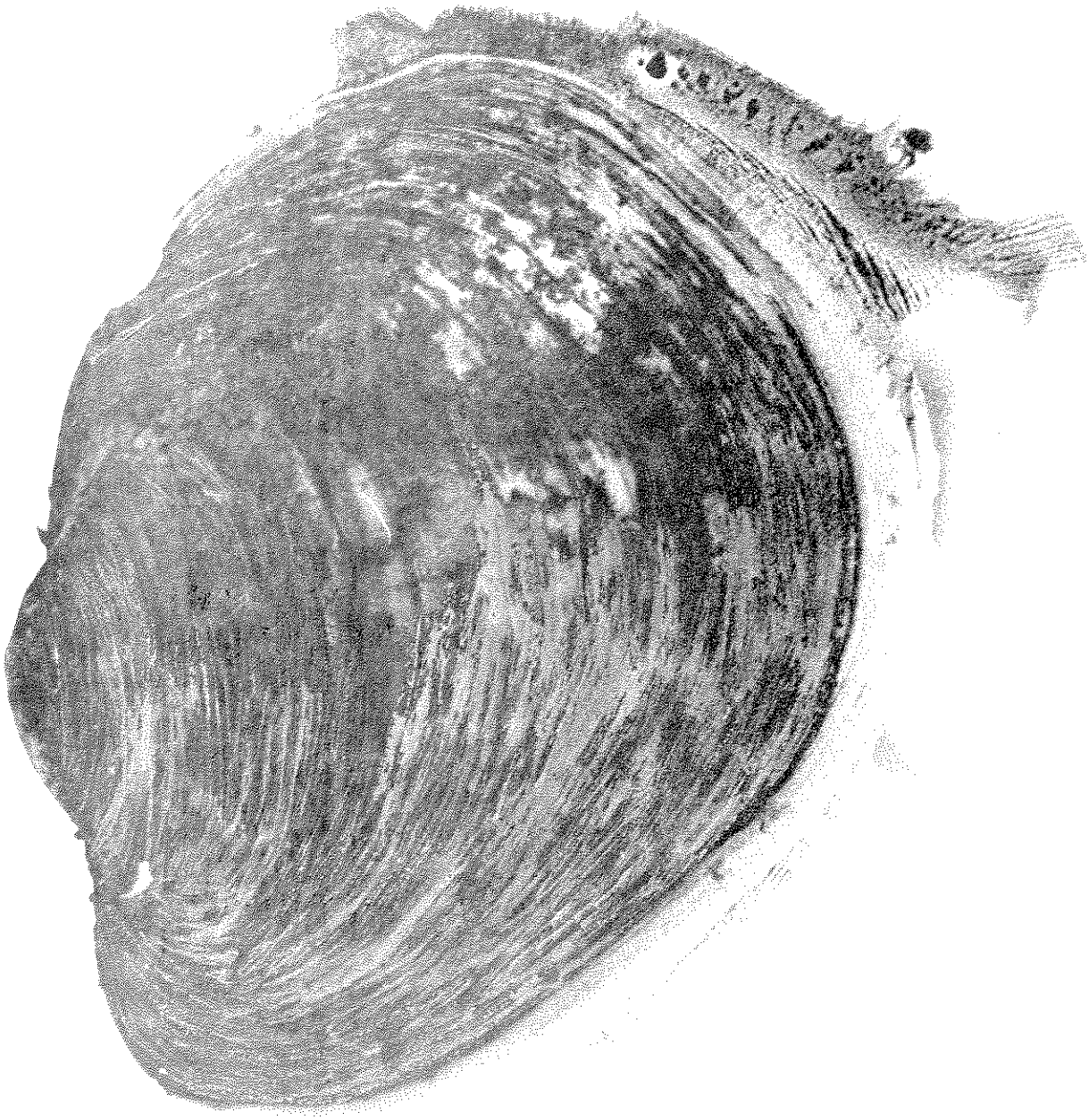
1938 13 species	1969 December 14 and 15, 1969 10 species (6 alive)	Alive	Dead
Cyclonaias tuberculata	*Cyclonaias tuberculata*	19	8
Elliptio dilatatus	*Elliptio dilatatus*	4	4
Strophitus rugosus			
Anodonta grandis	*Anodonta grandis*	15	7
	Anodonta imbecillis		1
Lasmigona costata			
Alasmidonta calceolus	*Alasmidonta calceolus*		1
Ptychobranchus fasciolaris			
Villosa (Micromya) iris	*Villosa (Micromya) iris*	1	1
Lampsilis fasciola	*Lampsilis fasciola*		5
Lampsilis siliquoidea	*Lampsilis siliquoidea*	1	
Lampsilis ventricosa	*Lampsilis ventricosa*	3	3
		43	*30*

mation on the *original* fauna in drainage systems that makes the detrimental changes brought about by the many destructive agents so unfortunate. Those responsible for alterations in the environment such as are brought about by power dams, sewage, industrial wastes, etc. usually are quick with a reminder that they will clean up their mess. Yet, few who are instrumental in making the changes have the foggiest notion of the fact that the losses in the biota are *irreversible* and the alterations witnessed will leave gaps in inter-relationships of fields like parasitology, public health, physiography, zoogeography, Pleistocene geology, etc. which can never again be bridged! It would, however, seem worthwhile to have those same agencies try to contribute something, if only in funds, to assist those who will at some later time try to bring back a semblance of the natural conditions where such assets were destroyed.

In the list of six species taken alive the relative abundance of the pink wartyback *(Cyclonaias tuberculata)* was interesting because somewhat farther upstream in the region of Delhi Mill (below Dexter) the shoals formerly produced thousands of specimens. This section of the stream is essentially the same ecological zone as the area below Barton Dam. As previously stated (van der Schalie, 1958), specimens of this species amounting to several tons were gathered and piled up on the bank of the river years ago when collectors tried to harvest pearls (produced by metacercariae of trematode parasites) commonly found in the mantle tissue between the interdental plate area of the hinge of this mussel. Since this species produces a nacre that is an off-color pink and not lustrous, their venture obviously was wasteful. All of the mussels at the site above the Barton Dam have now disappeared so that it is interesting to find some are still surviving below that dam. In view of the changes brought about in the river and the disappearance of all of the mussels below Dexter, it would seem reasonable to have these mussels used for almost any purpose rather than have them destroyed, as they too often have been, by pollution.

The next most common mussel was the paper-shell, *Anodonta grandis*, which while not formerly abundant probably became numerous by virtue of the slowing of the current as brought about by the impounding of water after the construction of the Argo Dam. All of the specimens collected were old and larger than usually found in the flow

FIG. 1. *Lampsilis ventricosa* (Barnes); a female with a well developed mantle flap showing its fish-like characteristics. (Picture by Daune Crankshaw).



system of a stream. The area evidently has become sufficiently lake-like to form the type of habitat in which *Anodonta* thrives. The general area also has assumed features that one associates with muskrat and mink habitats. Mussels are known to be the staple food of these fur bearers during the winter and, as a consequence, the survival and propagation of *Anodonta* (as well as the other species of mussels) can be viewed not only as important in the food chain, but also as a worthwhile feature for maintaining natural conditions in that portion of the Huron-Clinton park system.

Only four live lampsilid mussels were found, one *Lampsilis siliquoidea* (Barnes) and three *Lampsilis ventricosa* (Barnes). They are evidently less pollution tolerant than the more numerous species at this station. When the three Pocketbooks *(Lampsilis ventricosa)* were placed in a tray with water, the two females extended their mantle-flaps producing the striking minnow-like structures often seen in females of the Lampsilid group (Figure 1). Isaac Lea, as early as 1836, described and figured the flap of *Unio radiatus* (now known as *Lampsilis radiata* (Gmelin). Ortmann (1911) was among the first to observe the behavior of the flaps which are developed only in the females. He indicated that there are two possible uses; one may involve the need they serve to assist in aerating the protruding gills when they are heavily charged with developing glochidia; the other that the fish-like flaps serve as a lure for fish which may then serve as hosts for the glochidia. Louise R. Kraemer (1966) made an extensive study of the flaps of three lampsilid mussels but was careful to avoid any anthropocentric interpretations pending more critical studies designed to prove their function. Recently Welsh (1969) adduced plausible reasons to indicate that the flaps do serve to attract fish hosts.

Productive mussel-sustaining rivers are gradually disappearing. While formerly naiades were used extensively in the pearl button industry, they now are eagerly sought by dealers for shipment to Japan for use in the pearl industry. Tons of mussels (Pig-toes, Wash-boards, Niggerheads, etc.) are shipped to the Orient. The Japanese craftsmen grind out seed-pearls, which are then placed in live marine mussels for the addition of a lustrous outer coat to make a marketable natural pearl. In the U.S.A. one center for harvesting the shell for the pearl industry was the Kentucky Reservoir in the lower Tennessee River. The impact of this large impoundment on the mussels of that region was discussed by Bates (1962). It is now recognized that the supply is disappearing. Data on the studies undertaken during a three-year survey in that impoundment will be presented later. Many of the animals taken there were measured, aged and sectioned. It is evident that the fauna in those deep waters created by the dam at Paducah are probably mussels remaining from the preimpoundment period. The gonads of many of the animals were studied histologically (van der Schalie, in press) and it is now known that even animals from shells showing 25 annuli have normal reproductive functions. Evidently the marked ecological changes from flowing river to impoundment no longer permit the normal processes in the life histories of the several species and young specimens clearly are not appearing in the deep water beds.

More recently intensive studies have been undertaken in the Muskingum River in Ohio. This stream is still highly productive and as much as 50 tons of mussels per year have been sent to Japan. In addition to the collaborative work in the Museum of Zoology, intensive studies have been undertaken by John Bates and his group at Eastern Michigan University. Since in the past, records on production of mussels on shoals in rivers have been poorly reported, these studies will enable not only a measure of what the river yields but also some estimates as to the amounts that can safely be harvested. Means will be sought to replenish mussels on shoals in rivers, like the Huron, to reestablish the original fauna as an aid in the process of purification in streams.

REFERENCES

BATES, John M. (1962) The impact of impoundment on the mussel fauna of Kentucky Reservoir, Tennessee River. --Amer. Midl. Nat., 68: 232-36.

BEDFORD, F.W., ROELOFS. E.W., & ZABIK, J. (1968) The freshwater mussel as a biological monitor of pesticide concentrations in a lotic environment.--Limnology and Oceanography, 13: 118-126.

KRAEMER, Louise R. (1966) The mantle flaps in three species of freshwater mussels. -- Thesis, University of Michigan, 192 pp.

LEA, Isaac (1836) Observations on the genus Unio, etc. Vol. 2: 53; Plate 15, figure 49. Philadelphia: printed for the author.

NELSON, D.J. (1964) Deposition of strontium in relation to morphology of clam (Unionidae) shells. -- Verh. Internat. Verein Limno., 15: 893-902.

ORTMANN, A. E. (1911) Monograph of the Najades of Pennsylvania. -- Mem. Carnegie Mus., 4: 279-347.

van der SCHALIE, Henry (1938) The Naiad fauna of the Huron River in southeastern Michigan. -- Univ. Mich., Mus. Zool., Misc. Papers, 40: 1-83, 12 pls.

----- (1958) The effects of thirty years of 'progress' on the Huron River in Michigan. -- The Biologist, 40: 7-10.

----- (1970) Hermaphroditism among North American fresh-water mussels. -- Malacologia (in press).

WELSH, John H. (1969) Mussels on the move. -- Natural History, May, 1969: 56-59.

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