

THE NAIAD (FRESH-WATER MUSSEL) FAUNA OF THE GREAT LAKES

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Abstract

The studies of Bryant Walker, A. E. Ortmann and others have shown that the distribution of the rich North American fresh-water mussel fauna may serve as a useful source of information in reconstructing the past and present distribution of the aquatic animals that now inhabit the Great Lakes and their tributary streams. To understand the patterns observed, broad and basic outlines have been published to delineate the time and places where stream confluences took place. These facts often clearly account for the present patterns of distribution. Some of the reports containing these data will be cited. At present, more exact information is necessary regarding river channels which may be discernable in the deep portions of the Great Lakes. This information can assist in determining the way in which present day streams were formerly connected to streams as they existed prior to the establishment of modern lake levels. This summary account is submitted to encourage efforts to obtain more basic information needed to explain some of the conditions now extant.

Although Michigan is in the St. Lawrence drainage, its rich mussel fauna is wholly a Mississippi River assemblage. Walker (1913) indicated that the pre-glacial fauna of the St. Lawrence system was exterminated during the glacial period. He also stated that the fauna of Lake Erie was established when fish (carrying mussels) invaded the Lake Erie region through the Maumee River outlet into post-glacial Lake Maumee. Ortmann (1924) elaborated upon this invasion and showed that at a particular stage (the Trent Outlet Stage) in post-glacial lake development, the patterns of distribution now existing were established. At that time the Maumee River flowed through the partially dry bed of Lake Erie and the rivers tributary to Lake Erie had a *continuous* pattern. These conditions permitted three species of mussels (*Alasmidonta marginata*, *Actinonaias carinata*, and *Lampsilis fasciola*) to enter several rivers now draining into Lake Erie. It was possible to establish later (van der Schalie 1938) that three of the rivers in southeastern Michigan (the Raisin, Huron and Clinton) were tributary to that "greater Maumee River," but that the Rouge was of later origin and was never connected to the river system that existed when Lake Erie was practically non-existent. These events clearly show how closely the patterns of mussel distribution are related to the glacial and geomorphic history of the Great Lakes.

It should also be emphasized that the number of mussels and other organisms in the five major lakes is quite disproportionate. Goodrich and van der Schalie (1932) reported that the number of mussels in Lake Erie is greater than in any of the other lakes. Not only is this large number related to former stream connections but it is also related to the fact that Lake Erie is one of the largest of the so-called "river lakes" and its naiad fauna is more like that of a river than of a typical lake.

Southwestern Michigan with its rivers flowing into Lake Michigan is another region where mussel distribution indicates former stream confluence between rivers and lakes developed in the post-glacial course of events. Van der Schalie (1941) brought together data to show that when the rivers of western Michigan were connected, with the Des Plaines River and the Chicago outlet, to the Mississippi River, the fauna that now occupies the Grand, the Muskegon and the Saginaw drain-

ages was able to become established in species patterns now observed. In addition to the basic and broad stamp as shown by the mussel assemblage, it can be deduced that the Muskegon River was at one time a tributary to the Grand River; also, the fauna of the Saginaw drainage system was derived from the Grand during the period of confluence between these drainage systems. A study now under way contains information which shows that, although the divide between the streams of southeastern and western Michigan is very low (van der Schalie 1945), the mussels have maintained their patterns of distribution essentially as established at the end of the last glacial period. Passive means of distribution (birds, mammals, man, etc.) are clearly not of great consequence in the establishment of the patterns of distribution for the various mussel groups.

In northwestern Michigan and the Green Bay region there are good indications that the fauna of the western part of the Upper Peninsula is basically a Mississippi assemblage derived when confluence existed between the Fox River and the Wisconsin River at Portage, Wisconsin (Goodrich and van der Schalie 1939). More information is necessary regarding the former river channels now submerged in the northern portion of Lake Michigan. It is clear from the distribution of mussels in the rivers of the Upper Peninsula of Michigan, especially the streams now tributary to Green Bay, that at one time the lake level was sufficiently low to establish a *continuous* river pattern in the Fox River with a major stream whose bed is now submerged in Green Bay. Dr. Frank Leverett (van der Schalie 1939: 42) suggested that there was a sufficiently low stage in the Lake Michigan lake level to permit such a confluence. It is evident that more work is necessary both in tracing the mussel distribution at the present time and in relating this information to such fields as glacial history, geomorphology, etc. in the lake region. To this end it would be helpful if those making collections (by dredging or other means) could preserve properly the mollusks for more careful analyses in these interrelated fields.

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