THE ASIATIC CLAM IN MISSISSIPPI[1]

BY

Billy J. Grantham, Biologist
Mississippi Game & Fish Commission Laboratory
Biology Department, University of Southern Mississippi
Hattiesburg, Mississippi

The Asiatic clam was first collected in the United States in 1938 (Gregg, 1947), and since that time the spread has been nothing short of phenomenal. This small bivalve molluscan (Mollusca Pelecypoda, Heterodonta, Corbiculidae) is a member of the genus Corbicula and some dispute exists as to the exact species in Mississippi at the present time. Its life history differs from the common fresh water mussels in the family Unionidae in that the larval stages are not parasitic. The larval stage of Corbicula becomes planktonic, settles to the bottom and acquires its shell.

Corbicula is probably often confused with small unionids or possibly with the so-called fingernail clams of the family Sphaeriidae. Although this confusion exists, they are quite distinct from any other in that the shells are much heavier and thicker than either form mentioned and they possess heavy ridges on each valve.

Some speculation exists as to how the organism first was transported to America, but the most plausible explanation seems to be that of Gregg (1947), who believed that they probably were brought in with seed oysters in the early 1900's. During this time the United States was obtaining seed oysters from Japan. Another possibility suggested by the Orientals living along the West Coast is that it was brought in for food during the early 1900's (Hannah, 1966).

The first collection of a member of this genus was from the state of Washington on the Columbia River (Gregg, 1947) in 1938. Since that time it has been recorded from Alabama, Arizona, California, Florida, Idaho, Illinois, Kentucky, Louisiana, Nevada, Ohio, Oregon, Tennessee, and this report lists four unconnected stream systems in Mississippi.

---

1. Contributions from Dingell-Johnson Project F-9-R.

Its occurrence in Mississippi is from the Pearl, Pascagoula, Yazoo and Tennessee River systems. The occurrence of the organism in the Tennessee in Mississippi is not at all surprising since Sinclair and Ingram (1961), reported it upstream. Sinclair and Isom (1963), did a very careful study on the entire biology of this organism in the Tennessee River and studied forms from a number of localities. Cursory benthic collections now indicate its presence in several tributary streams of the Tennessee River in northeast Mississippi.

The occurrence of Corbicula on the Pearl River system at mile 46 (Walkiah Bluff) is an indication of its ability to become heavily populated in an area in a very short time. Extensive sampling on the Pearl in 1959-1960 (Grantham, 1960), failed to record its presence, yet sampling in the same area in 1965 recorded concentrations as high as 72 per square foot in rocky regions. The animals in this zone seem to have a definite preference for a rocky type bottom, although some are found in areas that are completely silted in with mud and detritus and some are even found on logs. The preference for this rocky substrate is probably due to there being less chance of its being swept downstream during periods of high flows. The uppermost limit on the Pearl at the present time appears to be at mile 75 near Bogalusa, Louisiana.

In early 1966, Corbicula was found on the Chickasawhay River (tributary to the Pascagoula), near Merrill, Mississippi. The uppermost point on this system is now near State Line, Mississippi. Since it was found on the Chickasawhay, it has also been found on the Leaf River and the upper section of the Pascagoula River. Extensive sampling on the Leaf in 1962 did not record its presence and, undoubtedly, it did not occur because the 1962 sampling station is still well marked and Corbicula now occur in excess of thirty per square foot.

Corbicula were also found on the Yazoo River system near Vicksburg by a private consulting firm and representatives of this collection were sent to this laboratory for identification.

In other areas of the United States where this clam has become established, it has always been recorded as a nuisance organism (Sinclair and Isom, 1963; Ingram, 1959). The economic aspects are heaviest perhaps in the Tennessee and Ohio River systems where it has been established for several years. Authors of the Tennessee Report, mentioned above, look upon the organism as a definite deterrent to the sand and gravel industry. They, in fact, refer to one industry that ceased operations completely on the Cumberland River due to its presence. The main complaint in this relation is that the size range of Corbicula is about the same as gravel which makes it impossible to separate it from the aggregate by methods presently being used. One contractor reported to Sinclair and Isom (1963), that it is quite nerve-racking to pour a section of concrete and then to see it gradually start moving. The nature of the shell and the musculature holding this shell together allow the valves to close up very tightly and to remain closed for considerable lengths of time. Once the gravel is added to concrete, thus they are back in a moist environment, the valves open and the clams start moving about. Extensive

motion is not possible but small voids can be made in concrete, which naturally weakens the entire structure.

Sinclair and Isom (1963) also refer to dead Corbicula clogging water intakes along the Tennessee River. The soft parts become separated very easily from the shell once it is dead and gas production due to putrefaction causes the remains to float. It is this decaying soft part that also causes clogging of irrigation pumps in California (Ingram, 1959) and pumps at steam generating plants on the Ohio and Tennessee Rivers. Hannah (1966), refers to Corbicula clogging an irrigation canal in California and that upon draining a thirty-mile section it was necessary to remove 50,000 cubic yards of dead shells.

In addition to the above-mentioned nuisance conditions, the animals reach such densities that they undoubtedly compete with more desirable fish food organisms.

Although most accounts associate this organism with nuisance conditions, certain points should be made as to beneficial uses. The beneficial use that will probably be of most value is its potential as a fish food organism, especially for certain bottom feeding species. Data that tend to support this probability were obtained during a fish population study on the Chickasawhay River on September 28, 1966. Stomach analyses of four blue catfish (Ictalurus furcatus) revealed that they had been utilizing Corbicula quite heavily as a source of food. Stomach analyses revealed the following:

No. of Fish	Inch Group	Weight	No. of Corbicula
1	11	0.7 lb.	1,634
1	13	0.7 lb.	1,146
1	14	1.1 lb.	2,014
1	15	1.1 lb.	1,285

Individual clams in the above counts ranged from 1 mm to 8 mm with those in the 14-inch fish predominately 2 - 4 mm. Stomach analysis of channel catfish (Ictalurus punctatus) did not reveal any Asian clams. Feeding habits of both fish are similar and further sampling will probably show that channel catfish also utilize Corbicula for food. Several other fish such as the redear sunfish (Lepomis punctatus) and the freshwater drum (Aplodinotus grunniens), undoubtedly have the ability to utilize this organism. Since it is utilized as a source of food for various fish, it will probably come into use on a limited scale for fish bait. They also will provide an additional source of food for waterfowl and various other species of wildlife.

Although this organism will probably never be used extensively as a source of food for human consumption in this country, it does provide some in several Asian countries. Agricultural enterprises are now underway in Japan and several other countries where the animal is cultivated and annual harvests occur.

There are two other possibilities for use of Asian clams, both being in the field of pollution control. One is to use the larval stages as test animals for bioassay work and the second is use of the adults as a stream assay organism to concentrate various trace metals.

The question could now be asked, "How did the clam spread so rapidly?" Attempts to answer this question have caused considerable speculation among biologists. The age-old assumption of spread by an organism such as this is that eggs, etc., are transported on the feet of birds. Sinclair and Isom (1963), pointed out that such explanations are of little value in explaining the spread of an organism such as Corbicula. They suggested that the rapid spread is perhaps associated with river commerce and possibly the movement of sport fishermen and boat enthusiasts from one body of water to another.

This clam, as pointed out above, has a planktonic larval stage, and water collected in boats and then hauled to other areas before being pumped out is one good explanation of the rapid spread. Practically no data exist to indicate how it made the leap from the Western part of the United States to the Eastern part other than that of river commerce.

There is now little doubt that Corbicula will establish in all stream systems of Mississippi within the next few years. Its presence in large numbers is so characteristic of the animal that it will undoubtedly cause problems as Mississippi attempts to more intelligently use streams to benefit man.

Dundee (1961) stated that, "Within less than 25 years this small, slow moving, bottom dweller has spread over much of the United States." This is again evidence enough of unfortunate biological introduction, whether the introductions are planned or accidental.

BIBLIOGRAPHY

Dundee, Dee S., and Walter J. Marman
1963. Corbicula fluminea in Louisiana. Nautilus 77:30

Grantham, Billy J.
1960. Completion Report of Pollution Studies on the Pearl River. Mississippi Game and Fish Reports to U. S. Fish and Wildlife Service, pp. 1 - 80.

Gregg, W. O.
1947. Conchological Club of California. Minutes, 69: pp. 3 - 4.

Hannah, Dallas
1966. Introduced Mollusks of Western North America. California Academy of Sciences, pp. 34 - 38.

Ingram, William M.
1959. Asiatic Clams as Potential Pests in California Water Supplies. Jour. Am. Water Works Assoc. 51: 363 - 370.

Sinclair, Ralph M. and William M. Ingram.
1961. A New Record for the Asiatic Clam in the United States, The Tennessee. Nautilus 74: 114 - 118.

Sinclair, Ralph M. and B. G. Isom
1963. Further Studies on the Introduced Asiatic Alam (Corbicula) in Tennessee. Tennessee Stream Pollution Control Board, Tennessee Department of Public Health, pp. 1 - 51.