Proceedings of the Iowa Academy of Science

Volume 66 | Annual Issue Article 62

1959

A New Method of Marking Fresh-water Mussels for Field Study

Ben Thoma
Iowa State Teachers College

George Swanson
Iowa State Teachers College

Virgil E. Dowell
Iowa State Teachers College

A New Method of Marking Fresh-water Mussels for Field Study

By Ben Thoma, George Swanson and Virgil E. Dowell

Abstract. A review of previously used methods of marking mussels and a description of a new system developed for field use are presented. A code numbering system, utilizing holes drilled into the shell, is described and evaluated.

In studying the life history of animals it often becomes necessary to devise some means of marking individuals within a population. Tags, bands, dyes, paints, systematic removal of "insignificant" parts (e.g., toe-clipping), etc., are commonly employed in marking animals for field study. The marking of fresh-water mussels provides an interesting challenge to these conventional methods. The purpose of this paper is to review some of the previously used methods of marking mussels, and to present and evaluate a method by which large numbers of mussels can be individually marked for study.

Review of Literature

Since only a limited number of investigations have been conducted which necessitated the marking of individual mussels, a correspondingly small number of marking systems have been reported. Isley (1914) used Roman numerals scratched on the shells as a means of identification. In evaluating this system he stated, "The method of marking a shell by scratching a number on it is simple enough, as a mark cut through the epidermis of a mussel valve will be carried indefinitely. To get a satisfactory series for a large number of specimens, however, is difficult." Isley also developed a tagging system in which brass tags were fastened to the specimens with a light copper wire which passed through a 2-mm. hole made in the posterior edge of the valve. He found that, "While the irritation at the moment was doubtless severe, the ultimate effect upon the animal's future growth and activity was insignificant." One disadvantage of this system was noted. Some tags were lost to small boys interested in collecting them.

Spear and Glude (1957), studying the soft clam (*Mya arenaria*) of the coastal waters of Maine, marked each clam with "Volger's opaque ink," which their experiments indicated would remain visible on these clams for a period of 2 to 4 years. Bovbjerg (1957), working on the feeding and activity of the fat mucket (*Lampsilis siliquoidea* Barnes), utilized "lacquer" to number individuals to follow their movements under laboratory conditions.

New Marking System

A marking system which would last throughout the life of a mussel and yet be capable of numbering hundreds of individuals was desired for a field study to be conducted in the West Fork of the Cedar River at Finchford, Iowa. A code system consisting of holes drilled into a 5 x 7 cm. piece of 35-gauge brass (hereafter referred to as the key) was used as a pattern for numbering each mussel. The key consists of five vertical rows of holes one-eighth inch in diameter, placed 8 mm. apart, and five horizontal rows 13 mm. apart (Figure 1). By assigning a number to each hole or combina-

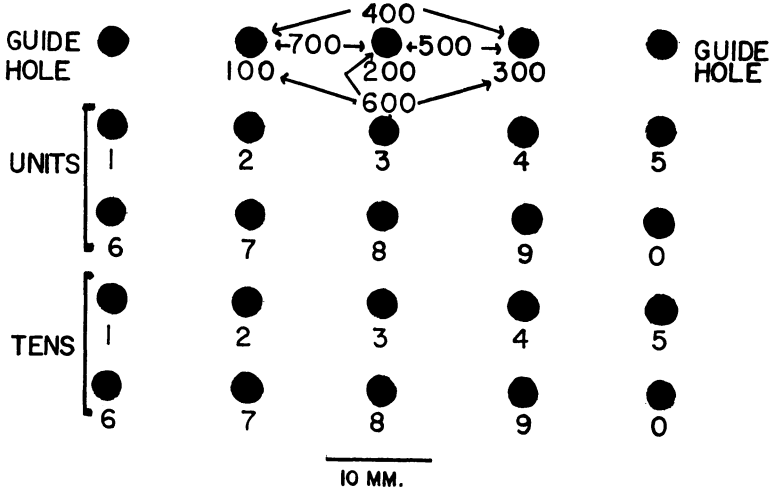

Figure 1. Key for marking mussels. For example, number 275 would be marked by drilling the following holes: the first, third and fifth of the first horizontal row (the first and fifth are guide holes, drilled on all shells), the fifth of the second

tion of holes, a code system from 1 to 799 can be obtained. The first and the last holes of the top horizontal row are guide holes and are used to set the key in the proper position for future re-identification. The three center holes of this row are used to mark the third, or hundreds, digit. The second and third horizontal rows are designated as the units digit, and the fourth and fifth are designated the tens digit. By utilizing only one valve for numbers 1 to 799, an additional 799 can be marked by using the opposite valve. The combined total of 1,598 would probably be sufficient for most field studies. However, the entire marking system can be rotated 90 degrees at a time for three additional systems on each valve, making it possible to mark a total of 6,392 individuals.

The steps in marking consist of placing the key in the desired position on a valve, selecting the holes in the key to obtain the number desired, and the drilling process. The depth which the holes are drilled varies depending on the thickness of the shell, but

usually extends into the nacre layer. A $^{3}/_{32}$-inch bit, shortened so only $^{1}/_{4}$ inch protrudes from the chuck, is used in a small hand drill for this operation.

Results and Evaluation

A total of 471 mussels (largely *Lampsilis ventricosa* Barnes) was marked in a four-month period of utilizing this system. Some difficulty was encountered in marking such thin-shelled species as *Anodonta grandis* (Say) and *Strophitis rugosus* (Swainson). Isley's method of scratching Roman numerals into the periostracum could probably be employed where only a limited number of these mussels are encountered. Since the key must often be curved in order to place the identifying marks on the shell, the holes must be spaced far enough apart to avoid difficulty in re-identification. Because the holes representing the key occupy an area 32 mm. x 52 mm., very small specimens cannot be marked by this system, and other means of marking these shells must be devised. One further factor which may be a disadvantage in utilizing this system is that it requires two field workers to drill the identifying marks.

Some major advantages of this marking system are: (1) large numbers can be marked, (2) the marks are permanent, (3) the process is inexpensive, and (4) the marks are not readily noticeable at a distance and therefore the mussels under study are not likely to be disturbed. Re-identification of marked mussels was easily made by using a transparent cellulose-acetate key. Excellent results were obtained in re-identifying marked specimens. Even those crushed, due to construction equipment operating in the stream in preparation of a bridge construction site, could usually be identified although in many cases only part of the marked valve was recovered. This identification was often dependent on knowing the previous measurements of the shell. Other marking systems, utilizing the general description of this method, can probably be developed and applied even more successfully.

Literature Cited

Bovbjerg, R. V. 1957. Feeding related to mussel activity. Proceedings Iowa Academy of Science. 64: 650-653.

Isley, F. B. 1914. Experimental study of the growth and migration of fresh-water mussels. U. S. Bur. Fish. Doc. No. 792. 1-24.

Spear, H. S. and J. B. Glude. 1957. Effects of environment and heredity on growth of the soft clam. Fishery Bulletin of the Fish and Wildlife Service. Bulletin, No. 114. 57: 279-292.

Department of Science
Iowa State Teachers College
Cedar Falls, Iowa