

## Estimating Fecundity in Mississippi Silversides, *Menidia aedens* (Pisces: Atherinidae)

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### INTRODUCTION

Jordan and Evermann (1896) give the two type locations for Mississippi silversides, *Menidia aedens* Hay, as the Mississippi River near Vicksburg, Mississippi, and near Memphis, Tennessee. These were the only places from which the species was known in 1896; however, the Mississippi silversides apparently is found throughout the lower Mississippi River drainage, in Reelfoot Lake, Tennessee (Rice, 1942), and as far north as the southwestern tip of Kentucky (Clay, 1962).

Except for range descriptions, information on this species is scarce. Apparently nothing has been published on the fecundity of Mississippi silversides, although Saunders (1959) studied the embryology of the fish. The purpose of this study was to estimate fecundity of the Mississippi silversides and to evaluate different methods for rapid estimation of the fecundity of this species.

### METHODS AND MATERIALS

Thirty-two specimens of Mississippi silversides containing mature eggs were collected from Lake Texoma during spring and summer, 1966. The specimens ranged from 68 to 118 mm in total length. While several sizes of eggs were evident in each ovary examined, mature eggs were readily distinguishable from all others by their larger size, transparency, and yellowish coloration (Saunders, 1959).

Ovaries were removed from each fish and placed separately in petri dishes containing a small amount of water. The amount of water used was important: if too much was used, turbulence confused the count while if no water was used, the adhesive eggs tended to stick together and became difficult to count.

After placing an ovary in the petri dish, a sagittal incision was made through the ovary wall, and the eggs scraped out with a scalpel. A binocular microscope was used to separate and count mature eggs. A dropper was helpful in removing groups of eggs after they had been counted.

### RESULTS AND DISCUSSION

The mean number of mature eggs contained in 31 fish was 984, with a standard deviation of 358.6 and a range from 384 to 1699. One female 86 mm in total length contained only 225 eggs. Since it is probable that it was partially spent at time of capture, this fish was excluded from analyses. One unusually large female caught in 1965 contained 2094 mature eggs, but was not included in analyses because of inadequate information.

Four measurements were compared with numbers of mature eggs to determine the best technique for estimating fecundity: 1) total length, 2) ovary weight, 3) total weight, and 4) body weight. Body weight was considered as the weight of the fish after ovary removal. Ovary weight was determined indirectly by subtracting body weight from total weight.

Graphs with fitted regression lines for these four relationships are contained in Figure 1, with statistics for the four relationships shown in Table I. All four comparisons were found to be statistically reliable, but:

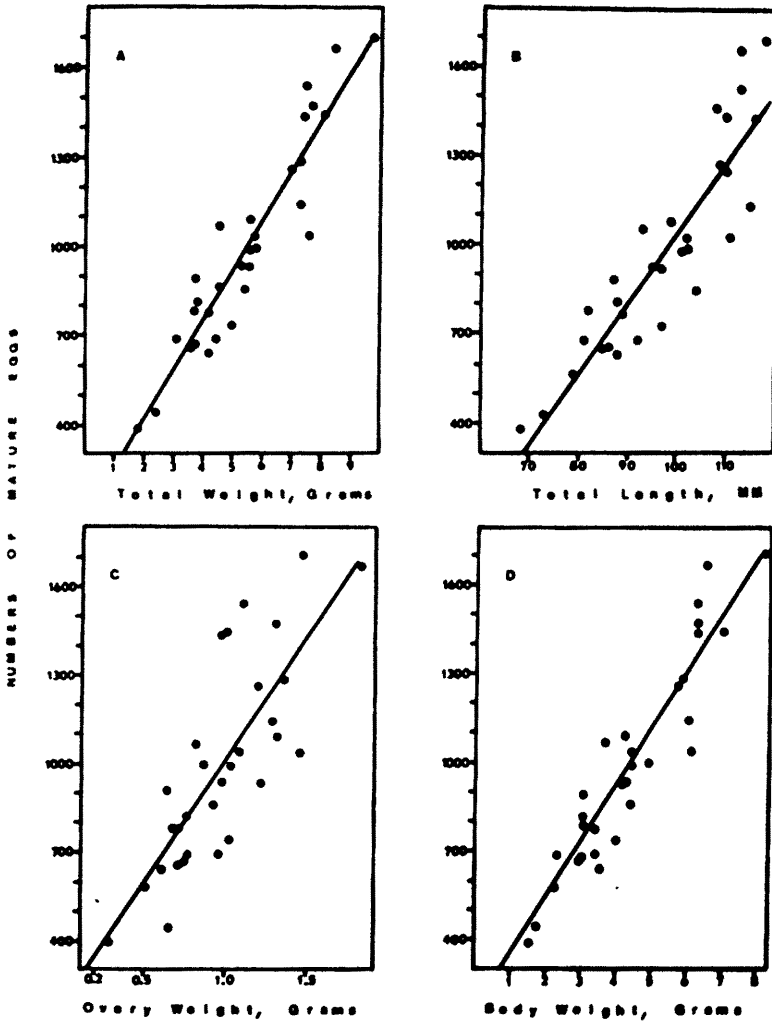


Figure 1. Correlation graphs and fitted regressions for total weight, total length, ovary weight, and body weight, A, B, C, and D respectively, with mature numbers of eggs for the Mississippi silversides.

TABLE I. STATISTICS FOR COMPARISONS OF TOTAL LENGTH, TOTAL WEIGHT, BODY WEIGHT, AND OVARY WEIGHT WITH MATURE EGG NUMBERS IN *Menidia audens*.

	Length	Total weight	Body weight	Ovary weight
Correlation coefficient, <i>R</i>	0.8724	0.9129	0.9122	0.7748
95% confidence interval, <i>R</i>	0.748 to 0.937	0.826 to 0.958	0.825 to 0.957	0.578 to 0.886
Test for correlation:				
T value	9.80**	12.86**	11.97**	6.57**
Regression:				
<i>B</i>	23.29	192.84	846.75	165.90
<i>A</i>	-1278.18	126.99	153.10	83.90
95% confidence interval, <i>B</i>	18.34 to 28.24	156.41 to 175.39	181.27 to 204.40	764.76 to 928.73

to different degrees. The 95% confidence intervals for the correlation coefficient, *R*, probably give the best comparable estimate of reliability. The total weight and body weight relationships have the narrowest confidence intervals, while the confidence interval for the total length relationship was only slightly larger. The confidence interval for the correlation of mature egg numbers and ovary weight was the widest.

It is apparent that the correlation between body length and numbers of mature eggs is the most practical method from which to estimate the fecundity of a population of Mississippi silversides, although correlations between both total weight and body weight with numbers of mature eggs are probably more reliable. The reason for the poorer correlation between mature egg numbers and ovary weight could be due to variability in numbers of immature eggs contained in each individual pair of ovaries.

#### LITERATURE CITED

- Clay, W. A. 1962. *A Field Manual of Kentucky Fishes*. Ky. Dep. Fish and Wildl. Resour., Frankfort, Ky. 137 pp.
- Jordan, D. S. and B. W. Evermann. 1896. *The Fishes of North and Middle America*. U.S. Govt. Print. Office, Wash., D. C.
- Rice, L. A. 1942. The food of 17 Reelfoot Lake fishes in 1941. *J. Tenn. Acad. Sci.* 17(1):4-13.
- Saunders, R. P. 1959. Notes on the embryology of *Menidia audens*. Unpub. Pap., Nat. Sci. Found.
- Saunders, R. P. 1959. A study of the food of the Mississippi silverside *Menidia audens* Hay, in Lake Texoma. Unpub. M.S. Thesis, Univ. Okla., Norman.