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SIZE AND SEX RATIO DIFFERENCES IN *UROSALPINX CINEREA* (SAY) (MURICIDAE) FROM GREAT BAY, NEW HAMPSHIRE[1]

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ABSTRACT

Three hundred and ninety-seven Urosalpinx cinerea *from Great Bay, New Hampshire, were sexed and measured for total shell length. Statistical comparison of the mean shell lengths and chi-square analysis of sex ratios for several size classes show that females are significantly larger than males. Hypotheses to account for this sexual dirmorphism are presented.*

INTRODUCTION

Previous investigators have noted in several populations of the common oyster drill, *Urosalpinx cinerea* (Say), that females attain a greater maximum shell length than males (Federighi, 1931a, 1931b; Cole, 1942; Hargis and MacKenzie, 1961). However, none of these workers demonstrated statistically significant differences in mean shell lengths between the sexes. Griffith and Castagna (1962), working with *Urosalpinx cinerea follyensis* (Baker, 1951) from Chincoteague Bay, Maryland, showed that females, in addition to having a greater maximum shell length, had a mean shell length significantly greater than males. Our paper reports the results of a similar study conducted on *U. cinerea* from Great Bay, New Hampshire.

Great Bay is a shallow, highly turbid estuary with a mud-silt bottom. Yearly salinities range from approximately seven ppt during the spring freshet to 30 ppt in late summer in the mid and lower reaches of the Bay. The drills are limited in their distribution to the few, remaining oyster reefs and are present in very low abundance. Drill density is approximately one to two individuals per square meter of oyster reef. However, they are often distributed in widely separated clusters of four to seven individuals.

METHODS

Approximately 500 oyster drills were hand-collected during the summer of 1972 by scuba divers. The collection site was an oyster reef located in the mid-portion of Great Bay encompassing an area of about 30,000 square meters. The divers collected all drills sighted. Trapping techniques were not employed since bias for a particular size or sex might have resulted. Griffith and Castagna (1962) found that male:female ratios differed between trap-collected and hand-collected drills. The low population density of the Great Bay drills and the high turbidity of the water necessitated numerous dives in order to collect sufficient numbers for statistical analyses. Only individuals greater than 10 mm in length and exhibiting a complete lack of a penis (females) or presence of a well-defined, C-shaped penis (males) were used. Smaller individuals were not used since they are extremely difficult to sex and quite often have not reached sexual maturity. Sexing was done by the live method of Hargis (1957) using 5 X and 10 X hand magnifiers. Shell length was measured to the nearest 0.1 mm with vernier calipers. Drills, after being sexed and measured, were assigned to one of four, pre-determined size classes: $\geqslant 10$ & < 15 mm (class 1), $\geqslant 15$ & < 20 mm (class 2), $\geqslant 20$ & < 25 mm (class 3) and $\geqslant 25$ mm (class 4). These size classes were arbitrarily chosen and do not represent natural breaks in size distribution. Statistical comparison of female and male mean shell lengths was by Cochran's approximation of the Behrans-Fisher test (Snedecor, 1956). Chi-square analysis was used to determine significant deviations from 50-50 sex ratios for the individual size classes and the total sample. All statistical analyses were evaluated at the 99 percent confidence level.

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[1] Jackson Estuarine Laboratory Scientific Contribution No. 1.

RESULTS

The results of this study are presented in figures 1 and 2. Females had a maximum shell length of 38.3 mm and a mean shell length of 20.2 mm. The respective values for males were 30.0 mm and 17.8 mm. Statistical analysis showed that the mean shell lengths were significantly different. Two hundred and thirty-three drills (58.69%) were females and 164 (41.31%) were males. This is a female: male ratio of 1.42:1 and represents a significant deviation from a 50-50 sex ratio. Significant deviations in sex ratios occurred in size classes 3 and 4, the female: male ratios being 1.73:1 and 18:1 respectively. The sex ratios for size classes 1 and 2 showed no significant deviation from a 50-50 sex ratio (0.95:1 and 1.09:1). One hundred females (42.9%) and 39 males (23.7%) were 20 mm or more in length, while 36 females (15.4%) and only 2 males (1.2%) were 25 mm or more in length. Eleven females (4.7%) were greater than 30 mm in length.

DISCUSSION

The results of our study clearly indicate that sexual dimorphism exists in oyster drills from Great Bay, New Hampshire. In addition, our work suggests that this dimorphism is due to the significantly greater number of females than males in the larger size classes. This preponderance of large females was sufficient to yield a significant deviation from a 50-50 sex ratio.

The sexual dimorphism in Great Bay drills may be attributable to the following reasons: females have a faster rate of growth than males, females live longer than males and thus have a longer period of growth, or both. Another possibility is that sexually mature males undergo a sex transformation into females. The occurrence of female *U. cinerea* with structures resembling vestigal penises suggests that this deserves investigation.

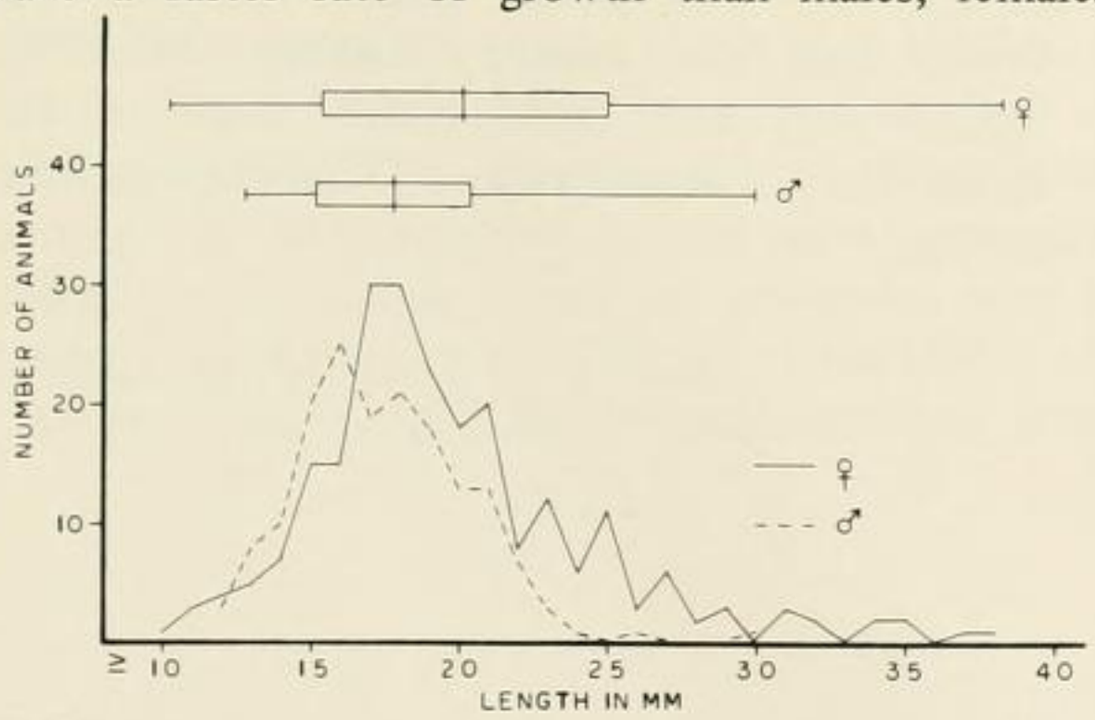

FIG. 1. *Length-frequency and size distribution of* Urosalpinx cinerea *from Great Bay, New Hampshire. Upper figure represents range, mean and ± one standard deviation.*

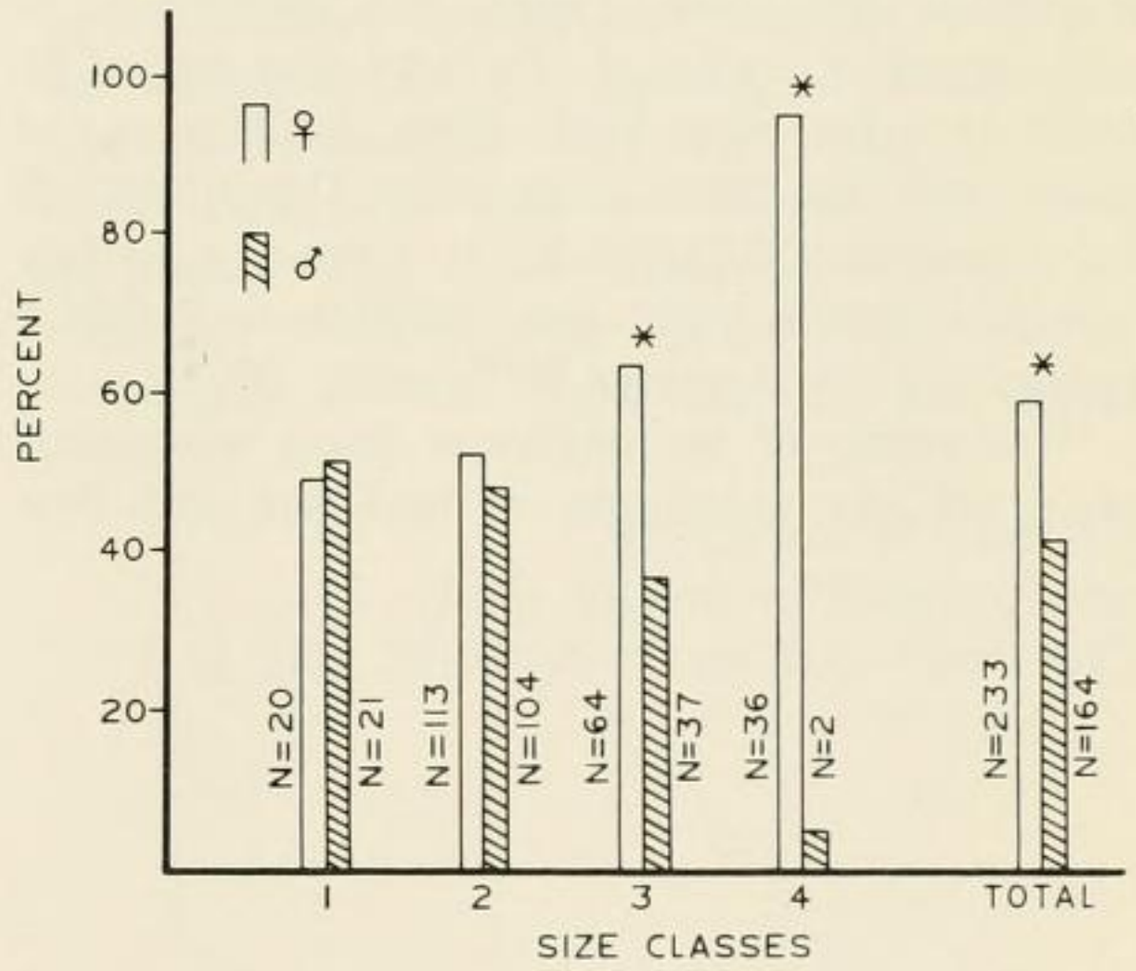

FIG. 2. *Percent distribution of female and male* Urosalpinx cinerea *from Great Bay, New Hampshire in each size class.* * = *Significant deviation from a 50-50 sex ratio.*

LITERATURE CITED

Baker, Bernadine B. 1951. Interesting shells from the Delmarva Peninsula. Nautilus **64** (3): 73-77.

Cole, H. A. 1942. The American whelk tingle, *Urosalpinx cinerea* (Say), on British oyster beds. J. Mar. Biol. Assoc. U. K. **25**: 477-508.

Federighi, H. '1931a. Further observations on the size of *Urosalpinx cinerea* Say. J. Conchol. **19**: 171-176.

Federighi, H. 1931b. Studies on the oyster drill (*Urosalpinx cinerea* Say). Bull. U. S. Bur. Fish. 47 (4): 83-115.

Griffith, G. W. and M. Castagna. 1962. Sexual dimorphism in oyster drills of Chincoteague Bay, Maryland-Virginia. Chesapeake Sci. **3**(3): 215-217.

Hargis, W. J., Jr. 1957. A rapid live-sexing technique for *Urosalpinx cinerea* and *Eupleura caudata* with notes on previous methods. Limnol. Oceanogr. **2**: 41-42.

Hargis, W. J., Jr. and C. MacKenzie. 1961. Sexual behavior of the oyster drills: *Eupleura caudata* and *Urosalpinx cinerea.* Nautilus **75** (1): 7-16.