

NOTES ON THE BIOLOGY AND FOOD HABITS OF THE CUNNER¹

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ABSTRACT

During the summer of 1971, 500 cunners (*Tautogolabrus adspersus*) ranging from 61 to 200 millimeters in standard length were collected from the Sakonnet River at Portsmouth, Rhode Island. The fish were examined for meristic characters, length-weight relationships and food habits. The data indicated that the cunner is omnivorous but that the majority of its food is animal material. Various species of algae were found in the alimentary tracts examined. *Balanus balanoides*, *Mytilus edulis* and *Mya arenaria* dominated the food, both in occurrence and volume. *Bugula* sp. also contributed greatly in terms of occurrence, but it was low in volume.

The cunner (*Tautogolabrus adspersus*) is one of two species of fish of the family Labridae inhabiting New England coastal waters, the other being the tautog (*Tautoga onitis*). The cunner ranges generally from Newfoundland to Virginia and is found mainly around piers, pilings, rockpiles and wrecks as well as in kelp and grass beds (Hildebrand and Schroeder, 1928; Bigelow and Schroeder, 1953; Serchuk and Frame, 1973). While once somewhat important commercially, the cunner is presently not sought by commercial fishermen. However, it makes up a significant portion of the catch of many sports fishermen (Serchuk and Frame, 1973). This note presents data on certain meristic characters of *T. adspersus*, as well as length-weight relationships and food habits of specimens collected in the vicinity of Portsmouth, Rhode Island.

MATERIALS AND METHODS

During the summer of 1971, 500 cunners were collected from the Sakonnet River at Portsmouth, Rhode Island (Figure 1). All the fish were captured by rod and reel using cut *Mya arenaria* and *Nereis virens* as bait. Immediately following capture, each fish was sexed, weighed to the nearest 0.1 gram and measured to the nearest millimeter (both in standard length and total length), and meristic determinations were made on the dorsal, anal, pectoral and pelvic fins. The gill raker count on the lower limb of the first arch was made on each fish. Because the cunner does not possess a morphological stomach (Chao, 1973), the

¹Appreciation is expressed to Dr. Gilbert W. Bane of St. Francis College for advice and encouragement in this work and to Dr. Howard Reisman of Southampton College and Dr. Herbert Austin of the New York Ocean Science Laboratory for reviewing the manuscript.

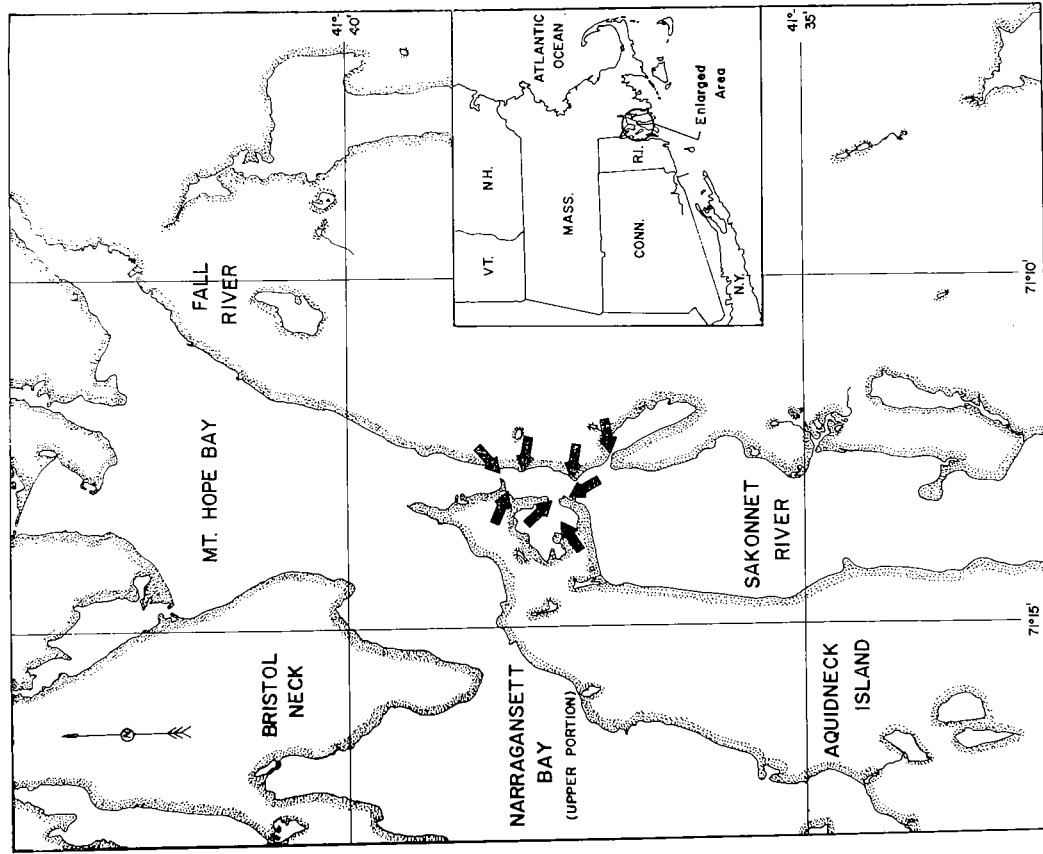


Figure 1. Map showing location of study area and enlargement with sampling stations indicated by arrows.

alimentary tracts were removed for food habits studies. The alimentary tracts were preserved in 10 per cent formalin until they could be examined in the laboratory.

Food habits analyses consisted of identifying the organisms found in each digestive tract and determining their volume. Enumeration of individual organisms was not always possible since many of the food items were crushed during either ingestion or digestion (e.g., *Balanus balanoides*, *Mytilus edulis*, *Mya arenaria*), existed as colonies (e.g., *Bugula* sp.) or were multicellular (e.g., various species of algae).

Length-weight relationships were obtained from the formula $Y = ax^b$, where Y is the length (either standard or total) in millimeters, x is the weight in grams, and a and b are constants.

RESULTS AND DISCUSSION

Meristic determinations on the dorsal, anal, pectoral and pelvic fin rays are presented in Table 1. The greatest variability was observed in the dorsal ray counts, including both soft and hard rays, although for each type of fin one particular count dominated in excess of 90 per cent of the 500 fish examined. The dominant counts were: XVIII, 10 for the dorsal; III, 9 for the anal; 14 for the pectoral; and 6 for the pelvic fin rays. No variability was observed in the pelvic ray counts.

TABLE 1. MERISTIC CHARACTERS OF 500 CUNNERS FROM THE SAKONNET RIVER AT PORTSMOUTH, RHODE ISLAND

Character	Number	Percentage of specimens
Dorsal fin rays	XVIII, 8	0.4
	XVIII, 9	2.2
	XVIII, 10	96.2
	XVI, 9	0.2
	XIX, 9	0.6
Anal fin rays	III, 7	0.2
	III, 8	0.6
	III, 9	99.2
Pectoral fin rays	14	99.2
	15	0.8
Pelvic fin rays	6	100.0

Jordan and Evermann (1896) listed dorsal and anal ray counts for *T. adspersus* as XVIII, 10 and III, 9, respectively, but they included no figures on the variability to be expected. Bigelow and Schroeder (1953) reported the dorsal fin of *T. adspersus* as having "about 18 spines and 9 or 10 soft rays" and the anal fin as having "3 stout spines and about 9 rays". Hildebrand and Schroeder (1928) found dorsal ray counts of XVIII, 9 and anal ray counts of III, 8 on a single cunner they examined from Chesapeake Bay. None of these authors presented information on the number of pectoral or pelvic fin rays.

Gill raker counts of the lower limb of the first arch indicated a range of 9 to 12. The majority of the fish (79.8 per cent) had 11 gill rakers on the lower limb, but 0.4 per cent had nine, 9.0 per cent had 10, and 10.8 per cent had 12 gill rakers. Jordan and Evermann (1896) reported that 11 gill rakers was the predominant number for the specimens they examined.

Length-weight relationships are presented in Table 2. The curves

TABLE 2. LENGTH-WEIGHT RELATIONSHIPS FOR 500 CUNNERS FROM THE SAKONNET RIVER AT PORTSMOUTH, RHODE ISLAND

Relationship and equation*	Value of r
Standard length-weight (n=500 fish) $Y = 0.000067 X^{2.815487}$	0.95893
Total length-weight (n=500 fish) $Y = 0.000016 X^{3.007439}$	0.97742
Standard length-weight (n=297 males) § $Y = 0.000093 X^{2.746324}$	0.95741
Standard length-weight (n=199 females) § $Y = 0.000052 X^{2.875636}$	0.95565

* See text for description of equation.
§ Number of males plus number of females is less than 500 because sex was not determined for four individuals.

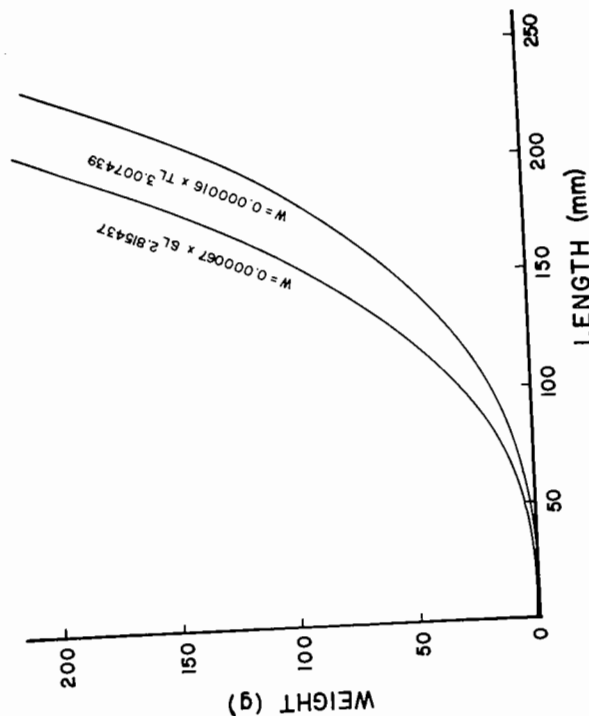


Figure 2. Relationship of weight to total length and standard length for 500 cunners from the Sakonnet River at Portsmouth, Rhode Island.

derived for the relationship of standard length to weight and of total length to weight, for all 500 specimens, are shown in Figure 2. Separate curves for males and females (which were based on standard length) are not included since many of the points were nearly concurrent with those for all fish. Because of the similarity in the three curves calculated on standard length, there is no reason to consider sex when determining weight on the basis of standard length, at least in the size range of the fish examined (i.e., 60 to 200 millimeters). The distribution of the fish

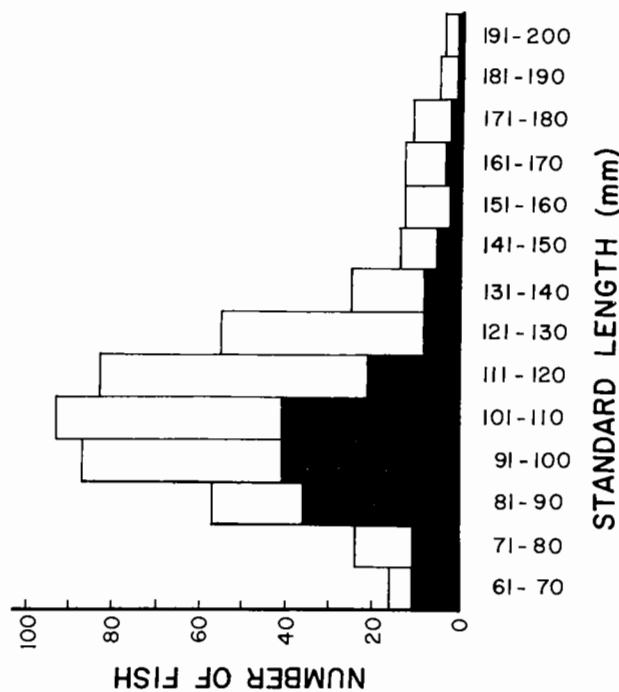


Figure 3. Length-frequency distribution, according to standard length, of 500 cunners from the Sakonnet River at Portsmouth, Rhode Island. Shaded portion indicates specimens with no food in alimentary tract.

collected was nearly normal (Figure 3), although skewed toward the smaller sizes because of failure to collect individuals less than 60 millimeters long by rod and reel.

Bigelow and Schroeder (1953) reported that adult cunners from the Gulf of Maine generally range from 6 to 10 inches (144-254 millimeters) in length with a maximum of about 15 inches (381 millimeters). The largest fish obtained in this study was 198 millimeters in standard length (251 millimeters in total length) and was thus within the norm for adults as given by Bigelow and Schroeder.

The food habits of the cunner have been discussed by various authors, including: Bigelow and Schroeder (1953); Chao (1973); Dexter (1947); Hildebrand and Schroeder (1928); Johansen (1925); Nichols and Breder (1927); Osburn (1921); and Richards (1963a, 1963b). Most authors agree that the cunner is omnivorous, although the preponderance of its food appears to be mollusks and crustaceans. Chao (1973), in a study of the morphology of the alimentary canal of *T. adspersus* and the food habits of specimens collected from the coastal waters of Massachusetts, concluded that the cunner is primarily carnivorous even though some plant material was often associated with the contents of the alimentary tract.

Of the 500 digestive tracts examined during the present study, 309

TABLE 3. FOOD ORGANISMS FOUND IN THE ALIMENTARY TRACTS OF 500 CUNNERS FROM THE SAKONNET RIVER AT PORTSMOUTH, RHODE ISLAND, AND THEIR OCCURRENCE BY FREQUENCY AND VOLUME

Organism	Specimens containing organism		Volume (per cent) §
	Number	Per cent*	
Algae			
<i>Ulva lactuca</i>	11	3.5	1.3
<i>Fucus vesiculosus</i>	9	2.9	1.6
<i>Laminaria saccharina</i>	5	1.6	0.6
<i>Porphyra</i> sp.	2	0.6	0.2
<i>Chondrus crispus</i>	2	0.6	0.2
<i>Ceramium rubrum</i>	2	0.6	0.2
Unidentified	5	1.6	0.4
Porifera			
<i>Microciona prolifera</i>	7	2.3	0.5
Unidentified	1	0.3	0.1
Coelenterata			
<i>Tubularia crocea</i>	6	1.9	0.6
<i>Metridium</i> sp.	13	4.2	2.0
Annelida			
<i>Nereis virens</i>	14	4.5	2.4
Arthropoda			
<i>Balanus balanoides</i>	147	47.6	38.8
<i>Gammarus</i> sp.	7	2.3	0.6
<i>Palaemonetes pugio</i>	1	0.3	0.1
<i>Neopanope texana sayi</i>	17	5.5	3.4
<i>Uca</i> sp.	3	1.0	1.4
<i>Libinia emarginata</i>	1	0.3	0.4
Unidentified macruran	2	0.6	0.9
Unidentified brachyuran	2	0.6	0.7
Mollusca			
<i>Mytilus edulis</i>	30	9.7	9.0
<i>Modiolus demissus plicatulus</i>	8	2.6	1.7
<i>Mercenaria mercenaria</i>	1	0.3	0.8
<i>Mya arenaria</i>	34	11.0	16.3
<i>Littorina littorea</i>	10	3.2	1.4
<i>Eupleura caudata</i>	7	2.3	0.9
Unidentified gastropod	3	1.0	0.2
Ectoprocta			
<i>Bugula</i> sp.	26	8.4	3.9
Unidentified	1	0.3	0.1
Chordata—Asciacea			
<i>Molgula manhattensis</i>	14	4.5	2.4
Chordata—Osteichthys			
<i>Menidia menidia</i>	13	4.2	5.7
<i>Fundulus majalis</i>	2	0.6	0.5
<i>Tautoglabrus adspersus</i>	1	0.3	0.6

* Based on the 309 specimens that contained food.

§ Based on total food volume of 221.8 milliliters.

contained food. The food organisms identified, together with their frequency of occurrence and volume, are presented in Table 3. Considering only the specimens that contained food, the organisms that occurred

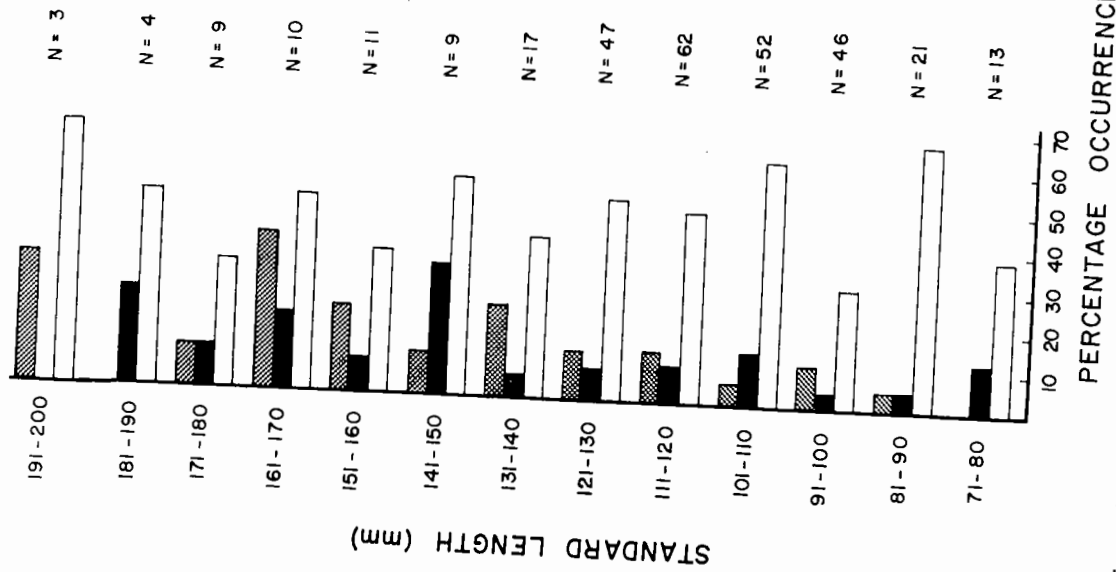


Figure 4. Percentage occurrence of *Balanus balanoides*, *Mytilus edulis* and *Mya arenaria* in the alimentary tracts of cunners from the Sakonnet River at Portsmouth, Rhode Island, according to the size of the fish in standard length.

most often were the barnacle *Balanus balanoides* (47.6 per cent), the mussel *Mytilus edulis* (9.7 per cent), the clam *Mya arenaria* (11.0 per cent) and the ectoproct *Bugula* sp. (8.4 per cent). These four species accounted for 68.0 per cent of the total volume of food material re-

covered. Algae of several species were found in 36 of the specimens (11.7 per cent) and represented 4.5 per cent of the total volume of food material. Fish were found in 16 specimens, three species being represented one of which was the cunner itself (a juvenile). Of the 16 individuals found as food items, 13 were *Menidia menidia*, which may reflect the availability of that species rather than selection by the cunner. Although there was a general parallel in the relative rankings of the various food organisms, whether based on occurrence or volume, the values for occurrence were usually higher because many specimens had taken more than one organism.

The findings of this study corroborate those of other authors that, while the cunner is omnivorous, mollusks and arthropods are its chief foods. The cunner also appears to be somewhat opportunistic in its feeding habits, but whether it is able to benefit nutritionally from algae is uncertain. Algae and other plant materials may be taken incidentally during primarily carnivorous feeding. Many attached forms were among the foods taken.

The data were also examined to determine whether any of the three major food items (*B. balanoides*, *M. edulis* and *M. arenaria*) was taken to a greater degree by cunners of one size than by those of another. The relationship based on standard length is shown in Figure 4. With respect to *B. balanoides*, there did not appear to be any preference by cunner of a particular size; it was present in excess of 30 per cent of all specimens examined regardless of size. Although *M. edulis* was absent from fish 71 to 80 millimeters long and from fish 181 to 190 millimeters long, and *M. arenaria* was absent from fish 191 to 200 millimeters long, this was not considered important because of the few specimens of these sizes that were examined. There appeared to be a trend toward an increasing frequency of occurrence of *M. edulis* and *M. arenaria* as the size of the cunners increased, but this was not consistent.

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