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Some Predators of Polyps of Chrysaora quinquecirrha (Scyphozoa, Semaeostomeae) in the Chesapeake Bay

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Abstract—Some invertebrate predators of polyps of *Chrysaora quinquecirrha* were identified. They included *Caprella equilibra, Callipallene brevirostris, Neopanope texana sayi, Pagurus longicarpus, Libinia dubia,* and *Cratena pilata.* Only *C. pilata* showed a preference over other possible prey organisms.

Introduction

The Chesapeake Bay is plagued each year by the Scyphozoan *Chrysaora quinquecirrha.* The abundant medusoid form of this animal is a nuisance to swimmers and fishermen, and causes economic loss to businesses which profit from visitors to our seashores. On occasions it has clogged intake screens on power plants which use estuarine waters for cooling. At times it also causes trouble in the cooling systems of vessels. The ecology of *C. quinquecirrha* has been studied by various workers (1–4, and others). Further study is needed to determine predators which may control populations in the estuary.

Known predators of the free floating medusa and ephyra forms include the harvest fish *Peprilus alepidotus,* the anemone *Diadumene leucolena,* the spider crab, *Libinia dubia* and the barnacle *Balanus eburneus* (1, 2, 5, 6). The sessile polyp stage might be expected to be subject to predation by many species. One organism which has been extensively studied is the nudibranch *Cratena pilata,* an organism capable of selectively ingesting polyps at a rapid rate (1, 7). The present research was directed toward determining the possible role of other common benthic invertebrates as predators on polyps.

Materials and Methods

Epibenthic species from several taxa were tested as possible predators (Table I). The animals examined had habitats similar to those of the polyp of *C. quinquecirrha.* Work on this project was completed during the months of June and July 1969.

In an initial evaluation of a species as a predator, five or more individuals were placed in a large fingerbowl containing a known number of polyps. After 24 to 72 hours, the remaining polyps were counted. Animals tested were considered possible predators if more than 25% of the polyps were destroyed during the test. Controls consisted of a known number of polyps in a fingerbowl. The mortality in the control bowls was compared to the mortality under experimental conditions.

Animals designated as possible predators were further tested to determine whether scyphopolyps were the preferred prey. Specimens were placed in a 12-inch fingerbowl containing polyps, and the behavior of the organisms was observed through a dissecting microscope. Controls were maintained in separate bowls. Results were considered positive when the suspected predator was seen ingesting a *C. quinquecirrha* polyp. Tests were repeated to confirm initial observations.

Polyps used in the study were attached to freshly collected oyster shells bearing other epibenthic organisms (hydroids, sponges, bryozoans). The shell

TABLE I

Summary of Animals Screened as Possible Predators of Polyps of Chrysaora Quinquecirrha Showing Positive (+) and Negative (−) Predation

Species	Length range mm	Results
Gammarus sp.	4	−
Caprella equilibra	5–8	+
Corophium sp.	5–10	−
Cyathura carinata	10–15	−
Palaemonetes sp.	30–40	−
Libinia dubia	30–40	+
Neopanope texana sayi	25–40	+
Pagurus longicarpus	15–20	+
Nereis succinea	25–45	−
Hydroides hexagona	15–20	−
Glycera dibranchiata	40–50	−
Nassarius sp.	15–20	−
Urosalpinx cinerea	10–15	−
Cratena pilata	2–5	+
Callipallene brevirostris	1–2	+
Stylochus ellipticus	2–4	−
Coronadena mutabilis	2–4	−
Opsanus tau	40–50	−
Gobiesox strumosus	40–50	−

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TABLE II

Details of Experiments on Six Predators of Polyps of Chrysaora Quinquecirrha

Species	Experiment Number	Test Days	Test Number Polyps	Test Percent Mortality	Control Number Polyps	Control Percent Mortality
Caprella	1	2	8	87	42	5
equilibra	2	3	15	100	26	11
	3	2	50	80	26	0
Callipallene	1	3	46	100	26	11
brevirostris	2	1	4	100	26	0
Neopanope	1	1	51	100	26	0
texana	2	4	125	92	40	0
Cratena		1	4	100	26	0
pilata						
Pagurus	1	1	16	100	42	5
longicarpus	2	3	100	91	26	11
Libinia	1	2	40	100	26	11
dubia	2	3	18	100	23	44

with its epifauna thus simulated a "natural environment," offering alternative prey to the attached scyphopolyps. Oyster shells with polyps were obtained from the York River and tributary creeks.

Results and Discussion

Six of the 19 species tested were regarded as predators (Table II). They were the caprellid amphipod *Caprella equilibra,* the pycnogonid *Callipallene brevirostris,* the mud crab *Neopanope texana sayi,* the hermit crab *Pagurus longicarpus,* the spider crab *Libinia dubia,* the nudibranch *Cratena pilata.* Mortality among test polyps ranged from 80 to 100% in tests lasting from one to four days. Each predator is discussed below.

Caprella equilibra. This amphipod moved over the oyster shell in an erratic manner. Both *C. quinquecirrha* and hydroid polyps were readily ingested. In feeding, the amphipod did not always use its large gnathopods.

Callipallene brevirostris. On contact with a polyp, *C. brevirostris* quickly grasped its prey with the chelifores and mouth appendages. Polyps were ingested by being sucked into the extended proboscis.

Neopanope texana sayi and *Pagurus longicarpus.* These decapods fed in a similar manner, crawling over the oyster shell and ingesting bryozoans, hydroids, and scyphopolyps. Polyps or other prey were grasped with the chelipeds, pushed to the mouth, and rapidly ingested. Both species were voracious predators in the laboratory; within 20 seconds each had devoured about 10 *C. quinquecirrha* polyps. Only one species of mud crab, *N. texana sayi* was studied, although other species of Xanthidae such as *Eurypanopeus depressus* or *Panopeus herbsti* may also be predators.

Libinia dubia. This species was reported to be a predator of the medusae of *Aurelia aurita* (6). The spider crab was also found to prey on the medusae of *C. quinquecirrha.* Such predation was frequently observed both in the field and in the laboratory. *L. dubia* feeds on scyphopolyps in the same manner as *N. texana sayi* and *P. longicarpus.* Feeding is in a non-selective fashion; other organisms (i.e., hydroids, bryozoans) are seized with the chelae and rapidly ingested.

Cratena pilata. This nudibranch, as indicated by Cargo and Schultz (1), and Vogel (7), appears to be the only predator that shows a feeding preference for scyphopolyps. *C. pilata* by-passes other food items and appears to search for *C. quinquecirrha* polyps; other materials, however, are ingested as well. No nematocyst reaction, except for a small twitch of the sensory rhinophores, was observed when the nudibranch made contact with polyps. *C. pilata* ingested polyps as quickly as it located them.

Five of the polyps predators identified in the present study are omnivorous in their feeding habits. These are *C. equilibra, C. brivirostris, N. texana sayi, P. longicarpus,* and *L. dubia.* All of the above possess a chitinous exoskeleton which provides protection from the nematocysts of the *C. quinquecirrha* polyps. The nudibranch *C. pilata,* a selective predator of scyphopolyps, has no exoskeleton, but is apparently not harmed by the nematocysts. It is suggested that these six invertebrate species, because of their abundance in the Chesapeake Bay, possess a high potential for destruction of *C. quinquecirrha* polyps. Further study of these predators and their feeding habits may suggest a natural method of controlling the jellyfish population in Chesapeake Bay.

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