OBSERVATIONS ON PREDATORS OF GIANT CLAMS (BIVALVIA: FAMILY TRIDACNIDAE)

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Giant clams are now the subject of mariculture studies throughout the Indo-Pacific region (Gwyther and Munro, 1981; Fitt et al., 1984; Heslinga and Watson, 1985). One question to be answered before large-scale culture is attempted is the extent of predation in the natural habitats. This paper presents preliminary observations on predation on five species of tridacnids (Tridacna crocea [Lamarck], T. derasa [Röding], T. maxima [Röding], T. squamosa [Lamarck] and Hippopus hippopus [Linn.]) in the laboratory and in nature.

METHODS AND MATERIALS

Observations on clam predation were made in the natura habitats while skin or SCUBA diving and in the laboratory. Bo laboratory-spawned juvenile clams and adult clams collected nature were observed. Potential predators (three gastropod three fishes and three crabs) were collected from coral reef The choice of these nine predator species was based primarily their availability, but, for some, also on anecdotal repor about their clam-feeding habits. In the laboratory, two to fo clams, each belonging to one species, were simultaneous exposed to one unfed potential predator in 60-l glass aquaria a were observed for periods varying from two to seven days. T water in the aquaria was aerated and kept at a temperature 26.5 to 31°C.

RESULTS AND DISCUSSION

Clam predation in nature was observed only once, despite t large number of dives (>100): a 17-cm-long tulip she Pleuroploca sp. attacked an 8.5-cm-long T. maxima.

Eight of the nine species of potential predators were fou to attack giant clams in the laboratory (Table 1). The excepti was the bat volute, Voluta vespertilio, which did not attack maxima, T. squamosa and H. hippopus. The muricid Chicore ramosus probably also preys on giant clams in the natur

Table 1. Summary of laboratory observations on clam predation, (+) attacked, (-) not attacked, (0) not tested.

PREDATOR SPECIES	CLAM SPECIES				
	T. crocea	T. derasa	T. maxima	T. squamosa	H. hippopus
Chicoreus ramosus	+	0	+	+	+
Pleuroploca sp.	+	0	+	+	+
Voluta vespertilio	0	0	-	-	-
Balistapus undulatus	+	0	+	+	+
Halichoeres sp. 1	+	0	+	+	-
Halichoeres sp. 2	+	0	+	+	-
Demania alcalai	+	+	+	+	+
Carpilius convexus	+	+	+	+	+
Thalamita sp.	0	0	+	0	+
Number attacked and consumed	7	9	8	8	8

habitats, as the family Muricidae is a well-known molluscan predator. Whether the other six species observed to attack clams in the laboratory do so in nature also is not known.

The predators exhibited various modes of attack. Chicoreus ramosus injects a toxic substance causing paralysis of clam muscles through a hole which it drills through the valve. It then sucks the fluids of the prey by means of its proboscis, inserted through the hole (Halstead, 1978). Chicoreus was also observed attaching directly to the clam through the gaping valves. Pleuroploca immobilized the clams by clasping the mantle with its foot, bringing its shell lip against the clams' valves preventing their closure. The predator then inserted its proboscis into the soft tissues, which it consumed. Balistapus undulatus fed on the mantle and the exposed byssus and foot of adult clams. Halichoeres fed only on the byssus and foot of anchored clams. The xanthid crabs Demania alcalai and Carpilius convexus used their chelae to break the valves of juvenile clams before feeding on their soft tissues.

The portunid crab Thalamita probably penetrated the soft tissu of adult clams through either the byssal orifice or the inhale siphon and fed on the soft tissues and mantle from within.

Six predatory species (C. ramosus, Pleuroploca sp., undulatus, Halichoeres spp. and Thalamita sp.) fed on both adul and juveniles; two (D. alcalai and C. convexus), on juveni only. T. squamosa was vulnerable to the attacks of Balistap because its valves in adult animals do not close completel exposing the mantle. Clams with a large byssal orifice (crocea, T. maxima) were readily attacked by Halichoeres wh detached from the substrate. Among the clams observed, hippopus suffered the least from predation; only Chicore ramosus and Pleuroploca attacked it. C. ramosus attack Tridacna spp. before Hippopus when these clam species we presented to the predator. C. ramosus and Pleuroploca attack all five species of giant clams.

Heslinga and Watson (1985) and Perron et al. (1985) report controlled experiments in Malakal harbor, Palau, Caroli Islands, in which juvenile T. derasa were preyed upon by t muricid gastropod Cymatium muricinum. Heslinga et al. (198 indicates that another muricid species, Chicoreus ramosus, also a natural predator at Palau.

My observations on clam predation, which lacked adequa controls, are preliminary, serving to indicate lines for futu laboratory experiments. Although a predator has been observ attacking a natural population, the extent of this predation as yet unkown.

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