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Predation by Sagitta on Larval Fish in Earthen Pond

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素堀池におけるヤムシによる仔魚の捕食

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Observations of predation by *Sagitta* on larval red sea bream, *Pagrus major* were carried out in an earthen pond. The specimens of *Sagitta* were collected quickly by hand-net from the culture pond to avoid predation during sampling procedure.

The *Sagitta* was identified as *Sagitta crassa* TOKIOKA. The phenomenal fact of feeding may be interpreted as indicating the possibility that *Sagitta* attacked or preyed on the dead larvae in the natural conditions.

Mortality of fish larvae by plankton is a widespread phenomenon, and copepods and chaetognaths are well known as common predators (LILLELUND and LASKER, 1971; NAGASAWA and MARUMO 1976; BAILEY and YEN, 1983; BLAXTER and HUNTER, 1983). Feeding behaviour of *Sagitta* has been investigated mostly in the laboratory conditions (REEVE, 1964; FRASER, 1969; KUHLMANN, 1976 ; FEIGENBAUM and REEVE, 1977), rare for observations in the natural conditions. In this paper, we describe the predation by *Sagitta* on larval fish in the natural conditions, and discuss briefly the difference of feeding behaviours between in the laboratory and in the wild

Materials and Methods

A pond of 15,750m^3, measuring 170×45×2m was used to raise larval red sea bream, *Pagrus major*. Water in the pond was introduced from the sea through a water gate screened to supply food organisms, therefore smaller animals were also transffered with the water column into the pond. Patches of the larval fish and copepods were often occurred during a rearing season of May (W.T.; 24°-27°C). Accidentally *Sagitta* was also seen in the patches, and seemed to prey on the larval fish and copepods. The chaetognaths which were in the upper layer of the pond were collected quickly by hand-net, then immediately preserved in 10% formalin solution to avoid the predation during the sampling

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procedures.

Results and Discussion

Collected specimens shown in Fig. 1 were identified as *Sagitta crassa* TOKIOKA by Dr. S. NAGASAWA. In the laboratory experiment, *Sagitta* bited the central portion of the trunk, and digested them as a round oval mass in which the pair of eyes were seen in the cephalic past (KUHLMANN, 1976), but all larvae found in the intestine of the *Sagitta* were digested from the caudal portion in the present observation (Fig. 1-a, b). *Sagitta* usually showed no response against moveless prey such as eggs and dead one, and weak response for yolk sac larvae (KUHLMANN, 1976; BAILEY and YEN, 1983). Swimming activities, especially on tail beating were needed to recognize and locate their food (LILLELUND and LASKER, 1971).

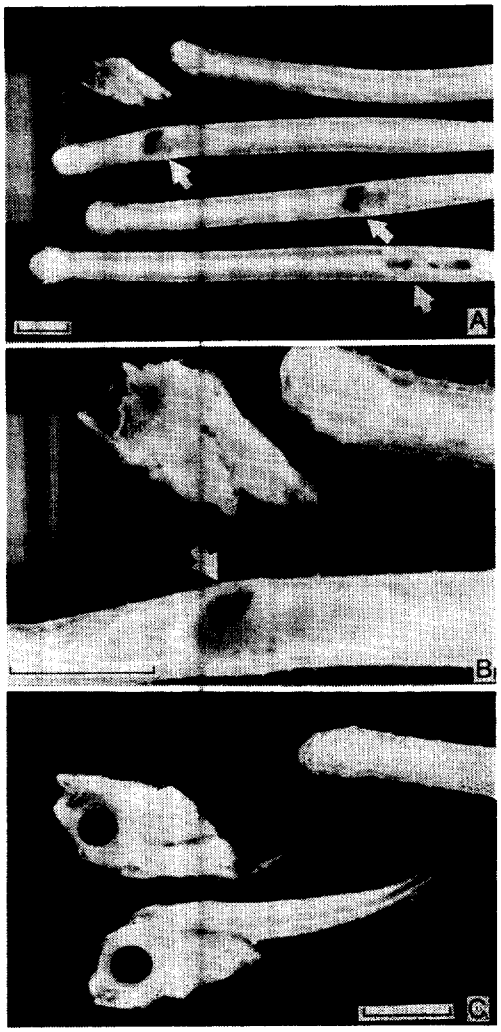

Fig. 1. Larval red sea bream bited and digested (arrows) by *Sagitta crassa* ranging 12.7 to 13.5 mm. A, dead larva bited and larvae with pigmented eyes digested; B, close-up of dead larva catched and larva shallowed; C, larvae with well pigmented eyes was digested at the posterior portion of body. Uncaptured larva is 4.7 mm SL in size. Scales denote 1.0 mm.

Some specimens obtained indicates that they attack the dead larva which was fairly disintegrated as shown in Fig. 1-a, b as well as living one (Fig. 1, c). Fish larvae of both specimens were connected fast with the grasping spines of *Sagitta*, and posterior portion of the larvae shaped slender, seeming to be digested. As mentioned before there were no opportunity for the *Sagitta* to catch the larvae during sampling procedures Therefore, the fact may be interpreted as indicating the possibility that *Sagitta* attacked or preyed on the dead animals in the natural conditions.

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粗放的な方式でマダイ種苗が生産されている素堀池においてヤムシが仔魚を捕食している現象を観察した。

ヤムシは *Sagitta crassa* TOKIOKA と同定された。捕食されたマダイは後期仔魚で，一部腐食した個体がありヤムシは動きのない餌生物には摂食行動を示さないとされる室内実験の結果と比較すると，自然条件に近い状態では *Sagitta* が死亡した餌料にも摂食行動を示す可能性があることを示唆している。