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Feeding Specializations in Adult Spiny Eel *Mastacembelus armatus*

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Abstract - Adult *Mastacembelus armatus* are predators, preferring live aquatic crustaceans and insects. Well developed dentition, strongly built stomach and short intestine besides other characteristics are related to its dietary habit.

Published data are available on the feeding biology of Indian freshwater fishes which command food value, but there is little information on the spiny eel (Mastacembeliformes) despite palatability and consumer appeal of this group of teleosts. Karim and Hossain (1972) worked on sexual maturity and fecundity of the spiny eel *Mastacembelus pancalus*. Srivastava (1975) reported unusual development of the caudal fin of the same species. Saxena et al. (1979) observed cytological details of the oocytes of *M. armatus*. Sikder and Das (1980) studied the skin structure of this species.

The present study focuses on the food and feeding habits of *M. armatus* locally known as "baam."

Adult *M. armatus*, 23.7-36.2 cm in total length, were captured and preserved in 10% formalin. Subsequently, they were examined for dentition and dissected to remove the alimentary canal. The guts were incised and their con-tents removed and qualitatively analyzed (Tables 1 and 2).

In the course of this study, the two parts of the alimentary canal vis. kopfdarm, comprising buccal cavity and pharynx, and rumpfdarm consisting of foregut (esophagus and stomach), midgut (intestine) and hindgut (rectum) were particularly examined.

Table 1. Relative gut index of the spiny eel of different sizes.

Total length of fish (cm)	Number of observations	Relative gut index (Mean ± SE)
5 - 10	19	0.50 ± 0.021
11 - 20	08	0.56 ± 0.024
21 - 30	20	0.68 ± 0.026
31 - 40	49	0.64 ± 0.005
41 - 50	24	0.63 ± 0.006

The mouth is equipped with fine but firm jaws. The upper jaw is longer and projects out over the lower one. The pointed mouth facilitates probing of food items

Table 2. Percentage composition of broad categories of food items of the spiny eel.

Food items	Young (5-20 cm)	Adult (21-50 cm)
Teleostomi	05	18
Crustacea	15	38
Aquatic insects	30	14
Annelids	34	15
Digested matter	13	12
Aquatic vegetation	01	03

which may be concealed under submerged objects and bottom deposits. There are numerous, small but sharp and strong teeth on the jaws (Fig. 1A) in the buccopharyngeal region (Fig. 1B). The teeth which are villiform do not show any enlargement into canine or incisor type of dentition. The nature of dentition suggests that it helps in grasping and holding the active prey and preventing its escape. The absence of gill rakers appears to be compensated by higher efficiency of dentition in performing the assigned function than is normally seen in predatory fishes having tooth-like gill rakers to supplement the role of teeth. In place of gill rakers there is an uneven gill arch surface.

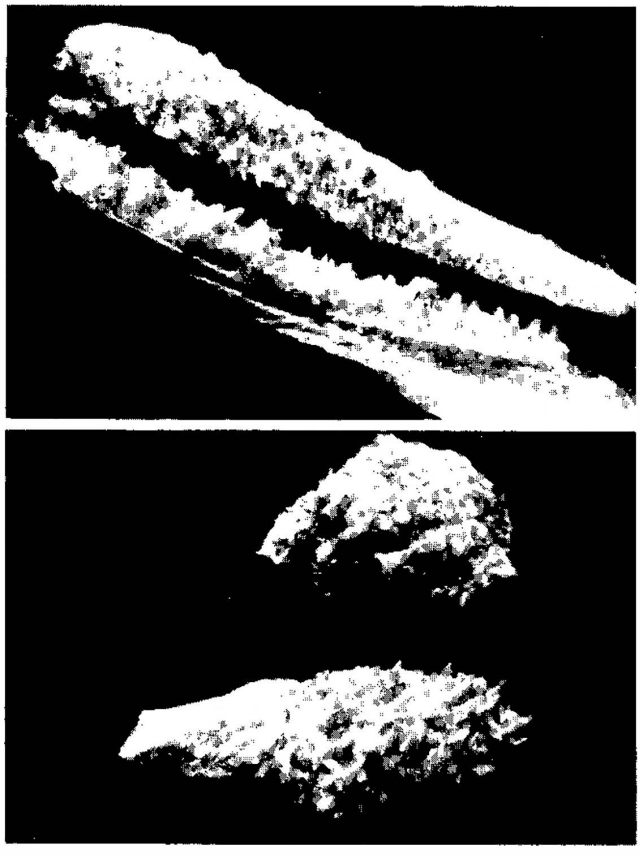

Fig. 1. Dentition of M. armatus. A. Jaws with teeth (side view); B. Buccopharyngeal teeth (surface view).

Ingested organisms are generally swallowed whole, particularly when large, with no mastication. The fish lacks structural adaptation to consume items which require oral grinding. This perhaps accounts for the absence of molluscan shells in the gut contents and amounts to specialization with respect to feeding on particular kinds of food. The mouth gape is wide enough to support intake of small to medium sized shrimps. Diameter and capacity of the buccopharyngeal cavity are equally accommodating. The buccopharynx leads to a short and thick walled tubular esophagus. The stomach is well developed, with thick, muscular walls and elongated shape. The remarkable distensibility of the stomach in spiny eels bears witness to this organ's capacity to receive sizeable items. In the absence of mastication being done in the mouth cavity, the stomach's ability to deal with the whole prey assumes importance.

The stomach opens into a short, almost straight, thick-walled intestine; intestine length/body length ratio was 0.27-0.34 (mean = 0.31). The intestine constitutes about half (49%) of the total length of alimentary canal. The rectum which contains fecal matter is short, varying little from the intestine in diameter. Total gut length was 0.6-0.7 (mean 0.64) of total fish length.

The fish is euryphagous, consuming mainly fish, shrimps and insects (Table 2). Items of plant origin (phytoplankton), which never exceeded 3% of the total food in the gut, may be actively eaten or released from the alimentary canal of prey organisms. The absence of gill rakers, which are instrumental in sieving plankton from water, and the short intestine not suited to extracting nutrients from low digestibility phytoplankton, rule out any substantial importance of plant matter in the eels' diet. Phytoplankton mostly occurred in the stomach of those specimens in which prey animals were in an advanced stage of digestion, implying their being food of the foraged organisms.

An interesting feature is that despite the fish's spending considerable period at the bottom, it avoided sand, mud and detritus. A distinct preference for living organisms over the dead or nonliving feedstuff was discernible. Nearly all food organisms in the gut were structurally intact and showed no sign of their being dead for long or having been decomposed before their ingestion by the fish. There is no evidence to suggest scavenging. The spiny eel seemed to feed on prey animals of considerable size range, from minute larvae of insects to fully formed shrimps. Seeking out such a variety of organisms reveals effective probing of the environment by the fish in predatory activity. A versatile feeder like the spiny eel is more adaptable to an ecosystem characterized by fluctuations in its food chain components.

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ERRATUM

We apologize to the authors and to our readers for the error which appeared on page 337 of Volume 6, Number 3 in the article by S. Chandrasekar and N. Jayabalan. 1993. Hematological Responses of the Common Carp, *Cyprinus carpio* L. Exposed to the Pesticide Endosulfan. Fig. 2 was incorrectly depicted. The correct version is printed below.