ON THE FOOD OF RAYS, *DASYATIS UARNAK* (FORSKAL), *D. ALCOCKII* (ANNANDALE) AND *D. SEPHEN* (FORSKAL)

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ABSTRACT

Observations on the food of three sting rays, *Dasyatis uarnak*, *D. alcockii* and *D. sephen* were made separately. *D. uarnak* was observed to feed voraciously on both pelagic and benthic organisms. All the three are carnivores, feeding chiefly on fishes, crustaceans, molluscs and polychaetes.

INTRODUCTION

Clark (1922) reported on the egg capsules and development of young ones of rays and skates and on the food of the juveniles of four species of rays at Plymouth.Hitz (1964) described the early development of *Raja binoculata* in Oregon coastal waters. Literature concerning the biology of rays from Indian coasts is meagre except that of Setna and Sarangdhar (1950) dealing with the breeding habits of sharks and rays in Bombay waters. Nair and Appukuttan (1973) reviewed the literature on the biology of sharks from Indian region. The available literature on rays in Indian waters deals mainly with the various forms of abnormalities.

MATERIAL AND METHODS

The material was collected from the catches of hooks-and-line boats and the small mechanised trawlers operating off Porto Novo (11°29' N lat., 79°46' E long.) from December 1972 to October 1974. The volumetric and occurrence methods of food analysis were followed and the results are presented in Table 1.

Dasyatis uarnak (Forskal)

A total of 68 specimens of the size range 720-1540 mm across the disc were available for the study; of these 25 speciments either had digested matter or digested juices in their stomachs. In others most of the food items were in fresh condition and were easily identified. A complete list of fishes and other items of food organisms is given in Table 1 from which it will be apparent that *D. uarnak* is a voracious carnivorous feeder, feeding on a variety of pelagic and benthic organisms.

TABLE 1 *Showing the percentage of volume and occurrence of different food items in* Dasyatis uarnak, D. alcockii and D. sephen.

(Figures in percentagee)

Food items	*D. uarnak*		*D. alcockii*		*D. sephen*	
	Occur-rence	*Volume*	*Occur-rence*	*Volume*	*Occur-rence*	*Volume*
Fish:						
Leiognathids	20.62	19.05	10.77	10.91	11.11	16.67
Anchovies	12.92	10.54	—	—	—	—
Mackerels	0.62	6.73	1.54	17.14	—	—
Nemipterids	5.42	6.19	—	—	4.44	7.78
Thrissocles spp.	2.08	5.10	—	—	—	—
Sciaenids	1.25	3.26	—	—	—	—
Soles	1.87	3.06	—	—	2.22	5.56
Platycephalus spp.	1.25	3.06	3.08	5.71	—	—
Sardines	2.92	2.86	—	—	—	—
Apogonids	2.71	2.65	7.70	6.50	—	—
Polynemids	0.21	2.04	—	—	—	—
Pentaprion sp.	0.42	2.04	—	—	—	—
Eels (young)	—	—	6.15	10.39	—	—
Puffer-fish	0.62	0.82	—	—	—	—
Total	52.91	67.40	29.24	50.65	17.77	30.01
Crustaceans:						
Prawns	33.54	21.94	18.46	12.46	11.11	13.89
Crabs	5.00	3.27	21.53	14.56	13.33	13.33
Thenus sp.	2.08	1.70	1.54	3.90	—	—
Squilla spp.	1.04	0.85	4.61	3.90	—	—
Total	41.66	27.76	46.14	34.82	24.44	27.22
Molluscs:						
Squids	2.50	2.04	9.23	7.79	—	—
Gastropods and bivalves	2.08	1.70	3.08	2.60	6.67	8.33
Total	4.58	3.74	12.31	10.39	6.67	8.33
Polychaetes:	—	—	12.31	4.14	48.89	24.44
Jelly-fish:	0.84	1.09	—	—	—	—
Prochordates:						
Sea squirts	—	—	—	—	2.22	10.00

Teleostean fishes of a wide range of families constituted the major item of food forming about 67% of the total volume of stomach contents. Fishes were present in all the stomachs examined. Among these, Leiognathids formed the single largest group constituting 19.05% of the total volume of the food followed by *Anchoviella* spp. (10.54%), mackerel (6.73%), *Nemipterus* spp. (6.19%), *Thrissocles* (5.10%) and Sciaenids (3.26%). Other fishes like soles,

Platycephalus spp., and Apogonids were also frequently met with. Pentaprions and lesser sardines were occasionally recorded. Polynemids (2.04%) and pufferfish (0.82%) were the rare items in the stomach.

Crustaceans ranked second in importance forming 27.76%. Prawns formed 21.9% of the total volume of food and their percentage of occurrence was 33.54% constituting a single major item among the crustacean diet. Crabs and *Thenus* formed 3.27% and 1.70% respectively of the total volume of stomach contents. Squilla (0.85%) formed occasional diet. Some of the common prawns occurred in stomachs included *Solenocera indica, Penaeus indicus, Parapenaeopsis hardwickii* and *P. stylifera.*

The next important item of food of *D. uarnak* was the molluscs which include gastropods, bivalves and squids. These together formed 3.74% and 4.58% by volume and occurrence, respectively, of the total food. Squids constituted 2.04% while gastropods and bivalves together formed 1.70% by volume.

Jelly fish were identified in two stomachs and their percentage was 1.09 by volume.

Dasyatis Alcockii (Annandale)

A total of 36 stomachs were examined of which 7 were empty or had only a very small quantity of digested fluid. The size of this species examined ranged from 440 mm to 1320 mm across the disc. Fishes crustaceans and molluscs constituted the major food items. Polychaetes were also recorded in the stomach.

In this species also fishes formed the major constitutent of food forming 50.65% of the total volume of the stomach contents. Among the fishes in the diet mackerels dominated (17.14%). Leiognathids and young eels ranked next in importance, constituting 10.91% and 10.39% respectively by volume. The other fishes found in the stomach were Apogonids (6.50%) and *Platycephalus* spp. (5.71%).

Crustaceans ranked second in importance as the food constituting 34.82% of the total volume of the stomach contents. Crabs by volume (14.56%) formed the single major constitutent among the crustaceans. Other crustaceans represented in the stomach were prawns (12.46%), *Thenus* sp. and *Squilla* sp. (each 3.90%).

Moluscs were the next important food item of this ray. Squids formed 7.79% of the total feed by volume while gastropods and bivalves constituted 2.60%.

Polychaetes formed 4.14% of the total volume of the food. This included both free-living and tube-dwelling forms and partly digested one also.

Dasyatis sephen (Forskal)

A total of 24 specimens ranging from 500 mm to 1410 mm across the disc was examined out of which 5 were with empty stomachs. In addition to fishes, crustaceans, molluscs and polychaetes, sea squirts were also recorded in the stomach.

Fishes, forming 30.01% by volume and 17.77% by occurrence, constituted dominant food item of this ray. Leiognathids formed 16.67% while *Nemipterus* spp. (7.72%) and soles (5.56%) ranked next in the total volume of the food in all the stomachs examined.

Crustaceans constituted the second important item of the food forming 27.22% of the total volume of the stomach contents and crabs 13.33%.

Polychaetes, a majority of which were *Nereis* spp. constituted the most dominant item of the total diet of this ray forming 24.44% by volume and 48.89% by occurrence.

Among molluscs, gastropods formed 8.33% of the total volume of the stomach conents. In addition to these, ascidians (10.00%) were also found in the stomachs.

Remarks

A close study on the food of these three species of *Dasyatis* revealed that all of them are carnivorous feeders and that *D. uarnak* appeared to be a voracious feeder, taking in a wide varieties of pelagic and benthic organisms. To cite an instance, one female *D. uarnak* of 1450 mm across the disc had in its stomach 88 numbers of medium sized prawns, 8 *Nemipterus* spp., 3 mackerels, 8 Leiognathids, 8 Apogonids, 3 lesser Sardines, 3 Anchoviella spp., 2 flatfishes, 1 *pentaprion longimanus*, 4 *platycephalus* spp., 3 puffer-fishes, 5 squids, 2 crabs and 2 molluscan shells. The fact that about 67% of the volume of stomach of this ray contained fishes shows that this species is highly piscivorous, on the other hand the intensity of feeding on fish is less in *D. alcockii* as evidenced by the presence of fishes with 50.60% of the total volume of the diet. This is further reduced to 30.01% in the case of *D. sephen*. *D. alcockii* and *D. sephen* appeared to prefer mostly benthic organisms like bottom living polychaetes, gastropods, bivalves, crabs, sea squirts and flat fishes. Clark (1922) observed that in the youngest rays, where the yolk sac had just been obsorbed, the food constisted, almost without exception, of small crustanceans like Amphipods, Carangonids and Isopods. As the young ray grew up in size the food consisted of larger crustaceans and of small fishes.

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