

**FOOD AND FEEDING HABITS OF THE CHINESE POMFRET
PAMPUS CHINENSIS EUPHRASEN FROM THE BAY OF BENGAL**

S. PATI

Department of Zoology, Ravenshaw College, Cuttack-753003

ABSTRACT

A detailed investigation of the food and feeding habits of the Chinese pomfret *Pampus chinensis* Euphrasen was undertaken from the Bay of Bengal during 1972 and 1973. The fish is a carnivore feeding mainly on zooplanktonic organisms, the phytoplankters contributed to a minor part of the diet. Copepods formed the main item in the diet followed by smaller jellyfishes and decapods. Amphipods, crustacean larvae, polychaete larvae, cuttlefish, chaetognaths, fish scales, fish eggs and larvae occurred in small quantities. Ostracods, cladoceran, marine insects and molluscan larvae were occasional in the diet. The semidigested food was highly macerated and pulpy, resembling shredded jelly fishes. The stomachs were heavily infested with digenetic trematodes. In contrast with other stromateids, the Chinese pomfret does not change its larval habitat and remains a surface feeder throughout life. This behaviour accounts for its effective fishing with drift gill-nets and a poor representation in the bottom trawls.

INTRODUCTION

POMFRETS are highly esteemed as table fish and are eagerly sought after by the fishermen. In India the fishery is contributed by three species, viz., Silver pomfret *Pampus argenteus* (Euphrasen), Chinese pomfret *Pampus chinensis* (Euphrasen) and Black pomfret *Parastromateus niger* (Bloch). Of the three, Chinese pomfret is considered to be the tastiest and forms a fishery of considerable importance along the West Bengal-Orissa Coast. Our knowledge relating to the food and feeding habits of the Chinese pomfret is meagre, being confined to the brief accounts of Basheeruddin and Nayar (1962) from Madras waters and Srinivasa Rao (1967) from the Andhra Coast. The present paper deals with a detailed investigation of the food and feeding habits of *P. chinensis* from the Bay of Bengal along the Orissa Coast.

I express my deep gratitude to Dr. E. G. Silas, Director, Central Marine Fisheries Research Institute, Cochin for his guidance and encouragements during the investigation. My sincere thanks are due to Shri J. C. Roy, Deputy Director, Department of Fisheries, Orissa for his assistance in the collection of samples from the Government Fishing bases along the Orissa Coast. The work was partially financed by the University Grants Commission, New Delhi.

MATERIAL AND METHODS

The data for the present investigation was collected from Chandipur (21° 29' N; 87° 02' E), an important pomfret landing centre in the northern part of the Orissa Coast. Weekly samples were obtained from gill-net catches and young ones were collected from the barrier-nets (*Malo Jalo*).

Fortnightly samples were also collected from the gill-net catches at Kirtania bordering West Bengal and Chudamani to the south of Chandipur. Collection from Paradeep was not successful as the fish is extremely rare in the trawl catches. A total of 561 stomachs were examined during the different months of 1972 and 1973. The contents of the stomachs were analysed by the modified points method (Swynnerton and Worthington, 1940; Frost, 1943; Hynes, 1950; Pillay, 1952). All lengths described in the present account relate to the standard length.

QUALITATIVE AND QUANTITATIVE ANALYSIS OF FOOD

The food was highly macerated and in an advanced stage of digestion. Because of this, identification of different items upto species level was difficult. A high proportion of semidigested pulpy mass resembling shredded jelly fishes was observed in the stomachs of Chinese pomfrets and has also been noted in the silver pomfrets (Suyehiro, 1942; Rege and Bai, 1964; Pati, 1978) from the Indo-Pacific region. The present study reveals that *P. chinensis* is a carnivore, feeding mainly on zooplankton. The mean percentage composition of the diet for the whole period of investigation is as follows :

Copepod 11.43%, amphipod 1.44%, ostracod 0.05%, cladoceran 0.11%, *Lucifer* 0.35%, *Acetes* 0.77%, decapod remains 1.60%, copepod eggs 0.22%, copepod nauplii 0.05%, zoea and megalopa 0.18%, marine insect 0.14%, ctenophores and medusae 2.18%, polychaete larvae 0.52%, molluscan larvae 0.06%, *Sagitta* 0.50%, cuttlefish 1.24%, fish eggs and larvae 0.23%, fish scale 0.52%, diatoms 1.98%, and semidigested matter 76.43%.

SEASONAL VARIATION IN FOOD

A comparison of the analysis of stomach contents of *P. chinensis* during 1972 and 1973 revealed that the diet was essentially the same during these years. The data based on samples collected during different months from Chandipur are presented in Table 1 and 2.

Copepod formed the major items of food and occurred throughout the year. Amongst copepods, the species of *Acrocalanus*, *Centropages*, *Eutrepina*, *Corycella*, *Acartia*, *Temora* and *Oithona* dominated in the stomach contents.

Amphipods formed a significant part of the diet and occurred throughout the year except October.

Ostracods and cladocerans were occasional in the diet and were observed in January, February, March and November.

Lucifer occurred in minor quantities during February, March, May, July and October.

Acetes were recorded in small quantities in the months of February, March, April, June, July and September.

Decapod remains constituted an important component of the food and ranked fourth in the diet. Their presence was recorded in all months except October.

Copepod eggs and nauplii were sporadic in the gut contents and occurred in January, April, August, September and December.

Zoea and Megalopa were observed from August to October and formed only an insignificant part of the diet.

Marine insects were occasional in the diet, observed only in April and July.

Ctenophores and medusae ranked second in the diet and were observed throughout the year.

TABLE I. Percentage of different food items in the gut contents of *P. chinensis* from gillnet catches during different months at Chandipur in the year 1972

Food items	Jan. (25)*	Feb. (22)	Mar. (40)	April (29)	May (26)	June (21)	July (25)	Aug. (28)	Sept. (43)	Oct. (49)	Nov. (35)	Dec. (21)
Copepod	21.17	15.72	4.51	18.04	11.31	9.23	6.23	7.65	15.32	6.72	7.82	21.21
Amphipod	1.25	2.13	1.82	—	0.52	—	2.12	1.32	—	—	1.93	—
Ostracod	—	1.04	—	—	—	—	—	—	—	—	—	—
Cladocera	0.82	—	—	—	—	—	—	—	—	—	0.80	—
Lucifer	—	—	2.42	—	2.13	—	—	—	—	1.63	—	—
Acetes	—	1.72	2.43	—	—	4.14	4.61	—	—	—	—	—
Decapod remains	—	—	0.83	1.42	4.90	—	2.14	4.63	—	—	—	—
Copepod egg	—	—	—	1.12	—	—	—	—	0.64	—	—	2.84
Copepod nauplii	0.82	—	—	—	—	—	—	—	—	—	—	0.51
Zoea and megalopa	—	—	—	—	—	—	—	0.81	0.64	—	—	0.51
Marine insects	—	—	—	1.21	—	—	—	—	—	—	1.20	0.61
Ctenophores and medusae	—	4.15	3.81	1.61	—	1.44	2.32	2.16	4.52	3.12	—	2.32
Polychaete larvae	—	—	—	—	—	1.22	—	—	—	—	3.32	1.72
Molluscan larvae	—	—	—	—	—	—	—	—	—	1.52	—	—
<i>Sagitta</i>	0.48	—	—	—	—	1.02	—	2.44	—	0.51	1.31	—
Cuttlefish	—	—	2.62	—	—	4.13	3.43	—	4.61	—	—	—
Fish eggs and larvae	—	—	—	—	4.22	—	—	—	1.03	—	—	—
Fish scales	0.33	0.40	1.22	—	—	1.30	—	—	—	2.00	—	1.30
Diatom	0.82	1.02	2.03	1.90	2.12	1.02	1.12	0.87	3.15	2.50	3.62	2.30
Semidigested matter	74.31	73.82	78.31	74.70	74.80	76.50	78.08	80.12	70.09	82.00	67.19	—

* Number of fish examined in each month is given in parenthesis.

Polychaete larvae were present in minor quantities during February, June and November.

Sagitta was recorded in minor quantities in the diet during most of the months except February to April and September.

Cuttlefish was fairly represented in the diet although their absence was noted in January, April, October and November.

Fish eggs and larvae were occasional in the diet and were recorded in the months of April and September.

Fish scales were observed in all months except April, May, July, August and November.

Diatoms were recorded throughout and ranked third in the diet.

Semi digested puply mass formed bulk of the gut content contributing to 76.43% during the period of observation.

TABLE 2. Percentage of different food items in the gut contents of *P. chinensis* from gillnet catches during different months at Chandipur in the year 1973

Food items	Jan. (18)*	Feb. (20)	Mar. (29)	April (15)	May (5)	June (8)	July (10)	Aug. (7)	Sept. (11)	Oct. (28)	Nov. (30)	Dec. (16)
Copepod	18.43	6.80	10.91	10.23	13.32	10.40	6.82	7.21	14.20	8.61	4.80	18.30
Amphipod	1.72	1.50	2.82	3.12	—	6.62	—	2.93	3.70	—	—	1.12
Ostracod	—	—	1.22	—	—	—	—	—	—	—	—	—
Cladocera	—	—	1.13	—	—	—	—	—	—	—	—	—
Lucifer	—	1.80	—	—	—	—	0.53	—	—	—	—	—
Acetes	—	—	1.22	2.02	—	1.20	—	—	1.20	—	—	—
Decapod remains	1.90	2.22	—	3.72	—	2.13	3.44	—	4.80	—	4.02	4.34
Copepod egg	—	—	—	—	—	—	—	0.82	—	—	—	—
Zoea and megalopa	—	—	—	—	—	—	—	1.86	1.60	1.15	—	—
Marine insects	—	—	—	—	—	—	0.55	—	—	—	—	—
Ctenophores and medusae	3.02	2.94	1.28	2.81	1.04	—	2.24	3.61	1.90	3.38	2.41	2.42
Polychaete larvae	1.44	—	—	—	—	—	—	—	—	—	2.93	2.07
Molluscan larvae	—	—	—	—	—	—	—	—	—	—	—	—
Sagitta	—	—	—	—	0.56	—	1.12	—	—	—	—	4.63
Cuttlefish	—	4.90	—	—	3.42	—	1.83	2.53	—	—	—	2.11
Fish eggs and larvae	—	—	—	0.64	—	—	—	—	—	—	—	—
Fish scale	—	0.50	—	—	—	1.05	—	—	0.70	3.13	—	0.61
Diatom	1.72	2.10	3.40	1.14	1.55	2.80	0.82	1.73	1.80	2.41	4.22	1.40
Semidigested matter	73.21	75.80	78.02	76.32	80.11	75.80	82.65	79.81	70.10	81.32	81.62	63.00

* Number of fish examined in each month is given in parenthesis.

VARIATION IN FOOD BETWEEN PLACES

Comparison of the diet of *P. chinensis* from Chandipur with samples from Kirtania and Chudamani revealed that the constituents of food were same in different localities. In all these localities copepods ranked first, followed by ctenophores, medusae and decapods in the diet. The relative

proportion of various items slightly differed between the places, which was probably due to the relative importance of a particular item in the environment.

FOOD OF YOUNG CHINESE POMFRET

The stomach contents of the young chinese pomfrets were examined qualitatively and quantitatively to trace out their variation from the adult. The analysis covered post-larvae and juveniles ranging in size from 2.0 cm to 11.0 cm SL (Table 3).

TABLE 3. Percentage of occurrence of food items in the stomach contents of young *P. chinensis* in various size groups (January, 1972 to December, 1973)

Food items	Size Group in cm								
	2-3 (2)*	3-4 (4)	4-5 (7)	5-6 (11)	6-7 (18)	7-8 (20)	8-9 (21)	9-10 (14)	10-11 (19)
Diatoms	110.00	100.00	100.00	76.00	28.00	10.50	—	16.00	—
Copepod	—	—	—	24.00	72.00	23.50	—	—	50.00
Copepod eggs	—	—	—	—	—	—	—	—	—
Copepod nauplii	—	—	—	—	—	—	—	—	—
Ctenophores and medusae	—	—	—	—	—	66.00	21.00	84.00	33.34
Acetes	—	—	—	—	—	—	—	—	—
Decapod remains	—	—	—	—	—	—	74.00	—	16.66
Fish scale	—	—	—	—	—	—	—	—	—

* Number of fish examined each month is given in parenthesis.

In *P. chinensis*, the young ones of the size group 2.0-5.0 cm SL were observed to feed on phytoplankton. Copepods were added to the diet in the juveniles ranging from 5.0 to 7.0 cm SL. Items like decapod remains, hydromedusae, and fish scales were recorded in the young ones of the size group 7.0-11.0 cm SL. Thus the post-larvae of the Chinese pomfret are phytoplanktophagous and during subsequent growth a variety of zooplankters are added to the diet. In a specimen measuring 8.8 cm SL from the trawl catch at Paradeep, detritus and sand grains were recorded in January 1973. Probably the juveniles occasionally feed at the bottom.

PARASITES IN THE STOMACH

A notable feature observed during the study was a heavy infestation of digenetic trematodes in the stomachs of *P. chinensis*. The parasite, commonly recorded inside the gut were *Lipidapedon elongatum*, *L. nelsonie*, *L. longivesiculum*, *Lecithocladium annulatum*, *L. glandulum*, *L. excisiforme* the latter being more frequent. The smallest fish carrying the helminth parasite was found to measure 8.0 cm SL. No abnormality in the morphological character was however detected due to such infection.

DISCUSSION

Basheeruddin and Nayar (1962) in their brief investigation on juvenile chinese pomfrets collected from Madras Coast during June, recorded

semidigested unrecognisable lacerated pulpy matter. The pomfrets are unique in possessing toothed oesophageal sac which acts as a grinding mill making the food pulpy and rendering the food organisms difficult for identification. The present investigation based on a systematic study for two years revealed that the early larvae feed on phytoplankton, whereas the adults live predominantly on zooplanktonic organisms. Srinivasa Rao (1967) in his brief investigation on the food of adult Chinese pomfret, from exploratory trawl catch of 1961, from Andhra Coast, recorded high percentage of crustacean remains along with amphipods and brachyurans during January to April. The present study from the Orissa Coast revealed that copepods form the main item of food of *P. chinensis*, supplemented mostly by smaller jelly fishes, decapods and diatoms. Amphipods, cuttlefish, chaetognaths, crustacean larvae, polychaete larvae, fish scales, fish eggs and larvae occur in minor quantities. Ostracods, cladocerans, marine insects and molluscan larvae were occasional in the diet. From the nature of the food organisms, it is evident that *P. chinensis* remains strictly pelagic throughout its life, which accounts for its effective fishing in the drift gill nets and a poor representation in the bottom trawls.

Stromateid fishes generally change their larval habit while attaining maturity and this is often associated with morphological changes (Haedrich, 1967). In the silver pomfret, *P. argenteus*, the early juveniles are surface dwellers, and the adults are benthopelagic (Pati, 1978). The Chinese pomfret however appears to stick to its early surface feeding habit throughout its life.

REFERENCES

- BASHEERUDDIN, S. AND K. N. NAYAR 1962. A preliminary study of the juvenile fishes of the coastal waters off Madras city, India. *Indian J. Fish.*, 8 (1) : 169-188.
- FROST, W. C. 1943. The natural history of the minnow, *Phoxinus phoxinus*. *J. Anim. Ecol.*, 12 : 139 - 162.
- HAEDRICH, R. L. 1967. The stromateid fishes: systematics and a classification. *Bull. Mus. Comp. Zool. Harvard*, 135 (2) : 131 - 139.
- HYNES, H. B. N. 1950. The food of the fresh water stickle-backs (*Gasterosteus aculeatus* and *Pygosteus pungitius*) with a review of methods used in studies of the food of fishes. *J. Anim. Ecol.*, 19 : 36-58.
- PATI, S. 1978. The food and feeding habits of silver pomfret *Pampus argenteus* (Euphrasen) with a note on its significance in fishery. *Proc. 65th. Indian Sci. Congr.*, Part - III (Abstract) : 230-231.
- PILLAY, T. V. R. 1952. A critique of the methods of study of food of fishes. *J. Zool. Soc. India*, 4 (2) : 185-200.
- REGE, M. S. AND D. V. BAL 1964. Some observations on the food and feeding habits of silver pomfret, *Pampus argenteus* (Euphrasen) in relation to the anatomy of its digestive system. *J. Univ. Bombay, N. S.*, 31 (5) : 75-79.
- SUYEHIRO, Y. 1942. A study on the digestive system and feeding habits of fish. *Jap. J. Zool.*, 10 (1) : 1 - 303.
- SRINIVASA RAO, K. 1967. Food and feeding habits of fishes from trawl catches in the Bay of Bengal with observation on the diurnal variation in the nature of feed. *Indian J. Fish.*, 11 (1) A : 277-314.
- SWYNNERTON, G. H. AND E. B. WORHINGTON 1940. Notes on the food of fish in Haweswater (Westmor-land). *J. Anim. Ecol.*, 9 : 183-187.