SEX RATIO IN *PUNTIUS VITTATUS* DAY IN THE FRESH WATER BODIES OF ERNAKULAM DISTRICT, KERALA

K.S. Jameela Beevi [1] and A. Ramachandran [2]

[1] Department of Zoology, Maharaja's College, Ernakulam, Cochin, Kerala 682011, India
[2] School of Industrial Fisheries, Fine Arts Avenue, Cochin University of Science and Technology, Cochin, Kerala 682016, India
Email: [1] ksjameela@yahoo.com; [2] ram-alappat@eth.net

Sex ratio indicates the comparison of number of males and females in a population. An understanding of the sex ratio in a fish in different months and seasons is essential for obtaining information on seasonal segregation of the sexes and their relative abundance in spawning season. It reveals the differential growth of the two sexes also. It is an indicator of population behaviour and fecundity according to Panthulu (1961). Many workers like Sobhana and Nair (1976), de Silva and Kortmulder (1977), Prem Kumar and Subramanian (1984), Islam and Hossain (1990), Kumar and Siddiqui (1991), and Reddy and Rao (1992) studied the sex ratios in fresh water fishes. In natural environment the optimum sex ratio is 1:1, but it may be far from this in particular age and size group. In the younger groups, the males predominate because they tend to mature earlier than females.

According to Nikolsky (1980), the optimum sex ratio may vary drastically as a result of being affected by numerous factors. He reported the predominance of females in fishes, especially in fishes where the males produce several batches of sperms but females produce only one batch of ova. Different populations inhabiting different regions show different sex ratios (Nikolsky, 1956). A higher sex ratio has been reported during the first breeding season and a lower sex ratio in second breeding season when the water parameters are at their peak according to Singh (1994). A rising temperature and moderate water velocity, vulnerability of females to their predators and other natural hazards, migratory phase in brooder population are some of the reasons for the changes in the sex ratio in fishes. Knowledge on the identification of the two sexes is very essential in ornamental fish management and marketing since fishes are kept in aquaria in pairs. The present study is aimed at an understanding the sex composition and sexual dimorphism in *P. vittatus* in Muvattupuzha in Ernakulam district.

Monthly collections of *P. vittatus* were made from November 2000 to October 2001. A total of 342 specimens (238 females and 104 males) were collected from the fresh water bodies of Muvattupuzha river at Vellore, Piravom by using scoop net. The sex ratio was calculated by using the chi-square formula. Chi-square $X^2 = (O-E)^2 / E$; where O - the observed number of fishes and E - the expected number of fishes. Their significance was also noted.

In *P. vittatus*, the males and females could be separated from 20mm length group onwards. The males are narrower than the females of the same size group, but can be easily identified during the breeding season as in other barbs. The mature fishes are with soft bulging abdomen coupled with protruding vent in the females and roughness of the pectoral fins in the mature males Misra (1950). Visual inspection of the gonad through magnifying glasses after opening the viscera showed flat testis with wavy margin and tubular ovary with granular eggs. The testes appeared to be whitish or greyish in colour while the ovaries were pinkish or reddish. Oozing of milk on gentle pressure in the males is an indication of spawning period.

The morphological changes observed in *P. vittatus* during the study are shown in Table 1. It could be seen that the two sexes were not in equal proportion through out the year. Females were more throughout the year except in April (30.0%), May (43.8%) and June months (44.4%). In the months of October, November, December, February, April, July, August, and September there is significant difference in the proportion of males and females ($P < 0.05$). In these months females are significantly higher than the males.

The male-female sex ratio in *P. vittatus* was observed as 1:2. The presence of more females in most of the months may be due to the vulnerability of females as stated by Bhatnagar (1972). The predominanace of males during April, May and June may be due to the faster growth of males. Similar results were reported by Nikolsky (1956, 1980) and Singh (1994).

Studies on the sex ratio of different species of *Puntius* showed a deviation from the optimal sex ratio 1:1. In *P. clavatus*, Nasar and Biswas (1987) reported a 1:1.4 ratio. A similar result was observed in *P. amphibius* by Premkumar and Balasubramanian (1984). In *P. ticto*, the ratio is 1:0.9 according to Manissery *et al.* (1979). Sobhana and Nair (1976) showed a 1:2 ratio in *P. sarana*, but Kumar and Siddiqui (1991) observed a 1:1 ratio. This deviation from the report of Sobhana and Nair (1976) may be due to the difference in populations inhabiting in different regions as stated by Nikolsky (1956) or due to a higher sex ratio during the first breeding season as stated by Singh (1994). Islam and Hossain (1990) reported a 1:1 ratio in *P. stigma*. The findings of the male-female ratio (1:2) from the presetn study is in agreement with the reports of Sobhana and Nair (1976). The month-wise observations of the sex ratio are shown in Table 2.

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***Table 1. Morphological differences in sexes observed in* Puntius vittatus**

No	Characters	Male	Female
1	Size of the body	Small	Large
2	Dorsal profile	Arched	More arched
3	Ventral profile	More or less flat	Arched
4	Head	With fine tubercles	Without tubercles
5	Fins (caudal and anal)	Reddish	Dusky
6	Body depth	Less	More

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***Table 2. Sex ratio observations in* Puntius vittatus**

Months	Males %	Females %	X^2	d f	Sig- 3.841
Nov.	4.0	96.0	7.41	1	(P< 0.05)
Dec.	50.0	50.0	25.16	1	(P< 0.05)
Jan.	29.4	70.6	0	1	NS
Feb.	50.0	50.0	5.764	1	(P< 0.05)
Mar.	21.1	78.9	0	1	NS
Apr.	70.0	30.0	6.36	1	(P< 0.05)
May	56.3	43.8	0.3125	1	NS
Jun.	55.6	44.4	0.5	1	NS
Jul.	7.0	93.0	0.333	1	NS
Aug.	5.6	94.4	31.837	1	(P< 0.05)
Sep.	29.4	70.6	28.44	1	(P< 0.05)
Oct.	28.2	71.8	5.7647	1	(P< 0.05)

NS - Not Significant

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NATIONAL AWARD FOR PROFESSOR T.C. NARENDRAN

The Ministry of Environment and Forests, New Delhi has selected **Dr. T.C. Narendran, Emeritus Professor**, Department of Zoology, University of Calicut for the prestigious **Janaki Ammal National Award on Taxonomy** for the year 2004, in recognition of his outstanding contribution to Taxonomy, particularly in the area of Insect Taxonomy, extensive revisionary work on Parasitic Wasps and for promoting the teaching and research on Taxonomy. The award carries a cash prize of Rs. 1 Lakh along with citation.

Professor Narendran has been doing phenomenal work on Taxonomy for the last three decades and his work has won him International acclaim. He has been awarded the famous fellowship of Royal Society London in 1980 to do collaborative research with the renowned scientist Dr. Z. Boucek of the Commonwealth Institute of Entomology, London. He was also a recipient of the fellowship of the reputed Smithsonian Institution, Washington D.C., U.S.A. in 1986 to work with Dr. E.E. Grissell at the Systematic Entomology Laboratory of the U.S. National Museum of Natural History, U.S.A. His collaborative research with Prof. Konishi (Japan), Prof. Kovac (Germany), Dr. Tezcan (Turkey) and many others resulted in several important scientific contributions. Considering the significant scientific contributions of Professor Narendran, the famous Indian Academy of Science elected him as its fellow in 2000. Professor Narendran has about 260 research papers published in International and National Channels. He has also published 6 books. He is in the editorial board of about 10 research journals including the leading research journals like Journal of Bombay Natural History Society, Entomon, Zoos' Print Journal, etc.

His research involves the study of a very important group of parasitic insects -- Parasitic Hymenoptera which keeps the population of several insect pests under check. His research findings have been widely used by several biological control workers all over the world.

The award will be presented by the Ministry of Environment and Forests at a function in the near future.

Hearty Congratulations to Professor Narendran for this muchdeserved award as well as many wishes for his continuing success in the future.