Pakistan Journal of Marine Sciences, Vol.1(1), 1-5, 1992

SEX RATIOS OF *METAPENAEUS KUTCHENSIS* GEORGE, GEORGE AND RAO, 1963 AND *PARAPENAEOPSIS SCULPTILIS* (HELLER, 1862) IN THE GULF OF KACHCHH, WESTERN INDIA

Rishad Pravez, Smita Krishnan and A.P. Mansuri
Department of Biosciences, Saurashtra University,
Rajkot - 360 005, India.

ABSTRACT: Sex ratio data of two species of penaeid prawns *Metapenaeus kutchensis* George, George and Rao, 1963 and *Parapenaeopsis sculptilis* (Heller, 1862), occurring in the Gulf of Kachchh, were statistically analysed. A preponderance of females was observed in both the species and the ratio of male to female for both years combined for *M. kutchensis* and *P. sculptilis* was found to be 1:1.5 and 1:2.7, respectively. Chi-square analysis revealed significant difference in the sex ratios of the two species.

KEY WORDS: Sex ratio - Penaeid prawns - *Metapenaeus kutchensis* - *Parapenaeopsis sculptilis* - Gulf of Kachchh.

INTRODUCTION

Studies on sex ratio reveal segregation or aggregation of males and females, in accordance with environmental conditions, the differential behaviour of sexes and due to fishing. Though the ratio is expected to be 1:1 in nature, variations from this value are often observed (Bal and Rao, 1984). Such information helps to assess the distribution and migratory behaviour of females to deeper waters for spawning (George and Rao, 1967).

Though few studies on sex ratio of *Metapenaeus kutchensis* in the Gulf of Kachchh have been carried out by Ramamurthy (1967), Deshmukh (1975) and Sarvaiya (1978), there is no detailed study on distribution of sex ratios in *M. kutchensis* and *Parapenaeopsis sculptilis* in the region. In view of this we present here results on the sex ratio distribution of *M. kutchensis* and *P. sculptilis* in the Gulf of Kachchh.

MATERIALS AND METHODS

Random sampling technique was adopted for collection of prawn samples of *M. kutchensis* and *P. sculptilis* from five sites *viz.* Modhwa, Surajbari, Jodiya, Sikka and Salaya, situated in the Gulf of Kachchh. While collecting the samples no distinction was made between the catches of different types of gears. Monthly sex ratios of the prawns were tested for distribution of equality in sexes using Chi-square (X^2) formula (Cochran, 1954) given below:

$$X^2 = \frac{\Sigma xi^2/ni - (\Sigma xi)^2/\Sigma ni}{pq}$$

Where 'xi' is the number of males in the ith month, 'ni' is the total number of observations in the ith month, $`p' = \Sigma xi/ni$ and $`q' = 1-p$.

A total of 3523 prawns of *M. kutchensis* and 2111 of *P. sculptilis* were analysed for their sex ratios during the study period 1985-87.

RESULTS AND DISCUSSION

The sex ratios of *M. kutchensis* and *P. sculptilis* during the different months are given in Table 1. It is evident from the values tabulated that the ratio of males in *M. kutchensis* exhibited considerable monthly variation while in *P. sculptilis* the ratio showed slight variation.

The percentage of males and females that occurred during different months of both the species is presented in Figs.1 and 2. In *M. kutchensis*, highest percentage of females was found during January (77.0) followed by December (73.4), March (62.8) and February (62.3). Values for the remaining months showed erratic changes, varying between 51.5 to 61.6%. A greater percentage of males was observed during July to October (Fig.1).

In *P. sculptilis*, the females outnumbered the males throughout the year. A maximum of 79.6 and 79.5% of females were recorded in November and February, respectively. The males of the species showed a highest value of 37.9% in September and a lowest value of 20.4% during November (Fig.2).

To assess if the variations in the monthly sex ratios were in accordance with the binomial theory, X^2 test was performed. The X^2 values for *M. kutchensis* and *P. sculptilis*, with the associated degrees of freedom during 1985-87, are given in Table 2. Significance tests at $P < 0.01$ confirmed that the variations in sex ratios in *M. kutchensis* and *P. sculptilis* during the different months differed significantly from the expected values, indicating that the same sex ratio was not maintained during the different months of the year.

Ramamurthy (1967) revealed a preponderance of females over males of *M. kutchensis* at Cherowari and Kandla in the Gulf of Kachchh. Similar observations were made by Deshmukh (1975), Sarvaiya (1978) and Joseph and Soni (1986). In the present study also, dominance of females over males was observed throughout the year. The ratio of males to females, for all the months combined, in *M. kutchensis* was found to be 1:1.5 in the Gulf of Kachchh.

Bhimachar (1963) observed in *P. sculptilis* a male to female ratio of 1:4.2 during January-May and 1:1.9 during June-December. Rao (1969) reported a male to female ratio of 1:3.24 in large-sized prawns in the Hooghly estuary, eastern India. The sex ratio (male/female) of the species studied by Patel and Balapatel (1982) in the Gulf of Khambhat, western India, was in the range of 0.16 to 0.72. The ratio of males to females in *P. sculptilis* for all the months combined from the Gulf of Kuchchh, was found to be 1:2.72, indicating a high preponderance of females over males.

The proportion of female *M. kutchensis* in the catch was higher than the male throughout the year (Fig.1). Since *M. kutchensis* has a prolonged spawning period from August to May in the Gulf of Kachchh (Pravez, 1990), no clear segregation of sexes during the breeding period was observed. In the case of *P. sculptilis*, though the proportion of females was higher than the males during the different months of the year, males exhibited slightly higher percentage during March-April and in September-October in the catch (Fig.2). Thus, females were less abundant during these

months, which is the breeding period of the species in the Gulf of Kachchh (Pravez, 1990). Hence it is possible that the difference in sex ratio may be due to the migration of females in deeper waters for spawning.

Table I: Combined monthly sex ratios during 1985-87.

Month	*Metapenaeus kutchensis*			*Parapenaeopsis sculptilis*		
	Sample size	Males	Ratio (Male/ Sample size)	Sample size	Males	Ratio (Male/ Sample size)
October	303	147	0.49	125	45	0.36
November	146	56	0.38	275	56	0.20
December	241	64	0.27	178	47	0.26
January	347	80	0.23	180	40	0.22
February	445	168	0.38	205	42	0.20
March	487	181	0.37	313	92	0.29
April	258	116	0.45	202	57	0.28
May	316	124	0.39	179	55	0.31
June	294	130	0.44	107	25	0.23
July	231	110	0.48	101	26	0.26
August	223	102	0.46	93	24	0.26
September	232	107	0.46	153	58	0.38

Table 2: Results of Chi-square test for the sex ratios, for the period 1985-87 combined

Species	Degrees of Freedom	Values of X^2
M. kutchensis	11	88.544*
P. sculptilis	11	30.305*

* Significant at $P < 0.01$

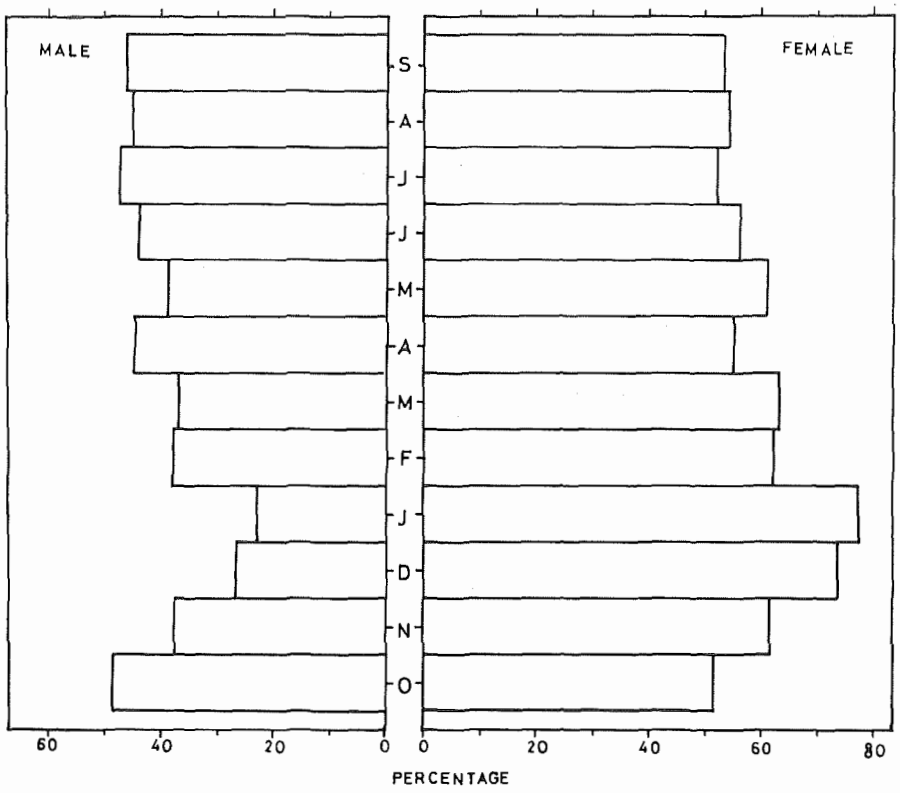

Fig. 1. - Percentage of males and females *Metapenaeus kutchensis* in different months of 1985-87.

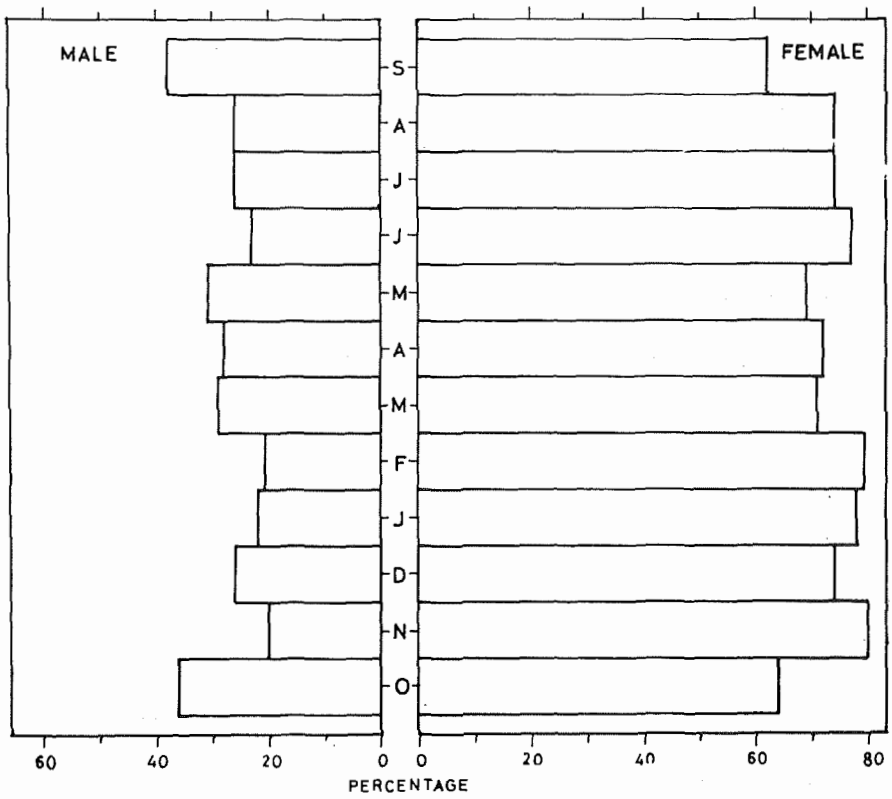

Fig. 2. - Percentage of males and females *Parapenaeopsis sculptilis* in different months of 1985-87.

ACKNOWLEDGEMENTS

We are grateful to Prof. R.M. Naik for his guidance and Prof. M.S. Murthy for going through the manuscript. Two of us (R.P. and S.K.) acknowledge the Junior Research fellowship awarded to them by World Wide Fund for Nature-India. We also express our thanks to Dr. Taej Mundkur for his valuable suggestions.

REFERENCES

Bal, D.V. and K.V. Rao. 1984. *Marine Fisheries.* Tata McGraw-Hill Publishing Company Limited, New Delhi. Pp.1-250.

Bhimachar, B.S. 1963. Information on prawns from Indian waters - Synopsis of biological data. *Proceedings of the Indo-Pacific Fisheries Council* 10:124-133.

Cochran, W.G. 1954. Some method for strengthening the common X^2 tests. *Biometrics* 10:417-445.

Deshmukh, V.M. 1975. A note on the prawn fishery in the Gulf of Kutch during 1962-1963. *Indian Journal of Fisheries* 22:265-269.

George, M.J. and P.V. Rao. 1967. Distribution of sex ratio of penaeid prawns in the trawl fishing, off Cochin. *Proceedings of the Symposium on Crustacea, Marine Biological Association of India* Part III:698-700.

Joseph, A. and V.C. Soni. 1986. Length-weight relationship and relative condition factor of prawn *Metapenaeus kutchensis* (George, George & Rao), from Okha (Gujarat). *Indian Journal of Fisheries* 33:127-129.

Patel, B.H. and I.A. Balapatel. 1982. Some observations on the prawn fishery of Gulf of Khambhat, Gujarat. *Indian Journal of Fisheries* 29:63-70.

Pravez, R. 1990. *Prawn fishery and a socio-economic perspective thereof, of three fishing villages on northern Gulf of Kachchh, India.* Ph.D. Thesis, Saurashtra University, Rajkot. Pp.1-175.

Ramamurthy, S. 1967. Studies on the prawn fishery of Kutch. *Proceedings of the Symposium on Crustacea, Marine Biological Association of India* Part IV:1424-1436.

Rao, P.V. 1969. Genus *Parapenaeopsis* Alcock 1901. Prawn Fisheries of India, *Central Marine Fisheries Research Institute Bulletin* 14: 127-158.

Sarvaiya, R.T. 1978. Prawn fisheries of Kutch with special reference to Sukhper and Lakhpat. *Indian Journal of fisheries* 25:35-40.