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Note

Chromosomes of the marine prawn *Parapenaeopsis stylifera*

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ABSTRACT

A chromosomal study was conducted on a marine prawn, *Parapenaoepsis stylifera*. The metaphase spreads were prepared from the hepatopancreatic tissue. The species possessed a modal diploid number (2n) of 74 chromosomes, FN = 110. The karyotype comprised of 1 metacentric, 18 submetacentric, 1 subtelocentric and 17 acrocentric pairs. The size of the chromosome ranged from 1.89 to 9.84 µm. Sex chromosomes were cytologically indistinguishable.

India is the largest producer of shrimps through capture fisheries, sharing over 10% of the total global capture shrimp output. *Parapenaeopsis stylifera*, popularly known as "Karikkadi" constitutes an important shrimp fishery along the west coast of India. It contributes about 18% by volume to the total shrimp landings of the country.

Karyological information is useful for cross-breeding, chromosome engineering and taxonomical studies of crustaceans, particularly shrimps and prawns. However, studies on the chromosomes of prawns and shrimps have been very limited since crustacean chromosomes are more in number and small in size. Some important cytological investigations on crustaceans have been made in the past, to cite some, Murofushi and Deguchi (1990), Ahmed and Nayak (1991), Justo *et al.* (1991), Xiang *et al.* (1994), Lakra and Kumar (1995), Kumar and Lakra (1996), Lakra (1997) and Campos-Ramos (1997). This paper is perhaps the first detailed information on the chromosome number and the karyotype of *P. stylifera*.

The study was conducted on adult individuals collected off Versova, a fish landing centre of Greater Mumbai, India and reared in the wet laboratory of the Central Institute of Fisheries Education, Versova, Mumbai for one week. The specimens were treated with 0.004% colchicine for 10 hours during night and hepatopancreatic tissue was taken out. The hepatopancreatic tissue was kept for hypotonic treatment in 0.9% sodium citrate for 70 minutes at room temperature. It was then transferred to Carnoy's fixative with three changes at an interval of 15 minutes. The metaphase slides were prepared from the fixed tissue following Kligerman and Bloom (1997). The slides were stained in 6% Giemsa in Sorenson's phosphate buffer for 30 minutes and differentiated in distilled water. The well-spread metaphase plates were photomicrographed using Olympus BHS-313 microscope.

TABLE 1. *Averages of ten cell spreads of metaphase chromosome measurements and classification of* Parapenaeopsis stylifera

Pair No.	Length of chromosomes (μm)			Relative length (RL %) ± S.D.	Arm ratio (A/R) ± S.D.	Centro metric index (CI) ± S.D.	Type of chromosome
	Long arm	Small arm	Total length				
1	3.03 ± 0.07	3.03 ± 0.07	6.06 ± 0.15	3.23 ± 0.08	1.00 ± 0.03	50.00 ± 0.3	M
2	5.3 ± 0.10	3.03 ± 0.07	8.33 ± 0.13	4.44 ± 0.07	1.75 ± 0.05	36.37 ± 0.7	SM
3	7.95 ± 0.07	1.89 ± 0.05	9.84 ± 0.20	5.25 ± 0.06	4.20 ± 0.10	19.20 ± 0.4	ST
4	4.17 ± 0.05	2.27 ± 0.06	6.44 ± 0.08	3.43 ± 0.04	1.83 ± 0.05	35.24 ± 0.8	SM
5	4.17 ± 0.05	1.89 ± 0.05	6.05 ± 0.05	3.23 ± 0.02	2.20 ± 0.07	31.23 ± 0.8	SM
6	3.79 ± 0.08	1.89 ± 0.05	5.68 ± 0.07	3.03 ± 0.06	2.00 ± 0.04	33.27 ± 0.5	SM
7	4.54 ± 0.08	1.89 ± 0.05	6.43 ± 0.10	3.43 ± 0.05	2.40 ± 0.07	29.40 ± 0.6	SM
8	4.54 ± 0.08	1.51 ± 0.05	6.05 ± 0.05	3.23 ± 0.02	3.00 ± 0.03	24.95 ± 0.7	SM
9	3.79 ± 0.08	1.51 ± 0.05	5.30 ± 0.10	2.83 ± 0.06	2.50 ± 0.09	28.49 ± 0.4	SM
10	4.54 ± 0.08	2.65 ± 0.04	7.19 ± 0.10	3.84 ± 0.06	1.71 ± 0.03	36.85 ± 0.3	SM
11	4.54 ± 0.08	2.27 ± 0.06	6.81 ± 0.09	3.63 ± 0.05	2.00 ± 0.04	33.33 ± 0.8	SM
12	4.54 ± 0.08	1.89 ± 0.05	6.43 ± 0.10	3.43 ± 0.05	2.40 ± 0.07	29.39 ± 0.5	SM
13	4.54 ± 0.08	1.51 ± 0.05	6.05 ± 0.05	3.23 ± 0.02	3.00 ± 0.03	24.95 ± 0.7	SM
14	3.03 ± 0.07	1.14 ± 0.10	4.17 ± 0.09	2.22 ± 0.05	2.65 ± 0.20	27.33 ± 0.9	SM
15	3.79 ± 0.08	1.14 ± 0.10	4.93 ± 0.07	2.63 ± 0.04	3.32 ± 0.20	23.12 ± 0.9	SM
16	3.41 ± 0.05	1.51 ± 0.05	4.92 ± 0.08	2.63 ± 0.04	2.25 ± 0.07	30.69 ± 0.8	SM
17	4.17 ± 0.05	1.51 ± 0.05	5.68 ± 0.07	3.03 ± 0.06	2.76 ± 0.25	26.58 ± 0.8	SM
18	3.79 ± 0.08	1.89 ± 0.05	5.68 ± 0.07	3.03 ± 0.06	2.00 ± 0.04	33.27 ± 0.5	SM
19	3.41 ± 0.05	1.89 ± 0.05	5.30 ± 0.10	2.83 ± 0.06	1.80 ± 0.06	35.66 ± 0.8	SM
20	3.41 ± 0.05	1.51 ± 0.05	4.92 ± 0.08	2.63 ± 0.04	2.25 ± 0.07	30.69 ± 0.8	SM
21	4.17 ± 0.05	–	4.17 ± 0.05	2.22 ± 0.02	–	–	A
22	3.41 ± 0.05	–	3.41 ± 0.05	1.82 ± 0.02	–	–	A
23	4.54 ± 0.08	–	4.54 ± 0.08	2.42 ± 0.04	–	–	A
24	3.79 ± 0.08	–	3.79 ± 0.08	2.02 ± 0.04	–	–	A
25	3.41 ± 0.05	–	3.41 ± 0.05	1.82 ± 0.02	–	–	A
26	3.41 ± 0.05	–	3.41 ± 0.05	1.82 ± 0.02	–	–	A
27	4.54 ± 0.08	–	4.54 ± 0.08	2.42 ± 0.04	–	–	A
28	4.54 ± 0.08	–	4.54 ± 0.08	2.42 ± 0.04	–	–	A
29	3.03 ± 0.07	–	3.03 ± 0.07	1.62 ± 0.04	–	–	A
30	4.92 ± 0.04	–	4.92 ± 0.04	2.62 ± 0.03	–	–	A
31	4.54 ± 0.08	–	4.54 ± 0.08	2.42 ± 0.04	–	–	A
32	4.54 ± 0.08	–	4.54 ± 0.08	2.42 ± 0.04	–	–	A
33	4.17 ± 0.05	–	4.17 ± 0.05	2.22 ± 0.02	–	–	A
34	3.79 ± 0.08	–	3.79 ± 0.08	2.02 ± 0.04	–	–	A
35	3.79 ± 0.08	–	3.79 ± 0.08	2.02 ± 0.04	–	–	A
36	2.65 ± 0.04	–	2.65 ± 0.04	1.41 ± 0.01	–	–	A
37	1.89 ± 0.05	–	1.89 ± 0.05	1.01 ± 0.01	–	–	A

A total of 71 mitotic metaphase plates were examined for determining the diploid chromosome number. The modal diploid number was found to be 74. The karyotype comprised 1 metacentric, 18 sub-metacentric, 1 subtelocentric and 17 acrocentric pairs. The size of the chromosome ranged from 1.89 to 9.84 µm. The fundamental number (FN) of arm value was found to be 110. The morphometric data and the ideogram are shown in Table 1 and Fig. 1, respectively. The second pair of chromosomes which are submetacentric can be used as marker chromosomes as it is conspicuously larger in size. Another interesting feature is the presence of non-staining regions (heterochromatin) in the 18th pair of the chromosomes. It is opined that these are the regions of nucleolar organizers (Agnese *et al.*, 1990).

Murofushi and Deguchi (1990) have reviewed and discussed the diploid chromosome number of 72 species of decapods (31 Macrura, 8 Anomura and 33 Brachyura) and possible karyotype evolution of 17 species (8 Macrura and 9 Brachyura). The diploid chromosome numbers of these species were distributed between 68 and 376. The chromosome number of six species from family Penaeidae has been reported by them. Their diploid chromosome number ranged from 68 to 92. The diploid number (2n = 74) of *P. stylifera* falls within the range of penaeid species.

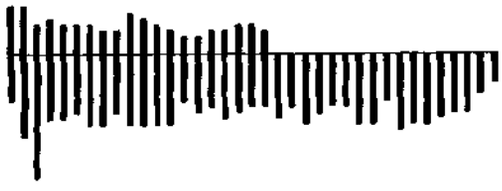

Fig. 1. Ideogram of *P. stylifera*.

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