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Note

Somatic and meiotic chromosomes of the freshwater prawn, *Macrobrachium rosenbergii* (de Man) used in aquaculture

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ABSTRACT

Cytogenetical studies were conducted in the Indian population of giant freshwater prawn, *Macrobrachium rosenbergii* for the first time. The chromosome spreads were obtained from the tissues of hepatopancreas, gill, antennal gland and regenerated blastema. A cytological analysis of these tissues revealed a modal diploid chromosome number of 2n = 118 in both male and female individuals. This was confirmed by the modal haploid chromosome number of n = 59 for the testes. A second peak of diploid chromosome number of 2n = 110 was also recorded in *M. rosenbergii.* The karyotype comprised 29 metacentric, 5 submetacentric, 3 subtelocentric and 22 acrocentric pairs in males and 37 metacentric, 6 submetacentric, 1 subtelocentric and 15 acrocentric pairs in females. The fundamental arm number in male and female was found to be 186 and 204 respectively. Sex chromosomes were cytologically indistinguishable.

Macrobrachium rosenbergii, the giant freshwater prawn is known to be the most important commercial species of Indian rivers and has also emerged as the best among the cultivable freshwater prawns. It grows upto 340 mm (male) in length and is cultured on a commercial scale in various states including Andhra Pradesh, West Bengal, Gujarat and Maharashtra. The non-availability of seed and long incubation period (15-25 days) requiring saline water are the major constraints in intensifying further the culture of *M. rosenbergii* in the country. Genetic studies on commercially important *Macrobrachium* spp. are extremely limited (Wong and McAndrew, 1994; Lakra and Kumar, 1995). Hence, the present study was taken up and At provides the basic cytogenetic data on the Indian population of *M. rosenbergii* for the first time- T^ information would be useful in future hybridization and chromosome engineering programmes m developing improved strains of *M. rosenbergii* for aquaculture industry,

Live specimens of *M. rosenbergii* weighing 8-13 g and measuring 81-124 mm (rostrum to telson length) were collected from a village pond in Naigaon district of Maharashtra State. It comprised of a heterogenous population originally collected from rivers Ulhas

Levari *et al.* (1984).

Analysis of 127 **metaphase chromosome** spreads obtained **from** somatic tissues? of both sexes (18 females and 9 males) **revealed** a modal diploid **number 2n = 118 in *M. rosenbergii* (Fig.** 1 and 3). However, a second peak of diploid chromosome number 2n = **110** was observed between **metaphases within** individuals of* seven **males** 22 females **(Fig.** 5 and 6). The diploid **chromosome** number in males was confirmed by **the**

;"ii •! Fig. 2. Karyotype of male *M. rosenbertfii.* Bar '-' ;"• = 5 **urn.**

Fig. 4 Karyotype of **fomalc** *M. **rosenbergiL*** Bar = 5 jim,

The **palaemonid family is reported** to possess diploid **chromosome** number ranging **from 100-136 (Komagata *et* «/.,**

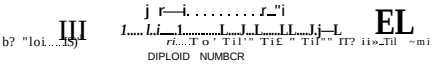
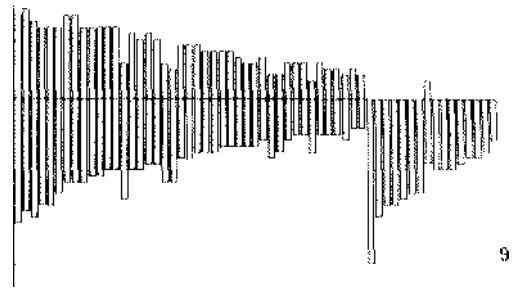


Fig. 6. **Frequency** and mode of the diploid **chromosome number of** female *M. rosenbergii.*



and 15 acrocenrtic pairs, Lakra and Kumar 1995) and *M. scabriculum* (22 metacentric, 10 telocentric and 22 acrocentric pairs, Lakra and Kumar, 1995). These karyotypic details suggest that the karyotypes of palaemonids are species specific.

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References

Beaumont, A.R. 1994. Chromosomal genetics. In : *Genetics and Evolution of Aquatic Organisms.* A.R.Beaumont, (Eds.), Chapman & Hall, London, p. 369-388.

Chavez Justo, C, M. Murofushi, K. Aida and I. Hanyu 1991. Karyological studies on the freshwater prawn, *Macrobrachium rosenbergii. Aquaculture,* 97 : 327-334.

Hayashi, K. and Y. Fujiwara 1988. A new method for obtaining metaphase chromosome from the regeneration blastema of *Penaeus (Marsupenaeus) japonicus. Nippon Suisan Gakkaishi,* 54(9) : 1563-1565.

Kligerman, A.D. and S.E. Bloom 1977. Rapid chromosome preparation from solid tissues of fishes. *J. Fish. Res. Bd. Canada,* 34 : 266-269.

Komagata, N., G. Suzuki., T. Urushido and T. Kondo 1988. The chromosome numbers of six Palaemonidae species. *The Carcinolo. Soc. Japan, Metting (Tokyo),* No. 12.

Lakra, W.S. and Kumar Prem 1995. Studies on the chromosomes of two freshwater prawns, *Macrobrachium idella* and *M. scabriculum* (Crustacea, Decapoda, Palaemonidae). *Cytobios,* 84 : 147-156.

Levan, A., K. Fredga and A. A. Sandberg 1964. Nomenclature for centromeric position on chromosomes. *Hereditas,* 52 : 201-220.

Manna, G.K. 1984. Progress in fish cytogenetics. *The Nucleus,* 27(3) : 203-231.

Mittal, O.P. and V. Dhall 1971. Chromosome studies in three species of freshwater decapods (Crustacea). *Cytologia,* 36 : 633-638.

Murofushi, M. and Y. Deguchi 1990. Karyotype evolution in Decapoda, Crustacea. In : *Proc. Second Asian Fishries Forum.* R. Hirano and I. Janyu (Ed.). Asian Fisheries Society, Tokyo, Japan, p. 549-553.

Rishi, K.K. 1989. Current status of fish cytogenetics. In : *Fish Genetics in India.* P. Das and A. G. Jhingran (Eds.), Today and Tomorrow's Printers and Publishers, New Delhi, 20 pp.

Vishnoei, D.N. 1972. Studies on the chromosomes of some Indian Crustacea. *Cytologia,* 37 : 43-51.

Wong, J.T.Y. and B.J. McAndrew 1994. Allozyme variation in riverine and lacustrine populations of *Macrobrachium nipponense* (de Haan). *Aquaculture and Fisheries Management,* 25 : 393-400.