72. Chromosomal Evolution Associated with Robertsonian Fusion in the Genus *Dascyllus* (Chrominae, Pisces)^{*)}

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Recent advances in cytogenetics have provided evidence indicating that evolutionary changes in organisms have taken place first in association with changes in the chromosomes. It is then allowed to state that cytogenetic data serve as a worthwhile tool for the elucidation of the systematic differentiation of the organism in general. The present article deals with the chromosomal features of the following 4 species of Chrominae, *Dascyllus trimaculatus*, *D. reticulatus*, *D. auruanus* and *D. melanurus* (Pomacentridae, Pisces), in relation to their species differentiation.

In Japan, 29 species belonging to the following 4 subfamilies of Procentridae, including Amphiprioninae, Chrominae, Pomacentrinae, and Glyphisodontinae, have been subjected to cytogenetic studies by several investigators. Some of the specimens here concerned were obtained through the courtesy of the Kushimoto Marine Park, Kushimoto, Wakayama Prefecture and some others were collected at Kuroshima in the Yaeyama Group, Ryukyu Island, Japan.

Kidney tissues were removed, minced with scissors and suspended in fish-BSS. Following the treatments with colchicine-, and KCl-hypotonization, they were fixed with Carnoy's solution as usual, air-dried and Giemsa-stained (Ojima and Yamano, 1980). Nomenclature of the chromosomes followed the system of Levan *et al.* (1964).

As shown in Table I, *D. trimaculatus* showed two different chromosome numbers, $2n=48$ and 47. *D. reticulatus* was characterized by chromosome polymorphism due to different chromosome numbers such as $2n=37$, 36, 35 and 34 (Fig. 1). Polymorphic karyotypes were observed also in *D. auruanus*: The following diploid numbers, 33, 32, 31, 30, 29, 28, and 27 were observed in this species. Only *D. melanulus* had $2n=48$ consisting of the A-type chromosome complement with subtelo- and acrocentric elements characteristic to the higher teleostean group. In all species, the NF value was the same being 48.

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Table I. Karyotype constitution of the genus *Dascyllus*

Species	CN	M, SM	ST, A	NF
<i>Dascyllus trimaculatus</i>	48	0	48	48
	47	1	46	48
<i>Dascyllus reticulatus</i>	37	11	26	48
	36	12	24	48
	35	13	22	48
	34	14	20	48
<i>Dascyllus auruanus</i>	33	15	18	48
	32	16	16	48
	31	17	14	48
	30	18	12	48
	29	19	10	48
	28	20	8	48
	27	21	6	48
<i>Dascyllus melanurus</i>	48	0	48	48

CN: Chromosome number. M, SM: Meta- and submetacentrics. ST, A: Subtelo- and acrocentrics. NF: Fundamental number.

Arai *et al.* (1976) reported the occurrence of a single karyotype with 47 chromosomes in *D. trimaculatus*. They have stated that a large metacentric chromosome, heteromorphic in nature, seems to be the sex chromosome, and that it may be produced by centric fusion. In our investigations, 15 of 17 individuals of *D. trimaculatus* possessed 48 chromosomes without showing the presence of heteromorphic element. In other two closely related species, *D. reticulatus* and *D. auruanus*, the chromosome number varies among species as well as within species in relation to the chromosome number as mentioned above.

A decrease of two elements in each species with the A-type complement result regularly in an increase of one element in each species with the M-type complement characterized by meta- and submetacentrics. Then, the chromosome number varies among intraspecies as well as among interspecies. The NF value was the same being in all species of *Dascyllus* under study. This indicates that the chromosomal polymorphism is explicable as a result of Robertsonian fusion in relation to species differentiation. This type of chromosomal evolution has been known widely in mammals, but such a feature is rare in fishes, particularly of the higher group, providing a clear-cut evidence for the chromosomal variation due to centric fusion in this study.

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Fig. 1. Serial alignment of somatic chromosomes of *Dascyllus reticulatus*. A: $2n=37$. B: $2n=36$. C: $2n=35$. D: $2n=34$.

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