

Chromosomes of *Leptobotia curta* (Cobitidae, Cypriniformes)

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Leptobotia curta (Temminck et Schlegel) is a member of the subfamily Botiinae, and has been considered as one of the most primitive loaches (Nalbant, 1963) and a relic in Japan.

Karyological studies of cobitid fishes have been made by some investigators (Nogusa, 1960; Muramoto et al., 1968; Hitotsumachi et al., 1969; Ojima and Hitotsumachi, 1969; Kobayasi, 1976). As far as I know, however, the karyotype of *L. curta* has remained unknown. In the present paper the karyotype of *Leptobotia curta* is described.

Material and methods

A male, 113.3 mm, and a female, 129.3 mm in total length, were used. They were offsprings of fish taken from the Yoshii River, Okayama Prefecture.

The specimens were injected with 0.15 ml of 0.5% colchicine solution. These fishes were kept for three hours at room temperature after the colchicine injection. The gills were minced with a pair of scissors, and fixed in a Carnoy solution containing two parts of methyl alcohol and one part of acetic acid after treatment in hypotonic solution for 18 minutes. The preparations were made according to the routine air-drying method, and the staining was performed with a Giemsa solution.

The classification of chromosomes is referred to Levan et al. (1964). The meta- and submetacentric chromosomes are described as two-arm, and the subtelo- and acrocentric chromosomes as one-arm.

The specimens used were identified as *Leptobotia curta* because of the following characters: dorsal fin with 3 spines and 10~11 rays, anal fin with 3 spines and 6 rays, caudal principal rays 10+9, number of vertebrae including the Weberian apparatus with 19 + 16~17, total 35~36.

The specimens used for the experiment are deposited in the Laboratory of Marine Zoology, Hokkaido University.

Result

The diploid chromosome number is 50 (Table

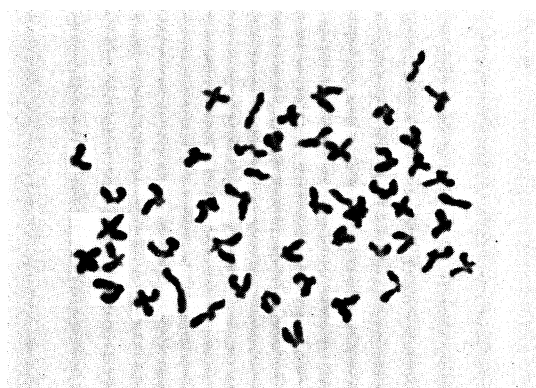


Fig. 1. Photomicrographs of metaphase from gill epithelial cells of *Leptobotia curta* (Temminck et Schlegel). $2n=50$. $\times 1540$.

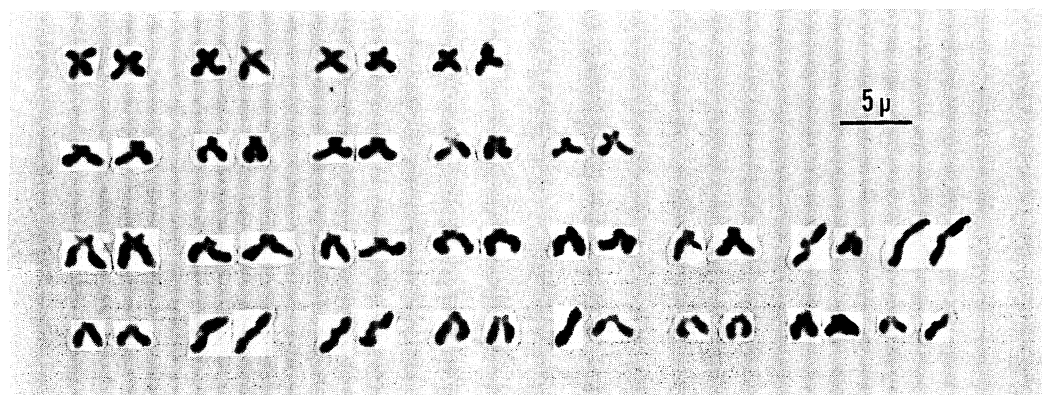


Fig. 2. Karyotype of *Leptobotia curta*, from Fig. 1. $NF=68$. $\times 1920$.

1). The karyotype comprises 4 pairs of metacentric, 5 pairs of submetacentric, and 16 pairs of subtelo-acrocentric chromosomes (Figs. 1 and 2). The arm number (NF) is 68. The difference between male and female karyotypes was not found.

Discussion

Among cobitid fishes with $2n=50$, the species has the highest number of two-arm chromosomes (Table 2). Its karyotype is similar to that of *Niwaella delicata* which is a member of the subfamily Cobitinae (Hitotsumachi et al., 1969; Ojima and Hitotsumachi, 1969). However, the karyotypic similarity does not seem to

indicate their close relationship because of differences in osteological characters (Nalbant, 1963; Mester, 1973).

Botia macracantha, which has been considered to be closely related to *L. curta*, has 98 chromosomes (Muramoto et al., 1968). However, it appears that *B. macracantha* increased its chromosome number without substantially changing its DNA content (Muramoto et al., 1968). The evolutionary mechanism of such chromosomal changes has not been understood. Therefore, the karyotypic relationship between *L. curta* and *B. macracantha* will remain in an open question.

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Table 1. Frequency distribution of diploid chromosome counts in *Leptobotia curta*.

Sex	2n						Total
	46	47	48	49	50	51	
Male	2		2	1	10	3	18
Female	1	1		1	6		9

Table 2. Comparison of chromosomal constitution in cobitid fishes.

Species	Diploid number	Two-arm chromosome	One-arm chromosome	References
Botiinae				
<i>Leptobotia curta</i>	50	18	32	Present report
<i>Botia macracantha</i>	98	28	70	Muramoto et al. (1968)
Nemacheilinae				
<i>Barbatula toni</i>	50	16* (14)	34* (36)	Hitotsumachi et al. (1969)
<i>Lefua nikkonis</i>	50	12	38	Hitotsumachi et al. (1969)
Cobitinae				
<i>Cobitis biwae</i>	96	58	38	Hitotsumachi et al. (1969)
	96	58	38	Ojima and Hitotsumachi (1969)
	48	—	—	Ueno and Ojima (1975)
	96	—	—	Ueno and Ojima (1975)
large race	96	88	8	Kobayasi (1976)
small race	48	48	0	Kobayasi (1976)
<i>Cobitis taenia taenia</i>	50	—	—	Ueno and Ojima (1975)
	86	—	—	Ueno and Ojima (1975)
	94	—	—	Ueno and Ojima (1975)
<i>Cobitis taenia striata</i>	50	—	—	Ueno and Ojima (1975)
	98	—	—	Ueno and Ojima (1975)
<i>Niwaella delicata</i>	50	18* (16)	32* (34)	Hitotsumachi et al. (1969)
	50	18* (16)	32* (34)	Ojima and Hitotsumachi (1969)
<i>Misgurnus anguillicaudatus</i>	50	14	36	Hitotsumachi et al. (1969)
	50	14	36	Ojima and Hitotsumachi (1969)
<i>Misgurnus fossilis</i>	100	—	—	Raicu and Taisescu (1972)
<i>Acanthopthalmus kuhlii</i>	50	14	36	Muramoto et al. (1968)

* 1st pair of two-arm chromosomes should be changed as one-arm.

Museum for disposal of the materials for the present study.

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アユモドキの染色体について

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アユモドキはドジョウ類の中ではもっとも原始的な1種と考えられているが、その染色体については知られていない。

今回、本種の染色体の観察を行った結果、 $2n=50$ で、核型は4対の中部着糸染色体、5対の次中部着糸染色体、16対の次端部および端部着糸染色体によって構成されていることが判明した。したがって本種のtwo-arm chromosomeの数は、 $2n=50$ をもつドジョウ類の中ではもっとも多く、その核型はアジメドジョウのそれと類似している。しかし両者の類似性は比較形態学上の明瞭な相違を考えると、近縁性を示唆するものではないらしく、また、アユモドキに近縁な*B. macracantha*では $2n=98$ であり、両種の染色体上の関係は不明である。

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