

Karyotypes of Four Cyprinid Fishes from Thailand

By

Ryoichi ARAI

Department of Zoology, National Science Museum, Tokyo

and

Wichian MAGTOON

Department of Biology, Faculty of Science, Srinakharinwirot University
at Bangkok, Bangkok, Thailand

Abstract Chromosomes of four cyprinid fishes from Thailand were observed. Karyotypes of these four species are as follows: *Mystacoleucus marginatus*: $2n=50$, $NF=76$; *Acrossocheilus deauratus*: $2n=50$, $NF=72$; *Puntius orphoides*: $2n=50$, $NF=80$; *Labeo behri*: $2n=50$, $NF=70$. Classification of *Acrossocheilus* is discussed from karyological and morphological viewpoints. The karyotype of *Mystacoleucus marginatus* is the first reported in the genus *Mystacoleucus*.

In order to clarify the phylogenetic systematics and zoogeography of cyprinid fishes in Thailand, we have observed karyotypes of cyprinid fishes from Thailand (MAGTOON & ARAI, 1989 and 1990). Recently, we had the chance to examine chromosomes of 4 cyprinid fishes in Thailand, i. e., *Mystacoleucus marginatus* (VALENCIENNES in CUVIER & VALENCIENNES, 1842), *Acrossocheilus deauratus* (VALENCIENNES in CUVIER & VALENCIENNES, 1842), *Puntius orphoides* (VALENCIENNES in CUVIER & VALENCIENNES, 1842), and *Labeo behri* FOWLER, 1937.

As karyotypes of these four species have not been reported, the results will be described shortly in the following lines.

Materials and Method

Three specimens of *Labeo behri*, 86.5 to 93.6 mm in total length (TL), and a specimen of *Acrossocheilus deauratus*, 133.8 mm in TL, were collected from Ubon Ratchathani, Northeast Thailand. A specimen of *Puntius orphoides*, 95.9 mm in TL, was caught at Mae Hong Song, North Thailand, and two specimens of *Mystacoleucus marginatus*, 87.2 and 102.7 mm in TL, at Uthai Thani, Central Thailand. Some morphological characters of material fishes are shown in Table 1. They are deposited in the fish collection of the Department of Zoology, National Science Museum, Tokyo. The classification of the family Cyprinidae in Thailand follows that by SMITH (1945).

Table 1. Morphological characters of material fishes.

Species	No. of fish	Standard length (mm)	Barbels	Lateral line scales*	Branched dorsal rays	Branched anal rays	Vertebrae
<i>Mystacoleucus marginatus</i>	2	65.5–76.5	4	27–30(2)	8	9	34
<i>Acrossocheilus deauratus</i>	1	104.6	4	31(3)	8	5	38
<i>Puntius orphoides</i>	1	73.6	4	28(2)	8	5	33
<i>Labeo behri</i>	3	62.2–73.8	2	39(3)	12	5	35

* Scales on the body side and the caudal fin were included. Figures in parentheses show the number of scales on the caudal fin.

Chromosome preparation was made from the head kidney following the method of OJIMA and KURISHITA (1980). The classification of chromosomes is adopted from LEVAN *et al.* (1964). Metacentrics and submetacentrics are described as two-arm chromosomes, and subtelocentrics and acrocentrics as one-arm chromosomes. The definition of the new arm number is referred to ARAI and NAGAIWA (1976).

Results

Mystacoleucus marginatus (Fig. 1 A, C). As shown in Table 2, the diploid chromosome number is 50. The karyotype comprises 16 metacentric, 10 submetacentric, and 24 acrocentric chromosomes. The arm number is 76. The new arm number is 50.

Acrossocheilus deauratus (Fig. 1 B, D). The diploid chromosome number is 50. The karyotype comprises 10 metacentric, 12 submetacentric, and 28 acrocentric chromosomes. The largest chromosome is submetacentric. The arm number is 72. The new arm number is 50.

Puntius orphoides (Fig. 2 A, C). The diploid chromosome number is 50. The karyotype of this species comprises 14 metacentric, 16 submetacentric, 4 subtelocentric, and 16 acrocentric chromosomes. The largest chromosome is submetacentric. The arm number is 80. The new arm number is 50.

Labeo behri (Fig. 2 B, D). The diploid chromosome number is 50. The karyotype comprises 12 metacentric, 8 submetacentric, 2 subtelocentric, and 28 acrocentric chromosomes. The largest chromosome is submetacentric. The arm number is 70. The new arm number is 50.

Table 2. Frequency distributions of diploid chromosome counts in four species of material fishes.

Species	2n										Total
	44	45	46	47	48	49	50	51	52		
<i>Mystacoleucus marginatus</i>			1		1		8				10
<i>Acrossocheilus deauratus</i>		1			1		6				8
<i>Puntius orphoides</i>					1		13				14
<i>Labeo behri</i>			1		1		9				11

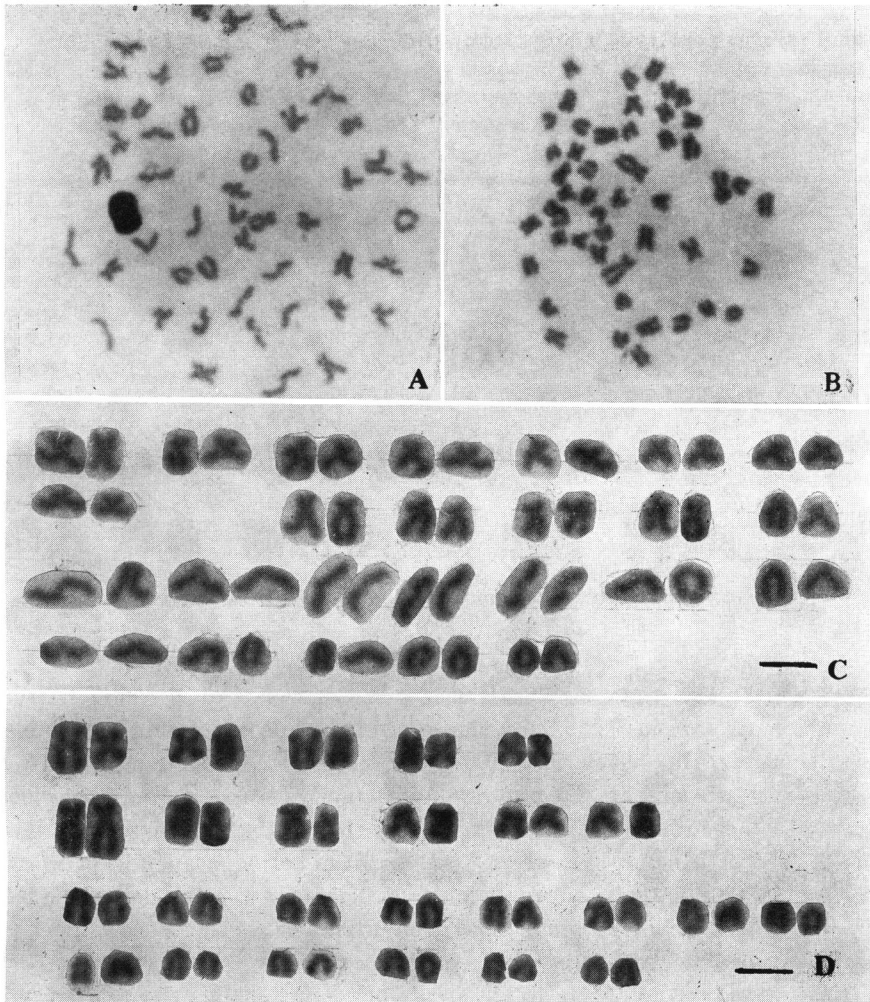


Fig. 1. Photomicrographs of mitotic metaphase chromosomes and karyotypes of two species in the genera *Mystacoleucus* and *Acrossocheilus*. A and C, *Mystacoleucus marginatus*; B and D, *Acrossocheilus deauratus*. Each scale indicates 5 μ m.

Discussion

Morphologically, the genus *Mystacoleucus* has the peculiar character, i.e., presence of a procumbent predorsal spine. HORA (1937) considered this character to be an autapomorphy of *Mystacoleucus*, but this character was also found in *Spinibarbus* species and *Rohtee ogilbii* (OSHIMA, 1919; SMITH, 1945). Although the karyotype of *Rohtee ogilbii* has not been reported, the diploid chromosome number of *Mystacoleucus* is 50, while that of *Spinibarbus* is 100. This fact suggests that the

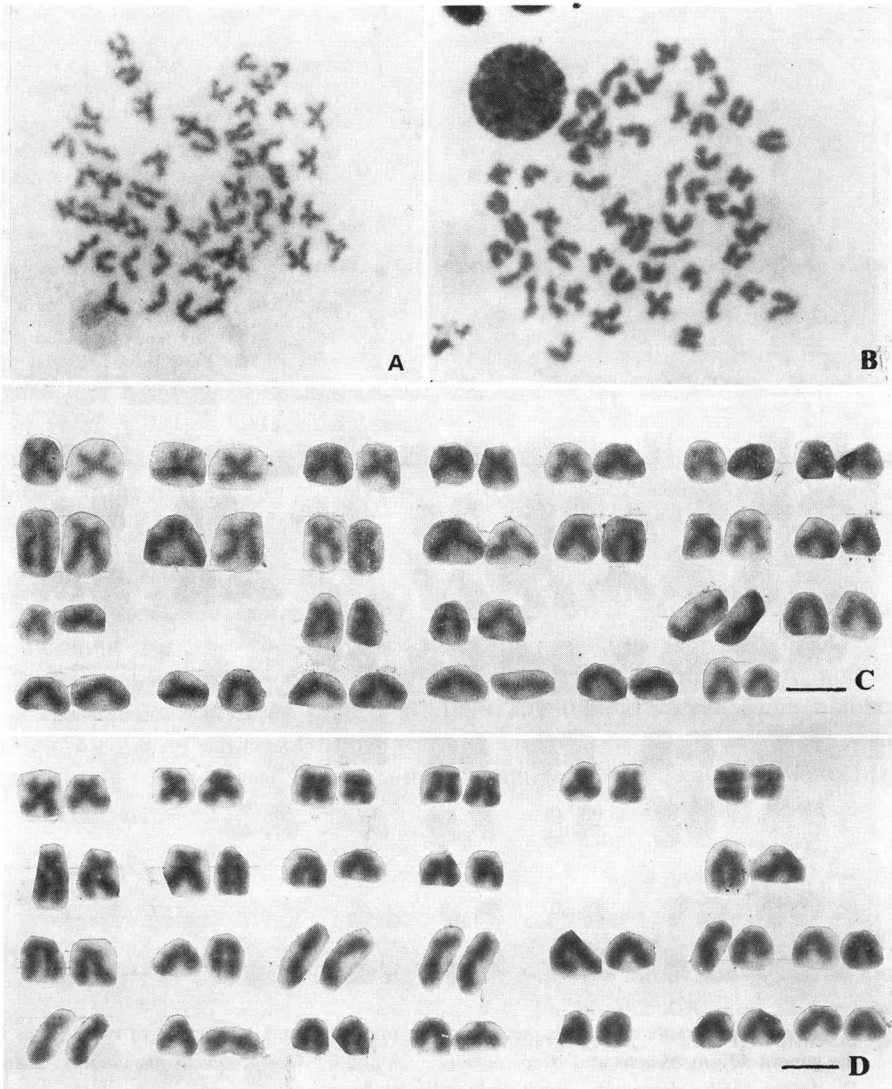


Fig. 2. Photomicrographs of mitotic metaphase chromosomes and karyotypes of two species in the genera *Puntius* and *Labeo*. A and C, *Puntius orphoides*; B and D, *Labeo behri*. Each scale indicates 5 μ m.

procumbent predorsal spine is not an autapomorphy of *Mystacoleucus* and occurred independently in *Mystacoleucus*, *Spinibarbus*, and *Rohtee ogilbii*.

The karyotype of *Acrossocheilus deauratus* is the first reported in the species of this genus from Thailand. KOTTELAT (1989, tab. 3) divided *Acrossocheilus* sensu SMITH (1945) into 3 genera, i. e., *Acrossocheilus* OSHIMA, 1919, *Poropuntius* SMITH, 1931, and *Neolissochilus* RAINBOTH, 1985. When we follow the classification by

Table 3. Karyotypes of the genus *Acrossocheilus* sensu SMITH (1945).

Excepting data of present study, data sources of karyotypes are different from those of morphology. As regards arm numbers (NF), metacentrics and submetacentrics are counted as two in NF₁, while metacentrics, submetacentrics, and subtelocentrics counted as two in NF₂. Morphological data are adopted from DAY (1875–1878), SMITH (1945), and WU *et al.* (1977).

Species	2n	NF ₁	NF ₂	No. of scales		Vertebrae	Literature on karyotypes
				I*	II*		
<i>Acrossocheilus fasciatus</i>	50	80	90	16	37–38	37–40	GUI <i>et al.</i> , 1986
<i>A. hemispinis hemispinis</i>	50	76	84	16	36–37	37–39	YU <i>et al.</i> , 1989
<i>A. iridescentis zhujiangensis</i>	50	80	90	16	39–41		GUI <i>et al.</i> , 1986
<i>A. labiatus</i>	50	78	82	16	36–38	38–39**	ARAI, 1982
<i>A. parallens</i>	50	80	94	16	36–37		GUI <i>et al.</i> , 1986
<i>A. wenchowensis beijiensis</i>	50	80	94	16	36–37		GUI <i>et al.</i> , 1986
<i>A. yunnanensis</i>	50	84		16–18	42–44	44	ZAN <i>et al.</i> , 1984
"	50	78	90				LI <i>et al.</i> , 1986
<i>Poropuntius deauratus</i>	50	72	72	14	29–33	38	Present study
<i>Neolissochilus hexagonolepis</i>	100	140		12	28–31	42–43**	MATSUDA, 1985
<i>N. sumatranus</i>	98	142	158	12	23–25		SUZUKI & TAKI, 1981

* I, Number of circumpeduncular scales. II, Number of scales in lateral series.

** Present study.

KOTTELAT (1989, p. 10), *Acrossocheilus deauratus* is placed in the genus *Poropuntius*. As shown in Table 3, the diploid chromosome number of *Acrossocheilus*, *Poropuntius*, and *Neolissochilus* is 50, 50, and 98 to 100, respectively. Karyologically it seems difficult to separate *Acrossocheilus* from *Poropuntius*. In case that the genus *Poropuntius* is considered to be valid, the karyotype of *P. deauratus* (= *Acrossocheilus deauratus*) is the first reported in the genus *Poropuntius*. As suggested by ARAI (1982, p. 145), *Neolissochilus* is more closely related to *Tor* than to *Acrossocheilus* sensu stricto and *Poropuntius* in the karyotype as well as morphological characters.

KOTTELAT (1989) synonymized *Labeo behri* with *Bangana pierrei*. When we follow KOTTELAT's classification, the karyotype of *B. pierrei* (= *Labeo behri*) is the first reported in the genus *Bangana*.

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