

Karyotypes of Three Cyprinid Fishes, *Osteochilus hasselti*, *O. vittatus*, and *Labiobarbus lineatus*, from Thailand

Wichian Magtoon and Ryoichi Arai

(Received March 17, 1989)

Cyprinid fishes of the genera *Osteochilus* and *Labiobarbus* are distributed in the Mae Nam Chao Phraya and the Mae Nam Mun, a main tributary of the Mekong River in Central and Northeast Thailand (Smith, 1945). They are also distributed in other parts of the Indochinese Peninsula and the Greater Sunda Islands.

Recently, we observed chromosomes of *Osteochilus hasselti*, *O. vittatus*, and *Labiobarbus lineatus*. As the karyotypes of *Osteochilus* and *Labiobarbus* have not been reported yet, they are described here. These fishes are characterized by having a long dorsal fin base and more than 10 branched dorsal rays. The interrelationship between karyotypes and the number of branched dorsal rays is also discussed.

Materials and methods

Two specimens of *Osteochilus hasselti* (Valenciennes), 105.0 and 114.5 mm TL, a specimen of *O. vittatus* (Valenciennes), 50.9 mm TL, and two specimens of *Labiobarbus lineatus* (Sauvage), 76.0 and 91.4 mm TL, were collected from Ayuthaya

District, Central Thailand. As we have studied interrelationships between karyotypes and morphological features, some morphological characters of the material fishes are shown in Table 1.

The method of chromosome preparation used in this study is similar to that of Ojima and Kurishita (1980). Classification of chromosomes followed Levan et al. (1964). Metacentrics and submetacentrics are described as two-arm chromosomes, and subtelocentrics and acrocentrics as one-arm chromosomes.

Results

Osteochilus hasselti (Fig. 1 A, C). As shown in Table 2, the diploid chromosome number is 50. A photograph of mitotic metaphase chromosomes and the karyotype of *Osteochilus hasselti* are shown in Fig. 1 A and C. The karyotype comprises 30 metacentric, 14 submetacentric, and 6 subtelocentric chromosomes. The arm number is 94.

Osteochilus vittatus (Fig. 1 B, D). The diploid chromosome number of this species is 50. The karyotype comprises 16 metacentric, 30 submetacentric, and 4 subtelocentric chromosomes. The arm number is 96.

Labiobarbus lineatus (Fig. 1 E, F). The diploid chromosome number is 50 (Table 2). The karyotype comprises 20 metacentric, 10 submetacentric, and 20 acrocentric chromosomes. The arm number is 80.

Table 1. Characters of three cyprinid species from Thailand.

Species	No. of fishes	SL (mm)	BD (mm)	Dorsal fin rays	Anal fin rays	Barbels	Vertebrae
<i>Osteochilus hasselti</i>	2	82.9-88.5	28.5-29.8	iv, 15	iii, 5	4	33
<i>O. vittatus</i>	1	38.0	10.0	v, 11	iii, 5	4	32
<i>Labiobarbus lineatus</i>	2	60.0-75.0	15.5-19.5	iv, 22-23	iii, 5	4	35

Table 2. Frequency distributions of chromosome counts in three cyprinid species from Thailand.

Cat. No.	Species	2n										Total
		43	44	45	46	47	48	49	50	51	52	
M.1.1	<i>Osteochilus hasselti</i>						1	1	3			5
M.1.2	<i>O. hasselti</i>				1	1	2	1	12			17
M.2.1	<i>Osteochilus vittatus</i>			1		1	2	1	8	1	2	16
M.3.1	<i>Labiobarbus lineatus</i>	1	1				1	1	3			7
M.3.2	<i>L. lineatus</i>			1		1			8			10

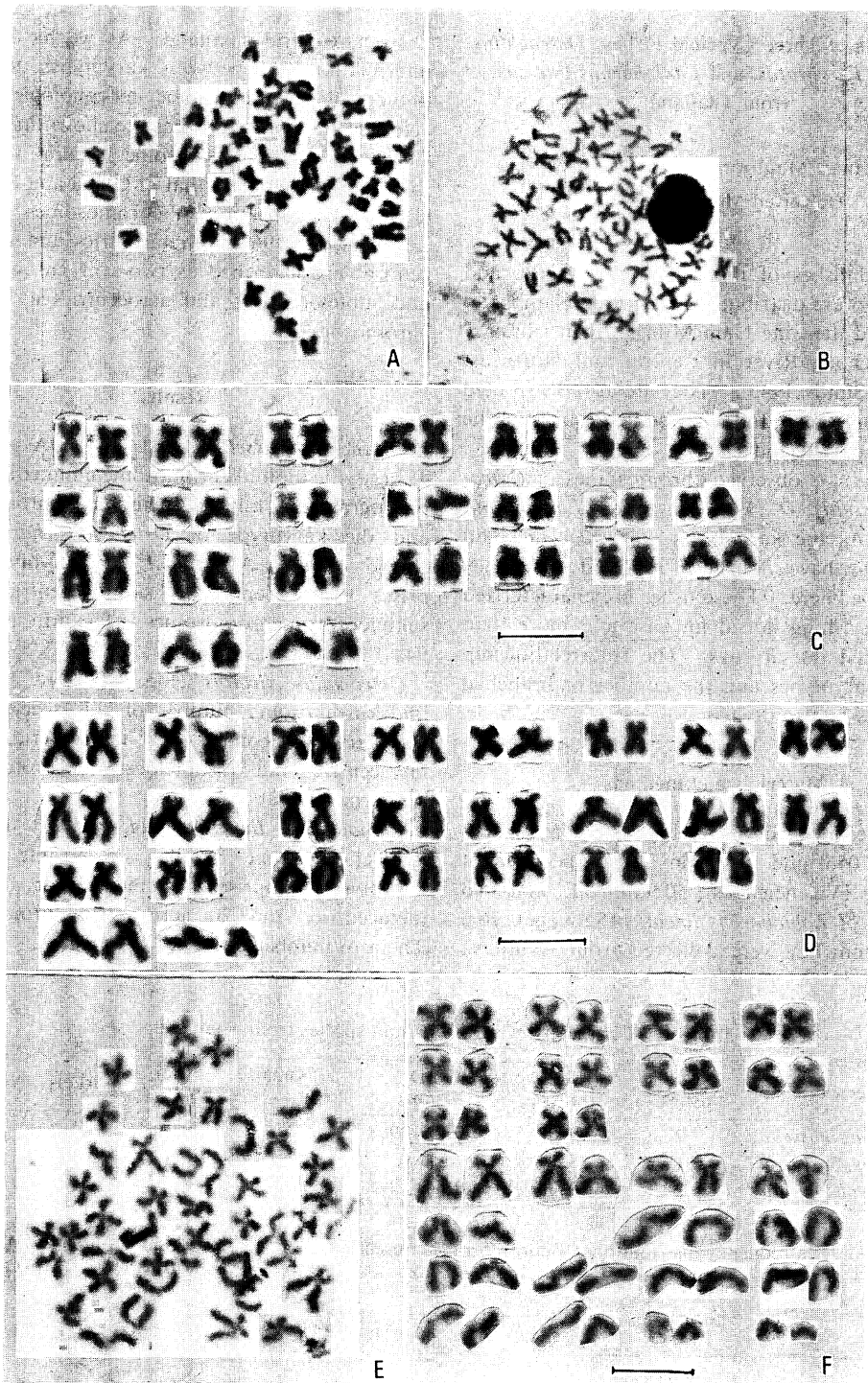


Fig. 1. Photomicrographs of mitotic metaphase chromosomes and karyotypes of three cyprinid fishes from Thailand. A and C, *Osteochilus hasselti*; B and D, *Osteochilus vittatus*; E and F, *Labiobarbus lineatus*. Each scale indicates 5 μ m.

Table 3. Karyotypes and morphological characters in cyprinid fishes having more than 10 branched dorsal rays and 5 branched anal rays. Data sources of karyotypes and morphological characters are not the same. Morphological characters are cited from Day (1875), Taki (1974), and Wu et al. (1977). NF_1 , metacentrics and submetacentrics are counted as two-arm chromosomes; NF_2 , metacentrics, submetacentrics, and subtelocentrics are counted as two-arm chromosomes. * Smith (1945) classified this species into *Morulus*.

Species	2n	NF_1	NF_2	Branched dorsal rays	Branched anal rays	Barbels	Lateral line scales	Literature on karyotypes
<i>Catla catla</i>	50	74	88	14-16	5	0	40-43	Manna and Khuda-Bukhsh, 1977
<i>Cirrhinus molitorella</i>	50	96	98	12-13	5	4	35-37	Zhang et al., 1984
<i>C. mrigala</i>	50	64	78	12-13	5	2	40-45	Rishi, 1981
<i>Labeo caeruleus</i>	48	66	72	12	5	2	40	Rishi, 1981
<i>L. calbasu</i>	50	64	86	13-15	5	4	40-44	Manna and Khuda-Bukhsh, 1977
<i>L. chrysophekadion*</i>	50	64	82	15-18	5	4	40-41	Muramoto et al., 1968
<i>L. pangusia</i>	50	68	84	11	5	2	40-42	Tripathi and Sharma, 1987
<i>L. rohita</i>	50	76	88	12-13	5	4	40-42	Gui et al., 1986
<i>Labiobarbus lineatus</i>	50	80	80	22-24	5	4	34-35	Present study
<i>Osteochilus hasselti</i>	50	94	100	14-16	5	4	33-35	Present study
<i>O. vittatus</i>	50	96	100	11-12	5	4	32-34	Present study
<i>Sinilabeo decorus decorus</i>	50	78	88	11	5	4	40-41	Gui et al., 1986
<i>S. d. tungting</i>	50	78	88	10-11	5	4	39-40	Zhang et al., 1984

Discussion

Osteochilus hasselti, *O. vittatus*, and *Labiobarbus lineatus* have the same diploid chromosome number, $2n=50$, but they are different in arm numbers, i.e., 94 in *O. hasselti*, 96 in *O. vittatus*, and 80 in *L. lineatus*. There are 20 acrocentrics in the karyotype of *L. lineatus*, while no acrocentric chromosome is found in the karyotypes of two *Osteochilus* species.

In external morphology, *Osteochilus* and *Labiobarbus* are characterized by having a long dorsal fin base and more than 10 branched dorsal rays. In order to study the interrelationships between karyotypes and morphological characters, the karyotypes and selected morphological characters in 13 cyprinid fishes which have more than 10 branched dorsal rays and 5 branched anal rays are listed in Table 3.

Table 3 seems to show the following points: 1) *Osteochilus* has the largest arm number, 2) *Labiobarbus lineatus* is characterized by having no submetacentric chromosomes, 3) the arm number (NF_1) of *Labiobarbus lineatus* is larger than any species of *Labeo*, 4) *Labeo chrysophekadion*, which is classified to *Morulius* by Smith (1945), is not different karyologically from the other *Labeo* species, 5) species with a large NF_1 (more than 78) have small numbers of lateral line scales (less than 40), 6) interrelationships between karyotypes and the number of branched dorsal rays are unclear, and 7) interrelationships between karyotypes and the number of barbels are also unclear. However, points 6) and 7) may depend on insufficient data.

Acknowledgments

We wish to express our thanks to Prof. Yasuhiko Taki, Tokyo University of Fisheries, for his guidance on the cyprinid fishes in Thailand, and Dr. Hiroshi Uwa, Shinshu University, for his valuable suggestion to this study.

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(WM: Department of General Science, Faculty of Science, Srinakharinwirot University at Bangkok, Bangkok 10220, Thailand; RA: Department of Zoology, National Science Museum (Natural History Institute), 3-23-1, Hyakunin-cho, Shinjuku-ku, Tokyo 169, Japan)

タイ国産のコイ科魚類 3 種 *Osteochilus hasselti*, *O. vittatus*, *Labiobarbus lineatus* の核型

Wichian Magtoon・新井良一

従来、コイ科魚類の 2 属、*Osteochilus* 属、*Labiobarbus* 属の核型についての報告はなされていない。今回、*Osteochilus* 属 2 種、*Labiobarbus* 属 1 種の染色体を観察したので報告する。実験魚は全てタイ国産で、*Osteochilus hasselti* の核型は $2n=50$ で、中部着糸染色体(M) = 30、

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次中部着糸染色体 (SM)=14, 次端部着糸染色体 (ST)=6 からなり, *O. vittatus* の核型は $2n=50$ で, $M=16$, $SM=30$, $ST=4$ であった. *Labiobarbus lineatus* の核型は, $2n=50$, $M=20$, $SM=10$, 端部着糸染色体 (A)=20 であった. なお, 背鰭基底長が長いことや背鰭条数が多い特徴を共有するコイ科の 6 属 12 種について, 核

型, 形態的特徴が比較された.

(Magtoon: タイ国スリナカリンウィロート大学理学部;
新井: 169 新宿区百人町 3-23-1 国立科学博物館分館動物研究部)