



# HOKKAIDO UNIVERSITY

Title	Rare Stichaeid Fish, <i>Pseudalectrias tarasovi</i> (Popov), from Japan and its Larvae and Juveniles
Author(s)	Miki, Toru; 三木, 徹; Yoshida, Hidetsugu et al.
Citation	北海道大學水産學部研究彙報, 38(1), 1-13
Issue Date	1987-02
Doc URL	<a href="https://hdl.handle.net/2115/23936">https://hdl.handle.net/2115/23936</a>
Type	departmental bulletin paper
File Information	38(1)_P1-13.pdf



**Rare Stichaeid Fish, *Pseudalectrias tarasovi* (Popov),  
from Japan and its Larvae and Juveniles\***

Toru MIKI\*\*, Hidetsugu YOSHIDA\*\*\*  
and Kunio AMAOKA\*\*

**Abstract**

*Pseudalectrias tarasovi* was reported only from the coast of the Sea of Japan and southern Kurile Islands, and its early life history was not known up to the present. In the present study, numerous specimens and a natural egg mass of *P. tarasovi* were collected from Minamikayabe-cho, southern Hokkaido, Japan. The egg mass was incubated in the aquarium and produced broods of larvae which were reared to benthonic juveniles. This paper describes wild adult specimens and reared larvae and juveniles of *P. tarasovi*, and discusses following points: distinguishing characters from the related species; intraspecific variation of characters used in the past works; the feature of the distribution and habitat.

**Introduction**

*Pseudalectrias tarasovi* (Popov) is a small coastal fish and always lies hidden under the stone. Taxonomically, *P. tarasovi* is a member of the family Stichaeidae and included in the subfamily Aletriinae *sensu* Makushok (1958), which comprise the genera *Alectrias*, *Alectridium*, *Anoplarchus* and *Pseudalectrias*. *P. tarasovi* was recorded originally by Popov (1933) under the name of *Alectrias tarasovi*, based on a single specimen from De-Kastry in the Sea of Japan. Afterwards, Lindberg (1938) established the monotypic genus *Pseudalectrias* to the species on the basis of having the low crest, toothless palatines and different pattern of interorbital pores and redescribed the species by using his 3 substitutional specimens for the lost holotype, which were collected from Shiaukfu Bay, the east of Peter the Great Bay. Recently, Pinchuk (1974) recorded one specimen of *P. tarasovi* from Svetlaya in the middle Primorsky, and 12 specimens of the species from Shikotan Island in the south of Kurile Islands which represented the first record from the Pacific coast. The taxonomic works for aletriine fishes including *P. tarasovi* were made by Makushok (1958), Peden (1967), Lindberg and Krasnyukova (1975), and Shiogaki (1985a). However these information on *P. tarasovi* was almost based on three records mentioned above. Because of the scant information on *P. tarasovi*, the intraspecific variation of characters and the early life history have not been known up to the present.

---

\* Contribution No. 185 from the Research Institute of North Pacific Fisheries, Faculty of Fisheries, Hokkaido University

(北海道大学水産学部北洋水産研究施設業績第185号)

\*\* Laboratory of Marine Zoology, Faculty of Fisheries, Hokkaido University

(北海道大学水産学部水産動物学講座)

\*\*\* Research Institute of North Pacific Fisheries, Hokkaido University

(北海道大学水産学部北洋水産研究施設)

During the course of the ichthyofaunal study at Usujiri Fisheries Laboratory of Hokkaido University in southern Hokkaido, we collected numerous specimens and a single egg mass of *P. tarasovi*. The egg mass with a brooding adult was found under the stone in the intertidal zone of the rocky shore at ebb tide, though the brooding adult was not captured unfortunately and therefore the sex could not be determined. This egg mass was incubated in the aquarium for 10 days and produced numerous yolk-sac larvae which were reared to benthonic juveniles.

The present paper represents a first record from Japan and fourth record of *P. tarasovi*. We describe the developmental series of *P. tarasovi* from yolk-sac larvae to benthonic juveniles based on reared specimens, and the morphological feature on wild specimens. We discuss the intraspecific variation of characters and the distinctive feature of *P. tarasovi* from the related alectriine species. Also we refer to the distributional pattern and the habitat of *P. tarasovi*.

### Materials and methods

The egg mass of *Pseudaletrias tarasovi* was collected on June 1, 1984, and contained in a 3-liter glass aquarium. The water temperature during the incubation and the breeding was kept to 10°C, which was almost accorded with the mean surface water-temperature in June at Usujiri, southern Hokkaido. The water in the aquarium was fully aerated and one third mass of water was changed every 2 days. *P. tarasovi* larvae and juveniles were fed brine shrimp, *Artemia* sp., and wild *Tigriops* sp. The last survivors of juveniles were reared to 81 days old after newly hatching and the largest one attained 25.2 mm in the standard length. These larvae and juveniles were preserved in 5 percent formalin and deposited as larval specimens at the Laboratory of Marine Zoology, Faculty of Fisheries, Hokkaido University (HUMZ-L). Wild specimens ranging over 40 mm standard length were registered in HUMZ. The definition of developmental stages follows Kendall et al. (1984). Measurements for larvae and juveniles were made according to Tokuya and Amaoka (1980) except for the following portions: the body depth is measured as the myomere depth at anal fin origin; the pectoral fin length is measured as the distance from the fin base to the posterior tip. Meristic counts and measurements for wild specimens were made in the same manner as Miki (1985). Larvae and juveniles, and wild specimens were measured to the nearest 0.1 mm with toolmarker's microscope system (OLYMPUS, DM 252-A) to the former and calipers to the latter. Data of reared specimens are shown in Table 1. Wild specimens collected at Usujiri and Ofune were captured by using the beach seine, dip net and fish-luring light, and by fishing. They include 39 male specimens ranging from 41.2 to 136.8 mm standard length and 13 female specimens ranging from 46.3 to 134.2 mm standard length (Fig. 1). The catalogue number and date are as follows (specimens from Ofune are shown in the asterisk): HUMZ 88013, 14 July 1980; HUMZ 90382, 23 Nov. 1980; HUMZ 90778, 17 July 1981; HUMZ 90792, 18 July 1981; HUMZ 91052-91056, 24 May 1981; HUMZ 92276, 26 Feb. 1982; HUMZ 92321, 17 May 1982; HUMZ 92335, 25 May 1982; HUMZ 92365-92367, 17 July 1981; HUMZ 92978-92980, 1981yr.; HUMZ 93129, 2 Feb. 1982; HUMZ 96464, May 1982; HUMZ 96588, 11 July 1982; HUMZ 97171-97175, 14 Apr. 1982; HUMZ 97513, 97514, 20 May 1983; HUMZ 98850, 13 July 1983; HUMZ 99394-99415, 13 July 1983; HUMZ 99695 (cleared

Table 1. Developmental series of eggs, larvae and juveniles in *Pseudaletrias tarasovi* (Popov).

Catalogue no. (HUMZ-L)	Days after hatching	Stage	SL (mm)	Specimens examined
3159	10 days before	embryos	—	—
3160	0	yolk-sac	6.2	1
3161	ditto	ditto	6.0-6.5	7
3162	3	ditto	6.7	1
3163	ditto	ditto	6.5-6.8	10
3164	14	preflexion	7.2	1
3165	21	flexion	7.7	1
3166	35	ditto	10.2	1
3167	42	postflexion	8.6	1
3168	ditto	ditto	9.1	1
3169	48	transforming	10.7	1
3170	ditto	ditto	7.6-10.2	3
3171	58	juvenile	8.7-9.0	3
3172	ditto	ditto	10.5	1
3173	ditto	ditto	11.6	1
3174	73	ditto	16.6	1
3175	ditto	ditto	13.5-17.3	2
3176	81	ditto	13.3	1
3177	ditto	ditto	16.7-25.2	5

specimen), 1982yr.; HUMZ 103056, 26 July 1984; HUMZ 104930\*-104932\*, 11 May 1985.

***Pseudaletrias tarasovi* (Popov)**  
(Japanese name: Nise-kitanotosaka)  
(Figs. 2-5)

*Alectrias tarasovi* Popov, 1933: 150, fig. 1 [*sic*, fig. 2?]

*Pseudaletrias tarasovi* (Popov): Lindberg, 1938: 507-510, 512, 513, fig. 6

*Pseudoaletrias tarasovi* (Popov): Pinchuk, 1974: 950-952

*Diagnosis*

Body scaleless. Crest on head low and separated into two ridges. Gill membranes united to each other and forming a wide free fold across isthmus. Pelvic fin absent. Pectoral fin small, the length usually one fourth of head length. Nasal and infraorbital canal series with only one pore each. Mandibular canal series with two pores. Body almost dark brown. White oblique band with black margins present on cheek. Two white spots with black margins arranged vertically on caudal peduncle.

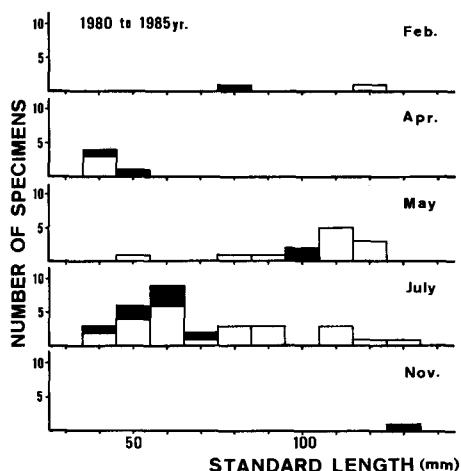


Fig. 1. Seasonal size frequency of *Pseudaletrias tarasovi* (Popov) based on 52 wild specimens. White and black bars show the male and female each.

*Description of wild specimens*

Meristics: Dorsal fin rays LXI-LXIV; anal fin rays I-II (usually I), 39-43; pectoral fin rays 9-11; pelvic fin absent; caudal fin rays 2-4+5-7+5-7+1-4 (usually 6+6 principal rays); vertebrae 21-23+43-46=65-68.

Proportional measurements in percent of standard length and in percent of head length in parenthesis: Length of dorsal fin base 77.2-86.7; length of anal fin base 49.5-56.0; preanal length 41.5-49.3; preanus length 37.6-47.1; predorsal length 13.7-17.8; head length 13.2-17.1; body depth at dorsal fin origin 8.2-11.6 (51.9-74.3); body depth at anal fin

origin 8.4-10.8 (54.6-72.9); depth of caudal peduncle 3.1-4.8 (20.0-32.4); length of pectoral fin 2.9-4.6 (19.0-31.1); length of caudal fin 6.6-9.7 (43.1-56.7); snout length 2.6-4.3 (17.5-26.9); length of upper jaw 4.9-7.3 (32.9-49.1); eye diameter 1.9-2.8 (12.1-17.8); interorbital width 1.1-2.1 (7.3-13.6); postorbital length of head 8.0-11.5 (59.3-72.6); length of dorsal spine 2.5-5.5 (19.1-35.5); length of anal soft ray 3.7-5.4 (23.5-36.7).

Body slender, subcylindrical and compressed posteriorly (Fig. 2). Snout slightly long, the length usually longer than eye diameter. Upper jaw varying with individuals in size and the posterior tip sometimes exceed a vertical through posterior margin of eye. Anterior nostril in a short tube, the length shorter than pupil diameter. Posterior nostril very small, not tubular, and present between nasal pore and eye (shown by arrow in Fig. 3). Dermal crest on head low and separated into two ridges: anterior ridge located above rostral and interorbital median line; posterior ridge ending before nape (Fig. 3). Gill membranes extending forward and united to each other at isthmus, and forming a wide free fold across isthmus. Uppermost gill membrane forming a dermal siphon.

Dorsal spines very flexible from first to about 26th spine (25th to 27th spine; to above anterior 5th to 7th anal ray) and gradually increasing the stoutness and rigidity posteriorly. Dorsal spines almost equal in the length except for anterior and posterior two or three short spines. Dorsal fin widely connected to base of caudal fin with shallow notch between fins. Anal fin originated below 20th to 23th dorsal spine and perfectly confluent to caudal fin without notch between fins (Fig. 2). Anal fin usually with a short and flexible spine and numerous soft rays. Anal soft rays usually simple, but posterior rays branched with the growth. Incomplete interhaemal spine embedded just before anal fin origin. Pectoral fin rays usually branched except for upper and lower short rays. Principal and the adjacent

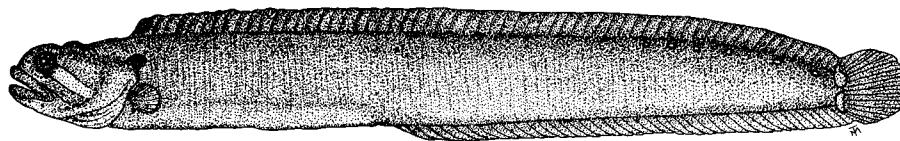


Fig. 2. Wild specimen of *Pseudalectrias tarasovi* (Popov), HUMZ 92979, 93.5 mm SL, male.

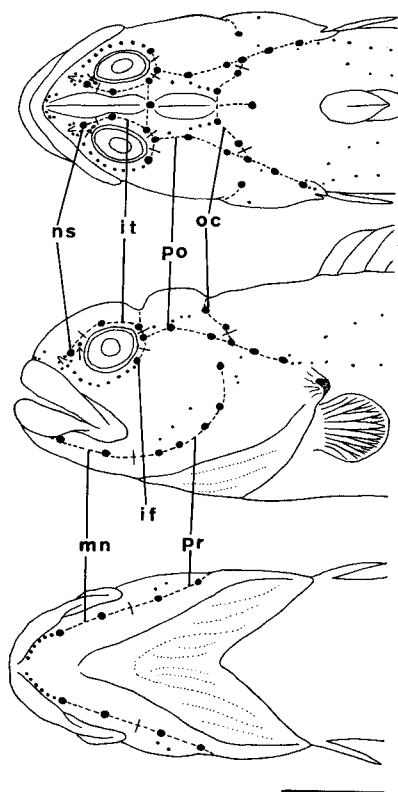


Fig. 3. Semidiagrams of dorsal, lateral and ventral heads in *Pseudalectrias tarasovi* (Popov), HUMZ 92979. Dashed lines and large black dots on the line show the cephalic sensory canals and pores each. Small black dots show free pit organs. Arrows before eyes show posterior nostrils. Abbreviations of canal series are shown as follows: ns, nasal series; it, interorbital series; oc, postorbital series; if, infraorbital series; pr, preopercular series; mn, mandibular series. Scale indicates 5 mm.

procurent rays of caudal fin branched. Epaxial hypurals forming a single plate (no variation in 56 specimens).

Head, body and all fins scaleless. Lateral line in two series of free pit organs. The upper series originating from above gill openings and running along dorso-lateral body and ending above anterior anal fin; interval between pits gradually widened posteriorly (these pits are observed only in the good condition and the number ranges from 13 to 20). The lower series on lateral median line throughout body; pits arranged at equal intervals and the series possessing 57 to 68 pits. Cephalic sensory canal pores rather rudimental and replaced to free pit organs (Fig. 3): nasal series with a single pore posteriorly and about 3 pits anteriorly; interorbital series with a pair of pores above middle of eye and 1 to 4 pores above posterior margin of eye (the variation is shown in Table 2; dorso-median pore is usually present); postorbital series with 6 to 7 (usually 6) pores; occipital series with 4 pores along supratemporal commissure and 1 to 2 (usually 1) pores posteriorly; infraorbital series with a single pore posteriorly and 6 to 9 pits below eye; preopercular series with 5 to 6 (usually 5) pores; mandibular series with 2 pores posteriorly and 5 to 7 pits anteriorly; about 5 pits around anterior nostril; other few pits present above anterior postorbital and preopercular pores, and behind superior-most preopercular pore.

Teeth on jaws conical: outer teeth enlarged irregularly and arranged in a row; inner teeth small and forming a band near symphysis of jaws. Teeth on prevomer

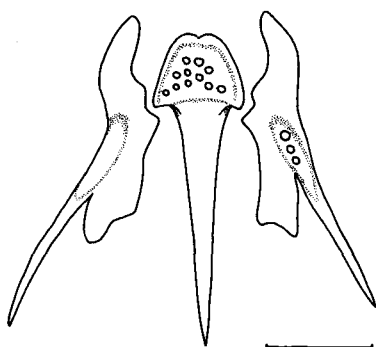


Fig. 4. Ventral view of the prevomer and palatines, HUMZ 99695. White circles show the teeth. Scale indicates 1 mm.

and palatines very small and conical: the former forming a patch; the latter arranged in a row but coming off easily (present in 83.9 percent of wild specimens at least on one side, Fig. 4).

**Coloration.** Head, body, and vertical fins blackish brown except orange to red tips of anal and caudal fins and slightly pale belly. In the aquarium, ground color sometimes changes to greenish light brown with irregularly wavy dark lines throughout body, but easily returns to uniformly dark ground. Pectoral fin orange or brown. White eye band with blackish margins running obliquely across cheek. Black line parallel to eye band present on lower cheek. Black blotch just above gill opening. Obscure black blotch often appears on anteriormost dorsal fin. Two distinct white spots with blackish margins arranged vertically on caudal peduncle. Faint dots present on posterior dorsal fin base at intervals in relatively young specimens.

*Description of developmental stages*

**Eggs:** The ovary and ovarian eggs were observed from the mature female of 104.8 mm standard length collected on May 20, 1983 (HUMZ 97514). The ovary is two-lobe shaped, fused at the base and contains about 1800 eggs. These eggs are generally spherical, almost equal in diameter, and ranging from 0.89 to 1.18 mm ( $\bar{x} = 1.04 \pm 0.06$  SD;  $n = 50$ ). Natural eggs forming a single mass were collected on June 1, 1984. This egg mass was not adhered to the stratum and was coiled by the guarding parent under the stone. These eggs are demersal, spherical and united to each other by some adhesive prominences, which were reported by Shiogaki and Dotsu (1972) in *Dictyosoma burgeri* and by Wourms and Evans (1974) in *Xiphister atropurpureus*. Small semisphere-like tubercles reported by Shiogaki (1985b) in *Alectrias mutsuensis* were not observed on the egg membrane. The eggs are distinctly larger than ovarian eggs, almost equal in diameter and ranging from 1.62 to 1.68 mm ( $\bar{x} = 1.66 \pm 0.03$  SD;  $n = 10$ ). The egg membrane is cloudy and the embryo is not seen clearly from the outside. Embryos were already developed and possessed pigmented eyes. Newly hatching occurred all together after 10 days' incubation.

Table 2. The variation of posterior interorbital pores in *Pseudalectrias tarasovi* (Popov). Seven patterns (A-G) were observed from 55 wild specimens. Pattern C is the condition reported by past works. Pattern A is shown in Fig. 3.

Pattern	A	B	C	D	E	F	G
Specimens examined	20	12	11	8	2	1	1
No. of left pore	1	1	0	0	0	2	1
No. of median pore	1	1	1	1	0	1	1
No. of right pore	1	0	0	1	1	0	2

Chronological data after the newly hatching are summarized in Table 1. The number of myomeres ranges from 62 to 64 (19-22+42-44) after the newly hatching.

Newly hatching (yolk-sac stage, Fig. 5A) : The examined specimens range from 6.0 to 6.5 mm standard length. The mouth is very small and located ventrally. Pectoral and vertical fins are present as fin-folds. Preanal fin-fold is present on the ventro-median line below the yolk-sac to anus. The anus opens before middle body (below anterior 20th myomere). The gut is slightly constricted posteriorly. The yolk is not fully absorbed and possesses a single oil droplet antero-ventrally. The notochordal tip does not start to flex yet. Large internal melanophore is present behind the isthmus and the similar 5 to 7 melanophores arrange along the dorsal gut at intervals. A series of small melanophores is present along the ventro-median line from the yolk-sac to the gut before the anus. A series of small melanophores is present subcutaneously along ventro-median line from about 3rd to the last caudal-myomere. Two small melanophores are present ventrally at the notochordal tip.

Three days after hatching (yolk-sac stage, Fig. 5B) : The examined specimens range from 6.5 to 6.8 mm standard length. The yolk-sac is absorbed gradually and remains at the anterior belly. Hypurals begin to be formed below the notochordal tip. The mouth is enlarged slightly. Internal melanophores newly occur on the dorso-lateral trunk just above the middle of caudal notochord. Two small melanophores below the notochordal tip move to the hypural margin.

Fourteen days after hatching (preflexion stage, Fig. 5C) : The examined specimen reaches 7.2 mm standard length. The mouth is more enlarged. A few large melanophores newly occur on the dorsal surface of the cranial capsule and the nape. Internal melanophores on the dorso-lateral trunk increase in number and extend forward and backward.

Twenty-one days after hatching (flexion stage, Fig. 5D) : The examined specimen reaches 7.7 mm standard length. The notochordal tip starts to flex upward. Caudal fin rays begin to ossify at this stage. Large internal melanophores on the dorsal surface of the gut are sometimes confluent with each other. Small melanophores at the notochordal tip extend along hypural margin.

Thirty-five days after hatching (flexion stage, Fig. 5E) : The examined specimen reaches 10.2 mm standard length. The notochordal tip flexes clearly upward. Dorsal and anal fin rays begin to ossify posteriorly. Pectoral fin rays begin to ossify from the upper part. The pectoral fin becomes small gradually. The preanal fin-fold becomes very small. The nostril is constricted in the middle. Subcutaneous small melanophores along the anal fin base are rearranged every myomere. Internal melanophores on the dorso-lateral trunk become embedded. The body length begins to vary individually.

Forty-two days after hatching (postflexion stage, Fig. 5F) : The examined specimens range from 8.6 to 9.1 mm standard length. The pectoral fin possesses 9 rays and its fin rays attain the adult complement. Vertical fin rays occur increasingly from the back to the front. The anus opens just below the middle body. The nostril is separated to the anterior tubular and the posterior tubuleless openings. Small melanophores sometimes occur behind the eye and on the lower angle of the preopercle. Subcutaneous small melanophores along the anal fin base have 1 to 1 ratio with myomeres and sometimes extend branches upward along myosepta and

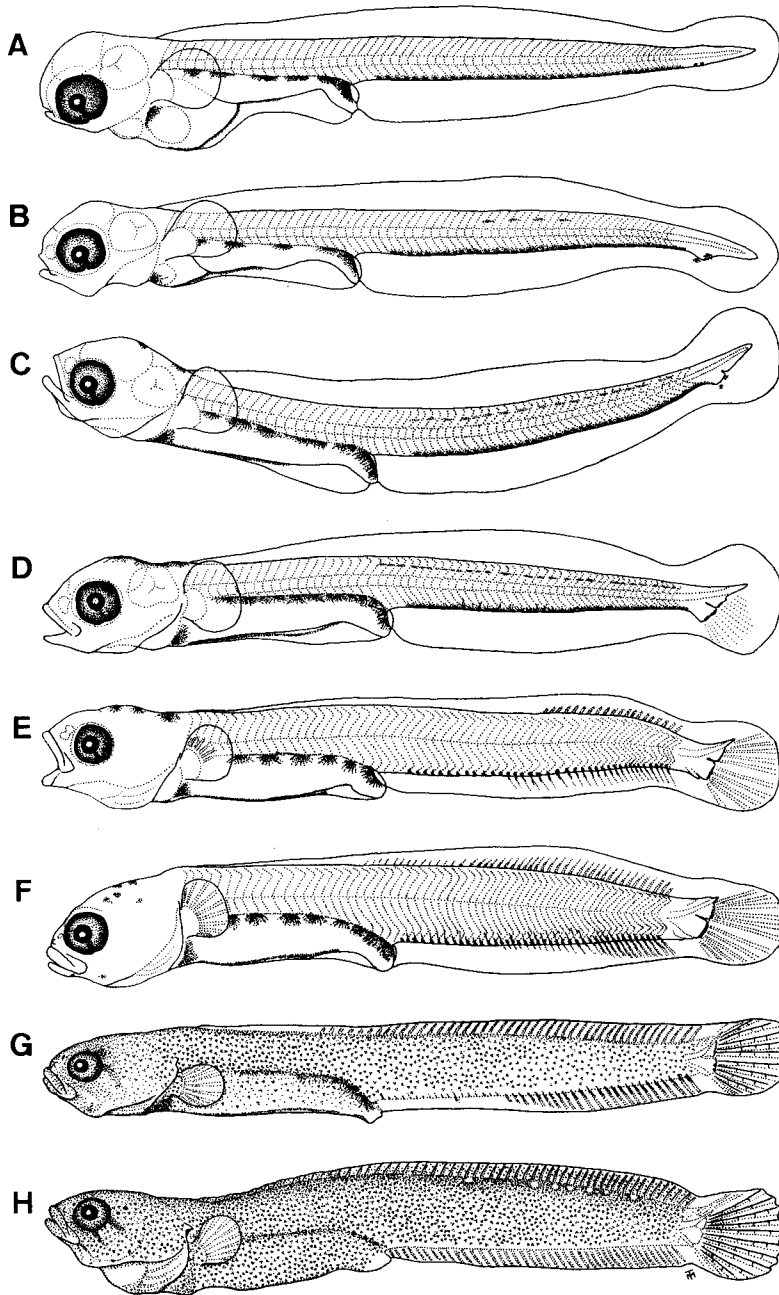


Fig. 5. Reared larvae and juveniles of *Pseudalectrias tarasovi* (Popov): A, newly hatching, 6.2 mm SL; B, 3 days after hatching, 6.7 mm SL; C, 14 days after hatching, 7.2 mm SL; D, 21 days after hatching, 7.7 mm SL; E, 35 days after hatching, 10.2 mm SL; F, 42 days after hatching, 8.6 mm SL; G, 48 days after hatching, 10.7 mm SL; H, 58 days after hatching, 10.5 mm SL.

downward along rays.

Forty-eight days after hatching (transforming stage, Fig. 5G): The examined specimens range from 7.6 to 10.7 mm standard length. Very small melanophores

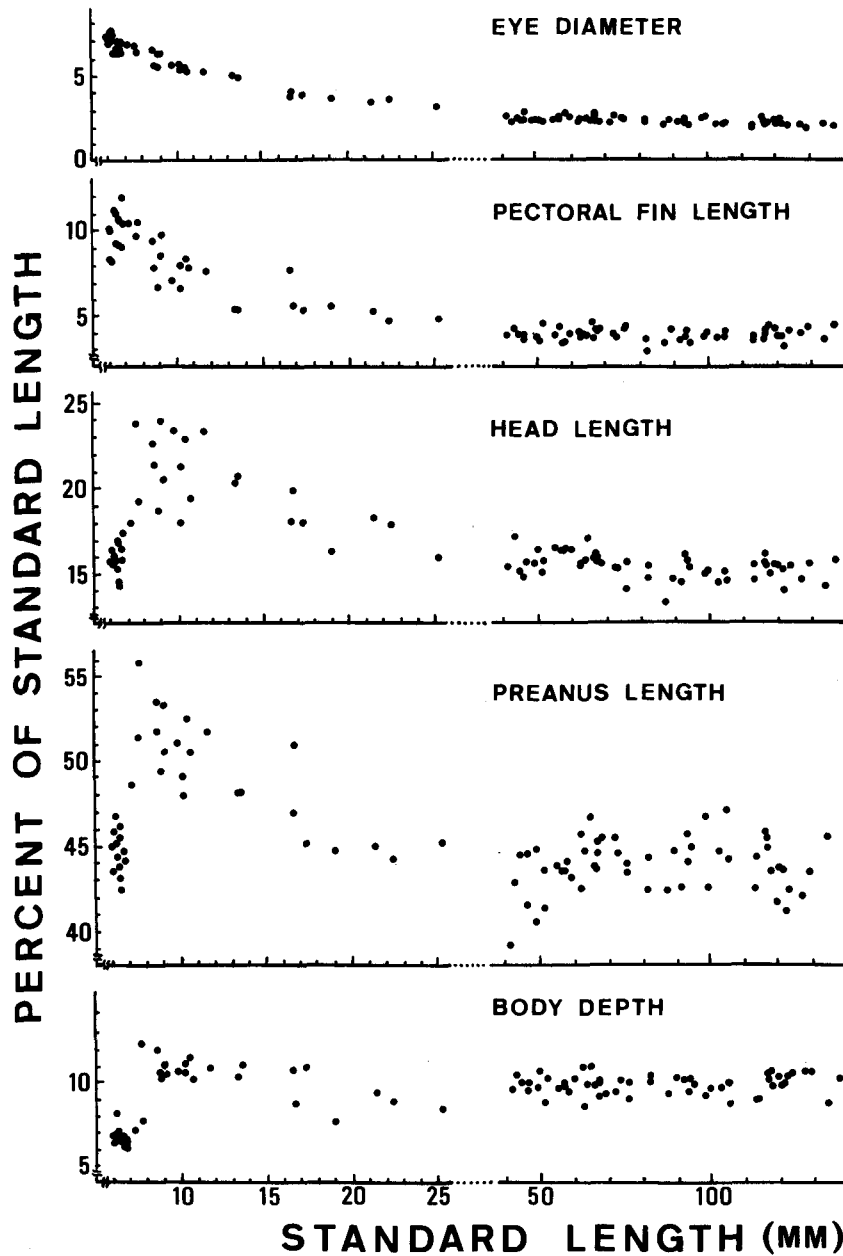


Fig. 6. Relative growth rates of the selected morphometric characters from newly hatching larvae to adults in *Pseudaelectrias tarasovi* (Popov).

cover the whole body densely. Large melanophores at the previous stages deeply sink into the muscles and are almost invisible. Vertical fin rays do not attain adult complements yet. Caudal procurent rays begin to ossify. The pectoral fin becomes smaller proportionally.

Fifty-eight days after hatching (juvenile stage, Fig. 5H): The examined specimens range from 8.7 to 11.6 mm standard length. Dorsal and anal fins possess 62 spines and 42 rays each, and the fin rays almost attain adult complements. Caudal fin rays nearly attain the adult complement. The body is pigmented more densely. The faint band on the cheek and the white dots along the posterior dorsal fin base begin to appear.

Seventy-three days and 81 days after hatching (juvenile stage): The examined specimens range from 13.3 to 25.2 mm standard length. Reared specimens almost show the same feature as wild adults by this time except for body proportions (Fig. 6).

## Discussion

### *Adult characters*

*P. tarasovi* is known as the monotype of the genus *Pseudalectrias* and is distinguished from any other alectriine genera and species in lacking scales on the body, and in possessing only a single nasal and infraorbital pores each, and only 2 mandibular pores. In addition to the above characters, the absence or presence of palatine teeth and the number of interorbital pores were recognized as the important characters of alectriine fishes (Popov (1933), Lindberg (1938), Makushok (1958), Peden (1967), Lindberg and Krasnyukova (1975), Shiogaki (1985a)). According to these past works, *P. tarasovi* lacks palatine teeth and possesses 3 interorbital pores, posterior one of which is located at the dorso-median line on the head. However, our specimens of *P. tarasovi* show that palatine teeth are usually present in many specimens (47 of 56 specimens), though the teeth are very small, easily coming off, and sometimes present only on one side (Fig. 4). The number of interorbital pores is also variable among the specimens and the condition is divided into 7 patterns by the number of posterior pores (Table 2). From these facts, the condition of palatine teeth and the number of interorbital pores should be omitted from the diagnoses of the genus *Pseudalectrias*. However the presence of dorso-median pore is usually useful for the identification of *Pseudalectrias* and *Alectridium*. The artificial key to genera of Alectriinae is consequently modified below. Key to species of Alectriinae should be referred to Shiogaki (1985a).

### Key to genera of Alectriinae

- 1a. Body scaleless ..... *Pseudalectrias* Lindberg
- 1b. Posterior body scaled ..... 2
- 2a. Gill membranes fused to isthmus, not forming a wide free fold across isthmus ..... *Anoplarchus* Gill
- 2b. Gill membranes fused to each other, and forming a wide free fold across isthmus ..... 3
- 3a. Crest on head developed, and the posterior end extended backward before

- nape. Dorsal median pore absent above posterior margin of eye.....  
 .....*Alectrias* Jordan et Evermann  
 3b. Crest on head low and ended before dorsal median pore above posterior  
 margin of eye .....*Alectridium* Gilbert et Burke

*Larval and juvenile characters*

*P. tarasovi* larvae are very similar to *Alectrias* larvae recorded by Tokuya and Amaoka (1980) and Shiogaki (1985b) in the shape and the pigmentation except for the seasonal occurrence. *P. tarasovi* yolk-sac larvae occur nearly in early June, judging from the condition of the collected mature female and natural egg mass. On the other hand, *Alectrias* yolk-sac larvae occur from March to April in southern Hokkaido (Tokuya and Amaoka, 1980) and *A. mutsuensis* larvae occur from January to May (Shiogaki, 1985b). As for the body size, *P. tarasovi* yolk-sac larvae are distinctly smaller than *Alectrias* yolk-sac larvae recorded by Tokuya and Amaoka (1980) (6.0-6.8 mm SL versus 8.1-9.6 mm SL), slightly smaller than *Alectrias mutsuensis* yolk-sac larvae ranging from 6.4 to 7.8 mm in the total length (Shiogaki, 1985b). In the transforming stage (Fig. 5G), *P. tarasovi* larvae become pigmented densely throughout the body, before the fin rays attain adult complements. On the contrary, *Alectrias* larvae perform the fin-ray ossification to adult complements before the densely pigmented stage.

Relative growth rates of *P. tarasovi* are examined from the yolk-sac larvae to adults in some selected morphometric characters (Fig. 6). These data show two different trends of the morphometric developments. One trend is observed in the eye diameter and pectoral fin length, the rates of which decrease monotonously with the growth. Another trend is observed in the head length, preanus length, and body depth, the rates of which increase sharply to about 10 mm standard length and afterward decrease gradually with the growth. In the case of *P. tarasovi*, the changing point from the increasing to decreasing trend is almost correlated with notochord flexion and the subsequent densely pigmented stage. Just at the same stage, *P. tarasovi* shifts from the planktonic to the benthonic life (Yoshida, personal observation). This correspondence between the morphology and the ecology probably reflects the change of the morphological adaptation answering to the life style.

*Distribution and habitat*

Data on the latitude and longitude are estimated from the map as follows: De-Kastry, the Tatar Straits, the Sea of Japan (type locality, 51°40'N, 140°51'E); near Svetlaya, middle Primorsky, the Sea of Japan (46°33'N, 138°20'E); Petrov Island, Shikotan Bay, the east of Peter the Great Bay, the Sea of Japan (42°49'N, 133°38'E); Krabovaya Bay (= Anama Bay), Shikotan Island, Kurile Islands (43°50'N, 146°44'E); Usujiri and Ofune, Minamikayabe-cho, Hokkaido, Japan (present study, 41°56'N, 140°58'E).

*P. tarasovi* inhabits the intertidal zone of the rocky shore and prefers to crawl into the crevice of the stratum or under the stone. In the aquarium, *P. tarasovi* often hid easily under the ground of pebbles, making the caudal portion of body swing laterally and quickly. In Usujiri, *P. tarasovi* was collected throughout the year (from February to November) from the same habitat. Additionally, the

natural egg mass was obtained in June from the same habitat. In the examination of the seasonal size frequency, *P. tarasovi* has at least two different year classes (Fig. 1). From these facts, *P. tarasovi* repeats the reproduction every year in Usujiri. *P. tarasovi* has almost the same niche as the related species, *Alectrias benjamini* and *A. alectrolophus*. In Hokkaido, these three alectriine species are known, but show almost parapatric distributions among them. *A. benjamini* is distributed along the coast from Tsugaru Straits to the Sea of Japan. *A. alectrolophus* is distributed along the Pacific coast from eastern to central Hokkaido. *P. tarasovi* is observed only from the boundary between the distributions of *A. benjamini* and *A. alectrolophus*. The distributional pattern of *A. benjamini* and *A. alectrolophus* almost corresponds to the warm and cold ocean current system around Hokkaido respectively. *P. tarasovi* inhabits in the mixing waters between these ocean currents. In conclusion, *P. tarasovi* is probably distributed discontinuously in the geographic range, which may be caused by the competitive displacement between the related species and/or the environmental factors.

### Acknowledgments

We are grateful to Dr. Alex E. Peden of the British Columbia Provincial Museum and Ms. Ann C. Matarese of the Northwest and Alaska Fisheries Center for reviewing the manuscript. Drs. Kazuhiro Nakaya and Mamoru Yabe kindly gave us helpful advice in the course of the present study. We also thank the following people who researched the ichthyofauna at Usujiri Fisheries Laboratory as the undergraduate theme of the Marine Zoology, Faculty of Fisheries, Hokkaido University and assisted us in collecting the sample: Messrs. Norio Yamamoto, Minoru Ishida, Masashi Natsume, Masahiro Imai, Kazuya Imamura. Our thanks are offered to Dr. Kenji Shimazaki of the Research Institute of North Pacific Fisheries, Faculty of Fisheries, Hokkaido University and Mrs. Miyako Kaneko of the Library, Faculty of Fisheries, Hokkaido University for informing us of geographical data in the Soviet Union.

### References

- Kendall, A.W.Jr., E.H. Ahlstrom, and H.G. Moser. (1984). *Early life history stages of fishes and their characters*. Pages 11-22 in H.G. Moser, W.J. Richards, D.W. Cohen, M.P. Fahay, A.W. Kendall, Jr. and S.L. Richardson, eds. *Ontogeny and systematics of fishes*. Amer. Soc. Ichthyol. Herpetol. Spec. Publ. 1.
- Lindberg, G.U. (1938). On the genera and species of the family Blenniidae (Pisces) related to the genus *Anoplarchus*. *Tr. Gidrobiol. Exsp. ZIN AN 1934 na Yaponskoe More*, 1, 499-514. (In Russian with English summary)
- Lindberg, G.U. and Z.V. Krasnyukova. (1975). Fishes of the Sea of Japan and the adjacent areas of the Okhotsk and Yellow seas. Part 4. Teleostomi. XXIX. Perciformes. 2. Blennioidei-13. Gobioidi (CXLV. Fam. Anarhichadidae-CLXXV. Fam. Periophthalmidae). *Zool. Inst. Akad. Nauk SSSR*, 108, 1-464. (In Russian)
- Makushok, V.M. (1958). The morphology and classification of the northern blennioid fishes (Stichaeidae, Blennioidei, Pisces). *Tr. Zool. Inst. Akad. Nauk SSSR*, 25, 3-129. (In Russian)
- Miki, T. (1985). New genus and species of the family Stichaeidae from Hokkaido, Japan. *Japan. J. Ichthyol.*, 32, 137-142.
- Peden, A.E. (1967). Redescription of a North Pacific prickleback, *Alectridium auranticum*. *J.*

- Fish. Res. Bd. Canada*, **24**, 1-8.
- Pinchuk, V.I. (1974). *Alectridium aurantiacum* Gilbert et Burke from Commander Islands and *Pseudoalectrias tarasovi* (Popov) from Kuril Islands, and an unusual specimen of *Stichaeopsis epallax* (Pisces, Stichaeidae). *Vopr. Ikhtiol.*, **14**, 948-954. (In Russian)
- Popov, A.M. (1933). Ichthyofauna of the Sea of Japan. *Issled. Morey SSSR*, **19**, 139-155. (In Russian with German summary)
- Shiogaki, M. (1985a). A new stichaeid fish of the genus *Alectrias* from Mutsu Bay, northern Japan. *Japan. J. Ichthyol.*, **32**, 305-315.
- Shiogaki, M. (1985b). Life history of the stichaeid fish *Alectrias mutsuensis* in Mutsu Bay, Japan. *Sci. Rep. Aquaculture Cen., Aomori Pref.*, **4**, 11-20. (In Japanese with English abstract)
- Shiogaki, M. and Y. Dotsu. (1972). Life history of the blennioid fish, *Dictyosoma burgeri*. *Bull. Fac. Fish. Nagasaki Univ.*, **33**, 21-38. (In Japanese with English abstract)
- Tokuya, K. and K. Amaoka. (1980). Studies on larval and juvenile blennies in the coastal waters of the southern Hokkaido (Pisces: Blennioidei). *Bull. Fac. Fish. Hokkaido Univ.*, **31**, 16-49. (In Japanese with English abstract)
- Wourms, J.P. and D. Evans. (1974). The embryonic development of the black prickleback, *Xiphister atropurpureus*, a Pacific coast blennioid fish. *Can. J. Zool.*, **52**, 879-887.