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Leptochilichthys microlepis, a New Species of the Family Leptochilichthyidae, Salmoniformes, from Aomori, Northern Japan

Yoshihiko Machida and Masaru Shiogaki

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Abstract A new deep-sea fish, *Leptochilichthys microlepis*, is described based on a single specimen trawled in the Pacific off Aomori Prefecture, northernmost district of Honshu, Japan. This species differs from other members of the genus *Leptochilichthys* in its higher counts of lateral line scales, 64 vs. less than 55, and vertebrae, 58 (35+23) vs. 47–50 (27–30+18–21). A key to the species of the genus is given.

The deep-sea fishes of the family Leptochilichthyidae are very rare and poorly known (Markle and Quéro, 1984). The genus *Leptochilichthys*, the only known member of the family, was established by Garman (1899) for *L. agassizii* based on a single specimen collected from the tropical Pacific off the coast of South America. This species is distributed in the eastern Atlantic between 14°11′N and 50°08′N, and in the eastern Pacific from the equator to 38°24′N (Markle and Quéro, 1984). *L. pinguis*, another member of the genus, was originally described by Vaillant (1888) as *Anomalopterus pinguis* based on a juvenile taken from the Atlantic off Morocco at 1,400 m depth. Sazonov and Ivanov (1980) suggested that this species is widely distributed from off Morocco to South Africa and from the Arabian Sea to the Sulu Sea. Furthermore, a single specimen of this species has been known from the Arafura Sea (Sazonov, pers. comm.). Though the generic name *Anomalopterichthys* was proposed by Whitley (1940) as a substitute name for *Anomalopterus*, Krefft (1978) considered it a junior synonym of the genus *Leptochilichthys*. Nelson (1976, 1984) placed *Leptochilichthys* in the subfamily Leptochilichthyinae of the family Alepocephalidae, while Sazonov and Ivanov (1980) and Markle and Quéro (1984) treated *Leptochilichthys* as a member of the family Leptochilichthyidae. We follow the latter opinion.

In 1980, the Research Vessel Kai-un Maru of the Fisheries Experimental Station of Aomori Prefecture trawled a single specimen of *Leptochilichthys* in the Pacific off the coast of Aomori Prefecture, Japan (Shiogaki, 1982). After comparison with other species by study of the literature, we conclude that this specimen represents a third species of the genus *Leptochilichthys*, which we herein describe as *Leptochilichthys microlepis* sp. nov. A key to the species of the genus is also given in this paper.

Methods of count and measurement followed those of Okamura and Kitajima (1984). Vertebral and vertical fin ray counts were taken from radiographs. Names of muscles of the cheek followed Winterbottom (1974) and Markle (1976).

The present specimen is deposited in the Department of Biology, Faculty of Science, Kochi University (BSKU), by courtesy of the Aquaculture Center of Aomori Prefecture (ACAP).

Leptochilichthys microlepis sp. nov.

(New Japanese name: Oni-iwashi)

(Figs. 1–3)

Leptochilichthys sp.: Shiogaki, 1982: 7 (listed).

Holotype. BSKU 43810, 303 mm SL, female, 40° 54′N, 142°01′E–40°36′N, 142°13′E, Pacific off Aomori Prefecture, northernmost district of Honshu, Japan, 724–726 m, trawled by the R. V. Kai-un Maru of the Fisheries Experimental Station of Aomori Prefecture, 18 May 1980.

Diagnosis. This species is distinguished from other members of the genus *Leptochilichthys* in its higher counts of lateral line scales, 64 vs. less than 55, and vertebrae 58 (35+23) vs. 47–50 (27–30+18–21).

Description. Dorsal fin rays 16; anal fin rays 14; pectoral fin rays 10; pelvic fin rays i, 9; branchiostegal rays 13; gill rakers on first arch 10+

Fig. 1. Lateral aspect of the holotype of *Leptochilichthys microlepis* sp. nov., BSKU 43810, 303 mm SL.

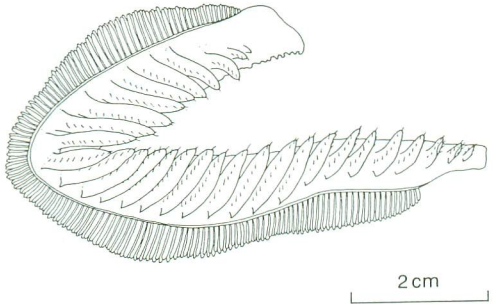

Fig. 2. Lateral aspect of right first gill arch of the holotype of *Leptochilichthys microlepis* sp. nov.

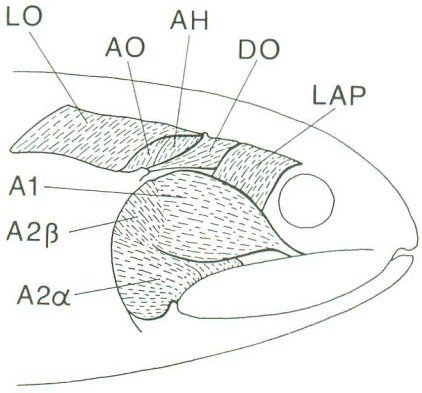

Fig. 3. Semidiagram showing cheek muscle of the holotype of *Leptochilichthys microlepis* sp. nov. A1, A2α and A2β, adductor mandibulae; LAP, levator arcus palatini; DO, dilatator operculi; LO, levator operculi; AH, adductor hyomandibulae; AO, adductor operculi.

20=30; scales above lateral line 8; scales below lateral line 8; pored scales in lateral line 64; pyloric caeca 12; vertebrae 35+23=58.

As % of SL: head length 33.5; body depth 18.5; predorsal length 63.0; preanal length 75.2; prepelvic length 58.1; length of caudal peduncle 14.8; depth of caudal peduncle 7.7; dorsal fin base 15.6; anal fin base 10.7. As % of head length: snout length 22.3; upper jaw length 45.8; lower jaw length 51.4; orbit diameter 12.1; interorbital width 25.2.

Body somewhat elongate and compressed, maximum depth at posterior base of pectoral axil, 5.4 in standard length (Fig. 1). Head large, compressed, 3.0 in standard length. Snout rather round in lateral view, 4.5 in head length. Mouth large, slightly oblique, a deep notch present at symphysis of upper jaw. Maxillary expanded, soft and thin, extending backward 1.5 times the diameter of orbit beyond posterior margin of eye; its lower margin sharp, the upper margin sheathed with membranous subocular bones except anterior one fifth of the length. Lower jaw soft, included in upper jaw, without symphyseal knob. Orbit small, circular, 1.8 in snout length; interorbital space broad, rather convex. Opercular bones soft; operculum thin and membranous, with about ten narrow, weakly thickened radiations directed posteroventrally. Gill opening extremely large, its anterior extremity below anterior margin of eye. Branchiostegal rays weak, slender, 13 on each side; the membranes free from isthmus, extending backward slightly beyond base of pectoral fin. Seven small mucous pores present on each side of interorbital space, arranged in a single row, those on suborbital region eight, 11 in preoperculo-mandibular series. Nostrils indistinct, because upper surface of snout is damaged.

Maxillary and premaxillary toothless. Uniserial, depressible teeth on prevomer and palatine short, needle-like, weakly recurved, regularly spaced like a comb. Teeth on dentary uniserial, shorter and more closely set than those on palatine and prevomer. Basihyal cartilage absent; basibranchial forming a thin, high bony plate bearing tiny papillae on its anterior part.

Gills four, with short filaments; gill rakers on each arch triangular, flat and flexible, bearing three to ten uniserial setae on mid-line of each side. Gill rakers on first arch 10+20=30, longest raker subequal to the diameter of orbit (Fig. 2). Pseudobranchial filaments short, 14 or 15 in each side, the longest about one third the diameter of orbit.

Dorsal fin with 16 rays, situated far posteriorly, behind middle of body length, its base subequal to the length of upper jaw. Longest dorsal ray at middle of the fin base, slightly shorter than one half the length of the fin base. Anal fin with 14 rays, its origin just below base of the last dorsal ray. Pectoral fin with ten rays, damaged but probably small, situated low on side of body; depth of the peduncle subequal to the diameter of orbit. Pelvic fin with nine rays and a splint, small, abdominal, its posterior base below origin of dorsal fin. Caudal fin forked. No adipose fin.

Head scaleless, skin slippery. Short, thin triangular dermal flaps present on head slightly before a vertical from the lower angle of dentary, arranged vertically and in a single row. Several short dermal cirri on anterior half of opercular region. Tiny dermal papillae on lower end of upper jaw. Isthmus scaly, sheathed with branchiostegal membranes. Body completely covered with cycloid, deciduous scales; eight scales both above and below lateral line. Lateral line nearly straight, extending from upper angle of gill opening to bases of middle caudal fin rays; 64 scales in lateral line.

Adductor mandibulae subdivided into sections A1 and A2, the latter further subdivided into A2α and A2β (Fig. 3). Section A1 inserted ligamentously on lateral surface of middle of maxillary; the muscle fibers of the posterior lower half not reaching anterior border of preoperculum, but connected with it by a thin membrane. Section A2 attached broadly on lateral surface of posterior part of maxillary, and indistinctly subdivided into A2α and A2β. Levator arcus palatini (LAP) with broad base, covering about one half the base of dilatator operculi (DO). Levator operculi (LO) well developed, covering the bases of ad-

Table 1. Comparison of characters of three species of the genus *Leptochilichthys*. * Sazonov (personal communication). ** Markle (1976).

Species Author	*L. microlepis* sp. nov. present study	*L. pinguis* Sazonov and Ivanov (1980)	*L. agassizii* Markle (pers. comm.)
Standard length (mm)	303	38.3–243	80–308
In % of SL			
Predorsal length	63.0	52.7–67.2	62.5–67.1
Preanal length	75.2	65.8–75.5	72.5–78.8
Dorsal fin base	15.6	18.0–22.2	(11.8–13.2)**
Head length	33.5	29.2+–46.6	36.8–43.2
Snout length	7.5	6.1–10.5	6.9– 8.4
Orbit diameter	4.1	4.4– 7.8	8.2– 9.6
Upper jaw length	15.3	16.1–22.7	21.1–24.1
Lower jaw length	17.2	16.9–25.0	21.9–28.6
Interorbital width	8.4	5.0– 6.6	5.2– 7.3
Counts			
Dorsal rays	16	16–21	11–15
Anal rays	14	14–18	11–13
Scales above lateral line	8	5–7	((4)–5)**
Scales below lateral line	8	6–7	((5)–6)**
Scales in lateral line	64	53–55	47–ca. 52
Pyloric caeca	12	8	10–13
Vertebrae	35+23=58	(29+21=50)*	27–30+18–21=47–50

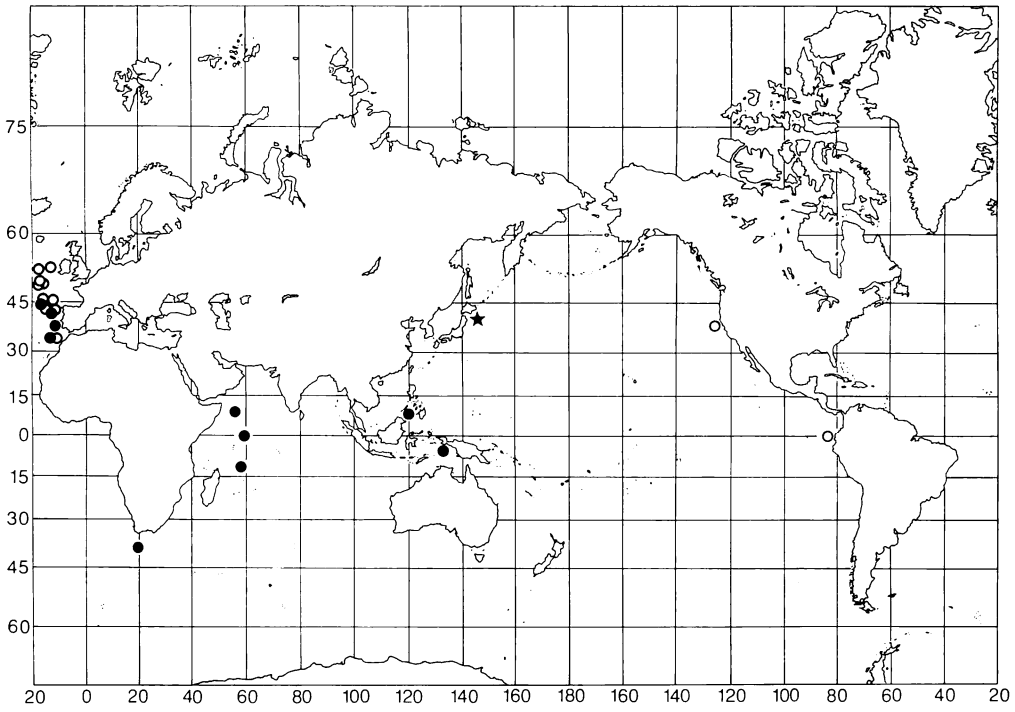

Fig. 4. Distribution of three species of the genus *Leptochilichthys*. Solid star, *L. microlepis* sp. nov.; open circle, *L. agassizii*; solid circle, *L. pinguis*.

ductor hyomandibulae (AH) and adductor operculi (AO).

Stomach large, U-shaped. Pyloric caeca 12, long, the longest about 2.5 in head length. Swim bladder absent. Abdominal vertebrae 35, more numerous than caudal vertebrae (23).

Coloration: In alcohol, body and fins uniformly chocolate brown, scale pockets much darker. Opercular regions and inside of mouth cavity black with purplish reflection; skin on top of head, snout and jaws largely peeled off, but probably lighter than opercular coloration. Peritoneum faintly brownish.

Etymology. This species is named *microlepis* in reference to its small scales on the body.

Distribution. Known only from the Pacific off the coast of Aomori Prefecture, northernmost district of Honshu, Japan, in 724–726 m (Fig. 4).

Remarks. The present new species fits into the genus *Leptochilichthys* of the family Leptochilichthyidae by the following characters: maxillary expanded; teeth absent from premaxillary and maxillary, but present on prevomer, palatine and dentary; basihyal absent; basibranchial toothplate with a high bony ridge; and adductor mandibulae subdivided into sections A1 and A2, the latter further subdivided into A2α and A2β (Markle, 1976).

Some selected proportional dimensions and meristic counts of the three species of *Leptochilichthys* are given in Table 1. *L. microlepis* is more closely similar to *L. pinguis* than to *L. agassizii* in counts of both dorsal and anal fin rays, and in the scale counts both above and below the lateral line. On the other hand, *L. microlepis* agrees with *L. agassizii* in the count of pyloric caeca. It is difficult to distinguish *L. microlepis* from its congeners based on these closely similar meristic counts, because *L. microlepis* is represented only by the holotype. *L. microlepis*, however, clearly differs from them in its higher counts of scales in the lateral line and vertebrae.

Sazonov and Ivanov (1980) and Markle and Quéro (1984) regarded the origin of the anal fin as an important discriminative character between the two previously described species of *Leptochilichthys*. For *L. pinguis*, Sazonov and Ivanov (1980) showed that the anal fin originates below the posterior one third of the dorsal fin base,

while Markle and Quéro showed that it inserts below the middle of the dorsal fin base. We examined a radiograph of the holotype of *Anomalopterus pinguis* and confirmed that the anal fin originates below the base of the 11th ray of the dorsal fin which consists of 17 rays. On the other hand, the anal fin originates behind the dorsal fin base in *L. agassizii* (Sazonov and Ivanov, 1980; Markle and Quéro, 1984). Judging from the data on proportional dimensions of the predorsal, preanal and dorsal fin base in *L. pinguis* and *L. agassizii*, the difference between the two species in the position of the anal fin origin is related largely to differences in the relative length of the dorsal fin base. The holotype of *L. microlepis* has the anal fin origin just below the posterior end of the dorsal fin base, the proportional dimension of which is intermediate between those of the other two species. Because of the slight differences in proportional dimensions of the dorsal fin bases between *L. microlepis* and other species, the position of the anal fin origin relative to the dorsal fin base cannot be considered an important discriminative character for *L. microlepis*.

In the Pacific Ocean, *L. agassizii* is known from off the west coasts of the Americas, while *L. pinguis* from the western tropical Pacific (Fig. 4). *L. microlepis* is likely to appear in the waters of high latitudes in the western Pacific Ocean. *L. agassizii* is bathypelagic at 2,000–3,000 m, on the other hand, *L. pinguis* is mesopelagic at 800–1,400 m and adults possibly benthopelagic (Markle and Quéro, 1984). Bathymetric range of *L. microlepis* seems to be about the same as *L. pinguis*.

Key to the species of *Leptochilichthys*

A_1 Scales in lateral line 64; vertebrae 58 (35+23)..... *L. microlepis* sp. nov.

A_2 Scales in lateral line 47–55; vertebrae 47–50 (27–30+18–21)..... B

B_1 Dorsal fin rays 11–15; anal fin rays 11–13 ..... *L. agassizii* Garman

B_2 Dorsal fin rays 16–21; anal fin rays 14–18 ..... *L. pinguis* (Vaillant)

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(YM: Department of Biology, Faculty of Science, Kochi University, 2–5–1 Akebono, Kochi 780, Japan; MS: Aquaculture Center of Aomori Prefecture, Moura, Hiranai, Aomori Pref. 039–34, Japan)

青森県沖の太平洋から得られたオニイワシ科（新称）の1新種

町田吉彦・塩垣　優

青森県沖の太平洋の水深 724–726 m から，1 個体のオニイワシ属（新称）魚類がトロールで採集された．本種は側線鱗数が 64 枚（既知種では 55 枚以下），脊椎骨数が 35＋23＝58 個（27－30＋18－21＝47－50 個）と多いことで既知種と区別されたので，新種 *Leptochilichthys microlepis* オニイワシとして記載し，本属の種の検索表を提示した．既知種では背鰭基底に対する臀鰭始部の相対位置が異なり，重要な分類形質とされている．本模式標本の臀鰭始部は背鰭基底の後端下にあり，既知種とわずかに異なっているが，測定値の差が僅少であり，この形質で本種を既知種と区別するのは困難である．太平洋では *L. agassizii* がアメリカの赤道域から北緯 38° にかけて，また，*L. pinguis* が西部熱帯域から知られている．本種は西部太平洋域において後者より北方に産し，後者の生息水深（800–1,400 m）とほぼ同様の深度に生息しているのかもしれない．

(町田：780 高知市曙町 2–5–1 高知大学理学部生物学教室；塩垣：039–34 青森県東津軽郡平内町大字茂浦　青森県水産増殖センター)