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Neolumpenus unocellatus, a New Genus and Species of Stichaeid Fish from Japan

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Abstract *Neolumpenus unocellatus* gen. et sp. nov., a stichaeid fish (subfamily Lumpeninae, *sensu* Makushok, 1958) is described on the basis of a single specimen found in the stomach of the Pacific cod, *Gadus macrocephalus* Tilesius, caught off Akkeshi, Hokkaido, Japan. The new genus and species is distinguished from all other lumpenines in having the following combination of characters: 1) 51 dorsal spines, 33 anal fin rays, 57 total vertebrae; 2) broad pelvic fin with deeply-branched soft rays; 3) lower rays of pectoral fin branched and not prolonged backward; 4) prevomerine and palatine teeth present; 5) pungent spines present in pelvic and anal fins; 6) upper lip fused to snout anteriorly; 7) gill openings not extending forward beyond a vertical through posterior margin of eye; 8) minimal (fifth) hypural present; 9) first interneural spine inserted between first and second neural spines; 10) extremely large cephalic sensory pores present; 11) high, steep snout; 12) ocellus on dorsal base of caudal fin.

During research into the food habits of the Pacific cod, *Gadus macrocephalus*, by the Hokkaido Regional Fisheries Research Laboratory, a single specimen of an undescribed stichaeid fish was found in the cardiac portion of the stomach of a Pacific cod trawled by TS Tanshu Maru, at depths between 106 and 107 m off Akkeshi, Pacific coast of Hokkaido, Japan. Following Makushok (1958), the species fits in subfamily Lumpeninae, and is here described as a new genus and species, *Neolumpenus unocellatus*.

Materials and methods

Institutional abbreviations of the holotype and the comparative material follow Leviton et al. (1985). Vertebrae and vertical fins were observed and counted from a radiograph. Paired fins were counted on the left side. Vertebral counts include the urostyle. The caudal fin ray count follows Yatsu (1981). Measurements follow Hubbs and Lagler (1958) except for the following additions: body depth was measured at the origin of dorsal fin; each length of pectoral and pelvic fins was measured in the longest ray. The count of cephalic sensory pores follows Makushok (1958) and their terms are abbreviated as follows: NP, nasal pores; IOP, interorbital pore; POBP, postorbital pore; POP, preopercular pores; IP, infraorbital pore; OCP, occipital pore; MP, mandibular pore.

Comparative material. *Lumpenus fabricii*: HUMZ 84892, 131.5 mm SL, 57°57.99′-58°00.16′N, 165°40.58′-40.02′W, eastern Bering Sea, 53 m deep, 11 July 1979. *Lumpenus sagitta*: HUMZ 93029, 144.7 mm SL, off Riruran, Kushiro, Hokkaido, Japan, 55 m deep, 18 Aug. 1981. *Lumpenus lampretaeformis*: BMNH 1970-10-9, 1-12, 127.8 mm SL, Kish and Bennet Banks, Dublin Bay, W. Irish Sea, 7 Oct. 1970. *Leptoclinus maculatus*: HUMZ 56449, 131.0 mm SL; *Anisarchus medius*: HUMZ 56453, 127.4 mm SL, 61°01′N, 158°17′E, Gizhiga Bay, Okhotsk Sea, 94-95 m deep, 7 June 1976. *Anisarchus macrops*: HUMZ 65786, 131.2 mm SL, 37°29.5′N, 136°11′E, off Ishikawa Pref., Japan Sea, 292-304 m deep, 7 June 1977. *Acantholumpenus mackayi*: HUMZ 93445, 131.8 mm SL, Nemuro Bay, Hokkaido, Japan, 31 July 1981. *Lumpenella longirostris*: HUMZ 99700, 125.8 mm SL, Uchiura Bay, Hokkiado, Japan, 24 Aug. 1983. *Poroclinus rothrocki*: BCPM 979-11304, 4 specimens, 110.5-156.8 mm SL, 48°42.3′N, 123°30′W, Satellite Channel, British Columbia, Canada; HUMZ 102587, 163.9 mm SL, 54°16.35′-16.03′N, 164°02.58′-00.13′W, Gulf of Alaska, 70 m deep, 18 July 1984.

Neolumpenus gen. nov.

(New Japanese name: Montsuki-gaji-zoku)

Type species. *Neolumpenus unocellatus* sp. nov.

Diagnosis. Snout high and almost vertically steep. Some cephalic sensory pores large, almost equal to half of pupil diameter (posterior nasal, interorbital and postorbital pores). Large pelvic

fin (47.8% of head length) with 3 deeply branched rays and a pungent spine. Lower rays of pectoral fin branched and not prolonged backward. Anal spines pungent. Upper lip fused to snout anteriorly and overhanging lower lip. Anterior end of gill openings not extending forward beyond a vertical through posterior margin of eye. First dorsal pterygiophore inserted between first and second neural spines. Minimal (fifth) hypural present.

Description. See species description.

Etymology. The generic name is the combination of the Greek, *neo* (meaning "new"), and the Latinized Danish, *lumpenus* (type genus of the subfamily Lumpeninae).

Remarks. The new form designated here as *Neolumpenus* gen. nov. is included in the subfamily Lumpeninae in having the following characters that Makushok (1958) gave in his key to subfamilies and genera of Stichaeidae: ossified canals of body lateral line absent; cephalic dermal appendages absent; pectoral fin well developed and larger than one half head length; pelvic fin with one spine and three soft rays; gill openings continued forward at the isthmus and gill membranes never form a wide free fold across the isthmus; last dorsal pterygiophore supports a single spine (Fig. 1).

Makushok (1958) recognized 6 genera in his Lumpeninae and suggested there were two subgroups in the subfamily, though these subgroups were not given taxonomic ranks. One subgroup comprised *Lumpenus*, *Leptoclinus* and *Anisarchus* which were characterized by the presence of weakly developed spines in the anal and pelvic fins (see Fig. 2B, F). Another subgroup comprised *Acantholumpenus*, *Lumpenella* and *Poroclinus* which were characterized by the presence of pungent spines in the anal and pelvic fins, though the condition of characters was not necessarily identical (see Fig. 2C, D, G, H). Additionally, Makushok (1958) used the following characters as diagnostic for lumpenine genera: the presence or absence of the prevomerine and palatine teeth; the condition of the lower pectoral fin rays; the position of the first dorsal pterygiophore; the presence or absence of the minimal hypural; the position of the anterior end of the gill openings; the degree of squamation of the head; the number of mandibular pores.

Taking the above characters into consideration, we compared the new form with all known genera

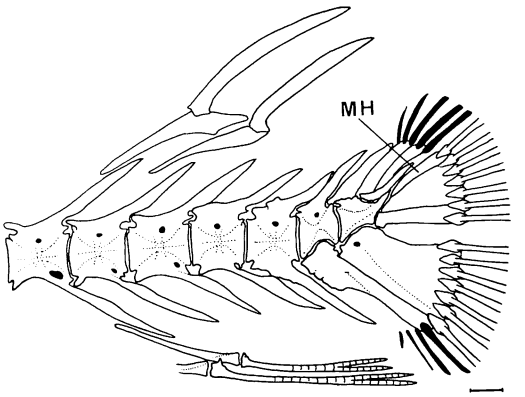

Fig. 1. Caudal skeleton and neighboring vertical fin rays of *Neolumpenus unocellatus* gen. et sp. nov. based on the radiograph of the holotype. Caudal procurrent rays are shown in solid black. Minimal hypural is abbreviated as MH. Scale indicates 1 mm.

of the Lumpeninae and added several characters we observed (Table 1, Figs. 2, 3). The new form has the lowest meristic values in the Lumpeninae and possesses a single mandibular pore, characters similar to those of *Anisarchus*. Compared to other genera, the branching pattern of the pelvic fin rays is unique in the new form. Makushok (1958) described the pelvic fin rays of lumpenines to be very shallowly branched if at all (Makushok, 1958: fig. 26), though his data excluded *Poroclinus*. The new form, however, has deeply branched rays in the pelvic fins and *Poroclinus* examined by us shows an intermediate condition between the new form and the remaining 5 genera of lumpenines (Fig. 2A–D). Other fin structures of the new form are relatively similar to the *Poroclinus* subgroup of Makushok (1958) in having pungent pelvic and anal spines, though the spines of the new form are not so stout as *Acantholumpenus* and *Lumpenella*. The anal spines of the new form differ from those of *Poroclinus* in that each anal spine of the new form and all other lumpenines except *Poroclinus* is independently supported by a pterygiophore. In *Poroclinus*, the first weak and the second pungent spines are supported by a single, common pterygiophore. Among features of the head, teeth and a few internal characters, the new form is similar to *Leptoclinus* which differs from the new form in the fin structures mentioned above (Table 1). As for the uniqueness of the new form, the high, steep snout and extremely large posterior

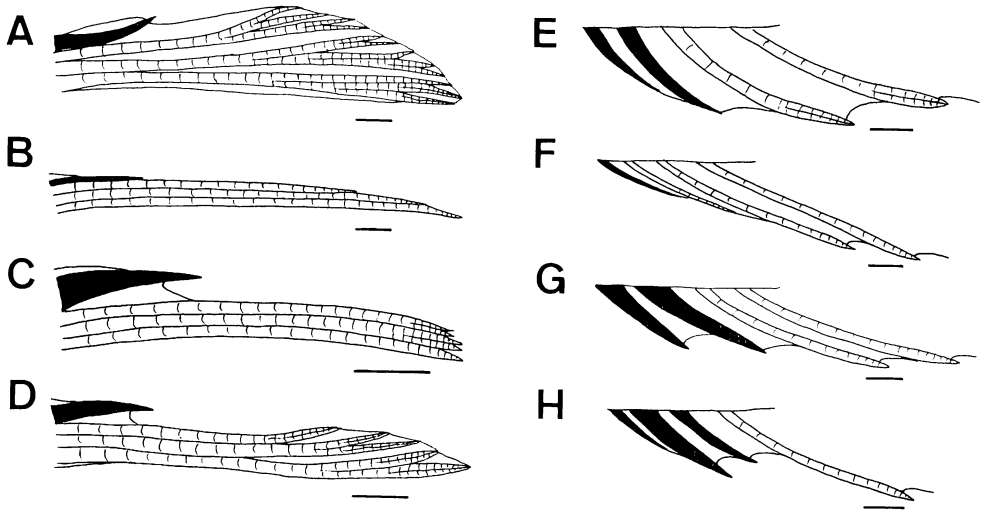

Fig. 2. Left pelvic fin and anterior 4 rays of anal fin. A, E, *Neolumpenus unocellatus* gen. et sp. nov., holotype, HUMZ 103749, 131.5 mm SL; B, F, *Leptoclinus maculatus*, HUMZ 56449, 131.0 mm SL; C, G, *Acantholumpenus mackayi*, HUMZ 93445, 131.8 mm SL; D, H, *Poroclinus rothrocki*, BCPM 979-11304, 123.8 mm SL. Scales indicate 1 mm.

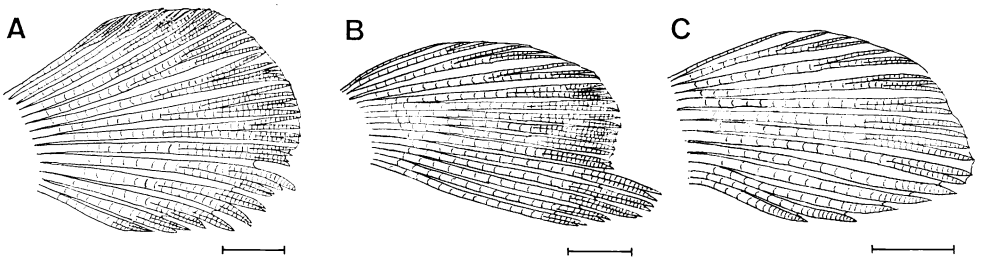

Fig. 3. Pectoral fin showing the shape and branching pattern of rays. A, *Neolumpenus unocellatus* gen. et sp. nov., holotype, HUMZ 103749, 131.5 mm SL; B, *Leptoclinus maculatus*, HUMZ 56449, 131.0 mm SL; C, *Anisarchus macrops*, HUMZ 65786, 131.2 mm SL. Scales indicate 5 mm.

nasal, interorbital and postorbital pores (as large as half pupil) are notable for a lumpenine, because the snout of all known genera is usually pointed or otherwise short and rounded, and the cephalic pores of all known genera are usually rather small (distinctly smaller than half pupil) and sometimes transformed into invisible short tubular openings.

Judging from the differences and discordance of characters between the new form and all other lumpenines, a new genus, *Neolumpenus*, is warranted for this new form.

Neolumpenus unocellatus sp. nov.

(New Japanese name: Montsuki-gaji)
(Figs. 1, 2A, E, 3A, 4–6)

Holotype. HUMZ 103749, 131.5 mm SL, female, found in the stomach of *Gadus macrocephalus* collected at 42°49.6′N, 144°53.5′E, off Akkeshi, Hokkaido, Japan, depths between 106–107 m, 9 May 1984.

Diagnosis. The caudal ocellus is useful for the identification of the species.

Description. Meristics: Dorsal fin rays LI; anal fin rays II, 31; pectoral fin rays 14; pelvic fin rays I, 3; caudal fin rays 5+7+7+4; vertebrae 21+36=57. Cephalic sensory pores: NP 2; IOP 1; POBP 1; IP 0; OCP 0; POP 4; MP 1.

Measurements: Preanal length 47.5% of standard length (253.0% of head length); predorsal length 17.5 (93.1); length of dorsal fin base 80.9 (430.8); length of anal fin base 48.7 (259.1); head length 18.8 (100.0); body depth 10.7 (57.1); depth of caudal peduncle 4.9 (26.3); length of pectoral fin 16.4 (87.4); length of pelvic fin 9.0 (47.8); length of caudal fin 13.3 (70.9); snout length 5.8 (30.8);

Table 1. Comparison of selected characters between *Neolumpenus* gen. nov. and 6 genera in Lumpeninae. Meristic counts of 6 known genera are inferred from the data of Jensen (1944), Matsubara and Ochiai (1952), Andriashev (1954), Makushok (1958), Leim and Scott (1966), Hart (1973), Lindberg and Krasyukova (1975) and the comparative material (in the asterisk).

	Neolumpenus	*Lumpenus*	*Leptoclinus*	*Anisarchus*	*Acantholumpenus*	*Lumpenella*	*Poroclinus*
Number of species	1	3	1	2	1	1	1
Counts:							
Dorsal spines	LI	LXI–LXXXV	LVII–LXIV	LII–LXV	LXVIII–LXXV	LXI–LXXI	LVII–LXVII
Total anal rays	33	40–62	35–42	33–43	43–49	39–47	42–47
Total vertebrae	57	70–85	66–72	60–70	76–80	71–76	65–68*
Mandibular sensory pores	1	2	2	1	2	2	3
Fin structures:							
Pelvic spine	pungent	weak	weak	weak	stout pungent	stout pungent	pungent
Pelvic rays	deeply branched	almost simple	almost simple	almost simple	almost simple	almost simple	tips branched
Anal spines	pungent	weak	weak	weak	stout pungent	stout pungent	weak plus pungent
Prolonged rays of lower pectoral fin	absent	absent	present	absent	absent	absent	absent
Thick simple rays of lower pectoral fin	absent	absent or present	absent	present	absent	usually present	absent
Other features:							
Anterior lip fused to, or protractile from snout	fused	protractile	fused	protractile	fused	fused	fused
Scaled area on head	almost cheek	almost cheek	almost cheek	anterior cheek	almost cheek	almost head	almost cheek
Anterior end of gill opening	behind eye	behind eye	behind eye	below eye	behind eye	below eye	behind eye
Prevomerine teeth	present	absent	present	absent	absent	absent	present
Palatine teeth	present	present or absent	present	present	present	absent	present
First dorsal pterygiophore to neural spines (NS)	1–2 NS	2–3 NS	1–2 NS	2–3 NS	2–3 NS	2–3 NS	2–3 or 3–4 NS
Minimal hypural	present	absent	present	absent	absent	absent	present

Fig. 4. *Neolumpenus unocellatus* gen. et sp. nov., holotype, HUMZ 103749, female, 131.5 mm SL.

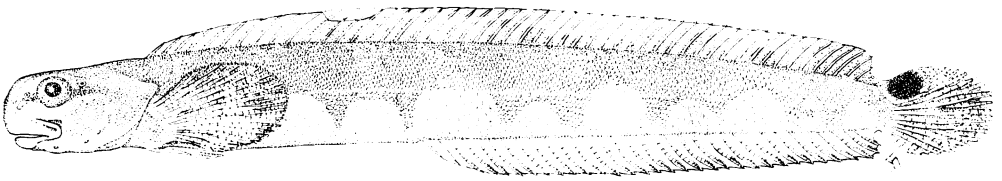

Fig. 5. Lateral view of *Neolumpenus unocellatus* gen. et sp. nov., holotype, restored to the original state.

length of upper jaw 6.7 (35.6); eye diameter 3.7 (19.4); interorbital width 1.3 (6.9); postorbital length of head 10.6 (56.3); length of dorsal spine 6.3 (33.6); length of anal soft ray 6.4 (34.0).

Body subcylindrical anteriorly and compressed posteriorly. Head relatively large and blunt anteriorly. Snout long, high, swollen and very steep, its dorsal profile acutely curved downward above nasal tube. Lips fleshy; upper lip fused to snout anteriorly, and overhanging lower lip; anterior half of lower lip somewhat broad (Fig. 6). Posterior end of upper jaw not reaching a vertical through posterior margin of eye. Anterior nostril in a form of single short tube, its length about half of pupil diameter; posterior nostril absent. Eye small and lacking dermal rim around eye; its diameter shorter than snout length. Infraorbital area wide, its width about half of eye diameter. Interorbital space slightly convex, its external width almost equal to eye diameter, but the narrowest width of frontals shorter than half of eye diameter. Gill openings continued forward at isthmus; anterior end not reaching a vertical through posterior margin of eye (Fig. 6). Gill membranes united, but not forming a wide free fold across isthmus. Posterodorsal margin of gill cover separated from temporal region, and never forming a dermal siphon.

Dorsal fin spines slender and rigid. Dorsal fin spines gradually increase in height to about 10th spine, the remaining almost equal in height except for last two short spines. Membranes between dorsal spines not incised except for a notch between dorsal and caudal fins, and narrowly connected with caudal fin. Anal fin with 2 pungent spines, and longer and slightly branched soft rays. Membranes between anal fin rays not incised and very narrowly connected with caudal fin. Pectoral fin ovoid, composed of branched rays; lower 5 rays less branched and broader than upper 9 rays; membranes between lower 5 rays slightly incised (Fig. 3A). Pelvic fin relatively large and slightly fan-shaped; pelvic spine pungent and easily distinguishable from soft rays; soft rays deeply branched, inner ray longer than outer ray (Fig. 2A). Caudal fin ovoid, and principal rays deeply branched. First dorsal pterygiophore inserted between first and second neural spines. Last dorsal pterygiophore supporting single spine; last anal pterygiophore supporting two rays; minimal (fifth) hypural present (Fig. 1).

Scales on body minute, elliptically cycloid, and overlapping; scales extend anteriorly onto nape. Scales on head slightly smaller than body scales, and restricted almost on cheek (Fig. 6). Scales not extending onto fins excepting bases of pectoral and caudal fins.

Cephalic sensory canals with large pores (Fig. 6): posterior nasal, interorbital and postorbital pores larger than others, and about half of pupil in diameter; anterior nasal pore about half diameter of posterior pore; single mandibular pore present below posterior end of mouth cleft. Series of free pit organs (free neuromasts) present

on head but generally not observable due to the state of preservation. Lateral line not forming ossified canals, but present in a series of free pit organs indistinctly running in straight line at mid-body.

Teeth on upper jaw slender, conical; outer, larger teeth arranged in a single row and more enlarged anteriorly; inner, smaller teeth restricted anteriorly. Teeth on lower jaw slender, conical in an irregular single row, but forming narrow band near symphysis; some anterior teeth directed somewhat outwardly. Prevomer and palatine with small conical teeth; prevomerine teeth forming small patch; palatine teeth arranged in a single row.

Coloration. In alcohol, dorsolateral side of head and body brown. Ventrolateral side of body with a series of irregular large white blotches. Dorsal margin of body dark. Ventral side of head and belly silverly white. Dark, narrow band horizontally crossing eye. Dorsal fin light brown. Anal and pelvic fins white. Upper half of pectoral fin slightly pigmented along the rays; lower half of pectoral fin almost white. Caudal fin light brown, with a solid black ocellus near dorsal base; ocellus margin white.

Distribution. Off Pacific coast of eastern Hokkaido, Japan. The distribution and habitat of the new species are considered to be on or near fishing grounds of the Pacific cod, since our specimen was in a fresh state in spite of it being found in a stomach.

Etymology. The specific name is the combination of the Latin, *uno* (meaning "one") and *ocellatus* (meaning "spotted as with eye"), which refers to the black marking on the caudal fin.

Remarks. The caudal ocellus of *Neolumpenus unocellatus* is rare among stichaeids. *Plectobranchus evides* and *Poroclinus rothrocki* possess the similar marking on the caudal fin. However the marking of *Plectobranchus evides* is very small and sometimes lost (Hart, 1973), and the marking of *Poroclinus rothrocki*, similar in the size and position, is not so conspicuous (light brown, the same as the vertical bands on body) as the ocellus of *Neolumpenus unocellatus*. As Norman and Greenwood (1963) mentioned the placement of such a coloration, it may suggest the hypothesis that the ocellus imitates an eye to confuse a predator about which is the head end of the prey and in which direction the prey will flee.

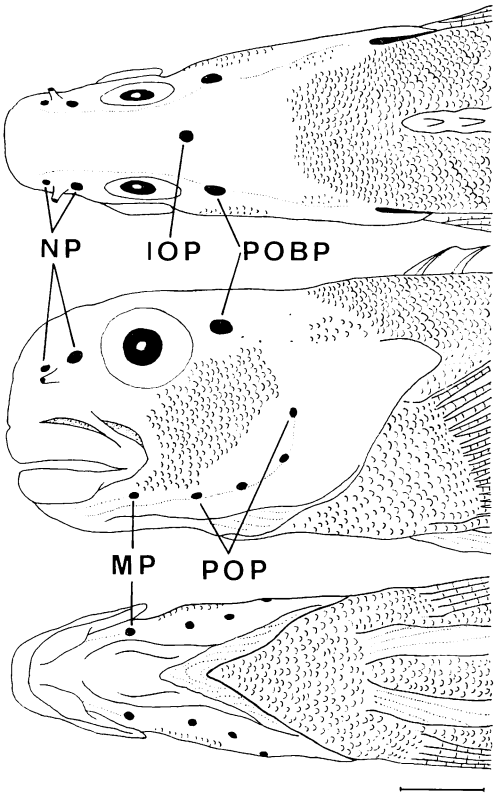

Fig. 6. Dorsal, lateral and ventral views of head in *Neolumpenus unocellatus* gen. et sp. nov. based on the holotype. Scale indicates 5 mm. NP, nasal pores; IOP, interorbital pore; POBP, postorbital pore; POP, preopercular pores; MP, mandibular pore.

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Literature cited

Andriashev, A. P. 1954. Fishes of the northern seas of the U.S.S.R. Zool. Inst. Akad. Nauk SSSR, 53, 566 pp. (In Russian.)

Hart, J. L. 1973. Pacific fishes of Canada. Fish. Res. Bd. Can., Bull. 180, ix+741 pp., 8 pls.

Hubbs, C. L. and K. F. Lagler. 1958. Fishes of the Great Lakes region. Bull. Cranbrook Inst. Sci., 26, xi+213 pp., 44 pls.

Jensen, Ad. S. 1944. Contributions to the ichthyofauna of Greenland. 4–7: 5. The Greenland species of the genus *Lumpenus*. Spolia Zool. Mus. Haun., 4(5): 31–35, pls. 4–5.

Leim, A. H. and W. B. Scott. 1966. Fishes of the Atlantic coast of Canada. Fish. Res. Bd. Can., Bull. 155, 485 pp.

Leviton, A. E., R. H. Gibbs, Jr., E. Heal and C. E. Dawson. 1985. Standards in herpetology and ichthyology: Part 1. Standard symbolic codes for institutional resource collections in herpetology and ichthyology. Copeia, 1985(3): 802–832.

Lindberg, G. U. and Z. V. Krasyukova. 1975. Fishes of the Japan Sea and the adjacent areas of the Okhotsk and Yellow seas. Part 4. Teleostomi. XXIX. Perciformes. 2. Blennioidei-13. Gobioidei (CXLV. Fam. Anarhichadidae-CLXXV. Fam. Periophthalmidae). Zool. Inst. Akad. Nauk SSSR, 108, 464 pp. (In Russian.)

Makushok, V. M. 1958. The morphology and classification of the northern blennioid fishes (Stichaeoidae, Blennioidei, Pisces). Trud. Zool. Inst. Akad. Nauk SSSR, 25: 3–129. (In Russian.)

Matsubara, K. and A. Ochiai. 1952. Two new blennioid fishes from Japan. Japan. J. Ichthyol., 2(4/5): 206–213.

Norman, J. R. and P. H. Greenwood. 1963. A history of fishes. Ernest Benn Ltd., London, xxxi+398 pp.

Yatsu, A. 1981. A revision of the gunnel family Pholididae (Pisces, Blennioidei). Bull. Natn. Sci. Mus. Tokyo, Ser. A, 7(4): 165–190.

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北海道厚岸沖より得られたタウエガジ科の1新属新種モンツキガジ

三木　徹・金丸信一・尼岡邦夫

北海道厚岸沖より得られたマダラの胃内容物を調査中に1個体のタウエガジ科魚類を発見し，新属新種 *Neolumpenus unocellatus* モンツキガジとして記載した．本種は比較的大きな胸鰭と1棘3軟条の腹鰭を持つこと，体側に骨質状の側線管を持たないこと，眼下感覚管孔が無いこと，左右の鰓膜が峡部から幅広く離れる一皮褶を形成しないことなどにより ウナギガジ亜科に含められる．さらに，深く分枝した腹鰭軟状を持つこと，腹鰭および臀鰭の棘が堅固であること，胸鰭下部軟条が後方に伸長しないこと，鋤骨および口蓋骨に歯が存在すること，鰓孔の前端が眼の後縁下に達しないこと，瞳孔の約 1/2 程度の非常に大きな頭部感覚管孔を持つこと，吻が鈍く，その外郭は険しいこと，尾鰭基底部の背方に1個の眼状斑を有することなどにより，本種は同亜科内の既存の属および種と明瞭に識別される．

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