Japanese Journal of Ichthyology
Vol. 39, No. 4 1993

魚類学雑誌
39巻4号 1993年

Callionymus leucopoecilus, a New Dragonet (Callionymidae) from the Yellow Sea

Ronald Fricke[1] and Chung-Lyul Lee[2]

[1] Staatliches Museum für Naturkunde
Schloss Rosenstein, Rosenstein 1, D-7000 Stuttgart 1, Federal Republic of Germany
[2] Department of Biology, Kunsan National University
68 Miryong-dong, Kunsan-shi, Chollabuk-do, Kunsan 573–360, Korea

Abstract *Callionymus leucopoecilus*, a new species of dragonet from the Yellow Sea, is described and illustrated. The new species is characterized by 4 spines in the first dorsal fin, 9 rays each in the second dorsal and anal fins, ii, 5, ii principal caudal fin rays, a preopercular spine formula of $^{1}\frac{3-4}{-}{}^{1}$, an interspace between the dorsal fin bases which is about equal to the first dorsal fin base length, the upper part of the pectoral fin base dark brown, and a low first dorsal fin without filaments in both sexes. *Callionymus leucopoecilus* is compared with the closely allied species *C. planus* Ochiai, 1955 from Japan, and *C. olidus* Günther, 1873 from the coasts of China and Korea.

The identity of the two nominal species *Callionymus sagitta* Pallas, 1770 and *C. macdonaldi* Ogilby, 1911, which were recently synonymized, is reconsidered. The two species are treated as separate, but closely allied species on the basis of five distinguishing characters.

The Indo-Pacific dragonets of the family Callionymidae were revised by Fricke (1983). He distinguished a total of 4 species from the Yellow Sea (*Callionymus beniteguri*, *C. lunatus*, *C. ornatipinnis*, *Draculo mirabilis*). Nakabo and Jeon (1985) found a fifth species, *Callionymus olidus*, to occur in a river mouth of the Korean part of the Yellow Sea. Nakabo et al. (1991) recorded *Callionymus sagitta* from Korean waters. In 1989, another dragonet species was found in Korean waters, co-occurring with *C. sagitta*, which was hitherto unknown to science, though once described by Chang (1966) from the East China Sea under the name *Callionymus kitaharae* (which is otherwise a synonym of *C. huguenini* Bleeker). The new species is described in the present paper.

Methods used in the present paper follow Fricke (1983). Standard length is abbreviated "SL." The type materials are deposited in the Kunsan National University, Department of Biology (BKNU), and in the Staatliches Museum für Naturkunde in Stuttgart (SMNS).

Callionymus (*Callionymus*) *leucopoecilus* sp. nov.
(Korean name: Hwenjom-Yangtae)
(Fig. 1)

Callionymus kitaharae (non Jordan et Seale, 1906): Chang, 1966: 181–182, fig. 115 (East China Sea).

Holotype. SMNS 10100, male, 84.1 mm SL, Korea, Uen-dong, Kunsan-shi, Chollabuk-do, 35°51′N 126°40′E, Lee Chung-Lyul, 10 Oct. 1989.

Paratype. BKNU 331, female, 78.7 mm SL, with the same data as the holotype.

Diagnosis. A *Callionymus* of the subgenus *Callionymus* with 4 spines in the first dorsal fin, 9 rays in the second dorsal and anal fins, 20–21 pectoral fin rays, a preopercular spine formula $^{1}\frac{3-4}{-}{}^{1}$, principal caudal fin rays ii, 5, ii, dorsal fin base length 0.9–1.2 in interspace between first and second dorsal fins, 0.9–1.1 in length of first dorsal spine, anal fin membranes in males with large dusky areas, and upper part of pectoral fin base dark brown.

Description. D_1 IV; D_2 vii, 1; A viii, 1; P_1 i, 18–19, i (totally: 20–21); P_2 I, 5; C ii, 5, ii, (ii). For meristic data expressed as hundredths of SL, see Table 1.

Body elongate and depressed. Head depressed, 4.1 (4.2) in SL. Body depth 7.1 (7.3) in SL. Body width 4.6 (4.7) in SL. Eye diameter 3.7 (3.6) in head. Preorbital length 3.6 (3.0) in head. Interorbital distance 10.5 (9.3) in head. Branchial opening dorsal in position. Occipital region smooth. Preopercular spine length 5.4 (4.4) in head; preopercular spine with an upcurved main tip, a straight or slightly

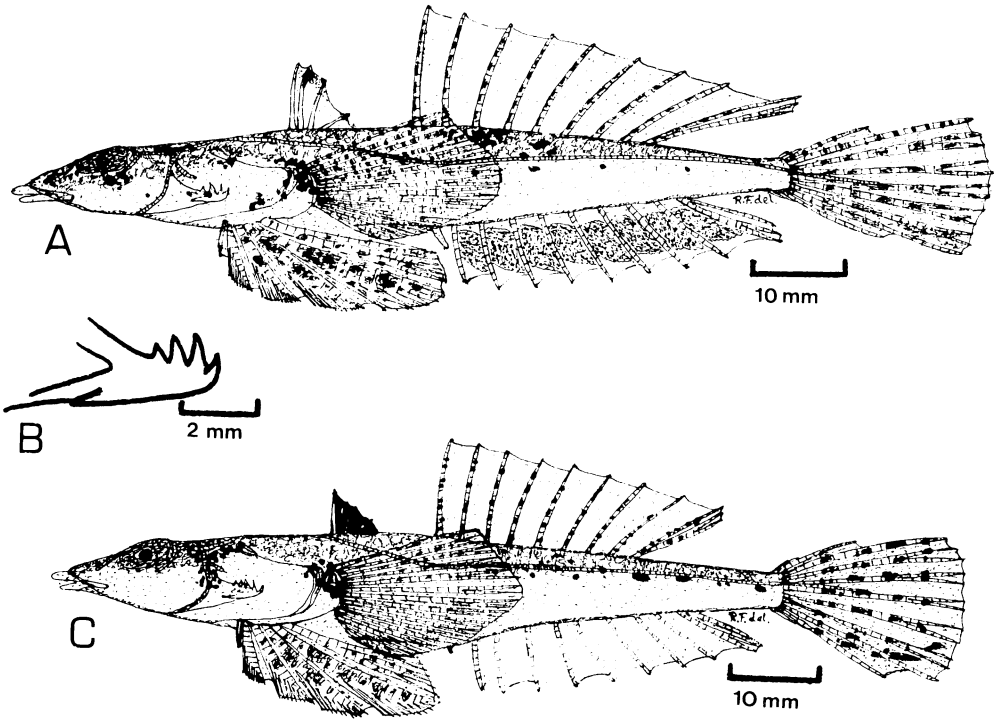

Fig. 1. *Callionymus leucopoecilus* sp. nov., SMNS 10100, holotype, male, 84.1 mm SL. A, lateral view; B, left preopercular spine. BKNU 331, paratype, female, 78.7 mm SL; C, lateral view.

convex ventral margin, an antrorse spine at its base and three to four curved points at its dorsal margin (formula: $^{1}\frac{3\text{-}4}{-}{}^{1}$; see Fig. 1B). Urogenital papilla elongate in the male, 7.5 in head; shorter in the female, 3.9 in head. Lateral line reaching from preorbital region to mid of third branched caudal fin ray (counted from above), with an interconnection each across the occipital region and across the dorsal part of the caudal peduncle; cephalic lateral line with a subocular branch and a divided preoperculomandibular branch. Caudal peduncle length 7.5 (7.4) in SL; caudal peduncle depth 22.4 (20.5) in SL.

First dorsal fin low, without filaments. First spine in the male 11.7 in SL, in the female 17.2 in SL; second spine in the male 12.3 in SL, in the female 25.2 in SL, third spine in the male 16.2 in SL, in the female 25.9 in SL; 4th spine in the male 30.5 in SL, in the female 34.5 in SL. First dorsal fin base length in the male 11.1 in SL, in the female 16.0 in SL. Predorsal (1) length 2.85 (2.68) in SL. Distal margin of second dorsal fin straight. First ray in the male 6.1 in SL, in the female 7.1 in SL; last ray in the male 5.0 in SL, in the female 6.8 in SL. Second dorsal fin base length 3.1 (3.5) in SL. Predorsal (2) length 1.99 (1.93) in SL. Anal fin beginning on a vertical through second ray of second dorsal fin. First anal fin ray length 12.7 (14.7) in SL; length of last ray in the male 7.6 in SL, in the female 8.6 in SL. Anal fin base length 3.1 (3.3) in SL. Preanal fin length 1.80 (1.73) in SL. Pectoral fin length reaching back to third anal fin ray base. Pectoral fin length 4.1 (4.0) in SL. Prepectoral fin length 2.66 (2.62) in SL. Pelvic fin reaching to urogenital papilla when laid back. Pelvic fin length 3.3 (3.3) in SL. Caudal fin distally slightly convex. Caudal fin length 3.8 (3.9) in SL.

Color in alcohol: Head and body sand yellow, belly lighter. Dorsal parts of head and operculum dark brown. Upper part of pectoral fin base with a large dark brown blotch. Back covered with numerous round light spots. Sides of body below the lateral line with a row of dark brown spots. Eye dark gray. First dorsal fin in the male light, the distal parts around the tip of the second spine dusky; first dorsal fin black in the female. Membranes of second dorsal fin translucent, rays spotted with dark brown. Anal fin membranes in the male with large dusky areas

(see Fig. 1A), in the female colorless. Caudal fin with vertical rows of dark brown spots, and with a few dark brown lines in the lowermost part. Upper part of pectoral fin with vertical rows of dark brown spots. Pelvic fin irregularly spotted with dark brown.

Sexual dimorphism: Males have a slightly higher first dorsal fin than females with a different color pattern, longer last rays of the second dorsal and anal fins, a different anal fin color pattern, and a longer urogenital papilla.

Etymology. "Leucos" (Gr.) means white, light; "poecilos" (Gr.) means spotted. The name of the new species refers to the numerous light spots on the dorsal parts of head and body.

Relationships. The new species is compared with two closely allied species, *Callionymus planus* Ochiai in Ochiai, Araga and Nakajima (1955: 106–108, figs. 4–5, Miya, Aichi Prefecture, Japan; Fricke, 1983: 247–249, fig. 73, South Japan) and *Callionymus olidus* Günther, 1973 (242–243, China; Fricke, 1983: 239–243, fig. 71, China, between Canton and Shanghai; Nakabo and Jeon, 1985: 43–50, figs. 2, 4, mouth of Kum River, Korea) by the characters given in Table 2. It is closest to *Callionymus planus* in body proportions, general coloration, the number of spines in the first dorsal fin etc., but differs especially in the caudal fin structure where it resembles *C. olidus*. The new species is distinguished from the co-occurring *Callionymus sagitta* by the caudal fin formula (i, 7, ii principal rays in *C. sagitta*), the females much smaller first dorsal fin (first spine half of length of first D_2 ray in *C. sagitta*, at most one-third of that length in *C. leucopoecilus*), by the black first membrane of the first dorsal fin in the female (light in *C. sagitta*), by the presence of a large black blotch at the pectoral fin base (not present in *C. sagitta*), and by the shorter

Table 1. Meristic data of the type specimens of *Callionymus leucopoecilus* sp. nov., expressed as hundredths of SL

	Holotype SMNS 10100 Male, 84.1 mm SL	Paratype BKNU 331 Female, 78.7 mm SL
Head length	24.27	23.77
Body depth	14.15	13.77
Body width	21.61	21.38
Eye diameter	6.50	6.58
Preorbital length	6.79	7.78
Interorbital distance	2.31	2.56
Upper jaw length	7.44	7.84
Left preopercular spine length	4.47	5.34
Urogenital papilla length	3.25	0.61
Caudal peduncle length	13.32	13.56
Caudal peduncle depth	4.47	4.88
Caudal fin length	26.28	25.78
Predorsal (1) length	35.13	37.36
Predorsal (2) length	50.23	51.80
Preanal fin length	55.55	57.74
Prepectoral fin length	37.58	38.20
Prepelvic fin length	26.42	24.48
First D_1 spine length	8.58	5.80
Second D_1 spine length	8.16	3.97
Third D_1 spine length	6.17	3.86
Fourth D_1 spine length	3.28	2.90
First D_2 ray length	16.36	14.17
Last D_2 ray length	20.02	14.74
First A ray length	7.85	6.80
Last A ray length	13.10	11.63
Pectoral fin length	24.24	25.28
Pelvic fin length	30.52	30.13
D_1 base length	8.99	6.24
D_2 base length	32.23	28.49
A base length	31.58	30.63

preopercular spine (2.6–3.6 in head in *C. sagitta*). It is distinguishable from *C. sagitta* at first sight by its body shape and body color pattern, which differs in more numerous small white spots in *C. leucopoecilus*, but less in *C. sagitta*.

Remarks. The new species would belong to the genus *Repomucenus* Whitley, 1931 in the system published by Nakabo (1982). In the system of Fricke (1983), the new species belongs to the subgenus *Callionymus* (*Callionymus*). Nakabo's (1982) generic system is artificial, as the distinguishing of many new genera was based on a single, highly adaptive character only, the shape of the urohyal (see Nakabo, 1983: 61 etc.). As the shape of the urohyal, i.e. the length of the ventral part, depends on the body shape and especially on the burrowing habits of the species, dragonets are divided into burrowing and non-burrowing groups, rather than into groups founded by a number of independent synapomorphies. While, on the other hand, the genus *Callionymus* sensu Fricke (1983) might well be split into several smaller genera, Fricke decided not to do this to keep the dragonet nomenclature stable. In Nakabo's system, 90% of the dragonet species would have to change their generic names, while this is necessary for only 15% in Fricke's system. Therefore, we use the system published by Fricke (1983), what results in the generic name *Callionymus* for the new species *C. leucopoecilus*.

Callionymus sagitta Pallas, 1770 was revised by Fricke (1983: 258–266, figs. 77–78) on the basis of 81 specimens from the Indo-West Pacific (11 Indian specimens, 32 Indonesian specimens, 6 Borneo specimens, 28 Gulf of Thailand specimens and 1 Hong Kong specimen). The northern Australian *Callionymus macdonaldi* Ogilby, 1911 was revised on the basis of 67 specimens by Fricke (1983: 197–201, fig. 56), and distinguished from *C. sagitta* by the smaller distance between the first and second dorsal fins, the different proportions and color pattern of the male's first dorsal fin, the plain black first dorsal fin of the female (*C. sagitta*: first membrane light), the coloration of the anal fin and of the caudal fin. Fricke (1984) applied to designate a neotype for *C. sagitta*, based on a female from India; this was approved by Opinion 1388 (1986). Nakabo et al. (1991) recorded *Callionymus sagitta* from the Yellow Sea on the basis of 48 specimens, and tried to revise the species again on the basis of 2 additional Indian specimens, 5 South China Sea specimens, and 16 Gulf of Thailand specimens. Though he had much less material from more limited areas available than Fricke's (1983) revision, except for numerous Korean specimens, he synonymized *Callionymus macdonaldi* on the basis of 16 specimens from Australia. The reason was that the Korean materials had similarities to that nominal species (dark anal fin), and that the female holotype of *C. macdonaldi* and the female neotype of *C. sagitta* were also similar, except in the coloration of the first dorsal fin and the distance between the first and second dorsal fins.

The major differences between *C. sagitta* and *C. macdonaldi*, as pointed out by Fricke (1983: 200–201) are, however, in males, though Fricke took the coloration of the first dorsal fin of the female as the most trenchant character, and therefore designated a female neotype of *C. sagitta* for comparation with the holotype of *C. macdonaldi*. The anal fin coloration cannot be considered as a character distinguishing the two species any more, but there are still 5 further valid characters which were found by Fricke (1983) comparing 148 specimens of the two species, and which were not discarded in the Nakabo et al. (1991) paper. Therefore, it is not necessary to synonymize the two well-introduced names *Callionymus sagitta* and *Callionymus macdonaldi*; they can be treated as separate, though closely allied, species. Ten specimens of the Korean populations were sent by the junior author and examined by the senior author. They belong to *C. sagitta*. The distribution

Table 2. Characters distinguishing *Callionymus leucopoecilus* sp. nov., *C. planus* and *C. olidus*

	C. leucopoecilus	*C. planus*	*C. olidus*
Principal C rays	ii, 5, ii	i, 7, ii	ii, 5, ii or ii, 6, ii
D_1 spine number	IV	IV	III
D_1 base in space between D_1 and D_2	0.9–1.2	0.2–0.3	2.0–5.0
D_1 base in first D_1 spine length	0.9–1.1	0.6–0.9	2.0–5.0
A coloration in males	Membranes w/ large dusky areas	Each membrane w/ a small distal dark brown blotch	translucent
Upper part of P_1 base	dark brown	light	light

range of *C. sagitta* is defined as from India to Indonesia and Korea, that of *C. macdonaldi* is restricted to northern Australia and Papua New Guinea.

The caudal skeleton of the new species was X-rayed and showed a normal development, similar to that of *C. olidus*. The state of the caudal fin of the male holotype and female paratype of *C. leucopoecilus* is considered as normal, not an abnormal condition.

Literature Cited

Chang, C. L. 1966. The fishes of the Yellow Sea; investigation of fishes from Pohai Strait, Tsingtao, 1966 (3rd ed.). (In Chinese.)

Fricke, R. 1983. Revision of the Indo-Pacific genera and species of the dragonet family Callionymidae (Teleostei). Theses Zoologicae, Vol. 3, J. Cramer, Braunschweig, x+774 pp.

Fricke, R. 1984. Status of the names *Callionymus sagitta* Pallas, 1770 and *Callionymus filamentosus* Valenciennes, 1837 (Teleostei, Callionymidae), and request to make an exception from Article 75c (4) and (5) for designating a neotype for *Callionymus sagitta* Pallas, 1770. Z. N. (S.) 2435. Bull. Zool. Nom., 41: 58–61.

Günther, A. 1873. Report on a collection of fishes from China. Ann. Mag. Nat. Hist., (4) 12: 239–250.

Nakabo, T. 1982. Revision of the genera of dragonets (Pisces: Callionymidae). Publ. Seto Mar. Biol. Lab., 27 (1/3): 77–131.

Nakabo, T. 1983. Comparative osteology and phylogenetic relationships of the dragonets (Pisces: Callionymidae) with some thoughts of their evolutionary history. Publ. Seto Mar. Biol. Lab., 28: 1–73.

Nakabo, T. and S.-R. Jeon. 1985. New record of a dragonet fish, *Repomucenus olidus*, (Pisces: Callionymidae) from Kum River (Kang'gyong-up), Korea. Korean J. Limnol., 18: 43–50.

Nakabo, T., S.-R. Jeon and S.-Z. Li. 1991. Description of the neotype of *Repomucenus sagitta* (Callionymidae) with comments on the species. Japan. J. Ichthyol., 38: 255–262.

Ochiai, A., C. Araga and M. Nakajima. 1955. A revision of the dragonets referable to the genus *Callionymus* found in the waters of Japan. Publ. Seto Mar. Biol. Lab., 5(1), art. 7: 95–132.

Opinion 1388, 1986. *Callionymus sagitta* Pallas, 1770 (Osteichtyes, Callionymidae): neotype designated. Bull. Zool. Nom., 43: 132–133.

(Received June 15, 1991; accepted September 2, 1992)

黄海からのネズッポ科魚類の1新種

Ronald Fricke・Chung-Lyul Lee

ここに新種として報告した *Callionymus leucopoecilus* は，第1背鰭棘が4本，第2背鰭と臀鰭の軟条がそれぞれ9本，尾鰭条が，ii, 5, ii 本，前鰓蓋棘数が $1\frac{3-4}{-}1$ 本，両背鰭基底の間隔が第1背鰭基底長と同長，胸鰭基底の上部が暗褐色で，雌雄とも第1背鰭が低くて糸状に伸びない諸特徴を兼ね備える．近似種ヘラヌメリ *C. planus* Ochiai や *C. olidus* Günther は胸鰭基底の上部が淡色なこと，その他で本種と区別される．