

***Schismatogobius fuligimentus*, a New Species of Freshwater Goby (Teleostei: Gobiidae) from New Caledonia**

I-Shiung Chen¹, Bernard Séret², Christine Pöllabauer³ and Kwang-Tsao Shao^{4,*}

¹National Museum of Marine Biology/Aquarium, Checheng, Pingtung, Taiwan 944, R.O.C.

²Antenne ORSTOM du Muséum national d'Histoire naturelle, Laboratoire d'Ichthyologie générale et appliquée, 43, rue Cuvier, F-75231, Paris, France

³ERBIO, Noumea, Nouvelle-Calédonie, France

⁴Institute of Zoology, Academia Sinica, Taipei, Taiwan 115, R.O.C.

(Accepted January 18, 2001)

I-Shiung Chen, Bernard Séret, Christine Pöllabauer and Kwang-Tsao Shao (2001) *Schismatogobius fuligimentus*, a new species of freshwater goby (Teleostei: Gobiidae) from New Caledonia. *Zoological Studies* 40(2): 141-146. A new species of the naked and small gobiid genus, *Schismatogobius* de Beaufort, 1912 is described from freshwaters of New Caledonia. The new species, *S. fuligimentus* sp. nov. can be distinguished from other species by (1) fewer (13-14) pectoral fin rays and (2) the ventral part of the head with deep black pigmentation in the female. This is the first *Schismatogobius* species reported from New Caledonia.

Key words: Fish taxonomy, *Schismatogobius*, Gobiidae, New Caledonia.

A detailed investigation has recently been made of the freshwater fish fauna of New Caledonia (Séret, 1992). This has yielded at least 79 species (Marquet et al. 1997, Séret 1997) and even up to 89 species (Pöllabauer 1997). At least 50% of them belong to the Gobioidae including a rhyacichthyid, thirty gobiids, and 10 eleotrinids following Hoese and Gill's (1993) classification; some of the gobioids are still unidentified or undescribed (Marquet et al. 1997, Pöllabauer 1997).

Among these freshwater gobiids, the small-sized genus, *Schismatogobius* de Beaufort, 1912, has a naked, elongate body, and adults live on the substratum of small pebbles in clear streams and rivers. So far, seven nominal species of *Schismatogobius* have been reported as *S. marmoratus* (Peters, 1868), *S. insignis* (Herre, 1927), *S. pallidus* (Herre, 1934), and *S. roxasi* Herre, 1936 in the Philippines (Herre 1953); *S. marmoratus* (Peters, 1868) and *S. bruyinisi* de Beaufort, 1912 in Indonesia (Kottelat et al. 1993); one species as *S. deraniyagalai* Kottelat and Pethiyagoda, 1989 from Sri

Lanka; and *S. roxasi* Herre, 1936 and *S. ampluvinculus* Chen, Shao and Fang, 1995, from southern Taiwan to the Ryukyu Islands (Chen et al. 1995). Additional new species of this genus may be discovered with more detailed surveys in certain areas such as northern Australia or other isolated Indo-Pacific islands (Allen 1989; Hoese pers. commun.).

From the field collections of the second author (BS) and third author (CP) in 1991 and 1996, respectively, from New Caledonia, six gobiid specimens which should be recognized as *Schismatogobius* were found. This new species is herein described as the first record of the genus *Schismatogobius* from New Caledonia.

MATERIALS AND METHODS

The specimens were collected by electro-fishing in 1991 and 1996. Morphometric and meristic methods follow Miller (1988). Terminology of head cephalic sensory canals and free neuromast organs

*To whom correspondence and reprint requests should be addressed. Tel: 886-2-27899545. Fax: 886-2-27883463. E-mail: zoskt@gate.sinica.edu.tw

(sensory papillae) is based on Ginsburg (1953) and Miller (1986 1988). The type specimens are deposited at the Museum of the Institute of Zoology, Academia Sinica, Taipei, Taiwan (ASIZP), Muséum national d'Histoire naturelle, Paris (MNHN), National Museum of Marine Biology/Aquarium, Pingtung, Taiwan (NMMBP), and National Taiwan University, Taipei, Taiwan (NTUM). Other comparative materials of congeneric species are deposited at ASIZP, the California Academy of Sciences, San Francisco (CAS), and the National Museum of Natural History, Smithsonian Institution, Washington, DC (USNM). Fin abbreviations: A, anal fin; C, caudal fin; D1 and D2, 1st and 2nd dorsal fins; P, pectoral fin; V, ventral fin.

Comparative materials

Schismatogobius ampluvinculus Chen, Fang and Shao, 1995. Holotype: ASIZP 056923, 22.2 mm SL, coll. I.S. Chen, Jinglun R., Taitung Co., Taiwan, 14 Dec. 1992. Paratypes: ASIZP 056988, 22.3 mm SL, coll. I.S. Chen, Jinglun R., Taitung Co., Taiwan, 29 Dec. 1993; ASIZP 057277, 5 specimens, 19.0-24.5

mm SL, coll. I.S. Chen, 9 Feb. 1995; Junpung Brook, Pingtung Co., Taiwan; ASIZP 057278, 3 specimens, 25.2-26.9 mm SL, coll. I.S. Chen, 2 Mar. 1995, Luliao Brook, Pingtung Co., Taiwan.

Schismatogobius bruynisi de Beaufort, 1912. CAS 63588, 1 specimen, 23.6 mm SL, coll. L.R. Parenti et al., 5 Nov. 1987, creek that enters Ginap R., tributary of Rempi R., 1 km W of Bitetta, Madang, Papua New Guinea.

Schismatogobius deraniyagalai Kottelat et Pethiyagoda (1989). USNM 268297, 3 specimens, 28.1-30.7 mm SL, 8 July 1969, coll. W. Smith-Vaniz, tributary to Gin Ganga 5 mi S of Hiniduma Rest House, Kanneliya Forest, Hiniduma district, Sri Lanka (Ceylon).

Schismatogobius insignis (Herre, 1927). USNM 339676, 5 specimens, 14.8-21.0 mm SL, coll. T. Roberts, Ocoy R. near Sibulan, of Dumaguete along highway from Sumaguete to Tanay, Negros Oriental Prov., Philippines.

Schismatogobius pallidus (Herre, 1934). Paratypes of *Gobiosoma pallida* Herre: CAS 116962, 15.8-17.2 mm SL, 3 specimens, coll. A.W. Herre, Si Tankay, Sibutu I. group, Tawi-Tawi Prov., Sulu Archipelago, Philippines.

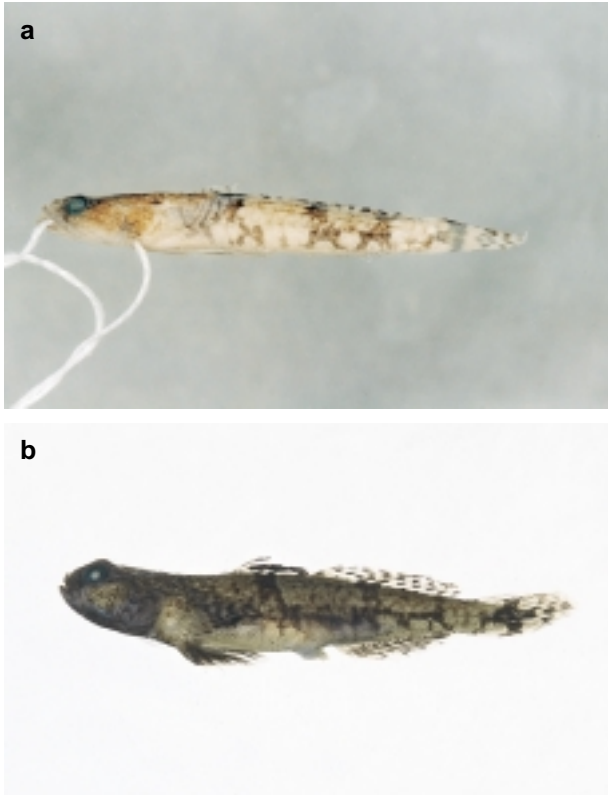


Fig. 1. *Schismatogobius fuligimentus* (a) MNHN 1996-394, paratype, 29.4 mm SL, male; (b) ASIZP 057814, paratype, 38.4 mm SL, female.

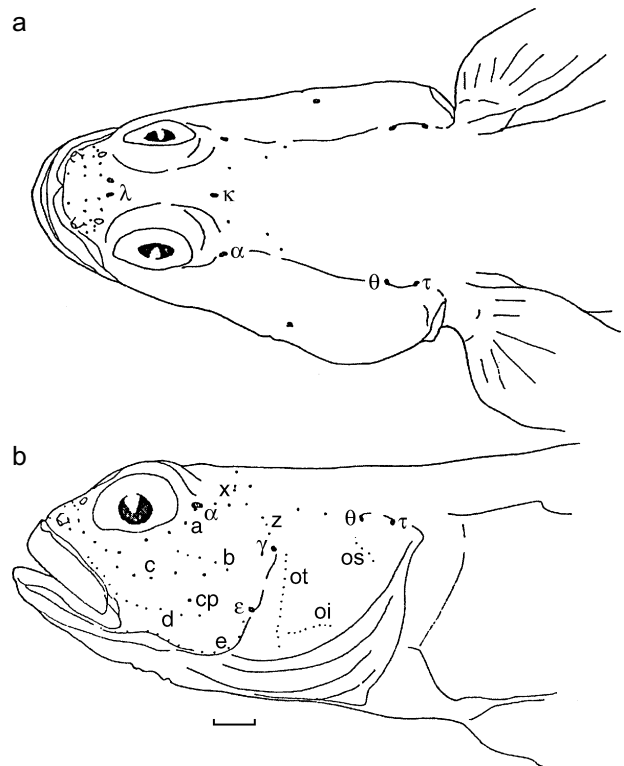


Fig. 2. Head lateral-line system of *Schismatogobius fuligimentus*. (a) dorsal view, and (b) lateral view. (Bar = 1 mm).

Schismatogobius roxasi Herre, 1936. Holotype: CAS 128609, 45.9 mm SL, San Jose, Panay I., Antique Prov., Philippines. CAS 63588, 1 specimen, 37.9 mm SL, Feb. 1925, coll. F. Reveche, San Jose, Panay I., Antique Prov., Philippines.

***Schismatogobius fuligimentus* sp. nov.**

(Figs. 1, 2, 3; Table 1)

Schismatogobius sp. Séret, 1997: 374; Marquet et al., 1997: 30.

Holotype: MNHN 1992-22, 30.6 mm SL, ♀, coll. B. Séret, 18 Sept. 1991, Dumbea R. (close to bridge; stream width 30 m, depth 1 m), New Caledonia.

Paratypes: MNNH 1992-21, 30.8 mm SL, ♀; other data same as holotype. MNNH 1996-394, 29.4 mm SL, ♂, Dothio R. (just below falls; stream width 2 m, depth 1 m), New Caledonia. ASIZP 057814, 38.4 mm SL, ♀, coll. C. Pöllabauer, 25 Oct. 1996,

Couville R., Noumea, New Caledonia. NMMBP 00472, 34.6 mm SL, ♀; NTUM 07999, 35.4 mm SL, ♀, other data same as for ASIZP 057814.

Diagnosis: This species is distinguished from other *Schismatogobius* species by a combination of the following characters: (1) lower number of pectoral fin rays (13-14) and (2) entire ventral side of head with deep black pigmentation in female.

Description (Fig. 1): Body rather slender, cylindrical anteriorly and compressed posteriorly. Head small, cylindrical but slightly compressed anteriorly. Head and trunk entirely naked.

Morphometrics as in table 1.

Snout obtuse and short, and about equal to or slightly longer than eye diameter. Eye large, positioned dorsolaterally; its upper margin projecting above dorsal profile of head. Bony interorbital quite narrow. Mouth oblique, lower lip more prominent.

Table 1. Morphometry of *Schismatogobius fuligimentus* sp. nov.

Morphometrics	Holotype (♀)	♂ (n=1)	♀ (n=5)
		Paratype	Holotype + Paratypes
Percentage of SL			
Head length	27.9	31.2	27.1-28.6 (28.0)
Predorsal length	39.1	37.0	37.1-40.0 (38.4)
Snout to 2nd dorsal origin	58.7	58.3	57.6-59.9 (59.1)
Snout to anal fin origin	58.9	60.9	58.9-65.3 (62.5)
Snout to anus	54.5	55.9	54.5-60.5 (57.3)
Snout to pelvic fin origin	28.9	27.5	27.3-28.9 (28.2)
Caudal peduncle length	15.3	17.3	14.7-16.4 (15.4)
Caudal peduncle depth	9.0	8.2	7.0- 9.0 (8.0)
1st dorsal fin base	19.2	18.6	19.2-20.7 (19.8)
2nd dorsal fin base	30.2	28.5	28.1-30.4 (29.8)
Anal fin base	22.2	25.8	22.2-24.6 (23.2)
Caudal fin length	23.8	23.8	22.5-24.4 (23.5)
Pectoral fin length	28.5	22.1	21.4-28.5 (24.4)
Pelvic fin length	25.9	23.8	22.4-25.9 (24.0)
Body depth at pelvic origin	15.7	13.1	14.4-15.7 (15.0)
Body depth at anal fin origin	15.2	12.2	14.1-16.5 (15.3)
Body width at anal fin origin	12.0	10.5	12.0-15.8 (13.4)
Pelvic origin to anus	28.9	30.9	28.9-34.7 (30.8)
Percentage of HL			
Snout length	25.4	31.0	21.9-30.8 (25.6)
Eye diameter	27.8	22.1	22.3-27.8 (25.6)
Cheek depth	31.3	35.7	25.6-34.7 (29.7)
Postorbital length	68.0	75.0	66.2-76.5 (70.3)
Head width in maximum	56.5	53.6	51.4-63.1 (58.2)
Head width in tip of gillopening	44.8	49.4	44.8-50.3 (46.8)
Fleshy interorbital width	6.9	7.9	5.8-10.0 (7.4)
Bony interorbital width	16.7	18.5	13.9-18.4 (16.4)
Lower jaw length	41.4	76.0	37.9-46.8 (41.5)
Percentage of caudal peduncle length caudal peduncle depth	58.8	47.2	47.9-58.7 (51.5)
Percentage of pelvic origin to anus pelvic fin length	89.8	76.9	64.6-89.8 (78.4)

The value in blanket is average.

Sexual dimorphism seen in jaw length. The maxillary extending to near lower corner of preopercle in male, but merely to vertical line of middle orbit in female. Tip of tongue bilobed. Both jaws with about 3 rows of tiny conical teeth. Caudal peduncle depth quite low. Gill-opening restricted, ventral extension not reaching the midline of opercle.

Fins: D1 VI; D2 I/9; A I/9; P 13 (n = 1) – 14 (n = 5); V 1/5 + 1/5. D1 without any elongate filaments and all rays about equal in length. D2 depth low, base long. Origin of A inserting vertically level with 2nd branched ray of D2. Posterior end of both D2 and A when depressed not reaching procurrent rays of C. C elliptical, length longer than postorbital length. P large and oblong, posterior end almost reaching vertical line through position of anus. V disc oblong, rear edge not extending beyond anus.

Cephalic lateral-line system

Head canal pores (Fig. 2): Anterior interorbital extension of anterior oculoscapular canal present, with double terminal pores λ slightly posterior to posterior nostrils; a single pore κ at rear of interorbital. Posterior extension of anterior oculoscapular canal terminating laterally on each side of head at pore α , just behind posterior edge of eye. Posterior oculoscapular canal with 2 terminal pores, θ and τ , preopercular canal with 2 pores, γ and ϵ .

Cephalic sensory papillae (Fig. 2): Infraorbital papillae in longitudinal row. Row *a* with few papillae below eye. Row *b* short. Single *cp* papilla. Papillae in infraorbital row *d* smaller but more numerous than in row *c*. Opercle with rows *os*, *ot*, and *oi*; row *os* short, and located just below posterior oculoscapular canal. Row *f* under lower jaw with only 2 papillae.

Coloration in alcohol (Figs. 1, 3): Coloration observed from 6 preserved specimens. Body light grayish yellow, dorsal 1/2 of trunk with 3 indistinct

blackish-brown bands, 1st one under 1st dorsal fin base, the 2nd under 2nd dorsal fin base, and last one on caudal peduncle. Abdomen creamy whitish, with light yellow ovary in female. Back of trunk with brown netlike pattern or with some black spots between bands. Lateral midline with a few black spots or short bars. Ventral 1/2 of trunk always with 4-5 major brownish-black blotches just below midline, the posterior 2 always extending close together or connected by horizontal stripe. Caudal fin base with a crosslike black mark separating 4 oblong light yellow spots around each quarter; two on caudal peduncle and 2 on the caudal fin.

Head with several black spots on cheek and opercle. Sexual dichromatism occurring on ventral part of head. Entire ventral part of head including chin and branchiostegal membrane covered with deep black pigmentation in female, but such dark pigmentation absent with just creamy yellow in male. An oblique black bar from anteroventral margin of eye to upper lip. A posteriorly oblique dark brown bar beneath lower posterior edge of eye on cheek in



Fig. 3. Ventral view of female *Schismatogobius fuligimentus*.

Table 2. Comparison of fin-ray counts from all nonimal *Schismatogobius* species

Species	Specimens No.	Locality	Dorsal fin	Anal fin	Pectoral fin
<i>S. fuligimentus</i> sp. nov.	3 [#]	New Caledonia	VI, I/9	I/9	13-14
<i>S. ampluvinculus</i>	10 [#]	Taiwan	VI, I/9	I/9	16
<i>S. bruy nisi</i>	1	New Guinea	VI, I/9	I/9	16
<i>S. deraniyagalai</i>	3	Sri Lanka	VI, I/9	I/8-9	15
<i>S. insignus</i>	5	Nigros, Philippines	VI, I/9	I/9	16-17
<i>S. marmoratus</i>	1 [*]	Samar I., Philippines	VI, I/10	I/9	ND
<i>S. pallidus</i>	3 [#]	Sulu, Philippines	VI, I/11-12	I/12	15
<i>S. roxasi</i>	2 [#]	Panay I., Philippines	VI, I/9	I/9	17

*: data from original description.

: type specimen(s) included.

ND: data not available.

male but indistinct in female. Anterior part of lips with 2 vertical black bars. Opercle with several dark brown to black spots. First dorsal fin with black spinous rays, thin submarginal grayish stripe, and a wide middle, longitudinal black band; 2nd dorsal fin with about 3 rows of horizontal spots or discontinuous stripes. Pectoral fin rays with 5-6 rows of deep black spots. Pelvic fin with blackish rays and dusky membrane.

Etymology: The species name, *fuligimentus*, refers to the specific diagnostic character of the deep black pigmentation (Latin: *fuligi*, black) on the chin (Latin: *mentum*, chin) and ventral side of head.

Distribution: This species is only known from 2 rivers in southern New Caledonia. It is also the first species of *Schismatogobius* formerly recorded from the region of the South Pacific islands; other known species have been found in the following Indo-Pacific regions: southern Japan (Ryukyus), Taiwan, Philippines, Indonesia, Australia, and Sri Lanka.

Habitat: This species seems to prefer shallow and clear-water riffles (collected at depths from 0.5 to 1.0 m) with slow or moderate current in rivers with a substrate of small to medium gravel. The water temperature in rivers of the habitat ranged from 21 to 24.5 °C in Sept. 1991 and about 24.1 °C in Oct. 1996. The elevations of the type localities for these adult specimens range from 18 m (in Couvelle R.) to 250 m (in Dothio R.) although it may be an amphidromous species (Chen et al. 1995).

Remarks: Seven nonimal species have been described from the Indo-Pacific region so far. *S. fuligimentus* is distinguished from *S. mamoratus* and *S. pallidus* by a lower count of D2 rays with I/9 in *S. fuligimentus* versus I/10 in *S. mamoratus* and I/11-12 in *S. pallidus* (Table 2). However, this species is well differentiated from the remaining species by fewer P rays (13-14 versus 15-17). Although *S. fuligimentus* resembles *S. deraniyagalai* in the very slender body shape, their females distinctly differ in coloration; the deep black pigmentation on the entire chin in females of *S. fuligimentus* contrasts with only a rounded black blotch at the anterior tip beneath the lower jaw on females of *S. deraniyagalai*.

Evolutionary convergence may have occurred between these 2 species because of the wide geographical separation between these 2 localities. *S. fuligimentus* seems rare with only 6 specimens collected in New Caledonia; further surveys may extend the distribution of this species and reveal more data on its ecology.

Acknowledgments: ISC wishes to thank the Ministry of Education, Taipei, Taiwan, R.O.C. for support-

ing his postgraduate studentship to work on a PhD degree in England; and to the Fishery Society of the British Isles (FSBI) in UK for providing traveling grants to attend the 5th Indo-Pacific Fish Conference in Noumea, New Caledonia in Nov. 1997. ISC is very grateful to Dr. P.J. Miller for his kind discussion of gobioid research, to Dr. D. Hoese for kindly discussing his research on Australian *Schismatogobius* species in Sydney; to Drs. W. Eschmeyer and T. Iwamoto in CAS; and to Drs. L. Parenti and J. Williams, and Mrs. S. Jewett in USNM for their help during visits to their institutions. The freshwater survey (PEDCAL) was supported by the Research Department of the French Ministry of Cooperation (CORDET).

REFERENCES

- Allen GR. 1989. Freshwater fishes of Australia. Neptune City, NJ: T.F.H. Publications. 240 pp.
- Chen IS, CC Han, LS Fang. 1995. A new record of freshwater gobioid fish, *Schismatogobius roxasi* (Pisces, Gobiidae) from southeastern Taiwan. Bull. Natl. Mus. Nat. Sci. **6**: 135-137.
- Chen IS, KT Shao, LS Fang. 1995. A new species of freshwater goby, *Schismatogobius ampluvinculus* (Pisces, Gobiidae) from southeastern Taiwan. Zool. Stud. **34**: 202-205.
- De Beaufort LF. 1912. On some new Gobiidae from Ceram and Waigeu. Zool. Anz. **39**: 136-143.
- Ginsburg I. 1953. Ten new American gobioid fishes in the United States National Museum, including additions to a revision of *Gobionellus*. J. Wash. Acad. Sci. **43**: 18-26.
- Herre AW. 1927. Gobies of Philippines and China Sea. Monogr. Bur. Sci. Manila **23**: 1-352.
- Herre AW. 1936. Notes on fishes in Zoological Museum of Stanford University. V. New and rare Philippine fishes from the Herre 1933 Philippine expedition. Philipp. J. Sci. **59**: 367-373.
- Hoese DF, AC Gill. 1993. Phylogenetic relationships of eleotrid fishes (Perciformes: Gobioidae). Bull. Mar. Sci. **51**: 415-440.
- Kottelat M, R Pethiyagoda. 1989. *Schismatogobius deraniyagalai*, a new goby from Sri Lanka: description and field observation. Spixi. **12**: 315-320.
- Kottelat M, AJ Whitten, SN Kartikasari, S Wirjoatmodjo. 1993. Freshwater fishes of western Indonesia and Sulawesi. Jakarta: Periplus Editions (HK). 221 pp, 84 pls.
- Marquet G, B Séret, R Lecomte-Finiger. 1997. Compared checklist of inland water fishes of three Indo-Pacific islands (Reunion, New Caledonia and Tahiti). Cybium. 21(i), Suppl: 27-34. (in French with English abstract)
- Miller PJ. 1986. Gobiidae. In PJP Whithead, ML Bauchot, JC Hureau, J Nielsen, E Tortonese, eds. Fishes of Northern-eastern Atlantic and Mediterranean. Paris: UNESCO 3: 1019-1085.
- Miller PJ. 1988. New species of *Coryrogobius*, *Thorogobius*, and *Wheelerigobius* from West Africa (Teleostei: Gobiidae). J. Nat. Hist. **22**: 1245-1262.
- Peters W. 1868. Über die von Dr. F. Jagor in dem Osstindischen Archipel gesammelten und dem Königl. Zool. Mus. überge-

- benen Fishe. Monatsber. Akad. Wiss. Berlin **1868**: 254-281.
- Pöllabauer C. 1997. Conserving the freshwater fish fauna of New Caledonia. [abstract]. 5th Indo-Pacific Fish Confer. 83, 3-8 Nov. 1997. Noumea, New Caledonia.
- Séret B. 1992. Passons d'eau douce du 'Caillou'. ORSTON-Actualites **37**: 2-7. (in French)
- Séret B. 1997. Les poissons d'eau douce de Nouvelle-Calédonie: implications biogéographiques de récentes découvertes. In J Najt, L Matile, eds. Zoologia Neocaledonica, Vol. 4, Mem. Mus. natl. Hist. nat. 171: 369-378. (in French)
- Wongrat P, PJ Miller. 1991. The innervation of head neuromast rows in eleotridine gobies (Teleostei: Gobioidaei). J. Zool. London **225**: 27-42.

記新喀里多尼亞島之一新種淡水鰕虎魚類－黑頰裸身鰕虎

陳義雄¹ Bernard Séret² Christine Pöllabauer³ 邵廣昭⁴

本文係報導產於新喀里多尼亞島淡水溪流內之一新種小型全身裸露無鱗之鰕虎魚類。本新種 *Schismatogobius fuligimentus* sp. nov. 擬稱為黑頰裸身鰕虎。本種能以下列主要特徵與同屬其他魚種區分開來：(1) 較少之胸鰭鰭條數 (13-14)，以及 (2) 雌魚頭部之腹面之頰部與鰓蓋膜具深黑色之色素斑塊。本屬亦為新喀里多尼亞島之新記錄魚屬。

關鍵詞：魚類分類，裸身鰕虎屬，鰕虎科，新喀里多尼亞島。

¹ 國立海洋生物博物館

² Antenne ORSTOM du Museum national d'histoire naturelle, Laboratoire d'ichthyologie générale et appliquée, Paris, France

³ ERBIO, Noumea, Nouvelle-Calédonie, France

⁴ 中央研究院動物研究所