

## *Schismatogobius deraniyagalai*, a new goby from Sri Lanka: description and field observations

(Osteichthyes, Gobiidae)

By Maurice Kottelat and Rohan Pethiyagoda

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*Schismatogobius deraniyagalai*, spec. nov. is described from Sri Lanka; it is distinguished from the four described *Schismatogobius* species by its slender body whose depth is 7.9–8.3 times in SL. This is the first record of the genus from an Indian Ocean island. The history of the discovery of the species and of falsified locality data is summarized.

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### Introduction

*Schismatogobius* are small naked gobies with a distinctive red-brown-grey-black marmorated disruptive colour pattern living among pebbles in freshwaters above tidal influence. Four nominal species have been described (Hoesle in litt. 1988), but their status is still open to discussion; these are *S. marmoratus* (Peters, 1868) described from Samar I., Philippines, *S. bruynisi* de Beaufort, 1912 from Ceram I., Indonesia, *S. insignis* (Herre, 1927) from Negros I., Philippines, and *S. roxasi* Herre, 1926 from Panay I., Philippines. The genus has also been collected in other islands of Indonesia (Sulawesi, Sumatra), Philippines and in Australia. We describe here a fifth species from freshwaters of Sri Lanka, the first to be reported from an Indian Ocean island; despite the uncertainties concerning the status of other *Schismatogobius* species, its peculiar slender body allows immediate identification.

One of us (RP) has been working on a book on freshwater fishes of Sri Lanka since 1985. He collected extensively on the island, obtaining several new species on which we are presently working (Kottelat & Pethiyagoda 1989; in prep.). The new goby has first been collected by RP in September 1988. Some specimens were kept alive for further observations by RP and a friend; without our knowledge or consent, some of these specimens came into the hands of a person who presented them to a colleague, asking that the new species be named for him; having no locality data, he had to invent them. In June 1989, we became aware of this and informed this colleague that RP is the actual collector, that we exclusively know the actual locality, that this fish does not occur at the alleged locality and that we were already working on it. A later very conciliatory proposal, that we could collaborate and send him the actual locality data, providing that some elementary conditions be fulfilled, remained without answer. From an earlier telex, we understand that he intends to describe this species, on the basis of our



material, although he knows he has only falsified locality data at his disposal. Evidence of the above informations are in the hands of the Editor.

Under these circumstances, a prompt description of the new species is necessary to ensure that it be associated right from the beginning with the actual locality and not with a locality where it does not occur; this is also in the interest of nomenclatural stability.

#### Material and methods

Methods for taking counts and measurements follow Hubbs & Lagler (1947). Abbreviations used are: CMS National Museum Colombo, SL standard length, ZSM Zoologische Staatssammlung München.

#### *Schismatogobius deraniyagalai*, spec. nov.

Types. Holotype: ZSM 27362, 30.8 mm SL, male; Sri Lanka: Prov. Sabaragamuwa: Kegala District: We Oya, a hill stream at Parusella Estate, near Siyambalagastenna hamlet, about 3 km from Yatiyantota town on the road from Yatiyantota to Punugala, 7°01'55"N 80°18'50"E; R. Pethiyagoda, 27 IX 1988. — Paratypes: ZSM/CMK 6400, 3 ex.,

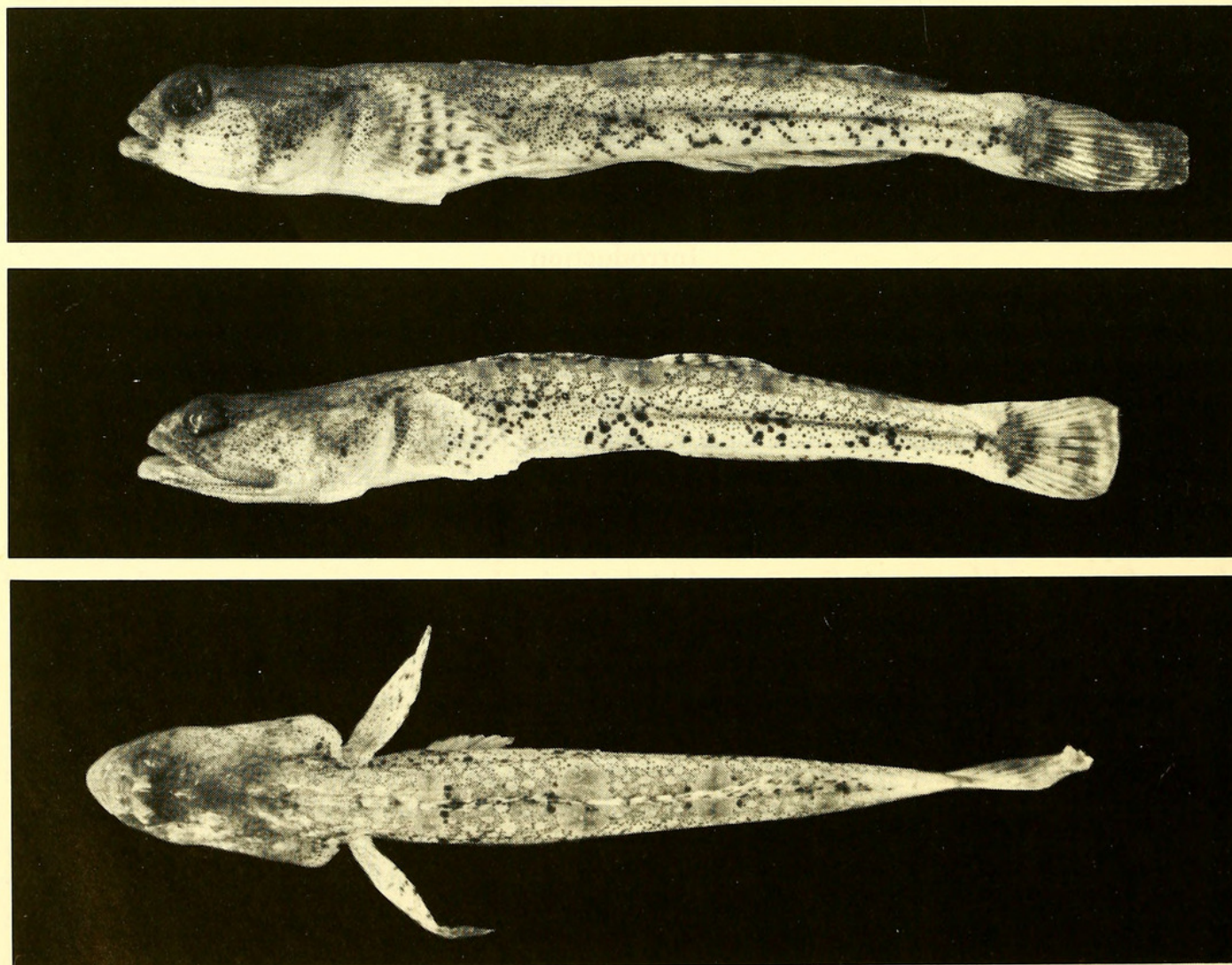


Fig. 1 *Schismatogobius deraniyagalai*, spec. nov. above: ZSM/CMK 6400, paratype, female, 31.6 mm SL; below: ZSM 27362, holotype, male, 30.8 mm SL.



29.8–31.6 mm SL, females; same data as holotype. — ZSM/CMK 6524, 2 ex., 37.7–40.0 mm SL, males; same data as holotype, kept alive in aquarium, preserved in March 1989. — CMS uncat., 12 ex., same data as holotype.

**Diagnosis.** The new species is distinguished from the four described species of *Schismatogobius* by its much slender body, 7.9–8.3 times in SL [vs. 4.0–4.25 in *S. insignus*, 5.0 times in *S. marmoratus* and *S. roxasi*, 4.0–6.0 in *S. bruynisi* (Herre 1927, 1936; Koumans 1935: 20; Peters 1868)]. It is the first species of *Schismatogobius* reported from Sri Lanka or an Indian Ocean island; all other known species have been collected in islands of the Pacific Ocean: Southern Japan, Indonesia, Philippines, Australia.

### Description

Morphometric data (in % of SL) of the male holotype, 30.8 mm SL, two female paratypes ZSM/CMK 6400, 31.3 and 31.6, mm SL and one male paratype ZSM/CMK 6524, 40.0 mm SL, respectively (other paratypes not measured as they were distorted) are as follow: total length 115.9, 117.6, 118.7, 115.0; head length 28.2, 25.6, 26.3, 31.8; predorsal length 38.3, 38.7, 38.6, 39.3; prepelvic length 32.5, 31.0, 30.4, 33.2; preanal length 60.4, 62.0, 62.7, 60.8; body depth at origin of first dorsal fin 12.0, 12.5, 12.7, 12.5; body width at origin of first dorsal fin 10.1, 10.5, 10.8, 10.0; depth of caudal peduncle 7.1, 7.0, 7.3, 7.3; length of caudal peduncle 16.2, 17.9, 17.1, 15.0; snout length 6.2, 5.4, 6.3, 7.3; head depth (at nape) 11.4, 12.8, 13.6, 13.8; eye diameter 6.2, 5.8, 5.7, 5.8; length of lower jaw (males only) 17.9, –, –, 20.3; length of pelvic fin 22.7, 23.3, 25.9, 22.3; length of pectoral fin 22.4, 19.2, 23.7, 19.5.  $D_1$ : VI;  $D_2$ : I, 9–10; A: I, 9; P: 14–15; V: I, 5.

Body naked, elongate, slender, with almost circular section. Head depressed, snout blunt, lower jaw protruding, reaching backwards almost to preopercle angle in males and to middle of eye in females. Eyes superior, close together, interorbital distance about equal to or slightly less than eye diameter. Tongue deeply notched. Teeth minute, granulous, on 2–3 rows on the anterior part of both jaws.

**Colouration.** Preserved specimens (holotype and paratypes ZSM/CMK 6400): Body yellowish brown, with numerous minute dark brown spots forming a dense reticulated pattern. This reticulated pattern is denser on the top of the head and in four small patches along dorsal midline, the first one at origin of first dorsal fin, the second one at origin of second dorsal fin, the third one at middle of base of that fin and the fourth one at its posterior extremity. To these four dark grey patches correspond four patches in the inferior half of the body with larger, black melanophores forming four very irregularly shaped black spots. A large, vertically elongated, oval spot at base of caudal fin. Chin blackish. Both dorsal fins with three rows of spots on the rays. Anal and pelvic fins hyalin. Caudal fin with about four irregular vertical rows of spots on the rays. Pectoral fin with about five vertical rows of spots.

In larger specimens (ZSM/CMK 6524), the blackish spots are larger and darker, the posterior two and the anterior two being more or less coalescent; they also extend on dorsal half of body. The caudal fin has two oval hyalin spots at its base, surrounded by black pigments and about three irregular vertical rows of spots.

In life, the body is yellowish brown with darker reticulations. The above mentioned four areas along the dorsal midline are greyish brown. The spots are black. In males, the chin and throat are orange-red. Inside of mouth of males bright red.

**Etymology.** Named for the late Paul E. P. Deraniyagala, in appreciation of his outstanding activity in Sri Lanka natural history.

**Field observations.** Despite extensive field work in all parts of Sri Lanka during the last 4 years, *S. deraniyagalai* has been collected only at or close to the type locality; on 23 IV 1989, some specimens have been collected from a slow flowing pool about 1 km upriver of the type locality. The species has also been seen but not collected at Yogama on the Sitawaka River (6°55'25" N 80°16'20" E), also a tributary of the Kelani River. The elevation of the stream at the type locality is approximately 40 m above sea level. The stream is about 5 m wide, has a substrate of pebbles with granite boulders in places where the stream is narrow and flow velocity higher, with sand and silt in areas of slower flow (shallow



pools). The greatest depth of the stream at the point of collection is about 1 m, but the fishes were observed among pebbles and sand in water as little as 30 cm deep. The original collection was made in a narrow part of the stream strewn with large boulders; the day of collection was in a period of low and occasional rainfalls in the area upriver and there were evidences (erosion) that the water level would be upto 4 m higher. The stream velocity was crudely measured at the surface by timing the distance travelled by a float in 5 or 10 seconds and was found to be approximately  $0.5 \text{ m.s}^{-1}$  at the centre of the stream in shallow rocky areas, and  $0.1-0.2 \text{ m.s}^{-1}$  at the centre of the stream in pools. Some unidentified *Hygrophila*-like plants were present further upstream of the point of collection. Thick clumps of a *Lagenandra* sp. were present on the margins of the slower flowing parts of the river. Other fish species observed at the type locality were *Puntius titteya* Deraniyagala, 1929, *P. pleurotaenia* Bleeker, 1864, *P. filamentosus* (Valenciennes, 1844), *Mystus vittatus* (Bloch, 1797) and the introduced *Tilapia rendalli* (Boulenger, 1896).

The water temperature at 10.30 on 27 IX 1988 was  $26^{\circ}\text{C}$  and the weather clear and sunny. Moderate rainfall had been recorded during the previous several weeks. The water was very clear. The atmospheric temperature was crudely measured to be  $27^{\circ}\text{C}$ . Acidity and hardness were measured using aquarium test kits (colour comparison methods); pH was 6.2 and total hardness  $0.4^{\circ} \text{dH}$ .

The We Oya has its origins about 20 km upstream of the type locality, in the hills around Dolobage. Collecting along the river in this upstream area showed the presence of this goby in a few small pockets, always in rocky parts of the stream. The We Oya meets the main stream of the Kelani about 5 km downstream of the type locality. The Kelani is, in terms of runoff ( $7.4 \times 10^9 \text{ m}^3$ ), Sri Lanka's second ranking river. It has a catchment area of  $2300 \text{ km}^2$  and originates in mountains more than 2000 m high, now mainly planted with rubber (*Hevea*). The Kelani flows into the sea about 60 km downstream of its confluence with the We Oya.

The We Oya flows through rubber plantations some distance (a few km) upstream. There are considerable amounts of leaf debris in the stream. There are probably agricultural effluents introduced from the plantations upstream of the type locality, but no specific introduction of pollutants was observed.

Feeding was not observed in the field. Local inhabitants were not aware of the diet of this fish, or even of the presence of the species in that stream. The goby was observed to take live *Artemia* nauplii in the aquarium, but showed no interest for the live fry of *Poecilia reticulata* or commercial aquarium fish food. Gut contents were not examined, but field observations indicate that it subsists mainly on zooplankton.

This species has a benthic life, like most other gobies. In the wild, undisturbed specimens move from rock to rock, and are very seldomly free-swimming. They approach the surface only if they move up to it along a rock. When disturbed, they dart to the bottom and burrow into the substrate, the head only being then visible. Many individuals were observed with the mouth wide open, facing against water flow. Adults were not observed shoaling, though it was not uncommon to observe a group of 3 to 7 individuals together in an area of about  $1 \text{ m}^2$ . In the aquarium, it was observed that they are able to change colour intensity to match the colour of the substrate.

Breeding behaviour has not been observed in the field. If, like several other freshwater gobies, this species has a marine larval stage, it can easily reach the sea; there are no dams, weirs, waterfalls or other obstacles along the route to the sea, approximately 65 km downstream of the type locality.

Investigations have been made at several localities along the Kelani to detect larvae of this species, but without success as the water is almost always very turbid. Observations had thus to be restricted to the vicinity of the type locality. Adults are abundant throughout the year. Females apparently outnumber the males significantly [out of 122 specimens collected by RP, 86 (70.5%) were females]. This may be biased because the males burrow more readily when disturbed. About 50 juveniles were briefly seen shoaling together on 14 IX 1989 but, owing to the turbidity, it was not possible to capture them to confirm the identification. They were moving together over the sandy substrate in very shallow wa-



ter (50 cm) in an oval, planar (one fish 'layer') shoal. The specimens were about 7–10 mm in total length.

Attempts to study the breeding behaviour in the field have had limited success. Larvae have never been seen or collected and no pairing or nest burrowing was observed. The wide mouth gape of the males and its bright red inner colouration suggest that it might have some display significance. Males were often observed together with females; they almost always had the mouth at least partly open, whether there was a female nearby or not.

As far as we are aware, there are no published data on the breeding habits of any species of *Schismatogobius* and it is not known if the whole life cycle is exclusively freshwater or if the fishes return to the sea at any stage. The relationships of *Schismatogobius* are also not yet cleared. Birdsong et al. (1988) recently divided the gobioids into 32 groups. *Schismatogobius* has not been assigned to any of them; they only mention that, according to Hoese (unpubl.), this genus and *Rhinogobius* might be related to *Awaous*, which they tentatively placed in the *Sicydium* Group, at the same time noting some affinities with the *Gobionellus* Group. In members of the *Sicydium* Group (*Lentipes*, *Sicydium*, *Sicyopterus*, *Sicyopus*, *Stiphodon*) larvae are drifted to the sea and seem unable to survive in freshwater (see for example Beyer 1989); they presumably remain close to their home stream, feeding in lagoons (Manacop 1953; Dotu & Mito 1955; Ryan 1986) before returning to freshwaters at a size of about 15 mm (MK, pers. obs.). On the other hand, it is known that some species of several genera of the *Gobionellus* Group (*Mugilogobius*, *Tamanka*) spend their whole life cycle in freshwaters (MK, pers. obs. in aquarium and lakes of Sulawesi). In Japan, some species of *Rhinogobius* (e. g. *R. giurinus*) are amphidromous while other are exclusively fluvatile (e. g. *R. flumineus*); in the *R. brunneus* „species complex“, some forms are fluvatile and others are amphidromous (Y. Masuda et al. 1989; Hayashi, in H. Masuda et al. 1984: 269–271). In Sulawesi, juvenile *Schismatogobius* sp. (about 10.0 mm SL) have been collected among pebbles immediately above tidal influence (MK, pers. obs.). The above observations on the Sri Lanka species seem to indicate that it might spend its whole life cycle in freshwater.

Status. The species is abundant in its preferred habitat and does not appear threatened at present. However, the very limited known distribution makes the whole population very sensitive to any environmental stress, especially pollution. Therefore, we consider the species worth of special concern and suggest that its population should be regularly monitored.

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