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A new species of *Asterropteryx* cheek-spine goby (Pisces, Gobiidae) from the Seychelles islands

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Abstract: *Asterropteryx gubbina* **sp. nov.** is described from Silhouette island, Seychelles. It is close to the widespread Indo-Pacific species *A. semipunctata* but differs in (1) having a dark spot and vertical bar on the caudal peduncle, terminated by a white area, (2) lacking a filamentous spine in the first dorsal fin and (3) having 12 second dorsal spines.

Key words: *Asterropteryx gubbina*, Gobiidae, new species, Seychelles

The cheek-spine goby genus *Asterropteryx* Rüppell, 1828 contains 8 species of small (less than 50mm) gobies from marine lagoons and reefs of the Indo-Pacific region. They are diagnosed by having at least one posteriorly directed spine on the posterior margin of the preopercle, cycloid or ctenoides scales on the cheek and operculum, no cutaneous ridge on dorsal midline of nape, dorsal fin spines usually VI+I, 10, anal fin rays I, 9; dorsal spines flexible; vertebrae 10+16=26; dorsal pterygiophores 3/II II I I 0; 2 anal fin pterygiophores anterior to first haemal spine; single epural; 6-7 transverse rows of sensory papillae below eye; cephalic sensory canal with pores B', C (single), D (single), E, F, G, H', K', L', M', N and O' (Shibukawa & Suzuki 2002, 2007). These characters are all found in other gobiids and no synapomorphies of *Asterropteryx* have been identified (Shibukawa & Suzuki 2002).

The genus can be divided into two groups (Shibukawa & Suzuki 2002, 2007): the "*spinosa* complex" (*A. spinosa, A. bipuntata, A. senoui* and *A. ovata*) and the "*semipunctata* complex" (*A. semipunctata, A. ensifera, A. striata* and *A. atripes*). These can be distinguished by the *semipunctata* complex having almost entirely separate pelvic fins, with only a rudimentary connecting membrane between the bases and no frenum; anterior-most caudal vertebra lacking a parapophysis; enlarged haemal arches on anterior most caudal vertebrae; preopercular spines restricted to between pores N and O'; embedded throat and ventral surface of gill membrane scales; cephalic sensory papilla row d broadly interrupted; some pairs of sensory papillae behind chin; blue spots on body.

On 5th December 2007 a distinctive *Asterropteryx* species was located in shallow lagoon waters on Silhouette island, Seychelles. Three further specimens were collected on 6-8th December and these specimens were compared to described species and recognised as a distinct species. This species is described below.

Methods

Counts and measurements follow (Shibukawa & Suzuki 2002, 2007). Scale counts were taken under dissecting microscope at x10 magnification. Cephalic sensory canals and papillae observed under a dissecting microscope at x10and x40 magnification.

Pores and canals were labelled after Shibukawa & Suzuki (2002,2007).

Institutional abbreviations: NPTS - Nature Protection Trust of Seychelles; UMZC - University Museum of Zoology, Cambridge

Comparative material of the two most similar members of the *Asterropteryx semipunctata* group were examined: *A. semipunctata* (NPTS un-numbered) and *A. ensifera* (UMZC F5935, 3 syntypes of *Asteropteryx monacanthus* Regan, 1908: 240).

***Asterropteryx gubbina* sp. nov.** (Fig. 1, 2, 3a)

Holotype. Male 13.9+3.21mm, UMZC F2008.1.1, south La Passe lagoon, Silhouette island, Seychelles, 4°29'03''S 55°15'09''E, 6th December, collected J. & R. Gerlach

Paratype. Female 12.9+2.13mm, UMZC F2008.1.2, 4°29'03''S 55°15'09''E, south La Passe lagoon, Silhouette island, Seychelles, 6th December, collected J. & R. Gerlach

Paratypes. Female 12.7+2.05mm, NPTS Cp2008.1, south La Passe lagoon, Silhouette island, Seychelles, 4°29'03''S 55°15'09''E, 5th December, collected J. & R. Gerlach; Male, damaged specimen (anterior half only), NPTS Cp2008.2, south La Passe lagoon, Silhouette island, Seychelles, 4°29'03''S 55°15'09''E, 7th December, collected J. & R. Gerlach

Diagnosis. *Asterropteryx gubbina* is distinguished from all other *Asterropteryx* species in having a dark spot and vertical bar on the caudal peduncle, terminated by a white area. It differs from *A. semipunctata* in lacking a filamentous spine in the first dorsal fin. It differs from *A. ensifera* in these characters and in having (1) at least 2 cheek spines (rather than 1) and (2) 12 first dorsal fin spines (rather than 9-11); from *A. atripes* and *A. striata* in having (1) no black lateral band, (2) a rounded caudal fin, and (3) topmost cheek spine below pore N.

Description. Dorsal fin spines VI+I 12; anal fin rays I 11; pectoral fin rays 12-16; pelvic fin rays I, 4-5, the innermost may be unbranched; branched caudal fin rays 6+6; upper unbranched caudal fin rays 2-5, unsegmented; lower unbranched caudal fin rays 4-6 unsegmented; longitudinal scale rows 24-25; transverse scale rows counted from origin of anal fin upward and forward to base of 1st dorsal fin 8.5; predorsal scales 8.

Proportional measurements given in Table 1. Head and body rather compressed, typical for *Asterropteryx*. Eye moderately large, its diameter equal to snout length. Interorbital space narrow, with less than pupil diameter. Mouth terminal, oblique, forming an angle of about 35° with body axis. Lower jaw slightly projecting beyond upper jaw. Posterior end of jaws extending to below anterior margin of pupil. Anterior nostril a short tube without skin flap. Posterior nostril a pore, closer to anterior margin of eye than to anterior nostril. Tongue rounded or nearly truncate, anterior tip free from floor of mouth. Lower lip interrupted at symphysis. Mental flap on chin absent. 2-4 short posteriorly directed spines on posterior margin of preopercle, uppermost one situated just behind and below sensory canal pore N; all preopercular spines similar in length, uppermost one slightly longer than others. Gill opening moderate in size,

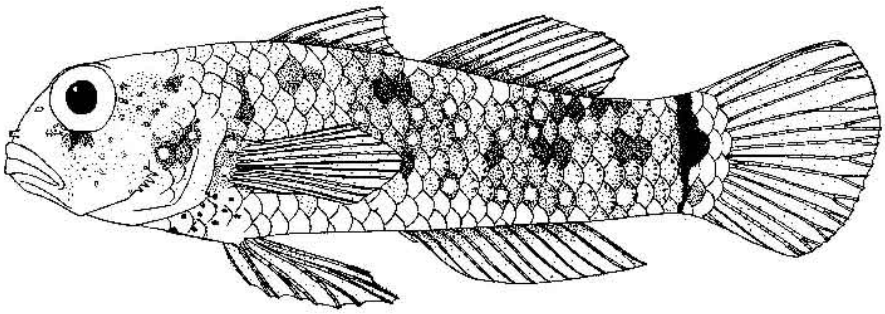

Fig. 1. *Asterropteryx gubbina* holotype. Scale bar 5mm. Note dorsal fin rays are finely divided, this is not distinguishable in the figure.

Table 1. *Asterropteryx gubbina* morphometrics

	Holotype Male	Paratype Female	Paratype Males	Paratype Females
Standard length (mm)	13.9	12.9	-	12.7
% of standard length				
Head length	24.5	17.9	17.0	22.5
Snout length	5.4	4.9	5.5	5.4
Length of longest cheek spine	0.8	0.7	0.7	0.7
Length of second longest cheek spine	0.7	0.7	0.7	0.7
Eye diameter	9.2	10.0	9.8	9.3
Interorbital width	1.2	1.1	0.9	0.9
Jaw length	6.1	6.9	6.5	6.9
Nape width	11.1	11.0	10.8	10.6
Head width	12.6	12.0	12.6	11.8
Head depth	22.7	23.0	22.9	22.6
Body depth	24.2	26.9	23.9	23.8
Body width	20.1	22.0	19.8	20.4
Predorsal length	38.2	39.4	38.0	39.1
Prepelvic length	36.1	29.8	35.5	29.8
Preanal length	60.3	57.4	-	58.7
Caudal peduncle length	23.7	16.5	-	16.0
Caudal peduncle depth	10.0	16.0	-	19.5
Length of D1 base	13.0	15.1	14.2	14.3
Length of first spine of D1	11.3	9.0	10.1	10.0
Length of second spine of D1	13.0	13.3	19.0	18.8
Length of third spine of D1	15.1	9.0	10.1	16.5
Length of fourth spine of D1	13.0	9.0	13.0	11.0
Length of D2 base	24.8	21.5	22.2	29.3
Length of spine of D2	15.1	11.2	10.1	10.2
Length of first segmented ray of D2	4.9	8.4	8.8	5.5
Length of longest segmented ray of D2	4.9	8.5	8.9	5.1
Length of first segmented ray of A	11.9	8.0	10.1	10.8
Length of longest segmented ray of A	12.7	10.0	10.8	11.7
P1 length	29.9	29.9	30.1	29.8
P2 length	24.8	25.0	22.5	23.0
Length of spine of P2	12.8	6.0	7.2	10.9
Length of fourth segmented ray of P2	14.8	21.0	13.5	12.9
Length of fifth segmented ray of P2	13.4	15.4	12.2	11.9
C length	19.6	23.3	-	21.5
% of head length				
Snout length	20.0	16.5	23.4	22.1
Eye diameter	36.0	33.3	29.9	30.2
Interorbital width	8.0	11.1	9.1	8.9
Jaw length	28.0	28.8	25.2	26.3
% of caudal peduncle length				
Caudal peduncle depth	44.1	55.1	-	49.0

lower edge extending anteriorly beyond pectoral fin base, reaching a vertical line at posterior margin of preopercle. Gill membrane attached to isthmus. No fleshy papilla-like projection on lateral margin of lateral wing of cleithrum. 1st dorsal lacking filamentous spines; 2nd spine is longest and reaches to base of 2nd dorsal. All segmented pelvic and caudal fin rays branched. Second dorsal fin higher than first, rays 1-8 uniform in length, 9-12 less than half the length of preceding rays. Pectoral fin rounded to slightly pointed, 6th ray longest, extending posteriorly to a vertical from base of anal fin. Pectoral fin rays unbranched. Pelvic fin not united at base, joined by only a rudimentary membrane; no pelvic frenum, 5th ray longest, tip reaching to base of anal fin; 5th ray 80% of fourth; all rays of pelvic fin branched. Caudal fin rounded.

Scales on head and body ctenoid with 16 cteni, except for slightly embedded cycloid scales on the anterior half of cheek, ventral surface of gill membrane, throat, nape around predorsal midline, pectoral fin base, prepelvic region and anterior half of abdomen. Snout, chin, lips, ventral surface of lower jaws and interorbital region naked. Teeth in jaws simple, conical; upper and lower jaws with about 4 rows of teeth anteriorly, narrowing to a single row posteriorly. Teeth in outermost row largest; no prominent canine-like teeth on jaws. No vomerine or palatine teeth.

Patterns of cephalic sensory systems shown in Fig. 3. Oculoscapular canal with pores B', C (single), D (single), E, F, G, H', K' and L'; preopercular canal with N and O'. Right and left sides of oculoscapular canal fused medially between pores C and D. Five short transverse rows of sensory papillae (1, 2, 3, 4/5 and 6) below eye. At least one longitudinal row of sensory papillae behind chin.

Colour in life. Dark phase: head and body dark brown to black, iris dark brown; alternate rows of body scales (rows 5 and 6) with a bluish white spot in centre of scales, blue spots also present on operculum and pectoral base. All fins infuscated with dark grey spots, most concentrated on base of dorsals. Caudal peduncle with a central black spot, crossed by a vertical dark bar which is wide above the spot, narrow below. Peduncle white posterior to the black band.

Fig. 2. Live *Asterropteryx gubbina*, photographed wild at La Passe, Silhouette 8th December 2007.

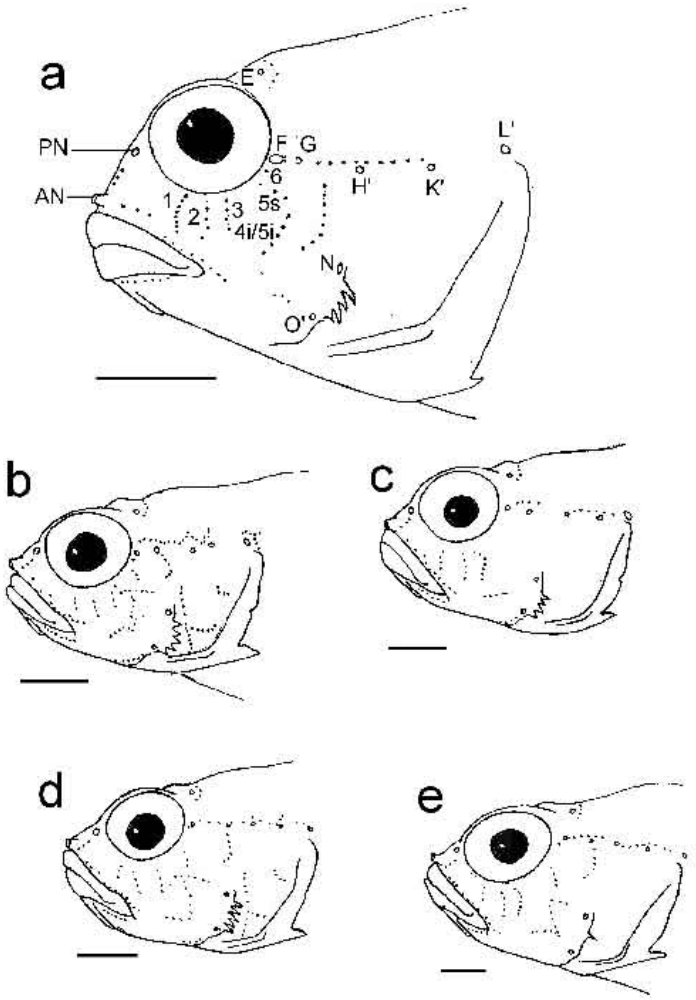

Fig. 3. Cephalic pore arrangement in *Asterropteryx semipunctata* group. a) *A. gubbina*; b) *A. atripes*; c) *A. semipunctata*; d) *A. striata*; e) *A. ensifera.* Scale 1mm. Dots represent sensory papillae (papillae rows numbered), open circles represent sensory canal pores (lettered). AN – anterior nostril, PN – posterior nostril.

Pale phase: dorsum off-white to pale grey-brown, cheeks and throat pale reddish-brown; three short dark reddish brown bars radiating from antero-ventral margin of eye; iris pale reddish-brown with white spots. Small dark spots on pre-pelvic region; large pale blue spots on operculum (2), pectoral base (2) and body (3 irregular rows of 5-6 spots on scale rows 5 and 6). Light reddish-brown patches on dorsum, may form 6 vertical bars. Pale scales with distinct dark chromatophores on posterior margin. Six white patches on dorsum between base of 1st dorsal and caudal. Caudal peduncle with central black spot, vertical dark bar reaching to spot and sometimes to underside, white posterior to

the black band. Caudal and pectoral fins hyaline, other fins with light brown bases.
Sexual dimorphism. Urogenital papilla distinct, long, narrow and pointed in males; female papilla short, broad, rounded or flattened. No sexual dimorphism in colouration. Both sexes lack filamentous dorsal spines, in males the 2nd or 3rd spine of the first dorsal reaches the base of the 2nd dorsal, in females no spines reach the 2nd dorsal.
Etymology. gubbina from 'gubbins' 16th century English for small pieces of fish.
Ecological and geographical distribution. All preserved specimens described above and 5 live individuals studied and released (8-9th December 2007) were collected from coral rubble in a lagoon at 1m depth. Subsequently one individual was observed in similar habitat in a depression on the reef flat.

Discussion

Asterropteryx gubbina belongs to the "*semipunctata* complex" of Shibukawa & Suzuki (2002) which is diagnosed by having unfused pelvic fins without a frenum, 1-10 cheek spines, throat scaled, operculum with approximately 4 rows of scales, two rows of papillae beneath chin, interrupted row d cephalic papillae, blue spots and no caudal black spot. Within this group it most closely resembles *A. ensifera* and *A. semipunctata*. Both *A. gubbina* and *A. ensifera* lack a filamentous spine in the first dorsal fin, in *A. ensifera* the longest spine is the 4th, in *A. gubbina* it is the 2nd or 3rd. *A. gubbina* has more rays in the second dorsal (12) than either *A. ensifera* (10) or *A. semipunctata* (9-11) and has more cheek spines than *A. ensifera* (2-4 compared to 1). It also differs from *A. semipunctata* in lacking a filamentous spine in the first dorsal. The colouration of the caudal peduncle appears to be distinct from all other *Asterropteryx* in the possession of a contrasting vertical black bar with a central spot and a terminal white area. This pattern is reputed to occur in small *A. semipunctata* but is not described in literature and we have not found it in specimens; a review of variation in *A. semipunctata* is in progress.

Key to species of the *Asterropteryx semipunctata* complex:

1. Black lateral band in pale phase individuals. Caudal truncate. Topmost cheek spine level with N. Hovering habit. Pacific only 2.
   No black lateral band. Caudal rounded. Topmost cheek spine below pore N. Bottom-dwelling. Indo-Pacific 3.
2. 3rd spine of first dorsal reaches to caudal fine. No black spots on dorsum, iris reddish, pelvic fin black. West Pacific *A. atripes*
   No filamentous dorsal spine, 4th spine may reach 2nd dorsal. Black spots on dorsum, iris white ventrally, pelvic fin transluscent. Pacific. *A. striata*
3. First dorsal fine spine with filament reaching C. Second dorsal with 10-11 rays. No black spot and bar on tail, no with end to peduncle. Indo-Pacific. 4.
   No filmanentous spines on dorsal, 2nd spine may reach second dorsal. Second dorsal with 12 rays. Black spot and vertical bar on tail, followed by white. Seychelles. *A. gubbina*
4. 1 cheek spine. A black lateral band sometimes present. *A. ensifera*
   2-9 cheek spines. No black lateral band. *A. semipunctata*

To date 115 species of Gobiidae have been recorded from Seychelles, including only two *Asterropteryx* species: *A. semipunctata* (Playfair 1867; Peters 1878; Mobius & Peters 1883; Smith 1958, 1963) and *A. ensifera* (Regan 1908 as *A. monacanthus*; Smith 1963). Smith (1965) considered *A. semipunctata* to be "common" and *A. ensifera* to be "rare", both species have been recorded at a wide range of depths. *A. semipunctata* is reputed to favour "dirty water" (Hoese 1991) and in Seychelles specimens have been collected around Mahé (north-east and east coasts), Anonyme, Souris and Aldabra, all coastal reef flats and mangroves. *A. ensifera* has been collected at "Amirantes, 30 fathoms" (island not specified - Regan 1908). *A. gubbina* has only been recorded in clear water in the coastal lagoon and in pools on the reef-flat at depths of less than 1m.

Asterropteryx gubbina was found in coral rubble in the in-shore lagoon in December 2007. This habitat was shared with the tropical sand goby *Favonigobius reichei*, the green-bubble goby *Eviota prasina* and *Valenciennea sexguttata*. Littoral rocky fringes of this habitat were also occupied by the blennies *Istiblennius andamensis* and *I. impudens*. In March 2008 seasonal sand movement resulted in most of this rubble being covered by sand. *A. gubbina* were observed to move to areas of lower turbidity and by April 2008 were restricted to silt-free pools within the reef-flat. Captive *A. gubbina* were observed to feed on small *Thalamita* sp. crabs and one individual was eaten by an immature *F. reichei*. Courtship display was seen in captive gobies in December 2007 and a 1cm juvenile observed in April 2008.

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