

Ontogeny of the cheek-spined goby *Asterropteryx semipunctata* (Pisces, Gobiidae)

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Abstract: *Asterropteryx semipunctata* and the similar *A. gubbina* are compared from specimens collected at Silhouette island, Seychelles. Ontogenetic changes in *A. semipunctata* show that adult morphology is attained at 30.1mm (development of dorsal fin pennant and urogenital papilla) whereas *A. gubbina* are mature at 12.7mm. The two species are easily distinguishable on colouration at all sizes.

Key words: *Asterropteryx gubbina*, *Asterropteryx semipunctata*, Seychelles, Silhouette, ontogeny

The cheek-spine goby genus *Asterropteryx* Rüppell, 1828 contains 9 described species of small (less than 50mm) gobies from marine lagoons and reefs of the Indo-Pacific region. The genus is divided into two groups (Shibukawa & Suzuki 2002, 2007): the “*spinosa* complex” (*A. spinosa*, *A. bipunctata*, *A. senoui* and *A. ovata*) and the “*semipunctata* complex” (*A. semipunctata*, *A. ensifera*, *A. striata*, *A. atripes* and *A. gubbina*). The “*semipunctata* complex” is the most diverse of the two groups and *A. semipunctata* is the most widespread species, being found from the east coast of Africa to the east Pacific. Recently described *Asterropteryx* have been well described and most are highly distinctive. However, confusion between juveniles of these small species makes identifications of some individuals and populations difficult. A study of one population of *A. semipunctata* in the Seychelles islands enabled ontogenetic changes to be evaluated and this common, widespread species to be compared with the similar but smaller *A. gubbina* (Gerlach & Gerlach 2008).

Methods

Study population

Asterropteryx populations were studied in the lagoon at Silhouette island, Seychelles (4°29'03”S 55°15'09”E) in between December 2007 and April 2009. These comprised localised populations of *A. semipunctata* and *A. gubbina* in coral rubble in the lagoon. *A. gubbina* was described from this population and was the only species located there in December 2007. Subsequently only *A. semipunctata* were located. Several individuals of *Asterropteryx* were captured and placed in an aquarium. A range of sizes was collected, from 10.1mm to 38.1mm, representing juveniles and mature adults of both sexes.

Measurements

Fish were individually transferred into a small glass tube, restricting their movement during examination under a dissecting microscope at x10 magnification. Counts and measurements follow Shibukawa & Suzuki (2002, 2007). Cephalic sensory canals and papillae observed under a dissecting microscope at x10 and x40 magnification. Pores and canals were labelled after Shibukawa & Suzuki (2002, 2007).

Description of *Asterropteryx semipunctata*

Dorsal fin spines VI+I 11-12, 3rd dorsal ray developed into a long, filamentous pennant in adults, this is apparent in all fish longer than 13.5mm standard length; anal fin rays I 11-15; pectoral fin rays 15-16; pelvic fin rays I, 7, 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 8-9; predorsal scales 8.

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, 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 frenal, 5th ray longest, tip reaching to base of anal fin; 5th ray 80% of fourth; all rays of pelvic fin branched. Caudal fin rounded.

Cheeks with 2-9 spines (3-8 in Silhouette specimens). 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, row 6 divided into two parts (6s and 6i). 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; body scales (rows 5 and 6) with an electric blue 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, and posterior half of second dorsal. Caudal peduncle uniformly dark.

Pale phase: dorsum of head and body off-white to pale grey-brown, cheeks and throat pale reddish-brown; usually no radiating bars from the antero-ventral margin of eye, some individuals may have one ventral bar running from eye to angle of jaw; iris pale reddish-brown with white spots. Small dark spots all over body; numerous large electric blue spots on operculum, pectoral base, second dorsal base (large adults) and on body. Light reddish-brown stripe on sides, 8 white patches on dorsum. Pale scales with distinct dark chromatophores centrally. White spot at base of pectoral. Caudal peduncle with a black spot on dorsal half, interrupted by a white spot at postero-dorsal end. In some individuals this extends downwards towards the ventral part of the peduncle, with a postero-ventral white patch. Peduncle not white posterior to the black band. Caudal and pectoral fins hyaline, other fins hyaline, with light brown bases.

Sexual dimorphism.

Urogenital papilla distinct, long, narrow and pointed in males; female urogenital papilla short, broad and rounded or flattened. No sexual dimorphism in colouration or in filamentous pennant development.

Onotgenetic changes

Colouration of juveniles is very similar to that of adults. Changes in colouration include expansion of blue spots, from being restricted to the lower half of flanks and on pelvic fins in juveniles under 10mm (maximum 9.6mm), extending all over the body by 13.5mm. Juveniles may have fine white speckles on the basal half of the pectoral fins, all over the pelvics and caudal fin. The filamentous dorsal pennant is not present in small juveniles under 10mm long (9.6mm), individuals 13.5mm long have the first three dorsal spines extended, reaching the second dorsal fin. At 27.1mm the filamentous third spine is developed, reaching 1/3 of the length of the second dorsal. At 30.9mm it is fully developed, reaching half-way along the second dorsal.

The urogenital papilla is not developed until maturity, the smallest individual with a urogenital papilla was 30.9mm long.

Comparison with *Asterropteryx gubbina*

Differences between the two species are summarised in Table 1.

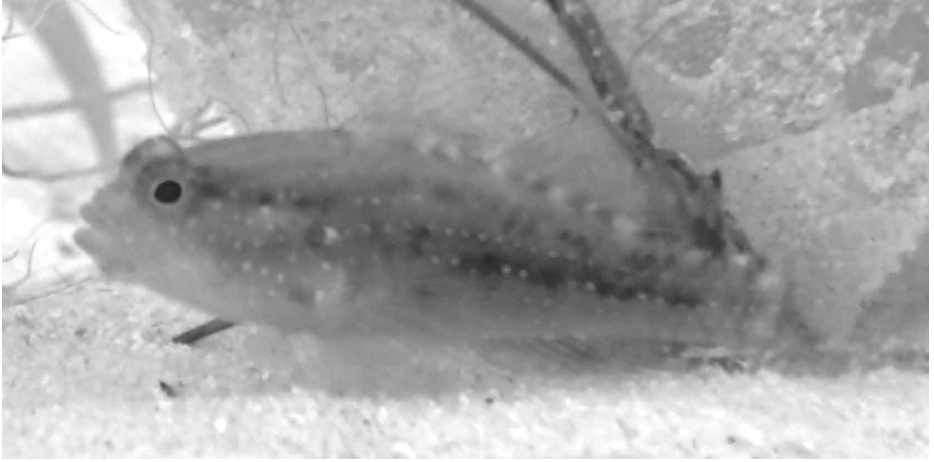


Fig. 1. Pale phase *Asterropteryx semipunctata* (top) and *A. gubbina* (bottom).

Discussion

The blue-spotted or starry goby *Asterropteryx semipunctata* is a widespread species. It is a highly distinctive species with bright blue spots at all sizes studied. The typical pennant on the first dorsal fin is detectable in subadult specimens over 13.5mm although full sexual maturity (as indicated by the presence of the sexually dimorphic urogenital papilla is only present in individuals with a standard length of at least 30.9mm, this gives an adult size range of 30.9-38.2mm. In contrast the superficially similar *A. gubbina* is mature at 12.7mm and does not exceed 17.0mm. It is probable that other diminutive species of *Asterropteryx* exist but have been assumed to be juveniles

of *A. semipunctata*. The description given above should serve to discriminate between true juveniles of *A. semipunctata* and other species.

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Table 1. Comparison of *Asterropteryx semipunctata* and *A. gubbina* from Silhouette island, Seychelles.

Characters		<i>A. semipunctata</i>		<i>A. gubbina</i>
		adult	juvenile	
colour pattern	caudal peduncle	black spot on dorsal half, may have postero-ventral white patch	as adult	black spot on dorsal half followed by a white vertical band
	spot pattern	body and fins	body only	absent
dorsal ray pennant present		long	>13.5mm	never
longest dorsal spine		3 rd	3 rd	2 nd or 3 rd
dorsal fin spines		VI+I 9-11	VI+I 9-11	VI+I 11-12
cheek spines		2-9	2-9	2-4
smallest adult with urogenital papilla		30.9mm	-	12.7mm
maximum size		38.2mm	-	17.0mm