

A new species of the gudgeon *Bostrychus* (Teleostei: Gobioidi: Eleotridae), from peninsular Malaysia

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ABSTRACT

A new species of the eleotrid genus *Bostrychus* is described from a single specimen obtained from a disturbed mangrove site at the Sementa River, in Selangor State, Malaysia. It resembles *B. sinensis* and *B. strigogenys* in vertebral number, body shape and interorbital pore pattern, but differs from all known species of *Bostrychus* by the ladder-like barred body markings, the spotted, dark-margined pectoral fins and low fin ray counts. It is the second known “estuarine” species of the genus.

KEYWORDS: Eleotridae, *Bostrychus*, new species, estuarine, Malaysia.

INTRODUCTION

There are six known species of the eleotrid genus *Bostrychus* Lacepède: five from the western Pacific and one from west Africa, with the last species sometimes placed in the genus *Hannoichthys* Herre. Hoese and Kottelat (2005) discussed these species in their description of the cave-dwelling *B. microphthalmus* and provided a key to the Pacific species. *Bostrychus* greatly resembles *Odonteleotris* Gill, but for the possession of vomerine teeth (lacking in *Odonteleotris*) and difference in adult size (*Odonteleotris* reaching at least 305 mm SL, *Bostrychus* reaching 185 mm SL) (pers. obs.; Hoese and Kottelat 2005).

No species of *Bostrychus* is very well studied, but three, *B. africanus*, *B. sinensis* and *B. zonatus*, are regularly recorded from estuarine (mangrove) habitats. The other species all appear to be confined to fresh waters and are highly localised in distribution. This paper describes a new species from a mangrove habitat in Malaysia. The collection site was searched for additional specimens subsequent to the new species’ discovery, but none were found. The site is now ‘reclaimed’ land.

METHODS

Measurements were taken using electronic callipers and dissecting microscope. Counts and methods generally follow Hubbs and Lagler (1970), except as indicated below. Transverse scale counts backward (TRB) are taken by counting the number of scale rows from the anal fin origin diagonally upward and back toward the second dorsal fin

base. Head length is taken to the upper attachment of the opercular membrane. The segmented or branched caudal ray pattern (c.g. 9/8 or 9/7) is the number of segmented caudal rays attaching to the upper and lower hypural plates respectively. Vertebral counts and other osteological information was obtained by X-ray. Pterygiophore formula follows Birdsong *et al.* (1988).

Abbreviations. NTM – Museum and Art Gallery of the Northern Territory (previously Northern Territory Museum), Darwin.

Comparative material. *Bostrychus sinensis*, NTM S.12731-018, 4(44-90), Yonada River, Iriomote-jima, Japan; NTM S.10555-001, 2(79-92), Ludmilla Creek, Darwin, Northern Territory, Australia. *Bostrychus zonatus*, NTM S.14219-001, 1(86), Ludmilla Creek, Darwin, Northern Territory, Australia; NTM S.14768-001, 2(93-114), creek off Dick Ward Drive, Ludmilla, Darwin, Northern Territory, Australia.

SYSTEMATICS

Bostrychus Lacepède, 1801

Bostrychus Lacepède, 1801: 140 (type species *Bostrychus sinensis* Lacepède, 1801, by subsequent designation).

Boroda Herre, 1927: 58 (type species *Boroda expatria* Herre, 1927, by original designation).

Hannoichthys Herre, 1950: 198 (type species *Eleotris africana* Steindachner; replacement for *Hanno* Herre, 1946, preoccupied by *Hanno* Gray, in Mammalia).

Bostrychus scalaris sp. nov.

Ladder gudgeon

Material examined. HOLOTYPE – NTM S.15552-003, 93 mm SL male, small pool at low tide, disturbed mangrove at Sementa River, 3° 4.84' N 101° 21.35' E, near Klang, Selangor State, Malaysia, H. Larson, A. Sasekumar, S. Lim, G. Liew and parasitology students, 5 October 2002.

Diagnosis. A *Bostrychus* with 1,9 second dorsal fin rays; 1,8 anal fin rays; 16 pectoral rays and 135 to 142 lateral scales; mandibular sensory papilla row *i* arranged in clusters; broad, depressed head and slender, compressed body; heavily pigmented pectoral fins, and distinctive ladder-like dark bars and complex serpentine pattern on the body.

Description. Based on the male holotype, 93 mm SL (Figs 1, 3).

First dorsal spines VI; second dorsal rays 1,9; anal rays 1,8; pectoral rays 16 (on both sides); segmented caudal rays 17, in 9/8 pattern; branched caudal rays 8/7; lateral scale count 135 (on left side; 142 on right); transverse scales backward 42 (on left; 35 on right); predorsal scale count 32; vertebrae 12+15; dorsal pterygiophore pattern 3-3210; 2 epurals; 4 anal pterygiophores anterior to first haemal spine.

Body slender, somewhat rounded anteriorly, compressed posteriorly; body depth at anal fin origin 15.5% of SL. Caudal peduncle long, length 23.0% of SL. Caudal peduncle depth 12.3% of SL. Head broad, depressed, considerably wider than deep at preopercular margin, head length 25.7% of SL; head depth at posterior preopercular margin 46.4% of HL; width at posterior preopercular margin 75.7% of HL; greatest width, at inflated cheeks, 82.4% of HL. Mouth large, terminal and oblique, forming an angle of about 30° with body axis; jaws ending at point just behind eye. Upper jaw length 56.5% of HL; inner margin of lips finely fimbriate; lower lip fused to chin anteriorly, side of lip free; chin slightly inflated anterior to groove containing mental papillae. Anterior naris at end of long tapering tube at edge of upper lip; posterior naris oval, in short tube sunken in distinct pit; adjacent to anterodorsal margin of eye. Eye small, lateral, width 15.9% of HL. Interorbital broad, fleshy, 37.7% of HL. Snout broad, flat, blunt anteriorly in dorsal view, flattened, slightly pointed in lateral view, 32.2% of HL. Gill opening damaged (removed for monogenean parasite study) but judging from tissue remnants, opening extending forward to under posterior margin of preopercle. Tongue large, tip gently rounded. Teeth in both jaws small, evenly sized, conical and rather blunt-tipped; in six or



Fig. 1. Living captive holotype of *Bostrychus scalaris*, NTM S.15552-003, 93 mm SL male, Sementa River, Malaysia, showing distinctive barred colour pattern. Image has been digitally modified, to remove white reflective scratches (on plastic aquarium wall).

seven rows across front of jaws, and four or five rows along side. Vomerine teeth low, blunt, conical, arranged in broad triangular patch six to eight rows deep. Headpores as shown in Figures 4, 5; five preopercular pores present; single median anterior interorbital pore; paired posterior interorbital pores; anterior (small and close to edge of upper lip) and posterior nasal pores; six pores from behind eye in broken oculoscapular canal. Sensory papillae in transverse pattern (Figs 4, 5); mandibular papillae *i* (sensu Sanzo 1911) in few short transverse rows and mostly arranged in eight or nine irregular clusters; pair of *i* papillae clusters on chin.

Body covered with small cycloid scales, reaching onto head; scales on head largely embedded in fleshy skin, can be difficult to discern. Opercle covered with small cycloid scales. Preopercle with small cycloid scales covering most of cheek (difficult to see, especially near papilla rows). Prepelvic region with embedded small cycloid scales extending forward onto isthmus (actual extent indeterminate due to damage). Pectoral fin base covered with small cycloid scales. Predorsal scales small, cycloid, extending up to just above opercle. Belly with embedded cycloid scales.

First dorsal fin low, pointed (tips of third and fourth spines twisted), adpressed fin falling well short of second dorsal fin spine, with gap of about 17 small scales between the two fins. Posteriormost second dorsal and anal rays taller than first dorsal fin but not greatly so; posterior rays slightly longer than anterior rays but not greatly so, posterior rays falling well short of caudal fin base. Pectoral fin broadly rounded, central rays longest, 16.9% of SL; upper and lowermost two rays unbranched. Pelvic fin length 18.0% of SL; pelvic fins slender, pointed, fourth rays longest, fins



Fig. 2. Living captive holotype of *Bostrychus scalaris*, close-up of head.



Fig. 3. Preserved *Bostrychus scalaris* holotype, NTM S.15552-003 (attitude due to gill arches being removed for parasite study).

extending less than half the distance to anus. Caudal fin oval, rounded posteriorly; caudal fin length 22.7% of SL.

Live colouration. Based on photographs of captive holotype (Figs 1, 2), taken under field conditions (not ideal; and using 2001-vintage digital camera). Head and body whitish with dark brown and pale gold markings. Head pinkish white on lower half, with dark brown to pale gold, ocellate to vermiculate, convoluted pattern covering most of head, markings coalescing dorsally; darkest and most conspicuous part of pattern a blackish brown broad band from snout running along suborbital and joining similar blackish brown bar from eye. Iris red-gold, outer margin of iris brown-speckled, thin light golden edge around pupil. Mid-side of body with ladder-like pattern of 24 short vertical dark brown bars, all joined together ventrally by irregular dark brown, partly broken, broad line and coalescing dorsally with serpentine pattern of broad dark brown lines and spots on dorsum; bars and spots and vermiculate lines mostly outlined diffusely with pale gold. Upper part of caudal fin with round black spot broadly ocellated with dark yellow; remainder of fin dark yellow with about five irregular bands of dark brown, outermost row blackish and reaching posterior margin of fin. First dorsal fin mostly folded down in only available photographs; blotches of dark brown and dark yellow partly visible. Second dorsal fin yellow with about seven oblique irregular bands of dark brown to blackish brown. Anal fin pale yellowish white; some purplish brown and dull yellowish mottling may be present (unclear from photos). Pectoral fin reddish orange with broad dark brown bar curving along fin base and outer half of fin blackish brown with narrow whitish margin, remainder of fin with dark brown spots and streaks following fin rays. Pelvic fins whitish with broad dusky grey streak or blotch on fin rays (not clear in photos).

Colouration in alcohol. Pattern same as live colour but body whitish with greyish brown markings on head and body (Fig. 3). Distinct slightly oval blackish spot, surrounded by white, on upper caudal fin base. Caudal fin spots dark brown. Pectoral fin markings blackish, with broad fin margin darkest. Anal fin white with indistinct scattered fine grey elongate marks running along fin rays. Pelvic fins whitish with broad dusky grey streak along central rays.

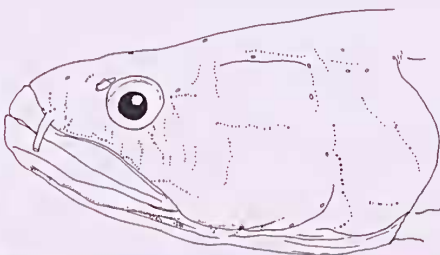


Fig. 4. Lateral view of head of *Bostrychus scalaris* holotype, showing lateral canal pores and sensory papillae.

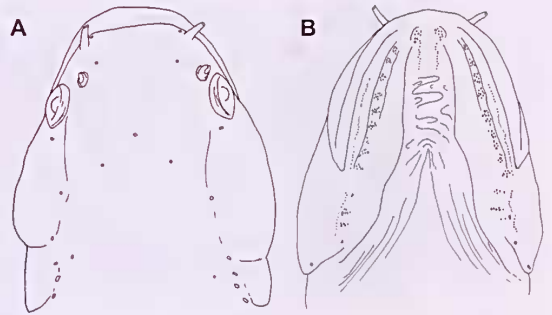


Fig. 5. *Bostrychus scalaris* holotype, A, dorsal view of head of showing lateral canal pores; B, ventral view of part of head, showing mandibular sensory papillae (gill region damaged).

Distribution. Known from only one specimen from Selangor state on the west coast of peninsular Malaysia, and from a watercolour painting (Fig. 6) in a notebook compiled in Singapore between 1858 and 1862 by the French naturalist F. L. de Castelneau, and now stored in the Zoological Museum of the University of Liège in Belgium (Loncux 2006). No specimens from Singapore are known.

Comparisons. This new species differs considerably in colour pattern from all other known species of the genus, having strongly pigmented pectoral fins, unlike all the others, which all have relatively plain unspotted pectoral fins, and it has a distinctive barring and serpentine pattern on the body. The ladder-like pattern of 24 short vertical dark bars along the side of the body somewhat resembles the bars seen in *B. zonatus* Weber, but this species has seven to nine broad brown bars along the lower half of the body and finely speckled and spotted dorsum. Good colour photographs showing the body pattern of living specimens of *B. strigogenys* Nichols and *B. zonatus* can be seen in Allen *et al.* (2000).

Bostrychus scalaris, *B. sinensis* Laeepède and *B. strigogenys* are all similar in body shape, in that they have broad flat heads with long jaws, while *B. zonatus* has a short snout and jaws and more cylindrical head; they also share similar first dorsal fin spine counts (VI–VIII) and vertebral numbers (26–30), while *B. zonatus* has VIII–X first dorsal fin spines and 36–38 vertebrae (pers. obs; Hoese and Kottelat 2005). The sunken pit in which the posterior naris protrudes from in *B. scalaris* is also present in *B. sinensis* and *B. zonatus* (other species not examined).

The mandibular sensory *i* papillae are arranged in proliferated clusters, with only the posteriormost three rows arranged in what could be described as short transverse rows, and the row is mostly set in a deep fleshy groove. This pattern is similar to that observed in *B. sinensis* and *B. zonatus* in which the transverse *i* rows are partly doubled or proliferated, but not to such an extent (pers. obs.).

Ecology. The holotype was found under a small log in a very small muddy pool at low tide, in a partly cleared mangrove (dominated by *Avicennia marina*) on the Sementa



Fig. 6. Castelneau's painting of *Bostrychus scalaris*, not identified to genus, from his Singapore notebooks. Photograph courtesy University of Liège, Belgium.

River, near Klang. The adjoining area was searched twice for additional specimens. The collection site is now "reclaimed" land. The water was brackish (20 ppt) and only a few centimetres deep.

The gill arches were removed for an ongoing survey of monogenean parasites and their relationships; unfortunately none were found (S. Lim, pers. comm.).

Etymology. From the Latin *scalaris*, a ladder, in reference to the step-ladder-like banded pattern on the body of this species. A suggested common name is ladder gudgeon.

Remarks. This species must have existed in Singapore at one time, as it was collected and illustrated by Castelneau (Fig. 6), some time between 1858–1862. This fish was identified only by the number 607, with no notes as to what genus Castelneau thought it might be. It is not known what has become of the specimen. The only *Bostrychus* that has been reported from Singapore is *B. sinensis* (Larson *et al.* 2008).

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