

A redescription of the bearded gudgeon, *Pogoneleotris heterolepis* (Günther, 1869) (Teleostei: Gobioidei: Butidae)

Helen K. Larson^{1,2*} & Tan Heok Hui³

Abstract. The poorly known butid gudgeon *Pogoneleotris heterolepis* is redescribed based on 15 specimens obtained from fish markets and local fishers from 1982 to 2018, plus examination of the holotype. It is unique among butids in having a longitudinal papilla pattern and the preopercular canal continuous with the oculoscapular canal and is one of only two gobioids (other than *Rhyacichthys* and *Terateleotris*) known to have this latter condition.

Key words. riverine fish, Borneo, aquatic biodiversity, Butidae, *Pogoneleotris*

INTRODUCTION

The rare butid gudgeon species *Pogoneleotris heterolepis* (Günther, 1869) belongs to a monotypic genus and is rarely referred to in the literature (Larson & Murdy, 2001; Kottelat, 2013). *Pogoneleotris* is a strange-looking large pinkish-brown gudgeon with the side and underside of the head covered with rows of elongate branched flattened papillae and groups of long branched barbels, the eyes are greatly reduced, each scale on the side of the body has several auxiliary cycloid scales, and the scales above and below the mid-lateral region are cycloid. The species appears to be known only from estuarine rivers of Sarawak, Malaysia.

Günther (1869: 445) originally described *Eleotris heterolepis* based on a single specimen (BMNH 1868.6.9.16; 136 mm SL), which had been sent to him by Giacomo Doria. Vinciguerra (1926) subsequently provided a more detailed description of *Pogoneleotris heterolepis*, based on one specimen of 171 mm (most probably total length) held at the Museo Civico di Storia Naturale (MSNG). Tan & Grinang (2018) indicated that the specimen examined by Vinciguerra is different from the specimen deposited in London. Both specimens were collected by the same person and it could be argued that the MSNG specimen is a syntype (e.g. Kottelat [2013] and Fricke et al. [2019]). However, Vinciguerra's remarks suggest that it was not the basis for Günther's description and should not then be regarded as a syntype. More importantly, the specimen deposited in MSNG was not

mentioned in the original description. Thus, the specimen catalogued as BMNH 1868.6.9.16 is the holotype and the unique type specimen of *Pogoneleotris heterolepis*.

We redescribe the species, based on examination of the holotype and 15 additional specimens obtained from fish markets and local fishers between 1982 and 2017.

MATERIAL AND METHODS

Measurements were taken using calipers and dissecting microscope. Counts and methods generally follow Hubbs & Lagler (1970), except as indicated. Lateral scale count follows scale rows. Transverse scale count (TRB) is the number of scale rows from directly in front of the anal-fin origin diagonally upward and back toward the second dorsal fin base. Circumpeduncular scale count is taken beginning at the first scale on top of the caudal peduncle immediately in front of the caudal fin, following the scale rows down and forward to the ventral edge of the peduncle, then around and back to the original scale. Head length is taken to the upper attachment of the opercular membrane. Interorbital width is least bony width. Head length (HL) is taken to the upper attachment of the opercular membrane.

TAXONOMY

***Pogoneleotris* Bleeker, 1875: 107 (type species *Eleotris heterolepis* Günther, 1869, by original designation and monotypy).**

***Pogoneleotris heterolepis* (Günther, 1869)**
(Figs. 1–4)

Eleotris heterolepis Günther, 1869: 445 (type locality: Malaysia: Borneo: Sarawak).

¹Museum and Art Gallery of the Northern Territory, GPO Box 4646, Darwin, NT 0801, Australia

²Museum of Tropical Queensland, 70–102 Flinders Street, Townsville, Queensland 4810, Australia; Email: helen.larson@nt.gov.au (*corresponding author)

³Lee Kong Chian Natural History Museum, National University of Singapore, 2 Conservatory Drive, Singapore 117377; Email: heokhui@nus.edu.sg



Fig. 1. Dorsal, lateral and ventral views of preserved male *Pogoneleotris heterolepis* (ZRC56949, 160.0 mm SL).

Pogoneleotris heterolepis – Bleeker, 1875: 107 (Borneo); Vinciguerra, 1926: 543, pl. 1; Koumans, 1953: 323; Tortonese, 1963: 342; Kottelat & Lim, 1995: 247; Larson in Randall & Lim, 2000: 639; Larson & Murdy, 2001: 3577; Parenti & Lim 2005: 194; Atack, 2006: 167; Kottelat, 2013: 395; Tan & Grinang, 2018: 203–210.

Material examined. SARAWAK: BMNH 1868.6.9.16, 136 mm SL male, holotype of *Eleotris heterolepis*, Sarawak, coll. G. Doria. ZRC 54119, 1(186), Rejang River at Kanowit, main river next to cemetery, coll. Martin Abba, 17 July 1982; ZRC 39733, 1(195), Kota Samarahan market, coll. H.H. Tan and S.H. Tan, 15 January 1996; ZRC 54118, 1(156), Serian wet market, coll. H.H. Tan, between 31 August and 5 September 1996; Sarawak Museum [held at ZRC], 1(152), Serian wet market, coll. H.H. Tan, between 31 August and 5 September 1996; ZRC 41853, 1(159.5), Serian, coll. H.H. Tan, 29–31 October 1997; ZRC 56950, 4(121–210), Sungai Simunjan, coll. J. Grinang and party, 7 September 2017; ZRC 56951, 2(121–155), Sungai Ba, coll. J. Grinang and party, 7 September 2017; ZRC 56952, 1(171), Rejang, Sibu, October 2017; ZRC 56949, 3(150–167), Sungai Simunjan, coll. H.H. Tan and party, 31 January 2018.

Diagnosis. First dorsal fin VI; second dorsal fin I,11–12; anal fin I,10; pectoral fin 20–23, usually 22; 17 segmented caudal fin rays in 9/8 pattern, branched caudal fin rays 15–

17, usually 15 in 8/7 pattern, procurent caudal elements 11–15 dorsally, 11–13 ventrally; lateral scales about 38–64, counting main rows only (difficult to see scale rows due to many auxiliary scales); TRB 15–25. Vertebrae 10+16=26 (n = 15); dorsal pterygiophore pattern 3-22110; epurals 2; 2 anal pteryiophores before first caudal vertebra. Pelvic fins separate, space between fin bases scaled. Body with large scales, ctenoid scales alternating with clusters of cycloid scales and auxiliary scales present. Teeth sharp, in about six rows in both jaws. Sensory canals and pores mostly obscured by skin and sensory papillae, but canal extends from pore just above upper lip continuously to rear of opercle; pores usually at ends of branches from main canal; four preopercular pores present, in canal continuous with oculoscapular canal. Sensory papillae in longitudinal pattern, papillae themselves are mostly elongate thin flaps or variously branched, others are seated in oval pits on cheek. Known only from estuarine rivers in Sarawak, Malaysia.

Description. First dorsal fin VI; second dorsal fin I,11–12, usually I,11; anal fin I,10–11, usually I,10; pectoral fin 20–23, usually 22; 17 segmented caudal fin rays, branched caudal fin rays 15–17, usually 15 in 8/7 pattern; lateral scales 38–64, counting main rows only (difficult to see scale rows due to the many clusters of auxiliary scales); TRB 15–25; 42–67 predorsal scales; 14–22 circumpeduncular scales.



Fig. 2. Dorsal, lateral and ventral views (right side reversed) of head of fresh *Pogoneleotris heterolepis* (ZRC56949, 160.0 mm SL male); showing extent of scalation and sensory papillae.

Morphometric values of males and females are given in Table 1. See Figs. 1 and 4. Body cylindrical anteriorly, becoming compressed and narrower posteriorly, with slender caudal peduncle (Fig. 1). Head broad, depressed anteriorly, with nape variably humped; with low concavity or groove at leading edge of scaled area behind interorbital. Eyes very small, facing dorsally. Interorbital very wide, about 30% of head length. Jaws large (about 40% of head length), oblique, at about 40° angle to body axis, chin tip anteriormost. Tongue large, tip rounded to blunt. Mouth terminal, oblique, lower jaw prominent, jaws reaching back to before very small eye; lip lining fimbriate, fimbriae often branched. Teeth in both jaws in 5–8 rows, with about six large stout curved teeth widely spaced across front of jaw, with 5–6 rows of small conical teeth crowded behind; and innermost row of

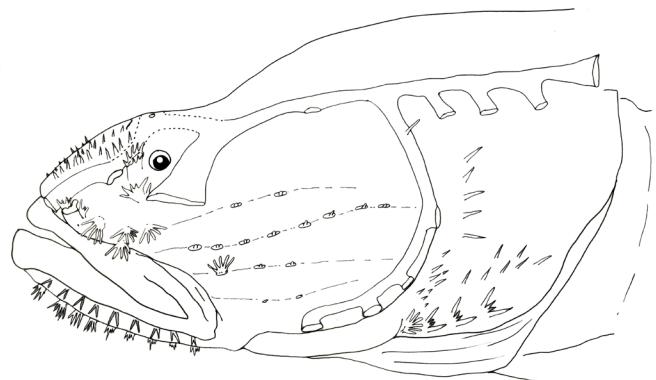


Fig. 3. Composite drawing of head showing lateral canals, sensory pores and papillae. Most papillae and flaps omitted for clarity, as are all scales.

teeth large and bluntly pointed. Gill opening wide, reaching to below rear margin of preopercle or just anterior to it. Shoulder girdle with 2–5 large fleshy rather square knobs or lobes. Pectoral fin base with broad scaled fleshy area extending partway onto pectoral rays.

Body with large vertically slender ctenoid scales (mostly posteriorly), with smaller ctenoid scales alternating with clusters of small cycloid and ctenoid scales and numerous auxiliary cycloid scales present at base of each large scale. Dorsal part of opercle and cheek behind eye with many very small cycloid scales in all but smallest specimens; patch of small cycloid scales on lower rear half of preopercle beneath the rows of branched cheek papillae; small scales on side of head and nape appear to sit in a concave base. Predorsal scales very small, reaching forward to close behind eyes, becoming more numerous and entering interorbital space in larger specimens; pectoral base, belly and breast with many small cycloid scales; broad area around anus naked, as is pectoral base axil and nearby area on body behind fin base (Fig. 2). Extent of scales on chest variable, often reaching right up into isthmus either densely or scattered anteriorly. One specimen (ZRC 56952) with several rows of small scales on rear part of branchiostegal membrane, on curved lobes of skin.

First dorsal fin low, triangular, does not quite reach second dorsal fin when adpressed. Second dorsal and anal fins pointed posteriorly. Pectoral fins with central rays longest, fins reaching back to below rear of first dorsal fin; bases of fin rays covered by thickened scaled flesh, with bases of rays obscured. Pelvic fins widely separate, pointed, but falling well short of anus; interspace between fins with 3–5 rows of cycloid scales. Caudal fin narrow, elongate and pointed.

Sensory head pores large, in distinctive arrangement (see Fig. 3); with a nasal pore beside each nostril tube (posterior nasal tube opening often with several flat filaments around opening), a very large wide pore below the eye, one small pore above preopercle (exact position variable) and usually four (occasionally three) pores along canal above opercle, 3–4 canals of which extend well on to upper part of opercle, ultimate canal pore enlarged; and four preopercular pores, the canals of which may extend on to interopercle and

Table 1. Morphometrics of *Pogoneleotris heterolepis*.

	Holotype (male)	Males range (n= 11)	Mean	Females range (n= 6)	Mean	Mean of both sexes
Percentage of standard length						
Head length	29.0	28.2–30.1	28.9	28.8–29.9	29.5	29.1
Body depth	—	17.1–21.5	19.0	18.0–18.9	18.5	18.8
Length of caudal peduncle	—	21.0–25.5	22.9	22.2–24.8	23.1	23.0
Depth of caudal peduncle	—	6.9–11.2	10.1	8.7–10.3	9.6	9.9
Length of pectoral fin	—	14.9–21.5	21.5	16.8–22.7	20.4	19.1
Length of pelvic fin	—	15.9–21.3	21.3	19.0–22.3	20.3	19.6
Length of caudal fin	—	25.0–30.1	27.8	27.8–31.3	29.7	28.5
Depressed D1 fin	—	14.5–19.3	17.9	17.0–20.1	18.3	18.1
Percentage of head length						
Head depth	—	51.8–66.5	57.2	48.3–57.5	52.8	55.4
Head width	—	68.5–83.6	74.8	68.6–72.3	70.3	73.1
Snout length	—	24.0–36.8	28.1	24.7–29.3	26.7	27.6
Eye width	5.3	3.0–5.8	4.1	2.5–4.8	3.9	4.0
Jaw length	—	37.5–42.4	40.2	36.2–41.6	38.6	39.6
Interorbital width	—	27.7–32.0	30.1	28.1–30.4	29.3	29.8

anterior part of opercle, preopercular canal continuous with oculoscapular canal (Fig. 3). In three specimens, a very small pore visible in middle of interorbital space; may be present in more specimens but could not be discerned due to scale covering. Pores generally obscured by thickened skin, crowded filaments and mucous coat, so that pores often could not be observed.

Sensory papillae mostly filamentous, in roughly longitudinal arrangement (see Fig. 2), a few papillae on top of head are short and bulbous, most are tentacle-like, branched 2–4 times on side and underside of head, fewer to no branches in papillae on top of head; on cheek, branched papillae arranged in at least four longitudinal rows; in between rows are 2–4 distinct lines occupied by row of widely spaced small papillae set within an oval “cell”; in larger specimens, these may be replaced by many-branched papillae (Fig. 3). Opercle with fewer filamentous papillae. Preserved, the branched and filamentous papillae are stiff and almost bristle-like in large specimens. Large slender scales along mid-side of body each with a vertical row of sensory papillae. Caudal fin with two rows of papillae, one on either side of fin mid-base on membrane between segmented fin rays 6 and 7 and rays 8 and 9.

When fresh, body and fins plain dark reddish brown, pink, purple to black (see Fig. 4). The present specimens are pink, with dark pink to purplish scales; side of head pale pink, underside of head whitish (Fig. 4). Males darker in colour than females. Dorsal fins pinkish white with spines darker

pink to grey, slightly more grey in males; anal fin dull pink, slightly darker in males; pectoral fin pink in females, pale grey in males; pelvic fins pale pink in females, pinkish white with purplish tips in males; caudal fin pink to pinkish grey in females, caudal fin rays grey with pink membranes in males.

Preserved, head and body yellowish brown to dark greyish brown, with usually only skin behind scales dark-pigmented, giving fish a pale-headed appearance (Fig. 1). Some small specimens with head dark grey and body almost black but underside of head dull whitish. Fins usually plain pale yellow to white, with pectoral, pelvic and caudal fins variably dark grey in some specimens. Reaches 210 mm SL.

Habitat. Known only from estuarine habitats; found in turbid rivers with mud substrate (Fig. 5). Tan & Grinang (2018) describe the habitat from which these came, and dissected one specimen (which contained crustacean remains).

Comparisons. *Pogoneleotris heterolepis* is unlike any other species of gudgeon, with its complex branched elongate sensory papillae, very small eyes, many multiple auxiliary scales on the body, distinctive sensory pore pattern and the stout fleshy lobes on the shoulder. It is the only butid and one of very few gobioid fishes (other than *Rhyacichthys* and *Terateleotris*) known to possess a preopercular canal that is joined to the oculoscapular canal, a condition first noted by Prachit Wongrat (unpublished thesis). It is also the only butid with a longitudinal papilla pattern.



Fig. 4. Fresh *Pogoneleotris heterolepis* from Simunjan, Sarawak; ZRC56949, female above (166.7 mm SL), male below (160.0 mm SL).



Fig. 5. Simunjan River habitat of this species; showing fishers' boat moored beside lines onto bank from gill net.

Remarks. It is commonly known as the bearded gudgeon, *Ikan buccat butta* or *Batu betutu*, and has been referred to as the Sarawak mud gudgeon. At the Rajang River delta, the local name in the Melanau dialect is *Ilong mapak* [=blind fish] (Tan & Grinang, 2018).

This species' conservation status has not been assessed by the IUCN. As it is regularly consumed by the local people and is restricted to mangrove habitats (which are generally threatened throughout South-east Asia), its conservation status deserves assessment sooner rather than later.

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