Title	Coelorinchus posteromaculatus (Actinopterygii, Gadiformes, Macrouridae), a new species of grenadier from the eastern Indian Ocean
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Citation	Ichthyological research, 67(4), 465-472 https://doi.org/10.1007/s10228-020-00741-x
Issue Date	2020-11
Doc URL	http://hdl.handle.net/2115/83356
Rights	This is a post-peer-review, pre-copyedit version of an article published in Ichthyological Research. The final authenticated version is available online at: http://dx.doi.org/10.1007/s10228-020-00741-x
Type	article (author version)
File Information	manuscript received 2020-05-25.pdf

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***Coelorinchus posteromaculatus* (Actinopterygii, Gadiformes, Macrouridae), a new species of grenadier from the eastern Indian Ocean**

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(Editorial note from the managing editor: please link the above register number to: [http://zoobank.org/urn:lsid:zoobank.org:pub: EAFB041D-5A6A-4404-B43D-130918194A4C](http://zoobank.org/urn:lsid:zoobank.org:pub:EAFB041D-5A6A-4404-B43D-130918194A4C))

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Running head: A new *Coelorinchus* from Indian Ocean

Type of paper: full paper

29 Number of text pages: 16

30 Number of Figures: 2

31 Number of Tables: 1

32 Number of ESM: 0

33

Abstract A new species of grenadier, *Coelorinchus posteromaculatus*, is described from nine specimens collected from the tropical eastern Indian Ocean at depths of 100–323 m. This species belongs to the *Coelorinchus argentatus* group (defined here to include 13 species), but differs from other members of that group in its unique body markings consisting of a single, prominent, lateral, dark blotch on the anterior part of the tail, and a slightly diagonal, narrow, dark stripe extending from the upper margin of the gill opening to below the first dorsal-fin midbase or beyond. *Coelorinchus posteromaculatus* is most similar to *C. gaesorhynchus* Iwamoto and Williams 1999 and *C. longissimus* Matsubara 1943, but further differs from the former in its much shorter snout (74–91% of postrostral length vs. 93–100% in *C. gaesorhynchus*), and from the latter in its relatively small mouth (upper-jaw length 38–43% of postrostral length vs. 42–49%).

Keywords Taxonomy · Description · Pisces · *Quincuncia* · *Coelorinchus argentatus* group

Introduction

Coelorinchus Giorna 1809 is the largest genus among the order Gadiformes, with about 120 valid species worldwide (Iwamoto and Williams 1999; Iwamoto et al. 2006, 2015; Nakayama and Endo 2017). The species of the genus are typically found on continental shelves and slopes in tropical and temperate waters of the world's oceans (Merrett and Iwamoto 2000; Iwamoto and Graham 2008; Nakayama and Endo 2017). Although its highest diversity lies in Southeast Asia, only a few recent works have attempted to establish the inventory of the deep-sea fish fauna in the region (e.g., Gloerfelt-Tarp and Kailola 1984; White et al. 2013).

In their book on the demersal fishes trawled from eastern Indian Ocean between southern Indonesia and northwestern Australia, Gloerfelt-Tarp and Kailola (1984) provided a color photograph of a unique *Coelorinchus* with a prominent dark blotch on the anterior part of the tail (unnumbered fig. on p. 82), so as to show the general appearance of macrourids (it is most likely to represent their "*Coelorinchus* sp. 3" collected from the south of Lombok Island, Indonesia). Unfortunately, they did not indicate any other information on the species, including the whereabouts of the photographed specimen. While this species appeared to belong to the subgenus *Quincuncia* Gilbert and Hubbs 1920 in having the combination of a long, attenuated snout and silvery reflections on the head and body, no described species of *Quincuncia* had been reported to have such a unique blotch on the tail.

During an ongoing review of *Coelorinchus* by the first author, the specimen illustrated by Gloerfelt-Tarp and Kailola (1984) was rediscovered at the Australian Museum, Sydney (AMS), and eight additional specimens of the same species were also found among several ichthyological collections in the world. A subsequent examination confirmed that they represent a new species, and we provide here a formal description of this species.

Materials and methods

Methods for counts and measurements follow Iwamoto (1970), Iwamoto and Sazonov (1988), Iwamoto and Williams (1999), Nakayama et al. (2015), and Nakayama and Endo (2017). Head, postrostral, and total lengths are expressed as HL, PRL, and TL respectively. The terminology of the head ridges is that redefined by Nakayama et al. (2015). Occipital scales refer to scales between the parietal ridges. Description of the body scales is based on scales on the dorsum below the interdorsal space, unless otherwise stated. In addition to a standard binocular microscope, a scanning electron microscope (SEM) was used to examine the fine structure of the body scales. Methods for SEM preparation follow Roberts (1993). Institutional codes follow Sabaj (2019). Type specimens of the new species are deposited in ichthyological collections of the Australian Museum, Sydney (AMS), Laboratory of Marine Biology, Faculty of Science and Technology, Kochi University, Kochi (BSKU), Institute of Oceanology, Russian Academy of Science, Moscow (IORAS), and Hokkaido University Museum, Hokkaido University, Hakodate (HUMZ).

***Coelorinchus posteromaculatus* sp. nov.**

(New English name: Tailspotted grenadier)

(Figs. 1, 2; Table 1)

Unidentified macrourid: Gloerfelt-Tarp and Kailola 1984: unnumbered color fig. on p. 82 (second from right top of page) (northwestern Australia and southern Indonesia; AMS I.44527-001).

Coelorinchus sp. 3: Gloerfelt-Tarp and Kailola 1984: 85, unnumbered fig. on p. 84 (third from top of page) (2 spec. from south of Lombok Island, NSMT-P22052, missing).

104 **Holotype.** AMS I.44527-001 (66.4 mm HL, 211+ mm TL, mature female), south of Lombok
105 Island, eastern Indian Ocean, 8.97°S, 116.08°E, 314 m depth, trawl, coll. by T. Gloerfelt-Tarp,
106 1 Aug. 1981.

107 **Paratypes.** AMS I.44527-002 (2, 57.8–65.3 mm HL, 165+–187+ TL), collected
108 with holotype; HUMZ 190722 (1, 58.2 mm HL, 197+ mm TL), HUMZ 190723 (61.0 mm
109 HL, 197+ mm TL), HUMZ 190724 (1, 59.1 mm HL, 192+ mm TL), west of Sumatra
110 1°07.37'S, 98°27.54'E–1°08.18'S, 98°28.24'E, 100–170 m depth, R/V Baruna Jaya IV, bottom
111 trawl, coll. by K. Odani, 3 Oct. 2004; IORAS 001-22 (2, 62.3–70.0 mm HL, 203+–220+ mm
112 TL), Andaman Sea, 11°46'03"N, 96°51'04"E, 315–323 m depth, FRV Akademik Knipovich,
113 trawl no. 455, 11 Mar. 1966; BSKU 106747 (1, 63.3 mm HL, 196+ mm TL), Thailand, coll.
114 by T. Senta (no further reliable information).

115 **Diagnosis.** Species of *Coelorinchus* with small, but intense, longitudinally elongate,
116 lateral, dark blotch on anterior part of tail. Light organ tubular, externally represented by long
117 black streak covered with scales, extending from immediately in front of anus to chest just
118 posterior to isthmus. Underside of head completely naked except for overlapping scales
119 behind lateral nasal ridges; dorsal surface of snout broadly naked along each side of median
120 rostral ridge. Snout long, sharply pointed, length 74–91% PRL, its dorsal profile gently
121 concave in lateral view; terminal scute long, spearhead-shaped, dorsoventrally flattened,
122 length 16–24% PRL when complete. Lateral nasal ridge incompletely supported by nasal
123 bone. Anus abutting anal-fin origin. Premaxillary teeth small, slender, conical in long,
124 narrow, tapered band, and none distinctly enlarged; posterior margin of tooth band almost
125 reaching lateral corner of mouth. Body scales covered with short, erect, slender spinules in
126 widely divergent rows; spinules in each row completely free from one another, forming
127 comb-like ridge; buttresses of spinules poorly developed. Second dorsal fin distinctly lower
128 than anal fin. Upper-jaw length 38–43% PRL; preoral length 65–82% PRL; length of gill slit
129 21–24% PRL; barbel length 9–14% PRL. Slightly diagonal, narrow, dark stripe extending
130 from upper margin of gill opening to below first dorsal-fin midbase or beyond; faint,
131 diagonal, dark stripe extending from pectoral-fin base to above anal-fin origin; median nasal

132 bone blackish; underside of head generally pale, without small, blackish, hair-like papillae;
133 lips pale to dusky; front of premaxillary ascending process dusky to dark; oral cavity
134 immaculate; gular and branchiostegal membranes heavily peppered; chest dark; first dorsal
135 fin dusky to dark, but second spinous ray prominently blackish; pelvic fin dusky; pelvic fin
136 heavily peppered.

137 **Description.** General features of the fish are shown in Fig. 1. Counts and
138 measurements are given in Table 1.

139 Body elongate, tapering gradually to long, laterally compressed tail. Trunk shallow
140 (width over pectoral-fin bases 1.3–1.5 in depth below first dorsal-fin origin in well-preserved
141 paratypes). Head large, HL about 3.2 (2.9–3.4) in TL. Snout long, sharply pointed, protruding
142 greatly beyond upper jaw; snout length 2.0 (1.6–2.0) times as long as orbit diameter; when
143 viewed laterally, dorsal contour of snout gently convex, with slight hump-like rise above
144 posterior nostril; lateral nasal ridge incompletely supported by nasal bone, slightly convex in
145 dorsal view. Orbit large, oval, greatest diameter 1.2 (1.1–1.3) in postorbital length.
146 Interorbital space slightly concave in preserved condition, width 1.1 (1.0–1.2) in orbit
147 diameter. Mouth moderate in size, inferior, upper-jaw length 1.0 (1.1–1.2) in orbit diameter;
148 posterior margin of maxilla extending to vertical through midorbit or beyond; lateral corner of
149 mouth barely restricted by folds of skin; lips thin, not papillose near tooth bands. Suborbital
150 region divided by longitudinal bony ridge passing from tip of snout to posteroventral angle of
151 opercle; its upper half almost vertical, lower half sharply inclined mesially. Preopercle large,
152 posterior margin inclined at about 60° angle, forming moderately angular lobe
153 posteroventrally. Subopercle prolonged ventrally into short, slender flap; posterior margin
154 deeply concave. Gill membranes narrowly connected across, and attached mesially to
155 isthmus, with slight posterior free fold; gill opening extending anteriorly to below posterior
156 margin of lower jaw. Outer gill slit moderately restricted by folds of skin, length 1.9 (1.9–2.2)
157 in orbit diameter. Gill rakers small, low, tubercular, armed with short, fine spines; no rakers
158 on outer side of first arch and inner side of fourth arch; gill filaments moderately long. Chin

159 barbel short, slender, tapering into hairline distal tip; length 3.8 (usually 3.5–4.5; 5.1 in AMS
160 paratype, 65.3 mm HL) in orbit diameter.

161 Anus abutting anal-fin origin, without scales in their interspace. Light organ long,
162 tubular, externally represented by long black streak, extending from immediately in front of
163 anus to chest just behind isthmus; both ends of light organ slightly expanded, teardrop-
164 shaped.

165 Teeth small, slender, conical, sharp, gently incurved, in long, narrow, tapered bands
166 in both jaws. In holotype, premaxillary teeth with about 6 tooth rows near symphysis,
167 posterior margin of tooth band almost reaching lateral corner of mouth; teeth becoming
168 progressively smaller inwardly, and none distinctly enlarged; mandibular teeth with about 4
169 tooth rows across widest point near symphysis; posterior end of tooth band extending to
170 lateral corner of mouth; all teeth uniformly small.

171 Body scales large, deciduous; those on dorsum below interdorsal space covered
172 with short, erect, slender spinules in widely divergent rows; spinules in each row entirely free
173 from one another, forming comb-like ridge; middle row not especially high or enlarged
174 compared with adjacent rows, and every row complete throughout; spinules forming angle of
175 about 70–80° to scale surface, giving somewhat velvety appearance to body; spinules
176 increasing in height posteriorly, and tip of last spinule in each row barely reaching or
177 extending only slightly beyond posterior scale margin; buttresses of spinules poorly
178 developed; no reticulate structures on unexposed portion of scale surface. Body fully scaled
179 except for fins.

180 Scales on head ridges modified and thickened; those on median rostral ridge
181 covered with radiating rows of spinules. Terminal scute long, spearhead-shaped,
182 dorsoventrally flattened. Three supraoccipital scutes between parietal ridges, but not
183 especially enlarged; posttemporal scutes absent. Other scales on head (except those on head
184 ridges) variable in size, generally similar to those on body, but spinules more erect; those on
185 opercle, preopercle, and postorbital and temporal canals largest. Nasal fossa entirely naked.
186 Dorsal surface of snout broadly naked along each side of median rostral ridge. Underside of

187 head completely naked, except narrow areas of characteristic overlapping scales immediately
188 behind lateral nasal ridges.

189 No open pores along cephalic sensory canals. Free neuromasts small, not modified
190 into prominent flaps or knob-like projections. Anterior nostril small, circular; posterior nostril
191 large, oval in shape. Grooved lateral line complete, not interrupted (at least in trunk where
192 scales are well-preserved).

193 Origins of first dorsal, pectoral, and pelvic fins about on same vertical; first dorsal
194 fin moderately high (its height 2.3–2.7 times as long as its base length in well-preserved
195 paratypes); second spinous ray not elongated, smooth along leading edge (small rudimentary
196 denticle present near distal tip in HUMZ 190724); its tip extending posteriorly to base of 2nd–
197 4th ray of second dorsal fin when laid back. Interdorsal space 1.0 (0.9–1.3) times as long as
198 first dorsal-fin base length. Origin of second dorsal fin above that of anal fin or slightly
199 behind. Tip of pelvic fin extending to anal-fin origin or slightly beyond; outer pelvic-fin ray
200 slightly prolonged, hairline at tip.

201 *Color in alcohol.* Short, prominent, narrow, slightly diagonal, dark stripe of about
202 1–2 scales deep, extending from upper margin of gill opening to below first dorsal-fin
203 midbase or beyond; faint, arched, diagonal, dark stripe of about 2 scales deep, extending from
204 pectoral-fin base to above anal-fin origin; small, but intense, lateral, longitudinally elongate,
205 dark blotch on anterior part of tail, extending about 3–5 scale rows horizontally, about 2–3
206 rows vertically; head and body slightly darker dorsally, paler laterally and ventrally; abdomen
207 dark, with somewhat purplish tinge; breast abruptly dark in front of pelvic-fin bases; median
208 nasal bone blackish; underside of head generally pale, but mandibular rami and ventral
209 surfaces of preopercles slightly dusky; short, black, hair-like papillae absent on head surfaces;
210 cephalic free neuromasts marked with 2 small black dots; lips pale to dusky; front of
211 premaxillary ascending process dusky to dark; oral cavity immaculate; gill cavity paler
212 anteriorly, darker posteriorly; gular and branchiostegal membranes heavily peppered; gill
213 arches, rakers, and filaments pale; first dorsal fin dusky to dark, but second spinous ray
214 prominently blackish; pelvic fin dusky; pelvic fin heavily peppered; second dorsal and anal

215 fins dark.

216 *Color when fresh.* Based on the color photograph provided by Gloerfelt-Tarp and
217 Kailola (1984: unnumbered fig. on p. 82; second from the right top of the page): dorsal
218 surfaces of head and body slightly dark, but lateral and ventral surfaces pale with ivory to
219 silvery reflections; diagonal stripe on trunk dorsum and blotch on anterior part of tail grayish.

220 **Etymology.** The specific epithet *posteromaculatus* is derived from the Latin
221 adjectives *posterior*, meaning “further back” or “hinder”, and *maculatus*, meaning “spotted”,
222 in reference to the species’ characteristic dark blotch on the anterior part of the tail.

223 **Distribution.** Known from the tropical eastern Indian Ocean at depths of 100–323
224 m.

225 **Remarks.** Data used in the following comparisons are from Iwamoto (1990),
226 Iwamoto and Merrett (1997), Iwamoto and Williams (1999) and this study. *Coelorinchus*
227 *posteromaculatus* belongs to a group of species characterized by the following combination of
228 features: light organ long, extending from anus to chest just posterior to isthmus; no
229 interspace between anus and anal-fin origin; lateral nasal ridge incompletely supported by
230 nasal bone; premaxillary teeth in long tapered band, with posterior margin of tooth band
231 almost reaching lateral corner of mouth; body scales covered with short, erect spinules in
232 quincunx order or subparallel rows; modified scales on head ridges not prominently
233 spinulated; dorsal surfaces of snout broadly naked along each side of median rostral ridge;
234 second dorsal fin poorly developed, its height distinctly lower than that of anal fin; lower half
235 of body overlain with silvery reflections (often indistinct in preserved specimens); dark spots,
236 blotches, and vermiculations present dorsally on trunk and tail in some species. Apart from
237 the new species, this group includes the following 12 valid species: *Coelorinchus argentatus*
238 Smith and Radcliffe in Radcliffe 1912 from the Philippines, New Caledonia, and northern
239 Australia; *Coelorinchus denticulatus* Regan 1921 from the western Indian Ocean;
240 *Coelorinchus formosanus* Okamura 1963, *Coelorinchus kamoharai* Matsubara 1943, and
241 *Coelorinchus longissimus* Matsubara 1943 from Japan to Taiwan; *Coelorinchus*
242 *gaesorhynchus* Iwamoto and Williams 1999 from Western Australia; *Coelorinchus mayiae*

243 Iwamoto and Williams 1999 and *Coelorinchus pardus* Iwamoto and Williams 1999 from the
244 Arafura Sea; *Coelorinchus multispinulosus* Katayama 1942 from Japan to the South China
245 Sea; *Coelorinchus quincunciatus* Gilbert and Hubbs 1920 and *Coelorinchus thompsoni*
246 Gilbert and Hubbs 1920 from the Philippines; and *Coelorinchus semaphoreus* Iwamoto and
247 Merrett 1997 from New Caledonia and Queensland, Australia. This group is called here the
248 *Coelorinchus argentatus* group.

249 The most important feature characterizing *C. posteromaculatus* is its unique body
250 markings consisting a single, prominent, lateral, dark blotch on the anterior part of the tail,
251 combined with a slightly diagonal, narrow, dark stripe extending from the upper margin of the
252 gill opening to below the first dorsal-fin midbase or beyond. The pattern is quite distinctive
253 among the group, as the other species have neither such a posterior blotch nor a diagonal
254 stripe on the trunk dorsum. Namely, *C. formosanus*, *C. gaesorhynchus*, *C. longissimus*, *C.*
255 *quincunciatus*, *C. semaphoreus*, and *C. thompsoni* lack any prominent body markings; *C.*
256 *argentatus*, *C. denticulatus*, *C. kamoharai*, *C. mayiae*, and *C. pardus* have only a series of
257 spots or blotches of irregular shape; and *C. multispinulosus* has many dark spots often
258 forming fine vermiculations.

259 Despite their pronounced differences in the body markings, *C. posteromaculatus* is
260 otherwise closely similar to *C. gaesorhynchus* and *C. longissimus*. In fact, the three species
261 can be distinguished from other members of the *C. argentatus* group by having the following
262 combination of features: body scales covered with needle-like spinules in subparallel to
263 widely divergent rows (Fig. 2); underside of head almost completely naked, except for
264 characteristic overlapping scales immediately behind lateral nasal ridges; smaller mouth
265 (upper-jaw length 38–43%, 42–44%, 42–49% PRL in *C. posteromaculatus*, *C.*
266 *gaesorhynchus*, and *C. longissimus* respectively); and shorter barbel (9–14%, 14–15%, 11–
267 18% PRL respectively) (see also Table 1). However, it further differs from *C. gaesorhynchus*
268 in its much shorter snout (74–91% PRL vs. 93–100% in *C. gaesorhynchus*), and from *C.*
269 *longissimus* in its relatively larger mouth (upper-jaw length 38–43% PRL vs. 42–49%).

270 The above definition of the *C. argentatus* group generally agrees with the original

concept of the subgenus *Quincuncia*, within which Gilbert and Hubbs (1920) included only *C. argentatus* (type species), *C. quincunciatus*, and *C. thompsoni*. Currently, this taxon is diagnosed primarily by the combination of a well-developed light organ extending from the anus to the chest just posterior to the isthmus and an incomplete bony support of the lateral nasal ridge (Okamura 1970a, 1970b, 1988). Based on this brief definition, the subgenus comprises not only the species of the *C. argentatus* group, but also *Coelorinchus melanobranchus* Iwamoto and Merrett 1997 known from New Caledonia and those of the *Coelorinchus hubbsi* complex as defined by Okamura (in Okamura and Kitajima 1984) and further refined by Iwamoto et al. (2009) to include the following 10 species: *Coelorinchus brevirostris* Okamura in Okamura and Kitajima 1984, *Coelorinchus fuscigulus* Iwamoto, Ho and Shao 2009, and *Coelorinchus hubbsi* Matsubara 1936 from Japan to Taiwan; *Coelorinchus cingulatus* Gilbert and Hubbs 1920 from Japan to the South China Sea; *Coelorinchus cylindricus* Iwamoto and Merrett 1997 from the Norfolk Ridge and New Zealand; *Coelorinchus gladius* Gilbert and Cramer 1897 from Hawaii; *Coelorinchus matsubarai* Okamura in Okamura et al. 1982 from the Kyushu-Palau Ridge and the Emperor Seamounts; *Coelorinchus melanosagmatus* Iwamoto and Anderson 1999 from the Indian Ocean; *Coelorinchus multifasciatus* Sazonov and Iwamoto 1992 from the Sala-y-Gomez Ridge; and *Coelorinchus spilonotus* Sazonov and Iwamoto 1992 from the Nazca and Sala-y-Gomez ridges and Hawaii. The *C. argentatus* group readily differs from *C. melanobranchus* in having a long attenuated snout tipped with a spear-like terminal scute (vs. short bluntly pointed snout with three tubercular scutes), and also from the *C. hubbsi* complex in having a poorly developed second dorsal fin distinctly lower than (vs. as high as) the anal fin and a pair of broad naked areas along each side of the median rostral ridge (vs. rudimentary or only narrowly developed). It is apparent that *Quincuncia* needs a systematic revision, due to the lack of phylogenetic analysis and the presence of taxonomic problems, both at the subgeneric and species levels.

Comparative materials examined. *Coelorinchus gaesorhynchus*—2 specimens from

299 Western Australia: CSIRO H2548-13 (holotype, 75.8 mm HL, 254+ mm TL); west of North
 300 West Cape, 21°44.7'S, 113°52.3'E, 290–320 m, FRV Southern Surveyor, sta. SS1/91/08
 301 (H2548), 24 Jan. 1991; SS1/91/08; CSIRO H2548-16 (paratype, 70.0 mm HL, 236+ mm TL),
 302 collected with holotype. *Coelorinchus longissimus*—29 specimens from Japan: BSKU 19077
 303 (1, 73.0 mm HL, 256 mm TL), off Satsuma Peninsula, Okinawa Trough, 31.2267°N,
 304 129.9750°E, 310 m, FRV Soyo-maru, sta. 72d, beam trawl, 12 Feb. 1959; BSKU 106767 (1,
 305 68.2 mm HL, 240+ mm TL), southeast of Shimokoshiki-jima Island, East China Sea,
 306 31.5658°N, 129.8915°E, 380 m, F/V Maruko-maru, tr. 1, bottom trawl, coll. N. Nakayama et
 307 al., 24 Apr. 2012; BSKU 109052 (1, 48.7 mm HL, 185 mm TL), east of Kasayama Bank,
 308 32.3884°N, 129.0505°E, 304–312 m, T/V Nagasaki-maru, cr. N365, sta. A3, 3-m ORE beam
 309 trawl, coll. N. Nakayama, 19 Nov. 2012; BSKU 113743 (1, 86.1 mm HL, 313+ mm TL), off
 310 Katsurahama, Tosa Bay, 230 m, F/V Kosei-maru, bottom trawl, coll. N. Nakayama et al., 9
 311 Apr. 2014; BSKU 99262 (1, 88.4 mm HL, 314+ mm TL), Mimase fish market, bottom trawl,
 312 1 Mar. 2006; BSKU 40440 (1, 91.4 mm HL, 327+ mm TL), BSKU 40441 (1, 92.4 mm HL,
 313 345+ mm TL), BSKU 40442 (1, 92.9 mm HL, 339 mm TL), BSKU 40445 (1, 96.2 mm HL,
 314 342+ mm TL), BSKU 40447 (1, 92.6 mm HL, 341+ mm TL), BSKU 40448 (1, 95.9 mm HL,
 315 277+ mm TL), BSKU 40451 (1, 96.6 mm HL, 338+ mm TL), BSKU 40457 (1, 81.0 mm HL,
 316 304 mm TL), Mimase fish market, bottom trawl, 8 Mar. 1985; BSKU 99346 (1, 93.0 mm HL,
 317 314+ mm TL), Mimase fish market, bottom trawl, coll. N. Nakayama, 23 Apr. 2008; BSKU
 318 99235 (1, 81.5 mm HL, 303+ mm TL), BSKU 99237 (1, 58.9 mm HL, 219+ mm TL),
 319 Mimase fish market, bottom trawl, coll. N. Nakayama, 31 Oct. 2007; BSKU 55 (1, 76.4 mm
 320 HL, 302 mm TL), Mimase fish market, bottom trawl, coll. T. Kamohara, 5 Mar. 1951; BSKU
 321 100497 (1, 78.7 mm HL, 287+ mm TL), Mimase fish market, F/V Kosei-maru, bottom trawl,
 322 15 Oct. 2009; BSKU 108871 (1, 77.5 mm HL, 278+ mm TL), Mimase fish market, F/V
 323 Kosei-maru, bottom trawl, 22 Oct. 2012; BSKU 94450 (1, 71.6 mm HL, 251+ mm TL),
 324 Mimase fish market, F/V Kosei-maru, bottom trawl, coll. N. Nakayama, 14 Apr. 2008; BSKU
 325 93088 (1, 63.4 mm HL, 237 mm TL), BSKU 93090 (1, 89.9 mm HL, 321+ mm TL), Mimase
 326 fish market, F/V Seiryō-maru, bottom trawl, coll. N. Nakayama, 24 Dec. 2007; BSKU 94387

(1, 51.5 mm HL, 203+ mm TL), Mimase fish market, F/V Seiryō-maru, bottom trawl, coll. N. Nakayama, 4 Apr. 2008; BSKU 69291 (1, 56.1 mm HL, 198+ mm TL), BSKU 69295 (1, 55.7 mm HL, 187+ mm TL), Tosa Bay, 33.1450°N, 133.5150°E, 240–249 m, FRV Kotaka-maru, otter trawl, coll. H. Endo, 20 Aug. 1997; BSKU 112928 (1, 98.7 mm HL, 342+ mm TL), off Okitsu, Tosa Bay, 280–320 m, F/V Kosei-maru, bottom trawl, coll. N. Nakayama et al., 24 Jan. 2014; BSKU 110426 (1, 29.8 mm HL, 113+ mm TL), Suruga Bay, 34.7651°N, 138.4880°E, 200–450 m, F/V Hinode-maru, sta. 4, bottom trawl, coll. N. Nakayama and R. Misawa, 23 Apr. 2013; BSKU 110081 (1, 40.7 mm HL, 154 mm TL), BSKU 110082 (1, 38.3 mm HL, 132+ mm TL), Suruga Bay, 34.7489°N, 138.4664°E, 200–450 m, F/V Hinode-maru, sta. 6, bottom trawl, coll. N. Nakayama and R. Misawa, 23 Apr. 2013.

Acknowledgements We thank the following researchers and museum specialists for specimen loans and assistance for this study: M. McGrouther, A. Hay, S. Reader and K. Graham (AMS); H. Endo, T. Yamakawa and T. Naito (BSKU); A. Graham, J. Pogonoski and P. Last (CSIRO); D.A. Astakhov and S.A. Evseenko (IORAS). We are also grateful to members of the Japan Deep Sea Trawlers Association (JDSTA), Overseas Fishery Cooperation Foundation, Japan (OFCF), and Research Institute for Marine Fisheries, Indonesia (RIMF), and to the crew of R/V Baruna Jaya IV, for providing an opportunity to sample in Indonesia. Gordon Yearsley (Hobart, Australia) reviewed an early draft of the manuscript and edited the English text. This study was supported by JSPS KAKENHI Grant Number JP16H06896 and JP18K14509 (to NN) and by a grant (19-14-00026) of the Russian Science Foundation (to AMP).

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436

437 **Figure legends**

438

439 **Fig. 1** *Coelorinchus posteromaculatus* sp. nov. AMS I.44527-001, holotype, 66.4 mm HL,
440 211+ mm TL, eastern Indian Ocean, 314 m depth. **a** Lateral view; **b** lateral, **c** ventral,
441 and **d** dorsal views of head and trunk; preserved condition

442

443 **Fig. 2** Scanning electron micrograph showing a scale from the dorsum below the interdorsal
444 space of *Coelorinchus posteromaculatus* sp. nov. HUMZ 190724, paratype, 59.1 mm
445 HL, 192+ mm TL

446

Table 1 Measurements and counts for three species of *Coelorinchus*

Species	<i>C. posteromaculatus</i>		<i>C. gaesorhynchus</i>	<i>C. longissimus</i>
Type status	HT	PT	HT + PT	NT
Number of specimens	1	8	2	29
Measurements (mm)				
Total length (TL)	211+	165+–220+	236+–254+	113+–345+
Head length (HL)	66.4	57.8–70.0	70.0–75.8	29.8–98.7
% of HL (% of PRL)				
Snout length	48 (90)	43–48 (74–91)	49–51 (93–100)	44–48 (77–90)
Orbit diameter	24 (45)	23–27 (43–48)	23–24 (46–47)	23–29 (43–51)
Postorbital length	30 (56)	29–33 (52–56)	27–28 (53–54)	28–31 (51–58)
Postrostral length (PRL)	54 (—)	53–58 (—)	51–52 (—)	53–57 (—)
Orbit–preopercle distance	34 (64)	32–35 (58–64)	32–34 (62–65)	31–37 (57–68)
Suborbital width	11 (21)	10–12 (17–22)	11–11 (21–22)	10–12 (19–22)
Upper-jaw length	23 (43)	21–24 (38–43)	21–23 (42–44)	23–27 (42–49)
Preoral length	41 (77)	38–43 (65–82)	44–46 (85–92)	38–45 (66–81)
Internasal width	18 (34)	18–20 (31–35)	19–19 (36–37)	17–22 (32–41)
Interorbital width	23 (42)	22–23 (38–44)	21–23 (42–44)	21–24 (38–43)
Body width over P. bases	29 (55)	27–34 (50–59)	32–33 (62–65)	28–44 (50–80)
Body depth at 1D. origin	— (—)	42–47 (73–86)	42–46 (80–91)	37–54 (70–99)
Body depth at A. origin	34 (64)	30–39 (53–69)	38–39 (74–74)	32–45 (56–82)
Pre-V. length	106 (197)	101–104 (172–194)	107–112 (211–214)	101–115 (183–207)
Pre-anus length	138 (258)	128–136 (225–257)	137–147 (271–282)	130–152 (234–275)
Pre-A. length	139 (260)	132–141 (231–265)	139–149 (275–286)	133–155 (236–281)
Isthmus–V. distance	28 (52)	27–31 (48–53)	29–30 (57–58)	27–36 (50–65)
Isthmus–anus distance	60 (113)	60–63 (109–114)	57–66 (112–125)	55–71 (99–128)
Isthmus–A. distance	62 (115)	63–66 (113–120)	60–68 (118–131)	56–79 (103–143)
V.–A. distance	36 (67)	37–40 (65–75)	37–40 (73–76)	31–47 (56–88)
Anus–A. distance	2 (4)	2–5 (4–10)	2–3 (5–5)	1–4 (2–8)
V. length	23 (42)	26–36 (46–63)	26–28 (50–56)	20–32 (36–59)
P. length	38 (71)	31–42 (53–80)	— (—)	30–34 (55–64)
Pre-1D. length	105 (196)	100–109 (175–195)	105–107 (205–207)	103–109 (184–200)
Height of 1D.	— (—)	35–40 (62–73)	— (—)	32–37 (58–70)
Length of 1D. base	17 (31)	14–17 (25–32)	15–18 (30–34)	15–19 (28–35)
Interdorsal length	16 (30)	16–23 (30–40)	15–20 (29–39)	15–26 (27–47)
Length of gill slit	13 (24)	12–13 (21–24)	12–12 (22–23)	11–14 (20–25)
Length of posterior nostril	7 (12)	7–10 (12–18)	6–8 (11–15)	6–9 (10–16)
Barbel length	6 (12)	5–8 (9–14)	7–8 (14–15)	6–10 (11–18)
Counts				
1D. rays	II,10	II,8–10	II,9	II,9–10
P. rays	i17	i14–i18	i15–i16	i15–i18
V. rays	7	7	7	7
Outer GR on first arch	0	0	0	0
Inner GR on first arch	8	7–9	8	7–8
Outer GR on second arch	6	5–6	6	5–6
Inner GR on second arch	8	7–8	8	7–9
Lateral line scales	45	37–42	44–45	36–45
Scales below 1D. origin	6	5–6	4.5–5	4.5–7
Scales below 1D. midbase	5	3–4.5	4	3.5–5.5

	Scales below 2D. origin	4.5	3.5–4.5	4	3.5–5.5
448	<i>1D.</i> first dorsal fin, <i>2D.</i> second dorsal fin, <i>A.</i> anal fin, <i>GR</i> gill rakers, <i>HT</i> holotype, <i>NT</i> non-				
449	type, <i>P.</i> pectoral fin, <i>PT</i> paratype, <i>V.</i> pelvic fin				

Fig. 1

Fig. 2