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（鰩鰻魚目：棘茄魚科）

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**Abstract:** *Malthopsis lutea* Alcock, 1891 is redescribed on the basis of two syntypes. The figured specimen is selected as lectotype. *Malthopsis kobayashii* Tanaka, 1916, previously assigned as a junior synonym of *M. lutea*, is resurrected based on its differentiation from *M. lutea*. Diagnoses, descriptions and figures are provided for both species.

**Keywords:** taxonomy, batfish, anglerfish, *Malthopsis lutea*, *Malthopsis kobayashii*

**摘要：**本文根據兩尾共模標本重新描述密星海蝠魚，並將原始繪圖之標本選定為選模以釐清本種之特徵。基於型態上之差異，本研究原先被歸在密星海蝠魚之異名的小林氏海蝠魚為有效名。上述兩者之鑑別特徵、一般描述及圖片亦一併提供。

**關鍵詞：**分類學，海蝠魚，鰨鰭魚，密星海蝠魚，小林氏海蝠魚

**1. Introduction**

The ogcocephalid genus *Malthopsis* Alcock, 1891 currently comprises 8 valid species, all but one occurs in the Indo-West Pacific Ocean (Ho *et al.*, 2009; Ho and Shao, 2010).

The type species *Malthopsis luteus* Alcock, 1891 (currently *Malthopsis lutea*) was described on the basis of 10 specimens collected from the Andaman Sea and has been recorded

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from Indo-West Pacific Ocean. However, according to the examination made by Dr. M. G. Bradbury (photos were also examined by us), the type series comprises two species, *M. lutea* and *M. mitrigera* Gilbert and Cramer, 1897. The latter was described from Hawaiian Islands originally and now found in the Indo-Pacific Ocean.

The study history of species of *Malthopsis* is somewhat complicated. Three additional species, *M. tiarella* Jordan, 1902, *M. annulifera* Tanaka, 1908 and *M. kobayashii* Tanaka, 1916, were described from Japan. However, Tanaka (1931) synonymized two latter species with *M. tiarella*. Kamohara (1937) went further and synonymized *M. mitrigera*, *M. annulifera*, *M. tiarella* and *M. kobayashii* with *M. lutea*. Okada and Matsubara (1938) separated *M. mitrigera* from *M. lutea*, but kept all other species as junior synonym. Kamohara (1950) recognized four species, *M. annulifera*, *M. mitrigera*, *M. lutea* and *M. tiarella*, and placed *M. kobayashii* in the synonymy of *M. lutea*. Ochiai and Mitani (1956) reviewed the genus *Malthopsis* from Japan and recognized 5 species, including *M. annulifera*, *M. jordani*, *M. lutea*, *M. mitrigera* and *M. tiarella*, and kept *M. kobayashii* in the synonymy of *M. lutea*.

Whitley (1961) described *M. lutea provocator* based on a single specimen collected from southeastern Australia. Paxton *et al.* (1989) provisionally synonymized it with *M. lutea* based on not recognizing subspecies in Australia (Paxton, pers. comm., 2010).


Recently we examined two sytypes of *M. lutea* deposited in the Natural History Museum, London (BMNH) and found they are not identical to what has been called *M. lutea* in the western Pacific Ocean. Thus, we reexamined the holotype of *Malthopsis kobayashii* and *M. lutea provocator* and recognized the former is a valid species and also a senior synonym of the latter. To verify the status of all these species, a lectotype is designated for *M. lutea* herein based on Article 74, The International Code of Zoological Nomenclature (the Code; ICZN, 1999).
The purposes of this study are to designate a lectotype for *M. lutea*; to provide a redescription of *Malthopsis lutea*; to resurrect *M. kobayashii*; and to reassign *Malthopsis lutea provocator* as a junior synonym of *M. kobayashii*.

### 2. Methods and Materials

Standard length (SL) is used throughout. Terminology for describing the angling apparatus follows Bradbury (1967). Methods and definitions of the characters used in this study followed Ho *et al.* (2009). Proportional measurements are rounded to the nearest 0.1 mm. Morphometric values are expressed as percentages of standard length. Meristic values are counted on both sides when paired. Institutional abbreviations are as listed in Fricke and Eschmeyer (2010). Materials examined are listed as: institution code, catalog number and, in parentheses, number of specimen (when more than 1) and standard length in mm.

### 3. Results

*Malthopsis lutea* Alcock, 1891


Material. – Lectotype, herein designated: BMNH 1898.7.13.6 (ex. ZSI F13024, 61.7 mm SL), Andaman Sea. Paralectotype: BMNH 1891.9.2.2 (1 specimen, 51.8 mm SL). ZSI F13014-15 (2 specimens, not examined). ZSI F13016, ZSI F13018 and ZSI F13021 (3 specimens, re-identified as *M. mitrigera*).
Fig. 1. Lectotype of *Malthopsis lutea* Alcock, 1891, BMNH 1898.7.13.6 (ex. ZSI F13024), 61.7 mm SL, Andaman Sea. (A) dorsal view; (B) ventral view.
Fig. 2. *Malthopsis lutea*, from the lectotype, BMNH 1898.7.13.6. (A) lateral profile of head; (B) bucklers on dorsal surface anterior to dorsal fin; (C) dorsal view of head; (D) right subopercular buckler; and (E) ventral surface near anus.
Fig. 3. Syntypes of *Malthopsis lutea*, now re-identified as *M. mitrigera*

Diagnosis. – Subopercular buckler dull, bearing many small blunt spinelets at its tip; ventral surface loosely covered by small- to mid-size bucklers, totally naked between these bucklers; rostrum relatively short and blunt, directed upward; principal bucklers on dorsal surface relatively small and low; and few brown rings present on dorsal surface.

Description. – Morphometric and meristic values are provided in Tables 1–3.

Body relatively depressed, disk markedly triangular in dorsal view, cranium slightly elevated above surface of other parts of disk; caudal peduncle cylindrical, tapering posteriorly; rostrum small and pointed, conical, directed upward and forward, about 60° (Fig. 2A), its length less than half of eye diameter; eye relatively large (13.6% SL in lectotype and 14.9% SL in paralectotype), directed dorsolaterally; no pupillary operculum; interorbital space relatively wide (6.8% SL in both specimens), not forming a groove between frontals; illicial cavity a small triangular cave, its width equal to its height; esca a single medial bulb bearing two small cirri on dorsal margin; mouth small, terminal; small villiform teeth on jaws forming narrow bands, those on ceratobranchial V forming two large, closely spaced and elongated patches, a quadrangular tooth patch on vomer, and a triangular patch on each palatine.

Scales on body surface in the form of bucklers: principal bucklers on dorsal surface relatively numerous in number, all small and blunt, mostly associated with lateral line
neuromasts, skeleton and disk margin (Fig. 2B). Small bucklers present between principal bucklers dorsal to opercular area; two pairs of small bucklers on rostrum base, one at anterior side between rostrum and illicial cavity and one at posterior margin; 5 bucklers on each side of orbital margin, two situated at anterolateral corner of orbit, the upper one larger than the lower one and directed outward; three on posterior area of frontal ridge, the later bigger; many small bucklers in 3-4 irregular rows on skin dorsal to eye; dorsal surface of skull with many flattened bucklers (Fig. 2C); a row of 5 large bucklers along the central axis ending with a pair bucklers at origin of dorsal fin. Buckler of subopercle relatively dull, bearing many small blunt spinelets (Fig. 2D). Ventral surface loosely covered by flat bucklers (Fig. 2E), largely naked between these bucklers and other areas. Caudal peduncle covered with large bucklers, those on dorsal surface forming 2 irregular rows, those on lateral side forming 2 rows of about equal size associated with lateral line, the lower row dense in arrangement, those on ventral surface of caudal peduncle forming two rows between anus and anal fin. 4 relatively flattened bucklers on each row; posterior margin of anus surrounded by 5 bucklers of larger size than neighboring bucklers.

All fins naked; interradial of pectoral fins thin, transparent; dermal cirri present on disk margin, lateral sides of caudal peduncle and in association with lateral line scales.

Coloration. – Background color of preserved specimen uniformly creamy-white. The lectotype with two half-faded irregular rings on central dorsal surface, about equal to eyeball. The paralectotype (BMNH 1891.9.2.2) is somewhat dried out and uniformly dark brown.

Distribution. – Only known from the Andaman Sea, but may extend nearby.

Remarks. – Except for two syntypes examined by us, three syntypes (ZSI F13016, ZSI F13018 and ZSI F13021) were re-identified as M. mitrigera based on the identification of Dr. M. G. Bradbury (pers. comm., 2006) and the photos examined by us (Fig. 3). According to Lloyd (1909), some syntypes were also sent to Oxford University Museum, Cambridge University Museum, United States National Museum (USNM) and The Aberdeen University Museum. A search for those other type series in these institutions (P. Campbell, pers. comm., 2008) and Zoological Survey of India (ZSI) has failed and those specimens might be lost (N. Delventhal, pers. comm., 2008).
Although Alcock (1898) published an illustration for *M. lutea*, there was no indication which specimen the illustration was based on. We examined both specimens deposited in the BMNH and recognized they match the original description and illustration. Of the two, BMNH 1898.7.13.6 was most likely used for the illustration. Moreover, both specimens are distinct from *M. mitrigera*. In order to verify the species, BMNH 1898.7.13.6 is herein designated as lectotype for *M. lutea*.

The presence of minute spines between bucklers on the ventral surface has long been used to diagnose *Malthopsis lutea* (e.g. Ochiai and Mitani, 1956; Yamada in Nakabo, 2002; Ho and Shao, 2008). However, according to the original description, supplemental data (Lloyd, 1909), and two syntypes deposited in the BMNH, this character is not present in any syntype of and is not a valid character for the species.

Lloyd (1909) studied 21 *Malthopsis* specimens collected from the Andaman Sea, including two specimens of *M. triangularis* (= *M. mitrigera*) and five syntypes of *M. lutea* (ZSI F13014-6, 13018, 13020), and concluded that there were 5 different types. His type v, represented by 4 specimens including the type series of *M. lutea*, showed some important diagnostic characters for the species: (1) subopercular buckler dull, bearing many small blunt spinelets at its tip, (2) ventral surface loosely covered by small- to mid-size bucklers, totally naked between these bucklers, and (3) brown rings on dorsal surface. These characters are also confirmed by these two BMNH specimens used in present study.

In addition, we suggest that Lloyd’s (1909) illustrations show his type y may represent another species, and his type w, x, z are all *M. mitrigera*. We are not able to examine his specimens and the hypothesis awaits confirmation.

Specimens of the present species collected from Japan, Taiwan and eastern Australia should refer to *M. kobayashii*. Bradbury (1986) reported it from South Africa and Manilo and Bogorodsky (2003) reported it from Arabian Sea. These were most likely misidentifications.

Comparison. – *Malthopsis lutea* is similar to *M. mitrigera* Gilbert & Cramer 1897 (Fig. 3), *M. jordani* Gilbert 1905, *M. annulifera* Tanaka, 1908, *M. retifera* Ho, Prokofiev and Shao, 2009 and *M. gigas* Ho and Shao, 2010 in having naked interspaces of the principal bucklers on the ventral surface. It can be easily separated from all the above mentioned species in having
a dull subopercular buckler, only weakly developed spinelets at its tip. It is most similar to *M. annulifera* but different in the dull subopercular buckler, the rostrum directed upward and forward (vs. forward horizontally), relatively large eyes (13.6-14.9% SL vs. 10.1-13.2% SL) and relatively more principal bucklers on the ventral surface (>30 vs. usually <20). It is also similar to *M. retifera* but different in lacking the reticulate pattern and five pairs of black spots laterally on the body.

*Malthopsis lutea* has also long been confused with *M. kobayashii* Tanaka, 1916, a species previously assigned as a junior synonym of *M. lutea* and resurrected herein. A detail comparison is provided below.

**Malthopsis kobayashii** Tanaka, 1916

*Malthopsis kobayashii* Tanaka, 1916: 348 (Type locality: probably from off Ise, Mie Prefecture, Japan. Holotype: ZUMT 55048).


Material: - Holotype: ZUMT 55048 (58.7 mm SL), probably from off Ise, Mie Prefecture, Japan.

Non-type: Taiwan. ASIZP 56024 (1 specimen, 65.4 mm SL). ASIZP 58054 (2, 48.7-59.3). ASIZP 58055 (9, 47.7-64.5). ASIZP 64599 (2, 34.8-68.1). NMMP 7915 (1, 48.8). NMMP 5335 (5, 58.1-63.3). Japan: FAKU 133 (1, 51.2). FAKU 1635 (1, 55.8). FAKU 1636 (1, 46.8). FAKU 1992 (1, 60.6). FAKU 4132 (1, 65.5). FAKU 4292 (1, 45.7). FAKU 4293 (1, 60.8).

Diagnosis. – Ventral surface covered in minute prickles; subepidermal buckler dull, bearing few blunt spinelets at its tip; principal bucklers relatively small and flattened, interspace fully covered by small bucklers and prickles; and rostrum pointed, directed rather forward than upward.
Fig. 4. Holotype of *Malthopsis kobayashii* Tanaka, 1916, 58.7 mm SL, probably from off Ise, Mie Prefecture, Japan.

Fig. 5. *Malthopsis kobayashii*, all taken from ASIZP 58054, 59.3 mm SL. (A) latera profile of head; (B) bucklers on dorsal surface anterior to dorsal fin; (C) dorsal view of head; (D) right subopercular buckler; and (E) ventral surface near pelvic fin base. (Please see next page)
Fig. 5. continued

Fig. 6. *Malthopsis tiarella* Jordan, 1904, ASIZP uncat., 46 mm SL, Dong-gang, SW Taiwan.
Description. – Morphometric and meristic data are provided in Tables 1.

Table 1. Morphometric (as % SL) and meristic data of *M. lutea* and *M. kobayashii*.

<table>
<thead>
<tr>
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<th>Malthopsis lutea</th>
<th>Malthopsis kobayashii</th>
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<tbody>
<tr>
<td>SL (mm)</td>
<td>Lectotype 61.7</td>
<td>Paralectotype 51.8</td>
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<tr>
<td></td>
<td>Mean (Range)</td>
<td>SD</td>
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<tr>
<td>Mophometrics (% SL)</td>
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<td></td>
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<tr>
<td>Skull length</td>
<td>26.7</td>
<td>28.8</td>
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<tr>
<td>Head width</td>
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<td>23.4</td>
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<tr>
<td>Head depth</td>
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<td>23.4</td>
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<tr>
<td>Orbital diameter</td>
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<tr>
<td>Interorbital width</td>
<td>6.8</td>
<td>6.8</td>
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<tr>
<td>Rostal length</td>
<td>6.2</td>
<td>5.6</td>
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<tr>
<td>Mouth width</td>
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<td>15.4</td>
</tr>
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<tr>
<td>Preanal length</td>
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<td>Disk margin length</td>
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<tr>
<td>Pectoral fin length</td>
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<tr>
<td>Dorsal fin length</td>
<td>18.3</td>
<td>22.0</td>
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<tr>
<td>Anal fin length</td>
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<tr>
<td>Caudal fin length</td>
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<td>32.6</td>
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**Meristics**

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<table>
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<tr>
<td>Dorsal sin rays</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Pectoral fin rays</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Anal fin rays</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>
Body depressed, disk markedly triangular in dorsal view, cranium about same surface level as other parts of disk; caudal peduncle cylindrical, tapering posteriorly; rostrum relatively strong, its base widest in genus, conical, directed rather forward than upward, usually less than 45° (Fig. 5A), distinctly overhanging illicial cavity and mouth; rostral length usually more than half of eye diameter; eye relatively large (12.4-14.0% SL, \( \bar{x} = 13.2\% \)), directed dorsolaterally; no pupillary operculum; interorbital space relatively narrow (6.0-7.5% SL, \( \bar{x} = 6.5 \)), flattened, not forming a groove; illicial cavity a relatively wide triangular concavity, wider than high; esca a single bulb, bearing 2 small cirri on dorsal margin; mouth small, terminal; small villiform teeth on jaws forming narrow bands, those on ceratobranchial V forming 2 large and elongated patches close together, and teeth on vomer and palatines in quadrangular patch.

Scales on body surface in the form of bucklers, relatively small and numerous, mostly associated with lateral line, skeleton and body edge. In most examined specimens, the bucklers on dorsal surface are all blunt (Fig. 5B) and those on caudal peduncle are serrated with a slightly enlarged axil spine directed backward. Those on larger individuals are all blunt and flattened.

Dorsal surface completely covered with small bucklers between principal bucklers, except for eyes, gill openings and fins. Four to five bucklers along the upper orbital margin and frontal ridge, two situated at anterolateral corner of orbit, upper one larger, directed outward, and with the rostrum forming a trident; 3-4 on frontal ridge, the latter larger. Skin above eye bearing several irregular rows of small bucklers and prickles. Bucklers of dorsal surface of skull forming 3-4 irregular rows (Fig. 5C), joined to a median row at post-cephalic region. Buckler of subopercular dull, bearing some small spinelets at its tip, lacking enlarged ones (Fig. 5D); central part of ventral surface covered by few flattened bucklers and numerous prickles (Fig. 5E); ventral surface of gill cavity and thoracic regions with large naked area; caudal peduncle covered by large bucklers, those on dorsal surface forming 5 irregular rows, 1 median row behind dorsal fin, 2 rows on each side of dorsal fin, 2 equal-sized rows on each lateral side associated with lateral line neuromasts, 2 rows of 4-6 flattened bucklers on ventral surface of caudal peduncle between anus and anal fin; posterior margin of anus surrounded by 4-5
bucklers, those are not larger than neighboring ones.

All fins naked, without bucklers, except for some small ones running out along the base of caudal fin rays; inter-radials of pectoral fins thin, transparent; dermal cirri flap-like, present on disk margin and lateral sides of tail associated with lateral line scales.

Coloration. – Dorsal background uniformly gray to deep brown, usually few black ring about equal to eye pupil present; a dark band may be present crossing the caudal peduncle; ventral surface uniformly pale to gray; all fins deeper in color, except for anal fin which may be pale and associated with the ventral coloration of each individual; some black stains may be present on some larger individuals.

Distribution. – By far, only known from western off Japan, Taiwan, Philippines and Australia.

Remarks. – Malthopsis kobayashii has long been placed in the synonymy of M. lutea, and its characters were taken to represent M. lutea (e.g. Kamohara, 1938; Ochiai and Mitani, 1956; Yamanda in Nakabo, 2002; Ho and Shao, 2008). However, examinations of the type series of both species revealed M. kobayashii is distinct and differs from M. lutea mainly in having numerous minute prickles on the ventral surface.

Comparison. – Malthopsis kobayashii is one of three species with the ventral surface covered by numerous minute prickles. It different from M. tiarella (Fig. 6) which co-occurs in the western Pacific in having usually 5 dorsal fin rays (vs. 6-7 in M. tiarella); more numerous bucklers on the dorsal surface (vs. fewer in M. tiarella); ring marks on dorsal surface (vs. deep brown spots in M. tiarella). It differs from the only Atlantic species, M. gnoma, in lacking gill filaments on the fourth gill arch (vs. some filament present in M. gnoma).


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