# Lates japonicus, a New Centropomid Fish from Japan

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Abstract Specimens of the centropomid genus *Lates* occurring in Japanese waters are compared with those from the Philippines, Thailand and Australia. Specimens from localities other than Japan are morphologically identical, and referrable to *L. calcarifer* (Bloch). Whereas, the Japanese specimens are found to represent a distinct, undescribed species, with clear morphological differences from *L. calcarifer*, although *L. calcarifer* was originally described by Bloch on the basis of a material allegedly from Japan. The Japanese form of *Lates* is described here as *L. japonicus* sp. nov. This new species differs from *L. calcarifer* in the relative depth of the body, relative length of the third dorsal and second anal spines, pectoral fin ray count, squamation, and gill raker count.

The coastal-water ichthyofauna of the southwestern part of the Japanese main islands contains a centropomid fish locally known as "akame", meaning red-eyes. Tanaka (1922) identified it as *Psammoperca waigiensis* (Cuvier). This specific identification was followed by Kamohara (1950) and Matsubara (1955). However, Katayama (1956) pointed out morphological distinctions of the fish from P. waigiensis, and identified it as Lates calcarifer (Bloch) which was originally described by Bloch (1790) as Holocentrus calcarifer on the basis of material allegedly from Japan. This specific name has been used since then by most Japanese ichthyologists for "akame", and Japan has been generally included in the geographic range of L. calcarifer (e.g., Nakamura, 1963; Masuda et al., 1975; Greenwood, 1976). However, Bloch's (1790) indication of locality is considered erroneous and his type material seems to have come from Java (Cuvier in Cuvier and Valenciennes, 1828).

In 1977 Katayama et al. compared the Japanese "akame" with its Australian counterpart, which is identified as *Lates calcarifer*, *L. cavifrons* Alleyne et Macleay, or *L. darwiniensis* Macleay, and showed distinct differences between the two forms in both external and internal characters. This implies possible specific separation of "akame" from *L. calcarifer*, and further comparative examination has been awaited to clarify the taxonomic status of these forms of *Lates*.

In this study we examined *Lates* specimens from Japan, the Philippines, Thailand and Australia, and found that the Japanese specimens are specifically distinct from other specimens which are referrable to *L. calcarifer*. This Japanese form of *Lates* is described here as *L. japonicus* sp. nov.

# Lates calcarifer (Bloch) (Fig. 1)

Holocentrus calcarifer Bloch, 1790: 80, pl. 244 (type locality: Japan).

Lates calcarifer: Cuvier in Cuvier and Valenciennes, 1828: 74 (on Bloch).

Pseudolates cavifrons Alleyne and Macleay, 1877: 262, pl. 3 (Torres Strait or the coast of New Guinea).

Lates darwiniensis Macleay, 1878: 345 (Port Darwin, Australia)

For other synonyms, see Weber and de Beaufort (1929: 396) and Katayama (1956: 113) (*Psammoperca waigiensis* in Katayama's synonym list should be deleted).

Material examined. NSMT-P 21756 (National Science Museum, Tokyo), 1 specimen, 209 mm SL, 12 Sep. 1981, NSMT-P 21758, 1 specimen, 317 mm SL, 14 Mar. 1983, NSMT-P 21759, 1 specimen, 229 mm SL, 15 Mar. 1983, all from Songkhla Lake on Gulf of Thailand, southern Thailand; NSMT-P 21757, 3 specimens, 139~194 mm SL, 8 Nov. 1982, Phuket, Andaman Sea, southern Thailand; NSMT-P 21755, 1 specimen, 212 mm SL, 12 May 1981, fish market in Manila, Philippines; A. 16557 (T. Abe's catalogue No.), 1 specimen, 282 mm SL, A. 16559, 1 specimen, 306 mm SL, both 17 May 1973, off

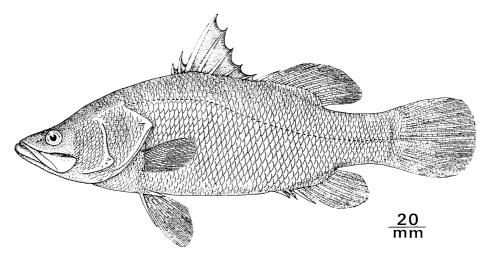


Fig. 1. Lates calcarifer, NSMT-P 21757, 194 mm SL, Phuket, Thailand.

Rockhampton, Queensland, Australia; non-catalogued, 10 specimens,  $45 \sim 63$  mm SL, hatchery-raised specimens at National Institute of Coastal Aquaculture, Thailand in 1981 (only for observation of juvenile coloration).

**Description.** Proportional measurements and selected counts are given in Table 1. General external morphological features are shown in Fig. 1.

Dorsal fin rays VII-I, 11; anal fin rays III, 8; pectoral fin rays 17 or rarely 18. Pored lateral-line scales to caudal base  $54 \sim 57$ ; scales in a series from origin of dorsal to lateral line 6, from origin of anal fin to lateral line  $9 \sim 10$ . Gill rakers (excluding rudimental rakers)  $3+1+8 \sim 9$ . Vertebrae 11+14=25. Pyloric caeca 5.

Body elongate, compressed. Mouth large, maxilla extending beyond a vertical at hind border of eye; supramaxilla present. First infraorbital finely serrated along lower border. Interorbital space convex, narrower than or equal to eye diameter. Teeth villiform, in bands on jaws, vomer, palatines and pterygoids; the band on vomer triangular; no teeth on glossohyal. Preoperculum finely serrated posterior border, with a strong spine at the angle and three shorter spines on lower border. Operculum with a spine at the angle. Pseudobranchiae small. Gill rakers longer than gill filaments.

Dorsal spines stout; the third the longest, slightly shorter than pelvic fin. Anal spines short; the third the longest, much longer than

the second.

Scales ctenoid; head scaly except for snout, interorbital space, preorbital region, mandible and throat; base of soft dorsal and anal fins covered with small scales. Lateral line ending near distal end of caudal fin; two other rows of pore-bearing scales on caudal fin, one above and the other below the main lateral line.

Color in life: In adults body grey, darker dorsally and lighter ventrally, with somewhat bluish tint and silvery sheen, without markings. Fins greyish. Pupils deep red. In juvenile body brownish grey, under certain conditions with a broad stripe of light brownish grey along mid-dorsal line from tip of snout to origin of dorsal fin and an irregularly demarcated broad stripe of the same color running parallel with the median stripe on either side of head from near snout to below origin of dorsal fin. Pupils deep red.

Remarks. The specimens we examined in this study are from widely scattered localities in the tropical Indo-Pacific. Nevertheless, there is no difference at the species level in all meristic and morphometric characters employed (Table 1). We therefore consider that *Lates* occurring in coastal waters of the Philippines, Thailand and Australia represents a single species, and identify this species as *Lates calcarifer* (Bloch). It agrees with the description and figure of *L. nobilis* by Cuvier in Cuvier and Valenciennes (1828) (synonymyzed with *L. calcarifer* by sub-

Table 1. Measurements and selected counts of Lates japonicus sp. nov. and L. calcarifer.

	Lates japonicus sp. nov.  Kochi, Japan					Lates calcarifer								
Character						Philip- pines	Songkhla, Thailand			Phuket, Thailand			Australia	
	Holo- type	Paratypes			Non- type									
	NSMT- P 21751	NSMT- P 21752	NSM T- P 21753	NSM I'- P 21754	K. 2485	NSMT- P 21755	NSMT- P 21758	NSMT- P 21759	NSMT- P 21756	NSMT-P 21757			A. 16559 A. 16557	
Standard length (mm)	269	309	286	149	288	212	317	229	209	194	159	139	306	282
Total length (mm)	330	374	350	180	351	263	_	283	256	240	191	170	375	346
Proportional measurements (	% SL)													
Head length	34 9	35.2	33.9	34.9	35.4	34.9	34.1	35.3	34 9	37.1	36 5	36 7	34 6	33 6
Body depth	36.1	38 8	36.3	36.9	36.8	33.4	30.3	31.9	32.5	33.5	30.2	30.2	32 6	31 5
Body width	17.8	18.7	16.7	15.1	16.9	15.5	15.1	15.3	13.4	17.5	14.5	14.4	_	_
Snout length	5.9	7 4	6 9	7 5	7.3	6.6	6.9	6.6	7.6	7.7	7.2	6 8	6 5	7 0
Eye diameter	5.0	5.1	5 2	5 5	5 2	5.6	4.4	5.1	6.2	5.7	6 3	6 3	4.2	4 2
Interorbital width	4.6	5 0	5.2	5.5	5.2	4.8	4.6	4.7	5 0	4.4	4.7	3.6	3 9	4 2
Length of maxilla	14.1	14.5	14.3	14.0	14.2	14.6	15.1	15 3	15.3	16.2	16.0	16 6	14 3	14 5
Length of caudal peduncle	20.0	21.3	19 5	18.7	20.1	17.9	17.3	19.2	18 6	17.0	16 4	18 0	16 3	15 9
Depth of caudal peduncle	14.8	15.2	14.3	13.4	14.2	13 6	13.3	13.1	13 6	14.4	12.3	13 3	13 4	13.8
Third dorsal spine	21.1	21.0	21.6	20 8	20.9	18.6	19.2	18.3	15 7	18 8	17 4	17 3	15 3	15 9
Last dorsal spine	4.0	5.1	5.2	4.7	5 9	6.1	3.8	3 9	4 0	4 9	4 0	4 5	5 5	3 9
Longest dorsal soft ray	14.8	13 9	15.3	14.5	15.6	15.5	16.4	15.7	14 3	15 2	13 8	14 4	13.7	12 4
First anal spine	5.2	4.6	5.2	5 7	5.6	2.8	2.4	2.4	2 5	29	3.7	2.5	2.2	2 1
Second anal spine	9.6	8.7	9.0	8.8	9.7	5.1	3.8	5.0	5.2	4 1	5.4	5.4	3.5	4 6
Third anal spine	8.1	8.0	6.2	7 3	7.6	8.0	7.3	7.9	7 0	6 8	6 0	7.9	4 2	5.6
Longest anal soft ray	12.6	13.2	13 9	14.7	16.3	14.1	12.8	13.1	13 8	13 4	14 5	16 0	13 0	12.7
Length of pectoral fin	14.8	15.5	15.0	14.7	16.0	14.3	14 8	15.3	14 3	16 0	15.1	15 8	15.3	14.5
Length of pelvic fin	19.3	21.3	19.9	18.7	21.2	21.2	20.8	20.5	20.1	21.1	19.8	20.9	19.2	18 4
Length of caudal fin	23.0	22.0	22.3	21.4	21 9	23.1	_	23.6	22.4	23.7	20.8	23.0	22 2	22 7
Counts														
Pectoral fin rays	16	16	16	16	16	18	17	17	17	17	17	17	17	17
Lateral-line scales	62	63	61	62	62	57	56	56	57	54	57	55	54	56
Gill rakers	2+1+6	2+1+6	2+1+6	2+1+7	2+1+7	3+1+9	3+1+9	3+1+9	3+1+9	3+1+9	3+1+9	3+1+3	$8 \ 3+1+8$	3+1+8

sequent authors) and with those of L. calcarifer by Bleeker (1873 ~ 1876, described as Plectropoma calcarifer) and Weber and de Beaufort (1929). Pseudolates cavifrons Alleyne et Macleay and Lates darwiniensis Macleay described from Australia are considered to be the same species as L. calcarifer because they are very closely similar to the latter in the following characters: depth of body, number of lateral-line scales and lengths of the second and third anal spines. In other words, they are synonyms of L. calcarifer (see Katayama et al., 1977).

Our material of Lates calcarifer agrees with Bloch's (1790) brief description and figure of Holocentrus calcarifer in the features of fin ray counts and serrations and spines of the preoperculum and operculum. However, they disagree in the dorsal profile of head, the shape of mouth, and the length of upper jaw. The disagreements between them are considered to result from the bad type specimen. Day (1878: 8) examined the type specimen and described it as follows: "Deformities in this fish are by no means rare. In one case the last few dorsal rays were deflected to the left side of the free portion of the tail, and had there become continuous at their bases with the anal spines, which were likewise inserted along the same portion of the fish, whilst the anal rays were in their natural position. It is very remarkable how in fishes which have died and stiffened with their mouths open, and the opercles and branchial rays distended, the appearance of the head becomes much changed, whilst it is difficult, or impossible to subsequently bring them back to their normal shape. Thus the profile of the head becomes more horizontal, whilst the posterior extremity of the maxilla does not reach so far back as when the mouth had been naturally closed." Since the type specimen of H. calcarifer appears to be lost (Katayama et al., 1977), we were unable to determine to what extent these differences are due to inaccuracy of the original description and figure. But the specimens from localities other than Japan are morphologically identical and referable to Holocentrus calcarifer Bloch. The specimens from Japan (L. japonicus) are different from Bloch's specimen in having a deeper body, the relative length of the second and third anal spines and the third dorsal spine shorter than

the pelvic fin. The identification of our material as L. calcarifer is based on Cuvier in Cuvier and Valenciennes (1828) who assigned H. calcarifer to the genus Lates (but separated L. calcarifer from L. nobilis), and on Günther (1859), Bleeker (1873  $\sim$  1876), Day (1878), Weber and de Beaufort (1929), and many subsequent authors who applied the name calcarifer to this tropical Indo-Pacific species, synonymyzing L. nobilis with L. calcarifer.

At all events, Bloch's (1790) indication of the type locality is most probably erroneous. Cuvier in Cuvier and Valenciennes (1828) states that"... Bloch, soit par ignorance, soit parce qu'il était trompé par les marchands hollandais dont il achetait des poissons, a presque toujour donné pour japonaises des espèces javanaises."

Lates japonicus sp. nov. (Japanese name: Akame) (Fig. 2)

Psammoperca waigiensis (non Cuvier): Tanaka, 1922: 602, pl. 147, fig. 407 (Kochi, Japan); Okada and Matsubara, 1938: 194 (Tosa and Miyazaki, Japan); Kamohara, 1950: 120, fig. 109 (Tosa and Miyazaki); Matsubara, 1955: 617 (Tosa and Miyazaki). Lates calcarifer (non Bloch): Katayama, 1956: 133 (Urado Bay, Kochi); Nakamura, 1963: 182, fig. 132a~c (Miyazaki and Kochi); Masuda et al., 1975: 223, fig. 52-H (southern Japan).

Lates sp.: Katayama et al., 1977: 45 (Japanese common name "akame" is used instead of Lates sp.); Masuda et al., 1980: 223, fig. 52-H (southern Japan).

Holotype. NSMT-P 21751 (National Science Museum, Tokyo), 269 mm SL, Urado Bay, Kochi Prefecture, Japan, 16 Oct. 1953.

Paratypes. NSMT-P 21752, 1 specimen, 309 mm SL and NSMT-P 21753, 1 specimen, 286 mm SL, both collected with the holotype; NSMT-P 21754, 1 specimen, 149 mm SL, fish market at Mimase, Kochi Prefecture, Japan, 31 Mar. 1966.

Other material. K. 2485 (Katayama's catalogue No.), 288 mm SL, collected with the holotype (cleared).

**Diagnosis.** A species of the genus *Lates* with: 1) comparatively high body (body depth  $2.56 \sim 2.92$  in SL), 2) third dorsal spine longer than pelvic fin, 3) second anal spine longer than the third, 4) 16 pectoral rays, 5)  $61 \sim 66$  pored lateral-line scales to caudal fin base, 6)  $7 \sim 8$  scale rows above lateral line to origin of dorsal fin and  $12 \sim 13$  scale rows below lateral line to

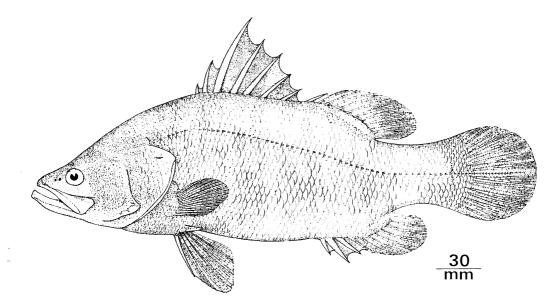


Fig. 2. Lates japonicus sp. nov., holotype, NSMT-P 21751, 269 mm SL, Urado Bay, Kochi, Japan.

origin of anal fin, and 7)  $2+1+6\sim7$  gill rakers (excluding rudimentary rakers).

**Description.** Data for the paratypes and non-type material differing from the holotype are given in parentheses.

Dorsal fin rays VII-I, 11 (VII $\sim$  VIII-I, 11); anal fin rays III, 8; pectoral fin rays 16; pelvic fin rays I, 5; pored lateral-line scales to caudal base 62 (61 $\sim$ 63); scale rows in a series from origin of dorsal fin to lateral line 7 (7 $\sim$ 8), from origin of anal fin to lateral line 12 (12 $\sim$ 13); gill rakers iii+2+1+vi (iii $\sim$ v+2+1+6 $\sim$ 7+iv $\sim$ vi); vertebrae 11+14=25; pyloric caeca 5.

Proportional measurements in percentages of SL are shown in Table 1. Body oblong, compressed; its greatest depth 2.77 (2.58  $\sim$  2.75), width immediately behind gill opening 5.60 (5.33  $\sim$  5.96) both in SL. Dorsal profile elevated, with a gentle concavity above eye; ventral profile slightly arched. Head pointed; its length 2.86 (2.83  $\sim$  2.95) in SL. Eye diameter 6.96 (6.27  $\sim$  6.81) in head. Snout 5.88 (4.74  $\sim$  4.86) in head. Interorbital space convex and narrow, about equal to eye diameter, 7.52 (5.78  $\sim$  7.03) in head. Length of caudal peduncle 1.74 (1.65  $\sim$  1.86), depth of the same 2.35 (2.32  $\sim$  2.60) both in head.

Mouth large, slightly oblique and slightly protractile; lower jaw projecting over the upper when mouth is closed; length of upper jaw 2.47 (2.37 ~ 4.48) in head; maxilla broadened distally, extending beyond a vertical at hind border of eye; supramaxilla present. Nostrils close together, directly in front of eye; anterior nostril with an elevated rim and a produced posterior flap; posterior nostril larger, ellipitical. Teeth villiform, in bands on jaws, vomer, palatines and pterygoids; the band on vomer triangular; tongue smooth. Preoperculum serrated along posterior border, with a strong spine at the angle and three shorter spines on lower border, the anteriormost being antrorse. Operculum with a spine at the angle. Pseudobranchiae small. Gill rakers longer than gill filaments.

Two dorsal fins connected at their bases; originating slightly behind insertion of pelvic fin; spines stout; first spine the shortest, less than eye diameter, 8.55 ( $8.20 \sim 10.00$ ) in head; the third the longest, longer than pelvic fin, 1.65 ( $1.56 \sim 1.70$ ) in head; following spines decreasing in length towards the last which is about equal to eye diameter; longest (5th) soft rays 2.35 ( $2.20 \sim 2.53$ ) in head. Anal fin originating below base of second dorsal soft ray; first spine small, about equal to eye diameter, 6.71 ( $6.12 \sim 7.52$ ) in head; the second stouter and longer than the third, 3.62 ( $3.73 \sim 4.04$ ) in head; the thrid 4.27 ( $4.36 \sim 5.39$ ) in head; longest (3rd)

soft ray 2.76 ( $2.36 \sim 2.66$ ) in head. Posterior tips of dorsal and anal fins rounded. Pectoral fin small, shorter than pelvic fin; its distal margin rounded. Pelvic fin inserted slightly posterior to lower end of pectoral fin base; not reaching vent; a scaly axillary process present. Caudal fin rounded.

Scales large, ctenoid; head scaly except for interorbital space, snout, preorbital region, upper jaw, mandible and throat; base of soft dorsal and anal fins covered with small scales. Lateral line gently curved, running along middle of caudal peduncle and ending near posterior tip of caudal fin; two other rows of pore-bearing scales on caudal fin, one above and the other below the median row.

Color in life: In adults body grey, pale below, with bluish tint and silvery luster. All fins blackish. Eyes deep red. In juvenile body dark brown; head with two obliquely longitudinal bands of cream yellow, the upper running along head dorsum from tip of snout to origin of dorsal fin, the lower running in parallel with the upper from below nostrils to upper end of gill cleft; lower side of head cream yellow. Pupils red. Side of body with two cross bands and irregular-shaped blotches of cream yellow, anterior cross band descending vertically from between second and third dorsal spines, posterior band from between first and second dorsal fins.

Ecological notes. Lates japonicus has been recorded from Tosa Bay in Kochi Prefecture, Shikoku and off Miyazaki City in Miyazaki Prefecture, Kyushu. Spawning seems to take place in these seas. Juveniles ascend the Shimanto River in Kochi Prefecture and the Ohyodo River in Miyazaki Prefecture. There is no record of its occurrence in the Ryukyu Islands in southern Japan.

Remarks. In spite of its close similarity to Lates calcarifer in gross morphology, L. japonicus shows decided, though not wide, differences from L. calcarifer in several characters (Table 1). In L. japonicus the body is deeper, and the third dorsal and second anal spines are longer in relation to both standard length and head length. The third dorsal spine is longer than the pelvic fin in L. japonicus but shorter in L. calcarifer, and the second anal spine is longer than the third in L. japonicus but much shorter in L. calcarifer. In meristics, L. japonicus has

fewer pectoral fin rays (16 vs. 17 or rarely 18 in *L. calcarifer*), more numerous lateral-line scales to caudal base (61 to 63 vs. 54 to 57), more numerous scales in transverse rows (7 to 8/1/12 to 13 vs. 6/19 to 10), and fewer gill rakers (2+1+6 to 7 vs. 3+1+9).

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### アカメ Lates japonicus sp. nov. の記載

片山正夫・多紀保彦

高知県と宮崎県の沿岸・河口周辺に出現するアカメ 科魚類アカメには、従来一般にLatesc alcarifer (Bloch) の学名が与えられてきたが、種の査定には疑問がもた れていた (Katayama et al., 1977). そこで本研究では 日本、フィリピン、タイ、オーストラリア産の Lates 属魚類を比較したところ、日本以外の地域からの標本 はすべて形態的に同一で L. calcarifer と同定される が、日本産のアカメは、L. calcarifer の type locality が日本ということになっている (Bloch, 1790) にもか かわらず、未記載の別種であることが判明し、これを L. japonicus sp. nov. として記載した。Bloch (1790) の type locality の表示は、おそらく javanaise を japonaise と混同したことからきた誤りと思われる (Cuvier in Cuvier and Valenciennes, 1828).

アカメ Lates japonicus は、体高体長比、背鰭第 3 棘と臀鰭第2 棘の相対長、胸鰭条数、鱗数、鰓耙数の諸形質で、L. calcarifer と区別される。本種はこれまで高知・宮崎両県下からのみ記録されている。

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