

Hoplichthys mimaseanus, a New Ghost Flathead from East Asia and Western Australia (Teleostei: Hoplichthyidae)

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Abstract A new hoplichthyid species, *Hoplichthys mimaseanus*, is described on the basis of two specimens (206.4–218.4 mm SL) collected from Tosa Bay, off Kochi Prefecture, Shikoku Island, Japan and off Uotsuri-shima Island, Senkaku Islands, southern East China Sea. In addition, two specimens collected from Western Australia are considered conspecific with this new species. The new species is clearly distinguished from its congeners by the following combination of characters: a long upper jaw exceeding posteriorly beyond base of posteriormost spine in outer row of spines on first infraorbital; knob-like gill rakers much shorter than interspaces between bases of rakers; a few small spines on ventral surface of lower jaw; low first dorsal fin, tips of adpressed spines not reaching to origin of second dorsal fin; posterior margin of caudal fin with distinctly rounded central portion demarcated by notches on upper and lower lobes; first dorsal fin yellow, with white anterior and posterior margins in fresh specimens. Form of caudal fin and coloration of first dorsal fin are unique characters to *H. mimaseanus* in the genus.

Key words: *Hoplichthys mimaseanus*, Hoplichthyidae, new species, Tosa Bay, East China Sea, Western Australia.

Ghost flatheads of the genus *Hoplichthys* inhabit the continental shelf and slope at depths of 50–1500 m in the western Pacific and Indian oceans. *Hoplichthys* is characterized by an extremely depressed head, the dorsal surface covered with many spines and serrated ridges, an elongated and mostly scaleless body, a single row of spines along lateral scutes on the body, and lowest three or four pectoral-fin rays free. The genus is composed of 10 valid species, five of which are known from Japan and adjacent waters (Nakabo, 2002; Nelson, 2006): *Hoplichthys langsdorfi* Cuvier in Cuvier and Valenciennes, 1829; *Hoplichthys gilberti* Jordan and Richardson, 1908; *Hoplichthys regani* Jordan, 1908;

Hoplichthys fasciatus Matsubara, 1937; and *Hoplichthys filamentosus* Matsubara and Ochiai, 1950.

In November of 2007, we obtained a single specimen of an undescribed species of *Hoplichthys* while sampling at Mimase fish market of Kochi City, Japan (Fig. 1). The specimen resembles *H. gilberti*, *H. regani*, and a Hawaiian species, *Hoplichthys citrinus* Gilbert, 1905, in having a short snout, a narrow interorbit and large eyes, but differs from them in other morphological characters (e.g., the length of gill rakers, the form of caudal fin, the coloration of the first dorsal fin). Subsequently we found a second specimen of the same species deposited in the fish

collection of Academia Sinica, Taiwan (ASIZP). This specimen was collected from southern East China Sea, off the Senkaku Islands in 2004. Furthermore we found more two specimens considered conspecific with this species. The two specimens are collected from Western Australia, off Point Cloates, and deposited in the fish collection of Australian Museum (AMS). We herein describe a new species of the genus *Hoplichthys* based on these specimens.

Materials and Methods

Counts and proportional measurements follow Hubbs and Lagler (1958), except: body depth, which is measured at the origin of the first dorsal fin; body width at the origin of the second dorsal fin; the lengths of the dorsal- and anal-fin bases

from the base of the first ray to the base of the last ray, excluding the terminal fin membrane; the pectoral-fin length from the base to the tip of the longest pectoral-fin ray; the length of the upper caudal peduncle is from the end of the second dorsal-fin base, not including the terminal fin membrane, to the center of caudal-fin base; the head depth at mid-point between the parietal spines on both sides; the preoptic snout length from the anterior tip of the snout to the anterior edge of the eye; and the preorbital snout length from the anterior tip of the snout to the anterior edge of the orbit. Lachrymal spines are counted only along the upper row. Inner and outer row spines on first infraorbital are the number of spines on the dorsal side of the first infraorbital. Gill rakers were counted on the outer row of the first gill arch of the right side. Vertebrae and cau-

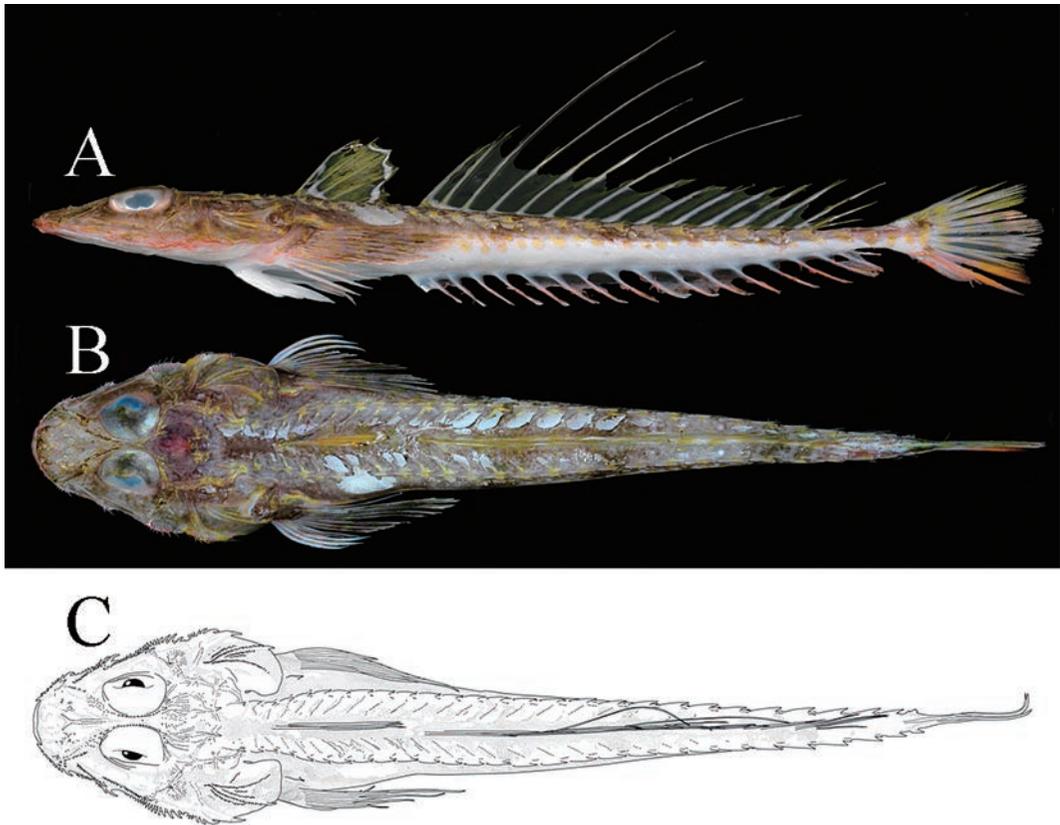


Fig. 1. *Hoplichthys mimaseanus* sp. nov., NSMT-P 109034, holotype, male, 218.4 mm SL. A, lateral view in fresh condition; B, dorsal view in fresh condition; C, illustration in dorsal view. Photographs by N. Nakayama.

dal-fin rays were counted from radiographs. Sex was determined by microscopic examination of gonads (no sectioning of gonads was undertaken). Measurements were made with calipers and dividers to the nearest 0.1 mm. Standard and head lengths are abbreviated as SL and HL, respectively. Counts of spines on the head are shown as “left side/right side”. The pectoral-fin ray count is shown as “joined pectoral-fin rays + free pectoral-fin rays = total pectoral-fin rays”. Terminology for spines on the dorsal side of head is shown in Fig. 2, following Nagano *et al.* (2012). Institution abbreviations follow Eschmeyer (1998), except for Hokkaido University Museum, Hakodate (HUMZ) and National Museum of Nature and Science, Tsukuba (NSMT).

Hoplichthys mimaseanus sp. nov.

[New English name: Mimase’s ghost flathead]

[New Japanese name: Mimase-harigochi]

(Figs. 1–5)

Holotype. NSMT-P 109034 (formerly BSKU

92004), 218.4 mm SL, male, Mimase fish market, Kochi City, Kochi Prefecture, Japan, 200–300 m depth, offshore trawl, coll. by N. Nakayama, 1 Nov. 2007.

Paratype. ASIZP 63198, 206.4 mm SL, female, southern East China Sea, near Uotsurishima, Senkaku Islands, 300–500 m depth, coll. by H. Ho, 24 Apr. 2004.

Non-types. AMS I.31156–003, 2 specimens, 179.1–182.8 mm SL, female and male, 23°25.4’S, 113°03.9’E–23°23.6’S, 113°05.1’E, off Point Cloates, Western Australia, 300–302 m depth, coll. by J. Paxton, 26 Jan. 1991.

Diagnosis. A new species of *Hoplichthys* with the following combination of characters: short preoptic snout (30.4–32.0% HL); large eyes (23.4–26.1% HL); narrow interorbit (2.9–3.7% HL); long maxilla exceeding beyond base of posteriormost spine in outer row of spines on first infraorbital; gill rakers shorter than interspace between bases of rakers; a few small spines on ventral surface of lower jaw; single developed spine on each lateral scute; low first dorsal fin, its adpressed tips not reaching to origin of second

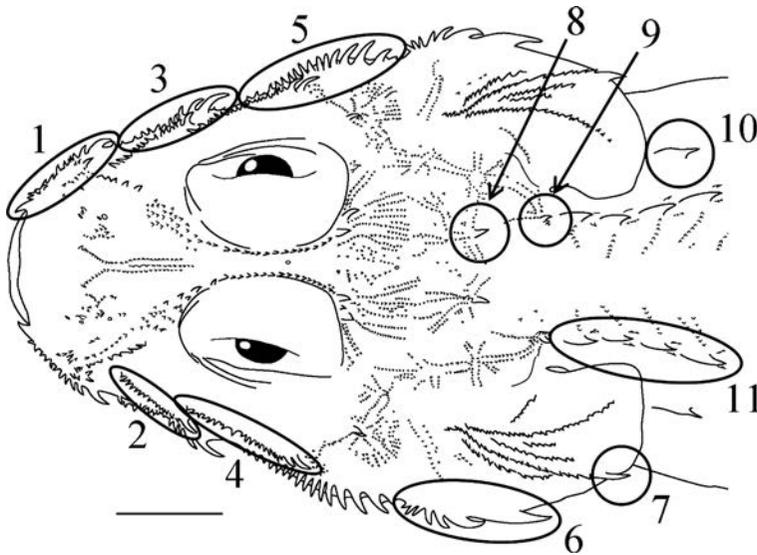


Fig. 2. Dorsal illustration of head of *Hoplichthys mimaseanus* sp. nov., showing series of spines and ridges. 1, row of spines on lachrymal; 2, inner row of spines on the first infraorbital; 3, outer row of spines on the first infraorbital; 4, inner row of spines on the second infraorbital; 5, outer row of spines on the second infraorbital; 6, preopercular spines; 7, opercular spine; 8, parietal spines; 9, posttemporal spines; 10, humeral spine; 11, spines on lateral scutes. Bar indicates 10 mm.

dorsal fin; short first free pectoral-fin ray (13.4–14.9% SL); and posterior margin of caudal fin with rounded central portion demarcated by notches on upper and lower lobes.

Description. Data for holotype are presented first, followed by that of paratype and non-types in parentheses if different: dorsal-fin rays VI-15; anal-fin rays 17; caudal-fin rays 6 + 6 = 12; pectoral-fin rays 13 + 3 = 16; pelvic-fin rays I, 5; gill rakers 2 + 11 = 13 (2 + 12 = 14); branchiostegals 7; vertebrae 26; lateral scutes 27. Head spines (Fig. 2): spines on lachrymal 11/10 (9–11/10); inner row spines on first infraorbital 16/16 (13–19/15); outer row spines on first infraorbital 11/10 (10–11/8–14); inner row spines on second infraorbital 22/22 (22–25/18–25); outer row spines on second infraorbital 17/17 (16–18/14–19); preopercular spines 7/7 (8/8–9); spines on ventral surface of lower jaw 3/2 (3–5/2–5). Proportional measurements as % SL: HL 29.5 (30.7–32.0); body depth 7.8 (7.4–7.6); body width 9.4 (8.9–9.7); pre-first dorsal length 30.0 (29.7–30.9); length of first dorsal-fin base 8.2 (7.8–8.3); length of first dorsal-fin spine 10.4 (7.8 in male, 8.1 in female); length of second dorsal-fin spine 11.8 (broken in male, 7.4 in female); length of sixth dorsal-fin spine 4.2 (2.7 in male, 3.6 in female); pre-second dorsal length 44.6 (43.8–46.1); length of second dorsal-fin base 46.6 (43.2–44.8); length of first dorsal-fin soft ray 12.3 (10.9–11.4 in female); length of fourth dorsal-fin soft ray 32.2 (28.3 in male, 11.5 in female); length of sixth dorsal-fin soft ray 28.0 (36.9 in male, 10.8–11.1 in female); length of eighth dorsal-fin soft ray 12.1 (12.6 in male, 10.6–11.3 in female); length of 15th dorsal-fin soft ray 9.4 (10.6 in male, 6.1–6.2 in female); pre-anal length 43.0 (43.1–45.8); length of anal-fin base 50.0 (46.6–48.3); length of first anal-fin ray 3.8 (3.3–3.6); length of 17th anal-fin ray 6.5 (6.1–6.9); pectoral-fin length 21.3 (19.5–21.6); length of first free pectoral-fin ray 13.4 (14.5–14.9); pelvic-fin length 13.0 (11.4–13.6); caudal peduncle depth 1.8 (1.6–1.8); length of upper caudal peduncle 11.4 (11.2–12.2); length of caudal peduncle 8.4 (8.3–9.4); caudal-fin length 17.1

(14.8–16.5). Proportional measurements as % HL: head depth 24.1 (21.6–24.8); head width at anterior margin of eye 43.9 (43.6–46.1); head width at inner base of posteriormost preopercular spine 56.0 (49.6–59.8); head width at outer base of posteriormost preopercular spine 65.3 (64.3–74.0); preoptic snout length 32.0 (30.4–31.1); preorbital snout length 23.3 (21.1–24.3); orbital diameter 35.5 (34.8–38.0); vertical eye diameter 23.4 (25.8–26.1); horizontal eye diameter 15.7 (18.2–19.2); interorbital width 2.9 (3.3–3.7); postorbital length 47.9 (43.9–45.2); upper jaw length 34.3 (36.0–36.7); lower jaw length 34.1 (32.4–35.3); length between upper edges of opercles on either side 25.1 (21.9).

Head extremely depressed, depth 2.7 (3.0–3.1) in width at outer base of posteriormost preopercular spine. Body elongate, slightly depressed, naked except for lateral scutes on lateral side of body; depth at origin of first dorsal fin 1.2 (1.2–1.3) in body width at origin of second dorsal fin. Snout paddle-like; preoptic snout length longer than vertical eye diameter, 1.5 (1.4–1.5) in postorbital length. Anterior nostril located mesial to central part of lachrymal, possessing short tube and small cirrus on posterior margin; posterior nostril slit-like, located mesial to posterior edge of lachrymal, slightly smaller than anterior nostril. Single cephalic sensory pore located anteromesial to both nostrils (Fig. 3). Upper jaw long, length slightly longer than preoptic snout length; posterior edge of maxilla exceeding beyond anterior margin of eye and base of posteriormost spine in outer row of spines on first infraorbital (Fig. 4). Teeth villiform, forming tooth bands on jaws, vomer and palatines. Anterior margin of tongue rounded. Eye large; vertical eye diameter 1.4 (1.2) in preoptic snout length. Interorbit narrow and concave; interorbital width 7.9 (7.0–7.9) in vertical eye diameter. Posterior margin of opercle relatively rounded. Lower margin of branchiostegal membrane fused with isthmus. Gill rakers extremely short and knob-like; length of each raker shorter than interspace between bases of rakers (Fig. 5); many minute spines on each raker. Many spines and

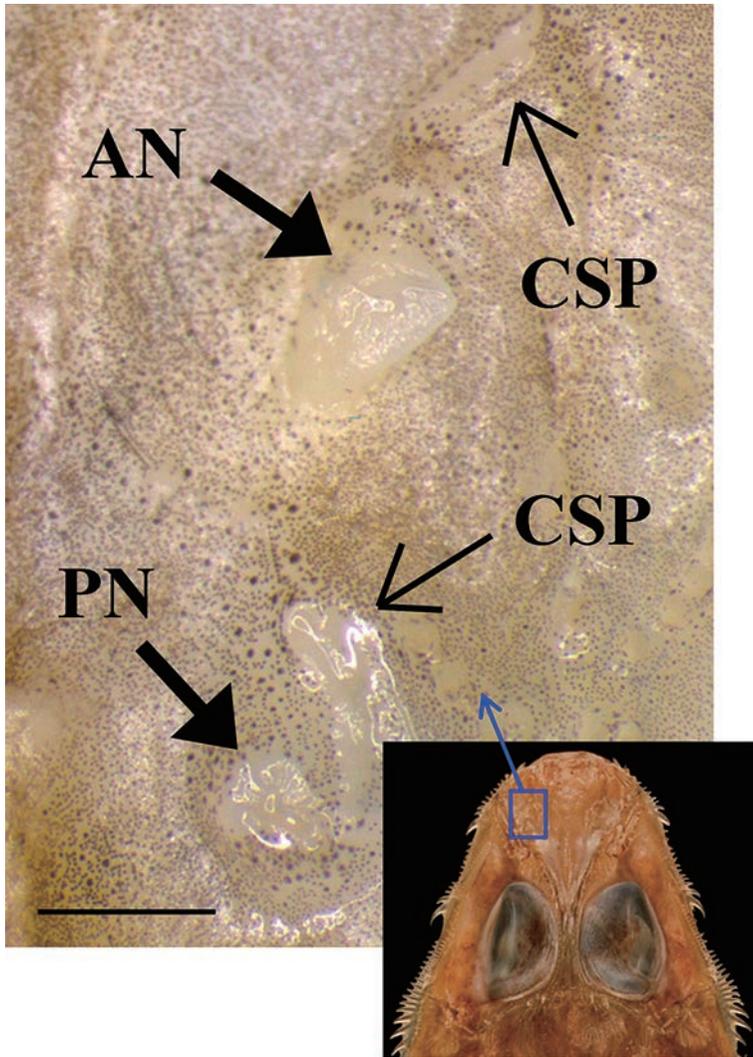


Fig. 3. Dorsal view of left side of snout in *Hoplichthys mimaseanus* sp. nov., NSMT-P 109034, holotype. AN, anterior nostril; CSP, cephalic sensory pore; PN, posterior nostril. Bar indicates 1 mm.

finely serrated ridges on dorsal surface of head (Fig. 2). Single paired rows of spines on dorsal mid-line of snout. Serrated ridges situated anterior to eye and interorbit, ridges ending at posterior margin of orbit; two large spines on posterior margin of orbit (large spine present or absent). Dorsal surface of lachrymal with small spines. Two rows of spines laterally on lachrymal; spines in upper row more numerous and larger than those in lower row; anteriormost spine in upper row slightly developed, directed forward; poste-

riormost spines largest, directed posterolaterally; spines between anteriormost and posteriormost spines small, directed upward; spines in lower row uniform size, directed downward. Two rows of spines dorsally on first infraorbital, inner row directed upward and outer row directed laterally; spines in outer row larger than these in inner row, becoming progressively larger posteriorly. Two rows (a single row) of small spines on ventral side of first infraorbital directed downward. Two rows of spines on second infraorbital, inner row

on dorsal surface and outer row on lateral side; spines in inner row directed upward, posteriormost spine largest, (accompanied by sparse small spines posteriorly and mesially); spines in outer row directed laterally, becoming progressively larger posteriorly. Outer rows of spines on first and second infraorbitals separated. Small spines sparsely (sparsely or densely) scattered on dorsal surface of third and fourth infraorbitals. Single spine present (present or absent) at center of third infraorbital. Single row of preopercular spines present laterally; penultimate spine developed, directed posteriorly; posteriormost spine largest, directed strongly posterodorsally, not reaching to posterior margin of opercle; other spines small, directed laterally. Two rows of small spines on dorsal surface of preopercle directed laterally from inner edge of preopercle. Single opercular spine developed, not reaching to posterior margin of opercle. Radially arranged, finely serrated ridges directed posteriorly from anterodorsal corner of opercle; two ridges especially developed, outer ridge accompanied by opercular spine, and inner ridge directed toward posterior margin of opercle. Single pair of well developed parietal

spines on occiput, with serrated ridges radiating from them. Several posttemporal spines present anterior to well developed spine on first lateral scute; serrated ridges radiating anteriorly from posttemporal spines. A few small spines buried under skin on ventral surface of lower jaw posterior to maxilla, directed anteroventrally (Fig. 4). Single humeral spine posterior to opercle, without (with one to three or without) small spines on its anterior margin. Single row of lateral scutes on body; single well developed spine directed upward and backward centrally on each scute, with single small spine directed posteriorly at its base; terminal scute extending to caudal fin base. One or two anteromesially directed serrated ridges on upper part of each lateral scute. First dorsal fin low, originating above second lateral scute (at junction between second and third lateral scutes) and ending above sixth lateral scute (seventh lateral scute); length of first dorsal-fin base 3.6 (3.9–4.0) in HL; tips of adpressed dorsal-fin spines not reaching to origin of second dorsal fin; second (first) dorsal-fin spine longest and third (second) to sixth dorsal-fin spines becoming progressively shorter posteriorly. Sec-

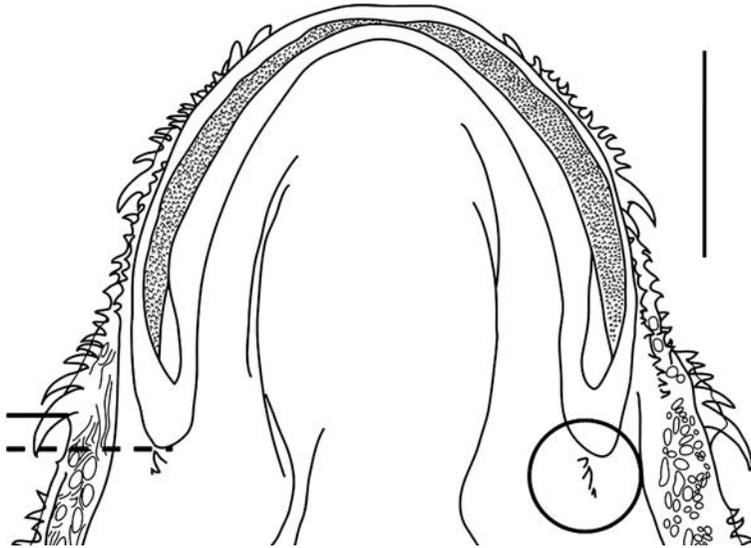


Fig. 4. Ventral illustration of head of *Hoplichthys mimaseanus* sp. nov., NSMT-P 109034, holotype. Spines on ventral surface of lower jaw are circled; solid and broken lines indicate posterior edges of base of outer row of spines on first infraorbital and maxilla, respectively. Bar indicates 10 mm.

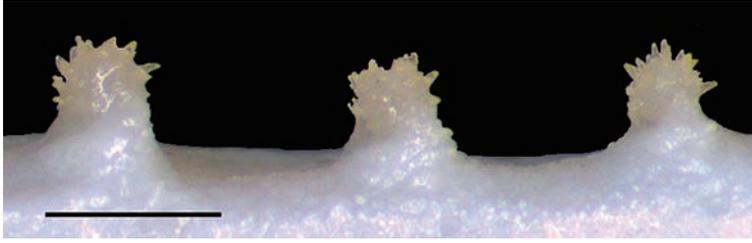


Fig. 5. Lateral view of first gill arch on right side of *Hoplichthys mimaseanus* sp. nov., NSMT-P 109034, holotype, showing gill rakers. Bar indicates 1 mm.

ond dorsal fin originating above junction between ninth and 10th lateral scutes, and ending beyond 23rd lateral scute; length of second dorsal-fin base 1.1 in length of anal-fin base; third to seventh dorsal-fin soft rays elongated and filamentous, with eighth to 15th dorsal-fin soft rays becoming progressively shorter posteriorly in male holotype; (first to ninth dorsal-fin soft rays subequal and 10th to 15th dorsal-fin soft rays becoming progressively shorter posteriorly in female). Pectoral fin originating at posterior edge of opercle, reaching to junction between 11th and 12th lateral scutes (11th or junction between 11th and 12th lateral scutes); third (fourth) ray longest, length 1.4 (1.4–1.6) in HL. Lower three rays of pectoral fin thick and free, shorter than remaining joined pectoral-fin rays; first free pectoral-fin ray, viz., 14th pectoral-fin ray, longest, not reaching (or reaching) to anus; its length 2.2 (2.1) in HL. Pelvic-fin base anterior to pectoral-fin base; distal edge of pelvic fin reaching to below sixth lateral scute; its length 2.3 (2.3–2.7) in HL. Anal fin lower than second dorsal fin, originating below ninth lateral scute (at junction between ninth and 10th lateral scutes), ending below 24th lateral scute; first anal-fin ray especially short, its length 1.7 (1.7–1.9) in length of last anal-fin ray. Caudal fin rounded, central portion of posterior margin extended; single notch on upper and lower lobes; depth of caudal peduncle 9.3 (8.0–9.5) in caudal-fin length. Anus slightly anterior to origin of anal fin.

Color in alcohol (holotype). Head and body brown dorsally, yellowish brown ventrally. Body with three obscure dark brownish bands dorsally.

Color of first and second dorsal fin and caudal fin when fresh disappeared. Pelvic fin and basal region of anal fin yellowish-brown. Membrane of pectoral fin, distal margin of anal fin and posterior margin of caudal fin dark brown.

Color when fresh (based on photographs, Figs. 1A, B). Dorsal surface of head and body light brown, scattered with irregular yellowish markings; ventral side white. Body with three indistinct brownish bands dorsally. First dorsal fin yellow with white anterior and posterior margins. Second dorsal fin translucent yellow. Pectoral fin light brown, same color as body, with obscure yellowish blotches. Anal fin translucent, white basally and red distally. Upper lobe of caudal fin white with indistinct yellowish bands, lower lobe orangish or yellowish.

Distribution. Central Tosa Bay, off Kochi, at depths of about 200–300 m (Mimase's offshore trawling usually fish around 200–300 m), southern East China Sea, around Senkaku Islands, at depths of about 300–500 m, and northwestern Australia, at depth of about 300 m.

Etymology. Named for the fish market in Kochi City, Mimase, where the holotype was collected.

Remarks. Among the 10 currently recognized species in the genus *Hoplichthys*, *H. mimaseanus* is most similar to *H. citrinus*, *H. gilberti* and *H. regani* in having a short snout, large eyes, a narrow interorbit, a single spine on each lateral scute, and a short pectoral fin not elongated nor filamentous. *Hoplichthys mimaseanus* differs from *H. citrinus*, *H. gilberti* and *H. regani* in having a few small spines on the ventral surface



Fig. 6. Lateral view of first dorsal fin of *Hoplichthys gilberti*, BSKU 92589, male, 159.8 mm SL.

of the lower jaw (Fig. 4) (vs. developed spines in the latters), short gill rakers, the length of each raker shorter than the interspace between bases of rakers (Fig. 5) (vs. longer than the interspace) and a low first dorsal fin, the posterior tip of the adpressed fin not reaching to the origin of the second dorsal fin in males (vs. tall, the posterior tip reaching to the origin). *Hoplichthys mimaseanus* is also distinguished from these three species in having the posterior margin of the caudal fin with a rounded and extended central portion demarcated by notches on the upper and lower lobes (vs. truncated or slightly rounded, without notches on the posterior margin of the finlobes), and the first dorsal fin yellow with white anterior and posterior margins in males (Fig. 1A) (vs. yellow with a large black blotch at the base of the posterior dorsal-fin spines in *H. citrinus*, yellow with a few white lines or spots running obliquely in *H. gilberti* (Fig. 6), and with obscure dark spots forming rows across both rays and membranes in *H. regani*) (Gilbert, 1905; Jordan and Richardson, 1908). These two characters are unique to *H. mimaseanus* within the genus.

Cephalic sensory pores anteromesial to the anterior and posterior nostrils are known only in *H. mimaseanus* among Japanese *Hoplichthys* species: *H. langsdorfii*, *H. gilberti*, *H. regani*, *H. fasciatus* and *H. filamentosus*. These sensory pores have not been mentioned in treatments of other *Hoplichthys*.

Comparative materials. *Hoplichthys citrinus*

(7 specimens): USNM 51610 (holotype, 152.1 mm SL), USNM 51670 (paratype, 154.6 mm SL), USNM 51704 (paratypes, 5 specimens, 135.0–184.6 mm SL), off Hawaii. *Hoplichthys gilberti* (11 specimens): USNM 51271 (holotype, 127.0 mm SL), SU 20229 (paratypes, 2 specimen, 109.5–161.8 mm SL), USNM 398507 (paratypes, 7 specimens, 78.2–139.6 mm SL), Suruga Bay; BSKU 92589 (159.8 mm SL), Tosa Bay. *Hoplichthys regani* (1 specimen): SU 22390 (holotype, 144.6 mm SL), off Kagoshima Prefecture.

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