

Notes on the Nomeid Fish *Psenes sio* from the Eastern Pacific

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Psenes sio of the family Nomeidae was first described by Haedrich (1970) from the equatorial eastern Pacific on the basis of five juvenile specimens. This species is considered endemic to the eastern Pacific, and occurs abundantly in the area as larvae and juveniles (Ahlstrom et al., 1976). However, adult or large-sized specimens have been rare: there have been recorded only four specimens that exceed the size of the type material (23.4–65.8 mm SL) (Horn and Haedrich, 1973; Chirichigno, 1978).

Among fish samples in the stomachs of bigeye tuna *Thunnus obesus* collected by the R/V *Daiichikakimaru* of the Japan Marine Fisheries Resource Research Center, from off Ecuador (01°18.3'S, 84°46.7'W) in the eastern Pacific in February 1981, I found

nine specimens of *Psenes sio* measuring up to 144.5 mm SL. This paper describes *Psenes sio* on the basis of both these specimens and the descriptions thus far made of this species, and provide new morphological information on the species.

Psenes sio Haedrich, 1970

(Fig. 1)

Psenes sio Haedrich, 1970: 1–7, original description, 5 specimens, 23.4–65.8 mm SL (holotype 60.3 mm SL), type locality, 11°10'S 80°01'W, 17 Oct. 1960; Horn and Haedrich, 1973: 167–169, 1 specimen, 219 mm SL, 22°N, 108°W, south of Cape San Lucas, Baja California; Chirichigno, 1978: 98–100, 3 specimens, 109 mm SL (8°14.4'S, 79°04'W), 134 mm SL (4°02'S, 82°07'W), 193 mm SL (13°49'S, 81°09'W).

Material examined. 9 specimens, 42.5–144.5 mm SL, obtained from the stomachs of two bigeye tunas (100 and 101 cm SL) caught by longlines, in the eastern Pacific (01°18.3'S, 84°46.7'W), on February 2, 1981.

Morphological characters. Meristic and morphometric data for the present specimens are shown in Table 1, together with those given by the previous

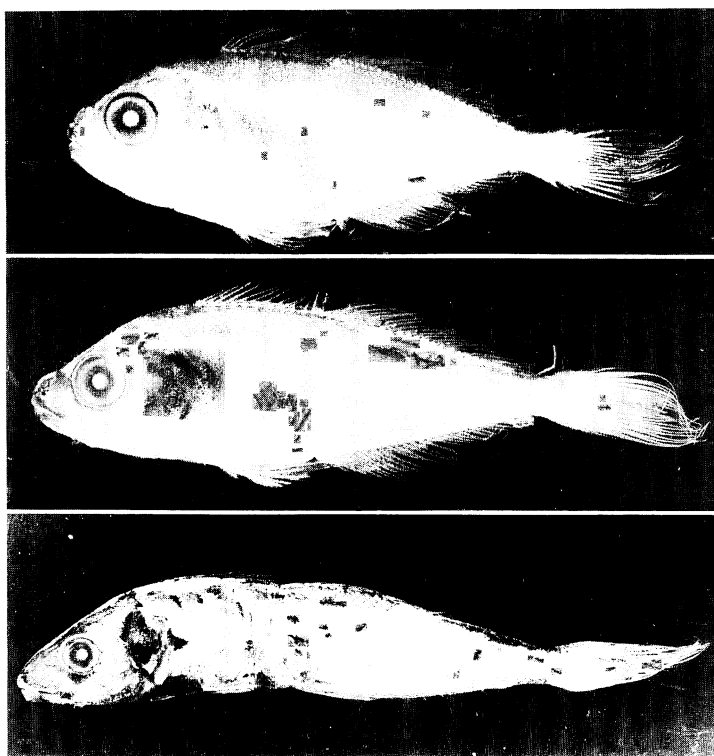


Fig. 1. *Psenes sio* obtained from the stomachs of bigeye tunas caught from the eastern Pacific. Top, 55.9 mm SL; center, 66.7 mm SL; bottom, 144.5 mm SL.

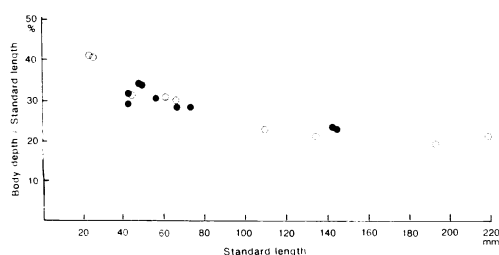


Fig. 2. Relationship between body depth/standard length ratio and standard length in *Psenes sio*. Closed circles, data from the present study; open circles, data from Haedrich (1970), Horn and Haedrich (1973) and Chirichigno (1978).

authors.

The body is elongate. The depth of the body decreases remarkably with growth; the maximum relative depth is about 40% of SL from about 23–25 mm SL, decreasing gradually to around 30% from about 40–80 mm SL, and attaining a constant level of about 22% from about 110 mm SL (Figs. 1, 2).

Two dorsal fins are present. The first and second dorsal fins are scarcely separated. The anterior base of the first dorsal fin is above the posterior margin of the opercle. The second dorsal fin originates above the anus. The anal fin originates just behind the anus. The dorsal and anal spines are fragile. The

pectoral fins are long, their posterior tips extending beyond the origin of the anal fin, with 17 to 19 rays. The pelvic fins are very long, their posterior ends extending beyond the anal fin origin. The caudal fin is forked, and the caudal peduncle is low and elongate. The skin is translucent along the anal fin base forward to the pelvic base in juvenile specimens.

The scales are deciduous, and scale pockets only were visible on the body in the present specimens. The opercles, cheek, and the dorsal part of the head behind the anterior margin of the eyes are scaled. The snout and temporal areas are naked. Cycloid scales on the dorsal part of the head are very small and thin.

The posterior end of the upper jaw is below the anterior border of the eye. Teeth on the jaws are in one row. The teeth on the premaxillary are conical. Those on the dentary are bladelike with small cusps (Fig. 3). The teeth on the prevomer form a patch on the anterior edge of the prevomer. The palatine and tongue have no teeth. Gillrakers are moderately long, with fine teeth on their inner sides, the number being 14–15 on the lower limb of the first arch. Gill sieves on the first gill arch are clustered with two to several spines (Fig. 3). The branchiostegals are 6 in number, 2 on the epihyal and 4 on the ceratohyal (Fig. 4). The pseudobranch is well developed.

The number of vertebrae is 36–38, including uro-

Table 1. Morphometric measurements and meristic counts of *Psenes sio*.

| Author | | Present paper | | | | | | |
|-----------------------|-----------|---------------|-----------|------------|-----------|-----------|--------|-----------|
| Total length (mm) | 54.3 | 54.9 | 61.0 | 61.6 | 69.0 | 84.1 | 91.0 | 172.5 |
| Standard length (mm) | 42.5 | 42.5 | 48.2 | 49.7 | 55.9 | 66.7 | 73.3 | 143.1 |
| | (100%) | (100) | (100) | (100) | (100) | (100) | (100) | (100) |
| Head length | (36.2) | — | (36.3) | (34.2) | (34.0) | (33.6) | (33.3) | (31.0) |
| Snout length | — | (8.5) | (9.1) | (9.5) | (8.9) | (9.3) | (8.7) | (9.4) |
| Eye diameter | (9.9) | (10.1) | (10.4) | (11.1) | (10.0) | (10.0) | (9.0) | (7.1) |
| Length of upper jaw | (10.8) | (12.0) | (10.8) | (11.3) | (10.0) | (10.3) | (9.1) | (8.9) |
| Interorbital width | (7.3) | (8.9) | (9.5) | (9.3) | (8.2) | (8.2) | (7.1) | (8.0) |
| Pectoral length | (25.9) | (27.5) | (25.7) | (25.1) | (22.7) | (22.9) | (21.1) | (19.4) |
| Pelvic length | — | (27.1) | (23.7) | (22.5) | (20.9) | (22.9) | (18.4) | (10.4) |
| Predorsal distance | — | (36.0) | (37.3) | (35.2) | (34.5) | (35.1) | (32.5) | (32.8) |
| Prenal distance | (56.5) | (55.8) | (55.8) | — | — | (51.6) | (56.5) | (52.1) |
| Maximum depth of body | (31.3) | (28.9) | (33.8) | (33.6) | (30.2) | (27.9) | (28.1) | (22.9) |
| Caudal peduncle depth | (6.1) | (6.6) | (6.4) | (7.0) | (6.8) | (7.0) | (6.7) | (7.0) |
| Counts | | | | | | | | |
| D. | XII-I, 24 | XII-I, 24 | XII-I, 23 | XIII-I, 23 | XII-I, 24 | XII-I, 24 | — | XII-I, 24 |
| A. | II, 23 | II, 23 | II, 24 | II, 24 | II, 23 | II, 25 | — | II, 23 |
| P ₁ | 19 | 19 | 19 | 19 | 18 | 18 | 18 | 18 |
| Gillrakers (left) | 8+1+15 | 8+1+14 | 8+1+14 | 8+1+15 | 7+1+15 | 8+1+15 | 7+1+14 | 8+1+15 |
| Vertebrae | — | — | — | 37 | 38 | — | — | — |

style. The supraneurals are 3 in number. In the caudal skeleton (Fig. 4), autogenous hypurals are 3 in number (fused hypurals 1 and 2, fused hypurals 3 and 4, and hypural 5). There are two pairs of uroneurals, three epurals, and a parhypural with a moderately long hypurapophysis. The haemal spines of preural centra 2 and 3 are autogenous. The caudal fin has 15 branched rays (8 in the upper lobe and 7 in the lower), 11 dorsal and 10 ventral procurent rays. The caudal skeleton includes the following free cartilage elements: two post-haemal spine cartilages, extending over HPU2 and HPU3 (CPHPU2+3), arranged in parallel, one post-haemal spine cartilage of PU2 (CPHPU2), one post-hypural 5 cartilage (CPHY5) and one inter-epural 3 cartilage (CIEP3) (Fig. 4).

The shape of the pharyngeal sac resembles a broad bean, bearing three white, regularly arranged streaks of different sizes. Two types of papillae are present in the pharyngeal sac (Fig. 3). The stomach is V-shaped. The pyloric caeca are branch-like (Fig. 4), 8–10 in number. The peritoneum is dark brown. The color of the specimens in alcohol is dark brown.

Remarks. Haedrich (1970) and Horn and Haedrich (1973) reported that the dorsal fin was scarcely divided, and that the first dorsal fin had 10 to 12 thin brittle spines and the second 23–26 long soft-rays. However, the first ray of the second dorsal fin in the

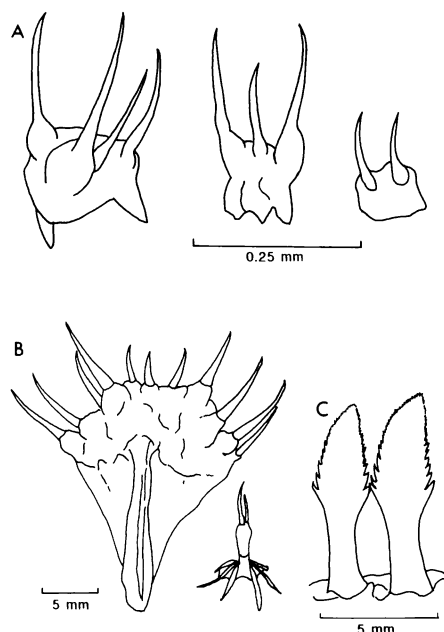


Fig. 3. Gill sieves on the gill arch, papillae in the pharyngeal sac, and teeth on the lower jaw of *Psenes sio*. A, gill sieves on the ceratobranchial (left and center) and on the epibranchial (right); B, papillae in the pharyngeal sac; C, teeth on the lower jaw.

Figures in parentheses represent proportions in hundredths of standard length.

| Haedrich (1970) | | | | | Horn and Haedrich (1973) | | Chirichigno (1978) | | |
|-----------------|--------|-----------|---------|---------|--------------------------|--------|--------------------|--------|---------|
| Holotype | | Paratypes | | | | | | | |
| 178.0 | 74.5 | >75 | — | — | 26.5 | — | 237.0 | 167.0 | 134.0 |
| 144.5 | 60.3 | 65.8 | 43.7 | 25.7 | 23.4 | 219.0 | 193.0 | 134.0 | 109.0 |
| (100) | (100) | (100) | (100) | (100) | (100) | (100) | (100) | (100) | (100) |
| (28.6) | (36.0) | (33.6) | (30.9) | — | (35.9) | (31.3) | (29.5) | (28.4) | (32.1) |
| (9.4) | (9.5) | (8.5) | — | — | (9.0) | (9.7) | (9.8) | (9.3) | (10.1) |
| (6.5) | (10.8) | (9.4) | — | — | (13.2) | (6.4) | (6.7) | (7.5) | (7.3) |
| (7.8) | (9.6) | (9.4) | — | — | (12.8) | (8.4) | (8.2) | (9.0) | (9.2) |
| (6.9) | (9.1) | — | — | — | (12.0) | (7.6) | (7.3) | (8.2) | (8.3) |
| (19.7) | (25.2) | (23.6) | (25.2) | (26.8) | (25.2) | (17.6) | (15.5) | (18.7) | (19.3) |
| (10.7) | (22.2) | — | (26.1) | (26.5) | (26.1) | (8.4) | (8.8) | (13.4) | (14.7) |
| (29.1) | (36.3) | (34.0) | (35.7) | (38.1) | (39.7) | (31.6) | (32.1) | (27.6) | (33.9) |
| (49.1) | (52.2) | (51.8) | (49.0) | (51.4) | (53.8) | (51.8) | (51.8) | (52.2) | (56.9) |
| (22.7) | (30.7) | (29.6) | (30.9) | (40.1) | (41.0) | (21.8) | (18.7) | (21.6) | (24.8) |
| (6.0) | (7.1) | (6.7) | (7.3) | (7.0) | (9.4) | (6.8) | (6.7) | (6.7) | (6.4) |
| XII-I, 23 | X, 23 | XII, 25 | XII, 25 | XII, 25 | XII, 24 | X, 26 | XI, 26 | X-25 | X-I, 24 |
| II, 23 | II, 24 | II, 23 | II, 23 | II, 23 | II, 23 | II, 23 | 26 | 27 | 23 |
| 19 | 19 | 19 | 18 | 19 | — | 17 | 17 | 17 | 19 |
| 8+1+14 | 7+1+14 | 8+1+15 | — | — | — | 8+1+15 | 8+1+15 | 8+1+14 | 8+1+15 |
| 37 | 38 | 38 | — | 38 | 36 | 36 | — | — | — |

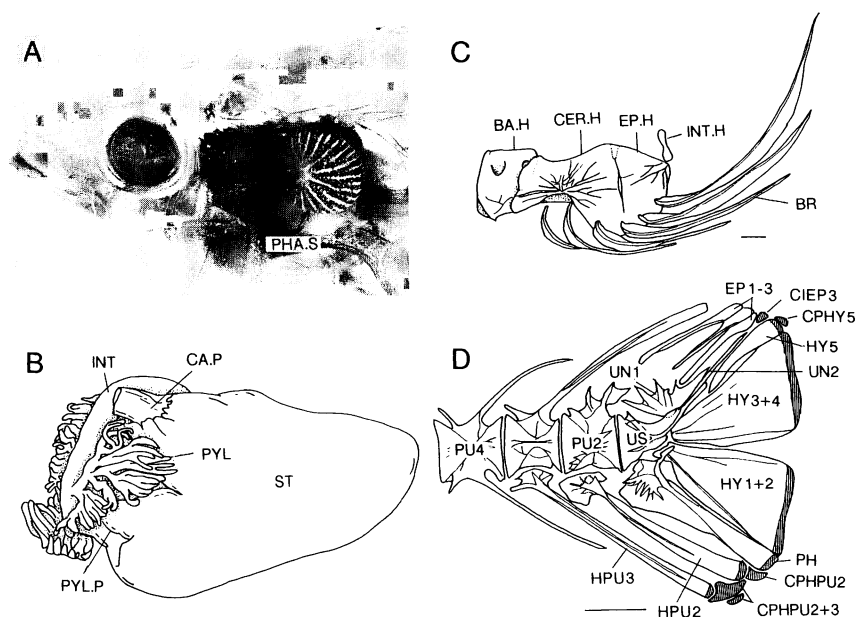


Fig. 4. Pharyngeal sac (A), stomach and pyloric caecae (B), branchiostegals and hyoid arch (C), and caudal skeleton (D) of *Psenes sio*. A: PHA.S, Pharyngeal sac. B: CA.P, cardiac portion of stomach; INT, intestine; PYL, pyloric caeca; PYL.P, pyloric portion of stomach; ST, stomach. C: HY.H, hypohyal; BR, branchiostegals; CER.H, ceratohyal; EP.H, epihyal; INT.H, interhyal. D: CIEP3, inter-epural 3 cartilage; CPHY5, post-hypural 5 cartilage; CPHPU2, post-haemal spine cartilage of PU2; CPHPU2+3, post-haemal spine cartilages extending over HPU2 and HPU3; HPU, haemal spine of preural centrum; HY, hypural; PU, preural centra; PH, parhypural; UN, uroneural; US, urostyle. Shaded area indicates cartilage. Scale bars indicate 1 mm.

present specimens, as well as one of the Chirichigno (1978)'s specimens and all the juveniles described by Ahlstrom et al. (1976), is a true spine. Re-examination is needed whether the first ray of the second dorsal fin is spinous or soft in the specimens described by Haedrich (1970), and Horn and Haedrich (1973).

The four free caudal cartilage elements (CPHPU2+3, CPHPU2, CPHY5, and CIEP3) observed in *Psenes sio* are also seen in other nomeid species, i.e. *Psenes cyanophrys* and *Cubiceps squamiceps* (Fujita, 1990). CPHPU2+3, CPHPU2, AND CPHY5 are also present in other stromateoid species, viz. *Cubiceps squamiceps* (Nomeidae), *Psenopsis anomala*, *Icichthys lockingtoni* (Centrolophidae), *Ariomma lurida* (Ariommatidae), and *Tetragonurus cuvieri* (Tetragonuridae) (Fujita, 1990). In all these species, there are two post-haemal spine cartilages which extend over HPU2 and HPU3 (CPHPU2+3) and arranged in parallel. The presence of such post-haemal cartilages might be interpreted as an

autapomorphy of the Stromateoidei.

The two largest specimens (143.1 mm and 144.5 mm SL) examined were females, but with immature ovaries.

Acknowledgments

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東太平洋で採集された *Psenes sio* (エボシダイ科) について

藤田 清

東太平洋で 1981 年 2 月漁獲された 2 尾のメバチ胃内容から、Haedrich (1970) が幼魚をタイプ標本として記載したエボシダイ科の *Psenes sio* が 9 個体採集された。現在まで、タイプ標本より大きな個体は 4 尾が報告されているにすぎない。本報告では既往の報告と新たな形態形質を含め、本種の再記載をした。

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