Revised Diagnosis and First Japanese Records of the Waspfish _Ocosia spinosa_ (Teleostei: Tetrarogidae)

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_Ocosia spinosa_ Chen, 1981 (Tetraodontidae) is newly recorded from the Pacific coast of Japan, on the basis of 10 specimens (31.3–78.1 mm standard length), having been previously reported only from Taiwan. A revised diagnosis for the species, based on the Japanese specimens plus a single specimen from Taiwan, is given as follows: XV–XVIII, 7 or 8 dorsal-fin rays; III, 4–6 anal-fin rays; usually 13 (rarely 12) pectoral-fin rays; 12–18 lateral-line pores on body; 6–15 gill rakers; usually 28 (rarely 27) vertebrae; 2nd dorsal-fin spine longest, slightly longer than 3rd spine; interspinous dorsal-fin membranes of middle portion of dorsal fin incised for one-fourth to one-third of each spine length; dorsal profile of snout concave; posterior lacrimal spine directed backward, its length about 2–3 times greater than that of anterior lacrimal spine; small lateral lacrimal spine usually present (absent in larger specimens); small spine usually present at anterior end of suborbital ridge in smaller specimens (absent in larger specimens); weak stubby papillae covering upper lip and anterior half to one-third of lower lip; trunk uniformly brownish-red when fresh, without distinct markings (but with faint brownish small blotch near base of middle portion of dorsal fin in some individuals). Although the presence or absence of small spines on the lateral surface of the lacrimal and anterior end of the suborbital ridge has previously been regarded as an important diagnostic character of _O. spinosa_, examination of the present specimens showed that the character changes with growth. The present specimens represent the first Japanese records, as well as the northernmost and easternmost records for the species. The new English and Japanese standard names “Red Waspfish” and “Aka-hachiokoze”, respectively, are proposed for _O. spinosa_.

Key Words: diagnosis, northernmost record, easternmost record, distribution, Japan, Taiwan.

Introduction

The waspfish genus _Ocosia_ Jordan and Starks, 1904 currently includes eight valid species (Poss and Eschmeyer 1975; Chen 1981; Mandritsa and Usachev 1990; Fricke 2017), two of which (_Ocosia vespa_ Jordan and Starks, 1904 and _Ocosia fasciata_ Matsubara, 1943) have previously been reported from Japanese waters (Nakabo and Kai 2013; Motomura 2020).

During a taxonomic study of the genus, 10 waspfish specimens collected from the Pacific coast of Japan and found in the collections of several Japanese museums, were identified here as _Ocosia spinosa_ Chen, 1981, based on meristic and morphometric values and coloration. The species has been recorded previously only from Taiwan (Chen 1981; Shao et al. 2008; Motomura 2019; Shao 2021), the present specimens, described here in detail, represent the first records of _O. spinosa_ from Japan, as well as the easternmost and northernmost records of the species. Furthermore, because examination of the Japanese specimens plus a Taiwanese specimen of _O. spinosa_ revealed that some diagnostic characters previously regarded change with growth, a revised diagnosis is also provided.

Materials and Methods

Counts and measurements followed Poss and Eschmeyer (1975) and Fricke (2017). Pectoral-fin rays, lateral-line pores on the body, and gill rakers were counted on both sides. Measurements were made to the nearest 0.1 mm with calipers. Standard length is abbreviated as SL. Head spine terminology follows Poss and Eschmeyer (1975), Randall and Eschmeyer (2002), and Motomura (2004). Caudal-fin rays and vertebral numbers were counted from radiographs of six specimens (BSKU 1887, 51541, 77926; FAKU 1887, 3041; KAUM–I, 133238). Photographs of heads of the specimens were taken with a Nikon D850 camera using an internal focus bracketing function; sets of multifocal images were then collated into an overall well-focused composite image, using Combine ZP (free software). The specimens examined in this study are deposited at the Laboratory of Marine Biology, Faculty of Science and Technology, Kochi University, Kochi, Japan (BSKU), Maizuru Fisheries Research Station, Kyoto University, Kyoto, Japan (FAKU), the Kagoshima University Museum, Kagoshima, Japan (KAUM), Kochi Senior High School, Kochi, Japan (KSHS; currently transferred to Kochi University).
NSMT), and National Museum of Nature and Science, Tsukuba, Japan (NSMT).

**Ocosia spinosa** Chen, 1981

[New English name: Red Waspfish; new standard Japanese name: Aka-hachiokoze]
(Figs 1–5; Tables 1, 2)

*Ocosia spinosa* Chen, 1981: 41, figs 4 (6), 28 [type locality: off Tung-kang (Dong-gang), Taiwan]; Shao et al. 2008: 246 [off Tung-kang (Dong-gang), Taiwan]; Motomura 2019: 540, unnumbered fig (off Dong-gang, Taiwan).

**Material examined.** 11 specimens, 31.3–103.5 mm SL. Japan: BSKU 1845, 72.5 mm SL, Tosa Bay, Mimase Fish Market, Kochi Prefecture, March 1952; BSKU 4291, 68.6 mm SL, Tosa Bay, Mimase Fish Market, Kochi Prefecture, 21 November 1954; BSKU 44240, 38.0 mm SL, Tosa Bay, Kochi Prefecture (33°18.60′ N, 133°40.77′ E), beam trawl, 130–132 m depth, RV *Toyohata-maru*, 16 November 1987; BSKU 51541, 72.5 mm SL, Tosa Bay, Mimase Fish Market, Kochi Prefecture, bottom trawl, 13 April 2000;

![Fig. 1. Fresh specimen of *Ocosia spinosa* from Kochi Prefecture, Japan (BSKU 51541, 72.5 mm SL).](image)

![Fig. 2. Various sizes of preserved specimens of *Ocosia spinosa*. A, BSKU 51541, 72.5 mm SL, Kochi Prefecture, Japan; B, BSKU 77926, 31.3 mm SL, Kochi Prefecture, Japan; C, FAKU 1887, 53.3 mm SL, Mie Prefecture, Japan; D, KAUM–I. 43828, 103.5 mm SL, Dong-gang, Taiwan.](image)
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BSKU 77926, 31.3 mm SL, Tosa Bay, Kochi Prefecture (33°15.08′N, 133°36.16′E–33°15.54′N, 133°36.92′E), 149–151 m depth, RV *Kotaka-maru*, 17 April 2006; FAKU 1861, 78.1 mm SL, off Owase, Mie Prefecture, 1 May 1936; FAKU 3041, 68.8 mm SL, KAUM–I. 133238 (formally FAKU 3042), 70.4 mm SL, off Miya, Aichi Prefecture, 7 November 1937, K. Matsubara; NSMT-P 142832 (formerly KSHS 5286), 73.8 mm SL, Tosa Bay, Mimase Fish Market, Kochi Prefecture, 16 December 1965, T. Yamakawa.

Taiwan: KAUM–I. 43828, 103.5 mm SL, off Dong-gang, Pingtung, Taiwan, 28 October 2011.

**Revised diagnosis.** A species of *Ocosia* distinguished from all congeners by the following combination of characters: dorsal-fin rays XV–XVIII, 7 or 8; anal-fin rays III, 4–6; pectoral-fin rays usually 13 (rarely 12); lateral-line pores on body 12–18; gill rakers 6–15; vertebrae usually 28 (rarely 27); 2nd dorsal-fin spine longest, its length 101.2–136.2% (mean 114.8%) of 3rd dorsal-fin spine length, 154.1–210.9% (181.8%) of 8th dorsal-fin spine length; interspinous dorsal-fin membranes at middle of dorsal fin (between 5th and 10th spines) incised for one-fourth to one-third of associated spine height in each; dorsal profile of snout concave (Figs 1, 2); posterior lacrimal spine directed backward, its length about 2–3 times greater than that of anterior lacrimal spine (Fig. 3); small lateral lacrimal spine usually present (absent in larger specimens; Figs 3, 4); weak stubby papillae covering upper lip and anterior half to one-third of lower lip; trunk uniformly brownish-red when fresh, without distinct markings (but with faint brownish small blotch near base of 6–9th dorsal-fin spine in some individuals) (Figs 1, 2) [based on Chen (1981), Mandritsa and Usachev (1990), Fricke (2017), Motomura (2019), and this study].

**Description.** Counts and measurements shown in Tables 1, 2. Diagnostic characters given above not repeated. Body somewhat elongated, laterally compressed, progressively more compressed posteriorly; covered with smooth skin, without scales. Caudal peduncle short. Lateral line complete, continuous, extending from behind supracleithral spine to caudal-fin base; end of tube associated with each lateral-line pore (except last 2 or 3 pores).

Head profile of snout elevated sharply, with a concavity in front of eye. Anterodorsal bony rim on orbit smooth. Two pairs of nasal openings, subequal in diameter. Interorbital bony rim somewhat narrow; interorbital ridges weakly de-
veloped, extending near origin of dorsal fin, ending with a blunt tip. Supraocular, parietal, and nuchal ridges in a row on upper rear margin of orbit. Pterotic and posttemporal ridges in a row behind mid-orbit, followed by a small supracleithral spine. Two lacrimal spines, anterior spine short, directed posteroventrally, its tip not reaching posterior margin of maxilla. Suborbital ridge connected posteriorly to base of uppermost preopercular spine. Three preopercular spines; uppermost longest, sharp and almost exposed from skin; 2nd and 3rd blunt, 2nd slightly exposed from skin, 3rd embedded in skin. Two opercular spines embedded in skin. Cleithral bone flattened, embedded in skin. Small spine on lateral surface of lacrimal (absent in relatively large specimens). Mouth small, terminal, slightly oblique; posterior margin of maxilla reaching to (or just short of) vertical through middle of pupil. Fine conical teeth on jaws, vomer, and palatines.

First dorsal-fin spine shortest; 5th to last spines of similar length. Second dorsal-fin soft ray longest; three-fourths of last dorsal-fin soft ray posteriorly connected to dorsal edge of caudal peduncle by membrane, but not extending onto upper margin of caudal fin. Origin of anal fin level with

### Table 1. Counts and measurements (expressed as percentages of standard length) of specimens of *Ocosia spinosa* from Japan and Taiwan.

|                         | Japan          | Taiwan        |
|-------------------------|----------------|---------------|
| **Counts**              |                |               |
| Dorsal-fin rays         | XV–XVIII, 7–8 | XVII, 7       |
| Anal-fin rays           | III, 5        | III, 4        |
| Pectoral-fin rays       | 12–13         | 13            |
| Pelvic-fin rays         | 1, 5          | 1, 5          |
| Caudal-fin rays         | 19–20         | 20            |
| Lateral-line pores on body | 12–18       | 16–17         |
| Gill rakers             | 6–15          | 8–9           |
| Vertebrae               | 27–28         | 28            |
| **Measurements (% of SL)** |              |               |
| Body depth              | 30.1–36.9     | 32.9          |
| Body width              | 15.1–18.7     | 16.5          |
| Head length             | 36.7–41.8     | 38.6          |
| Snout length            | 10.4–13.1     | 11.6          |
| Orbit diameter          | 8.5–11.3      | 9.9           |
| Interorbital width      | 4.6–6.2       | 5.4           |
| Upper-jaw length        | 13.2–14.6     | 13.8          |
| Postorbital length      | 16.4–19.9     | 17.7          |
| Pre-dorsal-fin length   | 20.1–25.2     | 23.2          |
| Pre-anal-fin length     | 64.8–71.9     | 68.1          |
| Pre-anus length         | 57.1–62.1     | 60.3          |
| Caudal-peduncle length  | 11.1–14.2     | 12.9          |
| Caudal-peduncle depth   | 8.6–10.1      | 9.2           |
| Dorsal-fin base length  | 81.5–87.3     | 84.2          |
| 1st dorsal-fin spine length | 6.3–11.5   | 8.6           |
| 2nd dorsal-fin spine length | 20.9–29.4   | 24.9          |
| 3rd dorsal-fin spine length | 19.0–24.3   | 21.8          |
| 4th dorsal-fin spine length | 15.5–20.0   | 17.5          |
| 5th dorsal-fin spine length | 12.8–17.2   | 15.3          |
| 6th dorsal-fin spine length | 12.3–15.9   | 14.3          |
| 7th dorsal-fin spine length | 12.5–15.1   | 13.9          |
| 8th dorsal-fin spine length | 12.3–15.5   | 13.7          |
| Penultimate dorsal-fin spine length | 12.1–16.1 | 13.3          |
| Last dorsal-fin spine length | 10.7–17.5   | 13.8          |
| First dorsal-fin ray length | 12.2–19.4   | 15.8          |
| 1st anal-fin spine length | 5.6–8.5     | 7.0           |
| 2nd anal-fin spine length | 10.0–14.5   | 12.5          |
| 3rd anal-fin spine length | 12.6–17.3   | 15.0          |
| Pectoral-fin ray length | 24.9–30.7     | 27.5          |
| Pelvic-fin spine length | 10.6–14.9     | 12.6          |
| Pelvic-fin ray length   | 17.5–26.9     | 20.3          |
| Caudal-fin length       | 14.3–27.6     | 23.4          |
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**Coloration of fresh specimen** (based on Fig. 1). Head and body uniformly brownish-red, deepening on head and dorsal body, abdomen more reddish. Faint dark brownish small blotch near base of 7th dorsal-fin spine. Five reddish-brown radial bars surrounding orbit: 1st bar extending behind snout; 2nd extending below orbit; 3rd extending forward pectoral-fin base; 4th extending forward origin of lateral line; 5th extending toward origin of dorsal fin. Dorsal fin pale brownish-red with pale yellow blotches; anal fin deep red; pectoral fin translucent red, base brownish-red, posterior margin dark brown; pelvic fin deep red; caudal fin brownish-red, posterior margin deep red.

**Coloration of preserved specimens** (based on Fig. 2). Head and body uniformly pale, yellowish-brown. Faint brownish small blotch near base of 6–9th dorsal-fin spine in some specimens (BSKU 1845, 4291, 51541; FAKU 1861, 1887, 3041). Radial bars surrounding orbit brown. All fins white. Anal, pectoral, pelvic, and caudal fins brown in small specimens.

**Distribution.** Currently known only from Japan (Aichi, Mie, and Kochi prefectures) and Taiwan (Chen 1981; Shao et al. 2008; Motomura 2019; Shao 2021; this study) (Fig. 5).

**Remarks.** The specimens examined here all had the following characters of the genus *Ocosia*, defined by Poss (1999) and Chungthanawong and Motomura (2021): 7 or 8 dorsal-fin soft rays; 1, 5 pelvic-fin rays; body not covered with scales; lateral line well separated from dorsal-fin base; no small papillae on body; palatine teeth present; tentacles absent on eyes; origin of dorsal fin anterior to posterior margin of orbit; tip of opercle not reaching to dorsal-fin base; body notably compressed. Although Poss (1999) and Chungthanawong and Motomura (2021) included XIV–XVII dorsal-fin spines as a diagnostic character of the genus, one specimen (NSMT-P 142832, 73.8 mm SL) had XVIII dorsal-fin spines.

Characters of the examined specimens also agreed with those of the holotype given in the original description of *Ocosia spinosa* by Chen (1981): 2nd dorsal-fin spine longest, slightly longer than 3rd dorsal-fin spine; 2 lacrimal spines, anterior spine shorter than posterior spine; interorbital ridges extending to near origin of dorsal fin, each ending with a blunt tip; a small supracleithral spine below first lateral-line pore; fine teeth on jaws, vomer, and palatines. The fresh coloration of a Japanese specimen (Fig. 1) also agreed closely with that given by Chen (1981: fig. 28). However, meristics of the Japanese and Taiwanese specimens examined here had extended ranges for the following characters, compared with those given by Chen (1981), Mandritsa and Usachev (1990), and Motomura (2019): XV–XVIII, 7 or 8 dorsal-fin rays in this study (XVI–XVII, 8 in the latter); 4 or 5 anal-fin soft rays (5 or 6); 12 or 13 pectoral-fin rays (13); 12–18 lateral-line pores on body (17) [this large extension mirrors similar variations recorded for *O. fasciata* (12–18 lateral-line pores in 16 specimens) and *O. apia* Poss and Eschmeyer, 1975 (16–21 lateral line pores in 20 specimens) (Poss and Eschmeyer 1975)]; 8–15 gill rakers (10) [a similarly wide variation recorded for *O. apia* (12–21 gill rakers in 20 specimens) (Poss and Eschmeyer 1975)]; 19 or 20 caudal-fin rays (20); 27 or 28 vertebræ (28).

Selected comparative characters are summarized in Table 2. *Ocosia spinosa* can be distinguished from its congeners by having the 2nd dorsal-fin spine slightly longer than the 3rd dorsal-fin spine (vs. 2nd spine longer than 3rd spine in *O. apia* and *O. possi* Mandritsa and Usachev, 1990; 2nd spine equal in length to 3rd spine in *O. vespa*, *O. fasciata*, *O. ramaraoi* Poss and Eschmeyer, 1975, and *O. zaspilota* Poss and Eschmeyer, 1975; 2nd spine shorter than 3rd spine in *O. sphex* Fricke, 2017) (Poss and Eschmeyer 1975; Mandritsa and Usachev 1990; Fricke 2017; Table 2). In addition, *O. spinosa* differs from *O. vespa* in having the interspinous dorsal-fin membranes incised for one-fourth to one-third of spine height in each (vs. membranes not incised in *O. vespa*), weak stubby papilae covering the upper lip and anterior half to one-third of the lower lip (vs. distinct stubby papilae), and the posterior lacrimal spine directed backward (vs. downward) (Poss and Eschmeyer 1975; Fricke 2017); from *O. fasciata* in having the interspinous dorsal-fin membranes incised for one-fourth to one-third of each spine height (vs. membranes incised for half of each spine height in *O. fasciata*), and the dorsal profile of the snout concave (vs. straight)
Table 2. Comparative characters for species of *Ocosia*.

| Characteristics                                      | *O. spinosa* | *O. apia* | *O. fasciata* | *O. possi* | *O. namana* | *O. sphex* | *O. vespa* | *O. zaspilota* |
|------------------------------------------------------|--------------|-----------|---------------|------------|-------------|------------|------------|---------------|
| References                                           | C, M&U, F, M, PS | P&E, F    | P&E, F        | M&U, F     | P&E, M&U, F | F          | P&E, F     | P&E, F        |
| Dorsal-fin spines                                   | XV–XVIII     | XVI–XVII  | XIV–XVI       | XV         | XV–XVI      | XIV        | XV–XVII    | XV            |
| Dorsal-fin soft rays                                | 7–8          | 7–8       | 7–9           | 8          | 8–9         | 8          | 7–9        | 8             |
| Anal-fin soft rays                                  | 4–6          | 5–6       | 4–6           | 5          | 5           | 7          | 4–6        | 5–6           |
| Pectoral-fin rays                                   | 12–13        | 12–13     | 11–13         | 12         | 13          | 13         | 12–13      | 12–13         |
| Lateral-line pores on body                          | 12–18        | 16–21     | 12–17         | 16–20      | 14–18       | 26–27      | 13         | 15–18         |
| Gill rakers                                          | 6–15         | 12–21     | 7–10          | 12–16      | 13–14       | 11         | 9–11       | 10–13         |
| Interspinous dorsal-fin membrane notch              | Present      | Present   | Present       | Present    | Present     | Present    | Absent     | Present       |
| Incision of interspinous dorsal-fin membranes of    | 1/4–1/3 of    | 1/3–1/2   | 1/2           | 1/4–1/3    | 1/4         | —          | 1/3–1/2    |               |
| middle of dorsal fin                                 | spine height |           |               |            |             |            |            |               |
| 2nd dorsal-fin spine length (vs. 3rd dorsal-fin spine) | Slightly longer (1.01–1.36 times) | Longer (1.6–1.7 times) | Equal (0.9–1.1 times) | Longer (1.5–2.2 times) | Equal (0.9–1.0 times) | Shorter (0.9 times) | Equal (1.0–1.1 times) | Equal (1.0–1.1 times) |
| 2nd dorsal-fin spine length (vs. 8th dorsal-fin spine) | Longer (1.54–2.11 times) | Markedly longer (1.9–2.3 times) | Longer (1.4–1.7 times) | Markedly longer (1.8–2.2 times) | Markedly longer (1.4 times) | Markedly longer (1.4–1.7 times) | Markedly longer (1.8–2.2 times) | Markedly longer (1.8–2.2 times) |
| Posterior lacrimal spine length (vs. anterior lacrimal spine length) | 1/3–1/2 | 1/2 | 1/2 | 1/2 | 1/4 | 1/3 | 1/3 |
| Posterior lacrimal spine direction                  | Backward     | Backward  | Backward      | Backward   | Backward   | Downward   | Downward   | Backward      |
| Lateral lacrimal spine                              | Present (Absent in larger specimens) | Present | Absent | Absent | Absent | Present | Absent | Absent       |
| Small spine at anterior end of suborbital ridge     | Absent (Present in smaller specimens) | Present | Absent | Absent | Absent | Absent | Absent | Absent       |

Abbreviations: PS, present study; P&E, Poss and Eschmeyer (1975); C, Chen (1981); M&U, Mandritsa and Usachev (1990); F, Fricke (2017); M, Motomura (2019).
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There being no current English or Japanese names for *O*. the northernmost and easternmost records for the species. sent the first records from Japan, Aichi specimens being mentioned above, the present Japanese specimens repre-

and “hachiokoze” is the common Japanese name for in reference to the uniformly red body color of the species, 

133238, 70.4 mm SL) had the small lateral lacrimal spine, 

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mens of anterior end of the suborbital ridge. Although smaller specimens (BSKU 4291, 68.6 mm SL; BSKU 53.3 mm SL; KAUM–I. 43828, 103.5 mm SL) had both of these spines (Fig. 3A), larger specimens (BSKU 77926, 31.3 mm SL; FAKU 1887, 53.3 mm SL; BSKU 1845, 72.5 mm SL) lacked them (Fig. 3C). The remaining specimens (BSKU 44240, 38.0 mm SL; BSKU 51541, 72.5 mm SL; FAKU 1861, 78.1 mm SL; KAUM–I. 133328, 70.4 mm SL) had the small lateral lacrimal spine, but lacked the spine on the suborbital ridge (Fig. 3B), such variations representing changes with growth (Fig. 4).

Since *O. spinosa* has been recorded only from Taiwan as mentioned above, the present Japanese specimens represent the first records from Japan, Aichi specimens being the northernmost and easternmost records for the species. There being no current English or Japanese names for *O. spinosa*, the new English and Japanese names “Red Wasp-fish” and “Aka-hachiokezo”, respectively, are proposed here, on the basis of BSKU 51541. “Aka” means “Red” in Japanese, in reference to the uniformly red body color of the species, and “hachiokezo” is the common Japanese name for *Ocosia*.

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