

Redescription of the specimen of *Thrissina dussumieri* (Teleostei: Clupeiformes: Engraulidae), collected from the Ogasawara Islands

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A single specimen of *Thrissina dussumieri* (Valenciennes, 1848) collected from the Ogasawara Islands, previously reported and briefly described *ca.* 90 years ago, has since been largely overlooked in studies of Japanese engraulid fishes. The specimen was re-examined and described in detail, and the record of *T. dussumieri* from Japanese waters is confirmed. The new standard Japanese name “Tsurugi-katakuchi” is proposed.

Key Words: *Thryssa dussumieri*, anchovy, Bonin Islands, distribution.

Introduction

The anchovy *Thrissina dussumieri* (Valenciennes, 1848) (Engraulidae) is widely distributed in the Indo-West Pacific (Whitehead *et al.* 1988), and abundantly caught and used as food or bait fish in tropical Asia (Day 1865; Talwar and Kacker 1984; Whitehead *et al.* 1988; Kong 1998; Zhang 2001; Matsunuma 2011; Madhu *et al.* 2016; Hata 2018). This species has been recorded from Japanese waters on the basis of only a single specimen, which was briefly described by Fowler (1928). However, that record has largely been overlooked, *T. dussumieri* being omitted from a review of Japanese engraulid fishes by Aonuma and Yagishita (2013). In the present study, the specimen reported by Fowler (1928) was re-examined and described in detail, thus the record of *T. dussumieri* from Japanese waters is confirmed.

Materials and methods

Counts and proportional measurements, expressed as percentages of standard length (SL), followed Hata and Motomura (2019). All measurements were made with digital calipers to the nearest 0.01 mm. The specimen examined in this study is deposited at the National Museum of Natural History, Smithsonian Institution, Suitland, MD, USA (USNM). Nomenclature and authorship of the genus *Thrissina* Jordan and Seale, 1925 followed Kottelat (2013).

Thrissina dussumieri (Valenciennes, 1848)

[English name: Dussumier's Thryssa; new standard Japanese name: Tsurugi-katakuchi]
(Fig. 1)

Engraulis dussumieri Valenciennes, 1848: 69 (type locality: Gulf of Khambhat, Gujarat, India); Day 1865: 311 [Cochin (currently Kochi), India]; Weber and de Beaufort 1913: 41 (Java, Indonesia; Sarawak, Malaysia; and India); Fowler 1928: 32 [Bonin Islands (currently Ogasawara Islands), Japan].

Engraulis auratus Day, 1865: 312 [type locality: Cochin (currently Kochi), India].

Thrissocles dussumieri: Jordan and Seale 1926: 368 (Penang, Malaysia); Fowler 1941: 681 (in part; India; Singapore; East Indies; Philippines; and Ogasawara Islands, Japan); Mishra 1976: 131, unnumbered fig. (India).

Thryssa dussumieri: Matsubara 1955: 196 (Ogasawara Islands, Japan; China; Philippines; East Indies; Singapore; and India).

Thryssa dussumieri: Whitehead 1967a: 142, fig. 14c [Coromandel and Bombay (currently Mumbai), India]; Whitehead 1967b: 23, fig. 2a (Andaman Sea, Bay of Bengal, and Arabian Sea); Whitehead 1967c: 265, fig. 47 (Singapore; Penang and Tanjong Dawai, Merbok Estuary, Malaysia); Talwar and Whitehead 1971: 77, pl. 2c [Canara, Malabar, Bombay (currently Mumbai), and Madras (Chennai), India]; Whitehead 1972: 232, fig. 56 [in part; coast of western Pakistan; Malabar, Bombay (currently Mumbai), Calicut (Kozhikode), and Waltair, India; Malaysia; Java, Indonesia]; Wongratana 1980: 150 (Thailand); Talwar and Kacker 1984: 197, fig. 85 (India); Whitehead and Bauchot 1986: 48 [Coromandel and Bombay (currently Mumbai), India]; Wongratana 1987: 109 (Pakistan to Southeast Asia and Taiwan); Whitehead *et al.* 1988: 429, unnumbered



Fig. 1. Preserved specimen of *Thrissina dussumieri*, USNM 86565, 87.6 mm SL, Ogasawara Islands, Japan.

fig. [Indian Ocean (coasts of Pakistan, India, Burma and south to Penang, Malaysia) and western Pacific (Malaysia, Indonesia, north to Taiwan)]; Young *et al.* 1994: 224, fig. 11 (Sinda, Kaohsiung, Taichung, and Tongkang, Taiwan); Mohsin and Ambak 1996: 134, fig. 203 (p. 134), fig. 59 (p. 694) (western India, Bangladesh, Pakistan, Sri Lanka, eastward to Southeast Asia); Carpenter *et al.* 1997: 118, unnumbered fig. (Persian Gulf); Kong 1998: 99 (Beluran, Sabah, Malaysia); Ni and Kwok 1999: 135 (Hong Kong, China); Wongratana *et al.* 1999: 1746, unnumbered fig. [western Pacific (Gulf of Thailand, Malaysia, Indonesia, north to Taiwan) and Indian Ocean (coasts of Pakistan, India, Myanmar and south to Penang, Malaysia)]; Munroe and Nizinski 2000: 588 (South China Sea); Zhang 2001: 144, fig. II-69 (Dongxiang Island, Fuzhou, Fujian; Shanwei, Guangdong; Zhapo, Yangjiang, Guangdong; Aotou, Huizhou, Guangdong; Ganchong, Hainan; Yinggehai, Hainan; and Qinglan, Wencheng, Hainan, China); Manilo and Bogorodsky 2003: S97 (Arabian Sea); Shao *et al.* 2008: 236 (Kaohsiung and Pingtung, Taiwan); Ambak *et al.* 2010: 45, unnumbered fig. (Malaysia); Satapoomin 2011: 50 (Andaman Sea); Matsunuma 2011: 34, unnumbered fig. (off Terengganu, Malaysia); Tran *et al.* 2013: 45, unnumbered fig. (Mekong Delta, Vietnam); Psomadakis *et al.* 2015: 156, unnumbered fig. (Pakistan); Madhu *et al.* 2016: 105 (Veraval, Gujarat, India); Ali *et al.* 2018: 308 (Iraq); Hata 2018: 43, unnumbered fig. (Ha Long Bay, northern Vietnam); Eagderi *et al.* 2019: 29 (Persian Gulf); Psomadakis *et al.* 2019: 299, unnumbered fig. (Myanmar); Hata 2019: 208, unnumbered fig. (Donggang, southwestern Taiwan).

Thryssa dussumieri (sic): Hussain *et al.* 1988: 20 (Khor Al-Zubair, Iraq).

Material examined. USNM 86565, 87.6 mm SL, Ogasawara Islands, Japan, collected by W. Stimpson, catalogued on 11 April 1924.

Description. Dorsal-fin rays 13 (unbranched rays 3; branched rays 10); anal-fin rays 37 (unbranched rays 3; branched rays 34); pectoral-fin rays 11 (unbranched rays 1; branched rays 10); gill rakers on first gill arch $15+18=33$; gill rakers on second gill arch $12+18=30$; gill rakers on third gill arch $11+10=21$; gill rakers on fourth gill arch $8+10=18$; gill rakers on posterior face of third gill arch 9;

prepelvic and postpelvic scutes $15+8=23$. Morphometrics (expressed as percentages of SL): head length 25.2; body depth 26.6; pre-dorsal-fin length 49.0; distance from snout tip to pectoral-fin insertion 25.9; distance from snout tip to pelvic-fin insertion 40.7; pre-anal-fin length 60.0; dorsal-fin base length 10.1; anal-fin base length 32.4; caudal-peduncle length 12.2; caudal-peduncle depth 10.3; pectoral-fin length 18.8; pelvic-fin length 11.0; interorbital width 6.8; snout length 4.5; orbit diameter 7.0; maxillary length 37.4; mandibular length 19.0; first dorsal-fin ray length 2.4; second dorsal-fin ray length 8.4; third dorsal-fin ray broken; fourth dorsal-fin ray length 19.4; fifth dorsal-fin ray length 17.8; first anal-fin ray length 1.7; second anal-fin ray length 3.7; third anal-fin ray length 14.8; fourth anal-fin ray length 13.7; fifth anal-fin ray length 13.4.

Body rather elongate, compressed, depth 105.6% of head length, deepest at dorsal-fin origin; dorsal profile gradually rising from snout tip to dorsal-fin origin, thereafter gently lowering (profile almost straight) to uppermost point of caudal-fin base; ventral profile lowering from lower-jaw tip to just below lowermost point of pectoral-fin insertion, thereafter parallel to body axis to anal-fin origin, elevated along anal-fin base, parallel to body axis on caudal peduncle. Anteriormost point of pectoral-fin insertion slightly posterior to rear edge of opercle, above to posteriormost point of pectoral-fin insertion. Posterior tip of pectoral fin beyond pelvic-fin insertion. First pectoral-fin ray longest. Pelvic-fin insertion anterior to dorsal-fin origin. Posterior tip of depressed pelvic fin reaching to vertical through origin of fifth dorsal-fin ray. Small spine-like scute located just anterior to dorsal-fin origin. Anal-fin origin posterior to rear end of dorsal-fin base. Anus situated just anterior to anal-fin origin. Dorsal and ventral margins of caudal fin nearly straight. Snout tip round, horizontally level (approx.) with eye center. Eye large, round, covered with adipose eyelid, positioned laterally on head above horizontal level of pectoral-fin insertion, visible in dorsal view. Pupil round. Orbit elliptical. Interorbital space flat. Nostrils close to each other, anterior to orbit. Anterior nostril slit-like, posterior nostril nearly semicircular. Mouth large, inferior, ventral to body axis, extending backward beyond posterior margin of eye. Maxilla long, its posterior tip slightly before of pelvic-fin insertion. First supramaxilla absent. Lower jaw slender, its dorsal profile not steeply elevated. Single rows of

small conical teeth on both jaws; teeth on posterior part of maxilla pointing downward. Several small teeth on vomer. Rows of palatine teeth increasing posteriorly (single and double rows anteriorly and on mid-section, respectively), forming a patch posteriorly on palatine and endopterygoid. Hyoid with small teeth on dorsal surface. Basihyal and basibranchial both with a teeth patch. Posterior margins of preopercle, subopercle and opercle convex, rounded, without serrations. Pseudobranchial filaments present, covered with fleshy membrane. Gill rakers long, slender. Serrae on gill rakers distinctively clumped. Gill membrane on each side joined distally, most isthmus muscle exposed (not covered by gill membrane). Scales absent on head. Lateral line absent. Scales absent on fins. Body covered with cycloid scales with numerous vertical grooves. Ventral edge of body covered with 23 keeled scutes from isthmus to anus.

Color of preserved specimen: Lateral surface of body uniformly silver, dorsum brown. Melanophores densely distributed on dorsum, less densely scattered along dorsal- and caudal-fin rays. Black saddle-like blotch on nape. All fin rays, maxilla, and snout tip semi-transparent yellowish. Iris silver.

Distribution. *Thrissina dussumieri* is widely distributed in the Indo-West Pacific, from Persian Gulf to Indonesia, southern coast of China, Taiwan, and the Ogasawara Islands (Fowler 1928, 1941; Whitehead *et al.* 1988; Carpenter *et al.* 1997; Wongratana *et al.* 1999; Zhang 2001; Psomadakis *et al.* 2015, 2019; Ali *et al.* 2018; this study).

Remarks. The specimen collected from the Ogasawara Islands was assigned to the genus *Thrissina* [recognized by Whitehead *et al.* (1988) and Wongratana *et al.* (1999) as *Thryssa* Cuvier, 1829, an incorrect but often used spelling of *Thrissa* Cuvier, 1816; see Kottelat (2013) for nomenclatural discussion] due to having keeled prepelvic and postpelvic scutes along the ventral edge, a small spine-like scute just before the dorsal-fin origin, the dorsal and anal fins with 13 and 37 rays, respectively, the uppermost pectoral-fin ray not extended as a filament, and small conical teeth on both jaws. The specific identification of the specimen was confirmed on the basis of the following combination of characters, closely matching the diagnostic features of *Thrissina dussumieri* given by Wongratana (1983, 1987), Whitehead *et al.* (1988), and Wongratana *et al.* (1999): maxilla relatively long, its posterior tip almost reaching the pelvic-fin insertion; gill rakers on lower limb of the first gill arch 18; serrae on the lower gill raker inner edges clumped; the first supramaxilla absent; keeled scutes on the ventral edge 23; the posterior end of the lower jaw not steeply elevated; and the nape with a saddle-like black blotch.

Only two *Thrissina* species, *T. dussumieri* and *Thrissina setirostris* (Broussonet, 1782), have a relatively long maxilla extending posteriorly well beyond the lowermost point of the pectoral-fin insertion (Wongratana 1983, 1987; Whitehead *et al.* 1988; Wongratana *et al.* 1999; Hata and Motomura 2019; Hata *et al.* 2020). However, *T. dussumieri* is easily distinguished from *T. setirostris* by having the lower jaw posterior end not steeply elevated (steeply elevated in *T. setirostris*), a shorter maxilla, its posterior tip reaching at

least halfway between the pectoral fin tip and the pelvic-fin insertion and sometimes reaching to pelvic-fin insertion in adults (reaching at least to the pectoral fin tip, often to the pelvic-fin insertion and sometimes to the anal-fin origin), first gill arch with 17–19 (vs. 10–12) gill rakers on lower limb, and prepelvic and postpelvic scutes numbering $14+16+6-9=21-24$ (vs. $16-18+9$ or $10=25-28$) (Wongratana 1983; Whitehead *et al.* 1988; Wongratana *et al.* 1999). Although Fowler (1941) and Whitehead (1972) regarded *Thrissina adelae* (Rutter, 1897) as a junior synonym of *T. dussumieri*, the former can be easily distinguished from *T. dussumieri* by its shorter maxilla (reaching slightly beyond the lowermost point of the pectoral-fin insertion), the first gill arch with 20–23 lower gill rakers, and the prepelvic and postpelvic scutes numbering 17 or $18+8-11=25-28$ (Whitehead *et al.* 1988; Hata and Motomura 2019).

Fowler (1928) reported *T. dussumieri* (as *Engraulis dussumieri*) from the Ogasawara Islands, based on a specimen obtained by W. Stimpson and deposited in USNM. The data provided closely matched that of the specimen examined here (USNM 86565). In his brief description of the Ogasawara specimen, Fowler (1928) noted the maxilla as nearly reaching to the pelvic-fin insertion, matching the condition in USNM 86565 and tacitly confirming its identity. Subsequently, Fowler (1941) included the Ogasawara Islands in the distributional range of *T. dussumieri*, referring to his earlier paper, and was followed by Matsubara (1955). However, the record of the species from the Ogasawara Islands has subsequently been overlooked. In their review of the genus, Whitehead *et al.* (1988) failed to include the Ogasawara Islands in the distributional range of *T. dussumieri*. Similarly, Randall *et al.* (1997) and Aonuma and Yagishita (2013) overlooked the species in their list of fishes of the Ogasawara Islands and review of Japanese engraulid fishes, respectively.

Although Matsubara (1955) proposed the Japanese name “O-tarekuchi”, meaning “large anchovy” for the species, such may be confused with the similar Japanese name “O-iwashi”, meaning “large clupeiform fish”, applied to *Thrissina baelama* (Forsskal, 1775) (Aonuma and Yagishita 2013). Accordingly, “O-tarekuchi” is considered unsuitable for *T. dussumieri*, the new standard Japanese name “Tsurugikatakuchi” being proposed as a replacement [based on the specimen reported herein (USNM 86565); “tsurugi” meaning “sword”, in reference to the long maxilla of the species, and “katakuchi” being the common Japanese name for the family Engraulidae].

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