

## First record of *Ariomma indica* (Teleostei: Perciformes: Ariommatidae) from Kagoshima Prefecture, southern Japan

By

Harutaka HATA<sup>1\*</sup>, Masahide ITOU<sup>2</sup> and Hiroyuki MOTOMURA<sup>3</sup>

<sup>1</sup> Center for Molecular Biodiversity Research, National Museum of Nature and Science, 4-1-1 Amakubo, Tsukuba, Ibaraki 305-0005, Japan

<sup>2</sup> 718 Kataura, Kasasa, Minami-satsuma, Kagoshima 897-1301, Japan

<sup>3</sup> The Kagoshima University Museum, 1-21-30 Korimoto, Kagoshima 890-0065, Japan

\* Corresponding author

**Abstract** A single specimen of *Ariomma indica* (Day, 1871), widely distributed in Indo-West Pacific was collected from the western coast of Satsuma Peninsula, Kagoshima Prefecture, southern Japan. Although the species has been widely reported from the Japanese mainland, no record prior to the specimen reported here exists from Kagoshima Prefecture.

Key words: fish fauna, distribution, Actinopterygii, Maru-ibodai, butterflyfish

### Introduction

The monotypic family Ariommatidae includes only the genus *Ariomma* Jordan & Snyder, 1904 (Haedrich 1967; Haedrich and Horn 1972), initially regarded as part of Apogonidae [by Jordan and Snyder (1904)]. This genus was subsequently placed in Nomeidae by Katayama (1952), sharing a large oesophagus with many papillae bearing minute slender teeth, the body covered with cycloid scales, a scarcely protractile maxilla, and the second dorsal and anal fins low, with long bases (latter three characters not observed in apogonids). Subsequently, Haedrich (1967) established the family Ariommatidae (as Ariommidae) for the genus. Species of Ariommatidae are distinguished from those of Nomeidae by having usually 14 or 15 soft rays in both the dorsal and anal fins (vs. more than 15 in Nomeidae), fleshy keels on the caudal-peduncle lateral surface (vs. keels absent on caudal peduncle), and lacking teeth on the roof of the mouth (vs. teeth present at least on the vomer and palatines) (Haedrich 1967; Haedrich and Horn 1972; Last 2001).

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\* Corresponding author TEL: 029-853-8153; E-mail: k2795502@kadai.jp

Of the six valid species recognized in *Ariomma* (Haedrich 1967; Haedrich and Horn 1972; Karrer 1984; Ajiad and Mahasneh 1986), *Ariomma brevipanum* (Klunzinger, 1884) “Minami-medai”, *Ariomma indica* (Day, 1871) “Maru-ibodai” and *Ariomma lurida* Jordan & Snyder, 1904 “Ome-medai” have been recorded from Japanese waters (Nakabo and Doiuchi 2013), with only the first-mentioned reported from Kagoshima Prefecture to date (Hata 2014, 2017; Hata et al. 2016, 2017a, b). Although *A. indica* has been recorded from the Japanese mainland and Okinawa Trough (see Distribution), no specimens have been recorded from Kagoshima Prefecture. Recently, a single specimen, collected off the west coast of Satsuma Peninsula in 2009 and deposited in the Kagoshima University Museum, Kagoshima (KAUM) collection, was identified as *A. indica*. Representing the first record of the species from Kagoshima Prefecture, it is described herein.

### Material and methods

Methods for counts and proportional measurements followed Tabeta and Ishida (1975). Standard length is abbreviated as SL. All measurements were made with calipers to the nearest 0.1 mm. Curatorial procedure for the voucher specimen followed Motomura and Ishikawa (2013).

### Results

#### *Ariomma indica* (Day, 1871)

(Standard Japanese name: Maru-ibodai)

(Fig. 1)

**Material examined** KAUM–I. 26500, 163.4 mm SL, northeast of Matsu-shima Island, Kasasa, Minami-satsuma City, Kagoshima Prefecture, Japan (31 ° 25 ' 06 " N, 130 ° 12 ' 32 " E), 0–20 m depth, 22 Dec. 2009, set net, M. Itou.

**Description** First dorsal-fin with 11 spines, second dorsal fin with one spine and 15 soft rays; anal-fin spine 3; anal-fin soft rays 15; pectoral-fin rays 24; pelvic-fin spine 1; pelvic-fin soft rays 5; gill rakers on first gill arch 8 + 15 = 23; pseudobranchial filaments 28. Morphometrics (expressed as percentages of SL): head length 28.3; body width at upper pectoral-fin base 13.4; greatest body width 15.1; maximum body depth (measured at origin of ninth dorsal-fin spine)



Figure 1. Fresh specimen of *Ariomma indica* from Kasasa, western coast of Satsuma Peninsula, Kagoshima Prefecture, southern Japan (KAUM-I. 26500, 163.4 mm standard length).

46.3; distance from pelvic-fin insertion to anal-fin origin 21.1; distance from snout to first dorsal-fin origin 35.5; to second dorsal-fin origin 57.3; to pectoral-fin insertion 28.5; to vent 54.1; to anal-fin origin 59.0; first dorsal-fin base length 22.3; second dorsal-fin base length 40.1; anal-fin base length 40.6; distance between first dorsal-fin origin to pectoral-fin insertion 26.9; to pelvic-fin insertion 43.4; to anal-fin origin 52.5; distance from pectoral-fin insertion to pelvic-fin insertion 19.0; distance from pectoral-fin insertion to anal-fin origin 32.9; caudal-peduncle length 11.6; caudal-peduncle depth 6.9; snout length 6.1; eye diameter 9.4; maxillary length 7.0; interorbital width 9.3; postorbital length 12.3. pectoral-fin length 34.6; pelvic-fin length 12.5.

Body oval, strongly compressed, deepest at origin of ninth dorsal-fin spine. Dorsal profile of body rising steeply from snout tip to just above posterior margin of eye, subsequently gently elevated to end of first dorsal-fin base, thereafter lowering to end of second dorsal-fin base. Ventral profile of body gently lowering from lower-jaw tip to anal-fin origin, subsequently rising gradually to posterior end of anal-fin base. Dorsal and ventral profiles of caudal peduncle parallel to body axis. Mouth terminal, small, posterior tip of maxilla not reaching to vertical through anterior margin of eye. Posterior part of maxilla concealed under lacrimal. Uniserial conical teeth on both jaws. No teeth on vomer, palatine, and basibranchial. Eye and pupil round, eye surrounded by well-developed adipose eyelid. Nostrils round, close to each other, anterior to orbit, below dorsal margin of eye. Posterior margins of preopercle and opercle smooth.

Anteriormost point of pectoral-fin insertion slightly anterior to posterior tip of opercle, above lower margin of eye. Lowermost point of pectoral-fin insertion anterior to anteriormost point of

pelvic-fin insertion, below lower margin of eye. Dorsal and ventral margins of pectoral fin nearly straight, posterior tip of fin pointed, reaching to vertical through fourth dorsal-fin soft ray origin. Three uppermost rays of pectoral fin unbranched. First dorsal-fin origin posterior to anteriormost point of pectoral-fin insertion, dorsal contour rising from fin origin to posterior tip of fourth spine, thereafter gently lowering to tip of last spine. Second dorsal-fin origin slightly anterior to anal-fin origin, dorsal profile elevated from fin origin to tip of first soft ray, subsequently parallel to dorsal profile of body. Posteriormost point of second dorsal-fin base just above that of anal-fin base. Anteriormost point of pelvic-fin insertion just below origin of third dorsal-fin spine. Posterior tip of depressed pelvic fin not reaching to anus. Anal-fin origin just below origin of second dorsal-fin ray, fin margin lowering from origin to tip of first soft ray, subsequently parallel to ventral profile of body. Anal-fin base ending just below posteriormost point of second dorsal-fin base. Caudal fin forked, tips of both lobes pointed. Anterior and posterior margins of both caudal-fin lobes nearly straight.

Low, indistinct fleshy keels on lateral surfaces of caudal peduncle. Lateral line originating on upper end of opercle, running parallel to dorsal profile of body, ending just below posteriormost point of second dorsal-fin base. Body scales cycloid, deciduous (most scales lost). Scales absent on all fins. Scaled area on dorsum of head extending to interorbit. Pseudobranchial filaments present. Gill rakers thin, cylindrical.

Fresh coloration—Body uniformly whitish-silver. Dorsum and upper part of lateral surface of body bluish. Dorsal surface of head, and dorsal and anal fins dark grey. Pectoral-fin rays whitish, semi-transparent, melanophores scattered along pectoral-fin rays. Caudal fin dusky, upper part greenish. Pelvic fin white. Pupil and iris black and silver, respectively. Dark vertical band through mid-eye.

**Distribution** *Ariomma indica* is widely distributed in the Indo-West Pacific, from the eastern coast of Africa to southern Japan and the northern coast of Australia (Haedrich 1967; Haedrich and Horn 1972; Kim et al. 1988; Boonyanate and Hylleberg 1993; Last 2001; Tafzilmeriam 2013, 2018; Nakabo and Doiuchi 2013; Okamoto 2017; Hata 2019). In Japan, it has been recorded from the Sea of Japan and East China Sea coasts from Wakasa Bay to Nagasaki Prefecture, the Pacific coast from Sagami Bay to Tosa Bay, and the Okinawa Trough (Okamura 1985; Nakabo and Doiuchi 2013). The present specimen is the first record from the western coast of Satsuma Peninsula, Kagoshima Prefecture.

**Remarks** The Kagoshima specimen is assignable to the genus *Ariomma* as defined by Haedrich (1967), Haedrich and Horn (1972), and Last (2001), being characterized by a deeply forked caudal fin, fleshy keels on the caudal-peduncle lateral surface, a well-developed adipose eyelid surrounding the eye, two dorsal fins (11 spines on first, a single spine and 15 soft rays on second), the anal fin with three spines and 15 soft rays, and no teeth on the vomer, palatines, and basibranchials. Moreover, the specimen was identified as *A. indica*, its deep body, 46.3% of SL. The species easily can be distinguished from all other congeners from Indo-Pacific by its deep body, deeper than 40% of SL (Haedrich and Horn 1972; Last 2001; Nakabo and Doiuchi 2013). Moreover, the meristics of the present specimen greatly agreed with those of *A. indica* given by Haedrich (1967), Haedrich and Horn (1972), Last (2001), and Nakabo and Doiuchi (2013).

*Ariomma indica* has been recorded widely from the mainland of Japan, including Fukui



Figure 2. *Ariomma indica* caught off from Kasasa, western coast of Satsuma Peninsula, Kagoshima Prefecture, southern Japan (specimens not retained). Photographed by M. Itou on 16 June 1993 (upper) and 4 June 2003 (lower).

Prefecture (Tega et al. 2014), Hamasaka, Hyogo Prefecture (Suzuki and Uno 1993), Nagato, Yamaguchi Prefecture (Sonoyama et al. 2020), East China Sea (Yamada 1983), Fujisawa, Kanagawa Prefecture (Yamada and Kudo 2001), Owase, Mie Prefecture, Nachi-katsuura, Wakayama Prefecture (Urano and Mochizuki 1984), Mimase (Okamura 1997), and Iburi (Doiuchi 2001), Kochi Prefecture, Ainan, Ehime Prefecture (Takagi et al. 2010), and the Okinawa Trough (Okamura 1985).

Although the ichthyofauna of Kagoshima Prefecture, including the Satsunan Islands, have been well surveyed in the recent years (e.g. Kagoshima City Aquarium Foundation 2008, 2018; Kaburagi 2016; Kimura et al. 2017; Motomura and Harazaki 2017; Iwatsubo and Motomura 2017; Koeda et al. 2018; Nakae et al. 2018; Motomura et al. 2018, 2019), *A. indica* has not been formally recorded to date from Kagoshima Prefecture, where it seems to be relatively rare. Although two specimens of *A. indica* caught off Kasasa were observed and photographed by the second author on 16 June 1993 and 4 June 2003 (Fig. 2), neither was retained, the present specimen therefore representing the first voucher-supported record of the species from Kagoshima Prefecture. During the ichthyofaunal surveys in Kagoshima Prefecture by the authors for more than twenty years, only three individuals of the species (present specimen and photographs) were found from the prefecture, suggesting that *A. indica* is most likely to be rare around the prefecture.

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## References

- Ajiad, A.M. and Mahasneh, D.M. (1986) Redescription of *Ariomma brevimanus* (Klunzinger [sic], 1884) a rare stromateoid from the Gulf of Aqaba (Red Sea). *Cybiurn*, 10 (3): 135–142.
- Boonyanate, P. and Hylleberg, J. (1993) Fishes from the 5th Thai-Danish expedition to the Andaman Sea in 1966. *Phuket Marine Biological Center Special Publication*, 12: 41–51.
- Doiuchi, R. (2001) *Ariomma indica* (Day). P. 236. In: Nakabo, T., Machida, Y., Yamaoka, K. and Doiuchi, R. (Eds.) *Iburi: Fishes of Kuroshio*. Osaka Kaiyukan, Osaka, Japan. (In Japanese)
- Haedrich, R.L. (1967) The stromateoid fishes: systematic and a classification. *Bulletin of the Museum of Comparative Zoology*, 135: 31–139.
- Haedrich, R.L. and Horn, M.H. (1972) A key to the stromateoid fishes. *Woods Hole Oceanographic Institution Technical Report*, 1972 (3): 1–46.
- Hata, H. (2014) *Ariomma brevimanum* (Klunzinger, 1884). P. 583. In: Motomura, H. and Matsuura, K. (Eds.) *Field guide to fishes of Yoron Island in the middle of the Ryukyu Islands, Japan*. The Kagoshima University Museum, Kagoshima, Japan and the National Museum of Nature and Science, Tsukuba, Japan. (In Japanese)
- Hata, H. (2017) Family Ariommatidae. P. 213. In: Iwatsubo, H. and Motomura, H. (Eds.) *Field guide to fishes of Kagoshima Bay in southern Kyushu, Japan*. Kagoshima Museum of Aquatic Biodiversity, Kagoshima and the Kagoshima University Museum, Kagoshima, Japan. (In Japanese)
- Hata, H. (2019) Family Ariommatidae. Pp. 1190–1191. In: Koeda, K. and Ho, H.-C. (Eds.) *Fishes of southern Taiwan*. National Museum of Marine Biology & Aquarium, Pingtung, Taiwan.
- Hata, H., Itou, M. and Motomura, H. (2016) *Ariomma brevimanum* (Perciformes: Ariommatidae) from Kagoshima Prefecture, southern Japan. *Nanki Seibutsu*, 58: 44–47. (In Japanese)
- Hata, H., Iwatsubo, H. and Motomura, H. (2017a) First record of *Ariomma brevimanum* (Perciformes: Ariommatidae) from Kagoshima Bay, southern Japan. *Nature of Kagoshima*, 43: 197–200. (In Japanese)
- Hata, H., Maekawa, T., Nakae, M. and Motomura, H. (2017b) First records of *Ariomma brevimanum* (Perciformes: Ariommatidae) from Amami-oshima island, Amami Islands, Kagoshima Prefecture, Japan. *Nature of Kagoshima*, 44: 13–16. (In Japanese)
- Iwatsubo, H. and Motomura, H. (2017) *Field guide to fishes of Kagoshima Bay in southern Kyushu, Japan*. Kagoshima Museum of Aquatic Biodiversity, Kagoshima and the Kagoshima University Museum, Kagoshima, Japan, 302 pp. (In Japanese)

- Jordan, D.S. and Snyder, J.O. (1904) Notes on collections of fishes from Oahu Island and Laysan Island, Hawaii, with descriptions of four new species. *Proceedings of United States National Museum*, 27 (1377): 939–948.
- Kaburagi, K. (2016) *Angling fishes of Tanega-shima Island*. Tamashida-sha, Nishinoomote, Japan, 157 pp. (In Japanese)
- Kagoshima City Aquarium Foundation (2008) *Fishes collected with set nets in Kagoshima and confirmed by Kagoshima City Aquarium*. Kagoshima City Aquarium Foundation, Kagoshima, Japan, 260 pp. (In Japanese)
- Kagoshima City Aquarium Foundation (2018) *Fishes collected with set nets in Kagoshima and confirmed by Kagoshima City Aquarium. Second edition*. Kagoshima City Aquarium Foundation, Kagoshima, Japan, 335 pp. (In Japanese)
- Karrer, C. (1984) Notes on the synonymies of *Ariomma brevimanum* and *A. luridum* and the presence of the latter in the Atlantic (Teleostei, Perciformes, Ariommatidae). *Cybiium*, 8 (4): 94–95.
- Katayama, M. (1952) A record of *Ariomma lurida* Jordan et Snyder from Japan, with notes on its systematic position. *Japanese Journal of Ichthyology*, 2 (1): 31–34.
- Kim, K.-H., Kim, Y.-U. and Kim Y.-S. (1988) Five species of fish new to Korean waters. *Bulletin of the Korean Fisheries Society*, 21 (2): 105–112.
- Kimura, Y., Hibino, Y., Miki, R., Minetoma, T. and Koeda, K. (2017) *Field guide to fishes of Kuchinoerabu-jima Island in the Osumi Group, Kagoshima, southern Japan*. The Kagoshima University Museum, Kagoshima, Japan, 200 pp. (in Japanese)
- Koeda, K., Hata, H., Yamada, M. and Motomura, H. (2018) *Field guide to fishes landed at Uchinoura Fishing Port, Kagoshima, Japan*. The Kagoshima University Museum, Kagoshima, Japan, 520 pp. (In Japanese)
- Last, P.R. (2001) Ariommatidae, ariommas. Pp. 3780–3783. In: Carpenter, K.E. and Niem, V.H. (Eds.) *FAO species identification guide for fishery purposes. The living marine resources of the western central Pacific. Vol. 6. Bony fishes part 4 (Labridae to Latimeriidae)*. FAO, Rome, Italy.
- Motomura, H., Hagiwara, K., Senou, H. and Nakae, M. (2018) *Identification guide to fishes of the Amami Islands, Japan*. The Kagoshima University Museum, Kagoshima, Japan, Yokosuka City Museum, Yokosuka, Japan, Kanagawa Prefectural Museum of Natural History, Odawara, Japan, and National Museum of Nature and Science, Tsukuba, Japan, 414 pp. (In Japanese)



- Motomura, H., Hagiwara, K., Senou, H. and Nakae, M. (2019) *Identification guide to fishes of the Amami Islands in the Ryukyu Archipelago, Japan*. The Minaminippon Shimbun Kaihatsu Center, Kagoshima, Japan. 438 pp. (In Japanese)
- Motomura, H. and Harazaki, S. (2017) Annotated checklist of marine and freshwater fishes of Yaku-shima islands in the Osumi Islands, Kagoshima, southern Japan, with 129 new records. *Bulletin of the Kagoshima University Museum*, 9: 1–183.
- Motomura, H. and Ishikawa, S. (2013) *Fish collection building and procedures manual. English edition*. The Kagoshima University Museum, Kagoshima, Japan and the Research Institute for Humanity and Nature, Kyoto, Japan.
- Nakabo, T. and Doiuchi, R. (2013) Ariommatidae. Pp. 1084, 2042. In: Nakabo, T (Ed.) *Fishes of Japan with pictorial keys to the species, third edition*. Tokai University Press, Hadano, Japan. (In Japanese)
- Nakae, M., Motomura, H., Hagiwara, K., Senou, H., Koeda, K., Yoshida, T., Tashiro, S., Jeong, B., Hata, H., Fukui, Y., Fujiwara, K., Yamakawa, T., Aizawa, M., Shinohara, G. and Matsuura, K. (2018) An annotated checklist of fishes of Amami-oshima Island, the Ryukyu Islands, Japan. *Memoirs of the National Museum of Nature and Science, Tokyo*, 52: 205–361.
- Okamoto, M. (2017) *Ariomma indicus* (Day 1871). P. 179. In: Motomura, H., Alama, U.B., Muto, N., Babaran, R.P. and Ishikawa, S. (Eds.) *Commercial and bycatch market fishes of Panay Island, Republic of the Philippines*. The Kagoshima University Museum, Kagoshima, Japan, University of the Philippines Visayas, Iloilo, Philippines, and Research Institute for Humanity and Nature, Kyoto, Japan.
- Okamura, O. (1985) *Ariomma indica* (Day). Pp. 548–549. In: Okamura, O. (Ed.) *Fishes of the Okinawa Trough and the adjacent waters II*. Japan Fisheries Resource Conservation Association, Tokyo, Japan.
- Okamura, O. (1997) *Ariomma indica*. P. 663. In: Okamura, O. and Amaoka, K. (Eds.) *Sea fishes of Japan*. Yama-kei Publishers, Tokyo, Japan. (In Japanese)
- Sonoyama, T., Ogimoto, K., Hori, S., Uchida, Y. and Kawano, M. (2020) An annotated checklist of marine fishes of the Sea of Japan off Yamaguchi Prefecture, Japan. *Bulletin of the Kagoshima University Museum*, 11: 1–152. (In Japanese)
- Suzuki, T. and Uno, M. (1993) *Coastal fishes of Hamasaka*. Hamasaka Town, Hamasaka, Japan. 34 pp. (In Japanese)
- Tabeta, O. and Ishida, K. (1975) Occurrence of the stromateoid fish *Ariomma brevimanus* in southern Japan. *Japanese Journal of Ichthyology*, 22 (3): 175–178.

- Tafzilmeriam, S. (2013) *Ariomma indicum* (Day, 1871). P. 205. In: Yoshida, T., Motomura, H., Musikasinthorn, P. and Matsuura, K. (Eds.) *Fishes of northern Gulf of Thailand*. National Museum of Nature and Science, Tsukuba, Japan, Research Institute for Humanity and Nature, Kyoto, Japan, and Kagoshima University Museum, Kagoshima, Japan.
- Tafzilmeriam, S. (2018) *Ariomma indicum* (Day, 1871). P. 284. In: Kimura, S., Imamura, S., Nguyen, V. Q. and Pham, T. D. (Eds.) *Fishes of Ha Long Bay, the World Natural Heritage Site in northern Vietnam*. Fisheries Research Laboratory, Mie University, Shima, Japan.
- Takagi, M., Hirata, T. and Nakata, S. (2010) Fishery catches. Pp. 172–214. In: Takagi, T., Hirata, T. and Nakata, S. (Eds.) *Fishes of Ainan, Ehime*. Soufu-sha-shuppan, Matsuyama, Japan. (In Japanese)
- Tega, T., Kodama, K. and Kinoshita, H. (2014) List of sea fishes of Fukui Prefecture. Pp. 219–228. In: Fukui Prefectural Fisheries Experimental Station (Ed.) *Reports of Fukui Prefectural Fisheries Experimental Station of 25th year of the Heisei Period*. Fukui Prefectural Fisheries Experimental Station, Tsuruga, Japan. (In Japanese)
- Urano, T. and Mochizuki, K. (1984) A record of an ariommid fish, *Ariomma indica*, from Japan. *Japanese Journal of Ichthyology*, 31 (2): 205–208.
- Yamada, U. (1983) *Ariomma indica* (Day). *Seikaikusuisankenkyusho News*, 44: 1. (In Japanese)
- Yamada, K. and Kudo, T. (2001) Landing fishes of Misaki Fisheries Market, from Sagami Bay, X. *Natural History Report of Kanagawa*, 22: 43–50. (In Japanese)

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