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## *Original Papers*

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**First reliable Japanese record of *Nemipterus japonicus* (Perciformes: Nemipteridae) from Tanega-shima Island, Osumi Islands (Kagoshima Prefecture), Japan**

Jumpei Nakamura* and Hiroyuki Motomura

**Abstract** The threadfin bream genus *Nemipterus* Swainson, 1839 (Perciformes: Nemipteridae) currently includes 29 valid Indo-West Pacific species, eight of which have been recorded from Japanese waters. During an ichthyofaunal survey of Tanega-shima Island, Osumi Islands (Kagoshima Prefecture), Japan, a single specimen (246.9 mm standard length) of the Japanese Threadfin Bream *Nemipterus japonicus* (Bloch, 1791) was collected at a depth of 10 m on 13 January 2020. The specimen was characterized by seven anal-fin soft rays, 47 lateral-line scales, 6 + 10 = 16 gill rakers, a moderately deep body (depth 33.9% of standard length), long pectoral fin (posterior tip vertically level with anal-fin origin), posterior tip of depressed pelvic fin reaching between anus and anal-fin origin, upper lobe of caudal fin filamentous, and body pinkish dorsally and silver ventrally, with 1 longitudinal yellow stripes on the lateral surface, and a reddish blotch on the lateral line above the pectoral fin. Although the species is widely distributed in tropical and subtropical Indo-West Pacific waters from the Red Sea and the east coast of Africa to Taiwan and the Malay Archipelago, and bears the specific and Japanese names *japonicus* and Nihon-itoyori, respectively, it has at no time been recorded from Japanese waters. Therefore, the present specimen of *N. japonicus*, described here in detail, represents the first reliable record from Japan and northernmost record of the species in the western Pacific Ocean. The specimen collected from Tanega-shima Island was most likely to have been transported from Taiwan or the Philippines by the Kuroshio Current, the species being unlikely to reproduce in Japanese waters.

*(*Corresponding author: Kagoshima City Aquarium, 3–1 Honko-shimmachi, Kagoshima 892–0814, Japan; e-mail: j-nakamura@ioworld.jp)*

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**First Japanese records of *Conocara werneri* (Alepocephalidae) from Hyuga-nada Sea, Japan**

Munehiro Takami*, Hiromitsu Endo and Atsushi Fukui

**Abstract** The alepocephalid genus *Conocara* Goode and Bean, 1896 is characterized by the dorsal-fin origin located posterior to the anal-fin origin, dorsal-fin base shorter than the anal-fin base, body covered with small scales (> 80 in longitudinal row above the lateral line), tubular lateral line scales, the maxilla toothless, upper jaw equal to or longer than the snout, and photophores absent. Six specimens of *Conocara werneri* Nybelin, 1947, collected from Hyuga-nada Sea, Japan in a depth of 1,453–1,481 m, on 3 April 1991, are distinguished from all congeners by the following combination of characters: 17–20 dorsal-fin rays, 30–34

anal-fin rays, 159–179 longitudinal series scales above the lateral line, 19–22 scales between the dorsal fin insertion and lateral line, 25–32 scales between the anal fin insertion and lateral line, premaxillary bony crests present, the upper jaw reaching a vertical through the orbit anterior margin, an uninterrupted inner row of gill rakers on the first gill arch, the absence of palatine teeth, and raised insertions of the dorsal and anal fins with well-developed anterior cariniform skin folds. The gut contents of the six specimens represented the following higher taxa: Amphipoda, Copepoda, Ostracoda, Gastropoda (conch), Diatoma, Pyrosomata, and Foraminiferida. Four specimens possessed 113–550 developed ovarian eggs (maximum diameter 4.6 mm). *Conocara werneri* has been recorded previously only from subtropical zones of the eastern Atlantic and off New Zealand (south-western Pacific), the present specimens therefore representing the first record of the species from Japanese waters and northernmost record in the Pacific Ocean. The new standard Japanese name "Sedaka-yajiri-iwashi" is proposed for the species.

*(*Corresponding author: School of Marine Science and Technology, Tokai University, Orido, Shimizu, Shizuoka 424–8610, Japan; e-mail: mtakami@tsc.u-tokai.ac.jp)*

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**Aspects of the biology of two *Nemipterus* species in coastal waters around Okinawa Island, Ryukyu Archipelago**

Masato Uehara*, Itaru Ohta, Akihiko Ebisawa and Katsunori Tachihara

**Abstract** Two closely related, commercially important threadfin breams, *Nemipterus furcosus* and *N. peronii*, are an essential coastal fishery resource in Okinawa Prefecture. The age, growth, reproductive cycle, and stomach contents from 124 *N. furcosus* and 37 *N. peronii*, obtained from November 2011 to December 2015, were examined, age being assessed from sectioned otoliths and gonadal histology. *Nemipterus furcosus* and *N. peronii* were the most abundant threadfin breams in Kin Bay and Nakagusuku Bay, Okinawa Island, areas including many coastal tidal flats, where the two species comprised 98.1% of the total number of *Nemipterus* individuals examined. Overall sex ratios of both species were significantly sex-biased, the apparent lack of transitional gonads implying functional gonochorism. The spawning seasons of both species were estimated as occurring between spring and fall, no immature fishes having been obtained. Age validation using edge-type analyses implied that opaque zones were formed once per year, being valid annual growth increments. Although no intersex differences in maximum length, growth equation, and age range were observed in *N. furcosus*, *N. peronii* females were larger and older than males. The greatest ages observed were 4.3 and 7.0 years for *N. furcosus* and *N. peronii*, respectively. Both species fed predominantly on crabs, which primarily occupied the inner bays. Over the previous 27 years, the catch per unit effort of *Nemipterus* has declined in the highly altered environments of Kin and Nakagusuku Bays, suggesting that the decline in the populations of these species at Okinawa Island may be due to coastal fishery practices, environmental decline, and the degradation of suitable habitats. The biological implications for conservation are discussed.

*(*Corresponding author: Onna Village Fisheries Cooperative, 59 Maeganeku, Onna, Okinawa 904-0414, Japan; e-mail: cladosiphon@lily.ocn.ne.jp)*

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**First Japanese record of the snailfish *Osteodiscus andriashevi* (Liparidae), collected off Iwate, Japan**

Kenta Murasaki*, Yoshiaki Kai, Hiromitsu Endo and Atsushi Fukui

**Abstract** Snailfishes (Cottoidei: Liparidae) are a large, morphologically diverse group of marine fishes, comprising about 32 genera with over 430 species worldwide. Among them, *Osteodiscus* Stein, 1978 is primarily distinguished from other genera in having a unique skeletal pelvic disk covered only by thin skin. Three species of the genus are currently known: *Osteodiscus cascadiae* Stein, 1978 from the eastern North Pacific; *Osteodiscus andriashevi* Pitruk and Fedorov, 1990 from southern Sea of Okhotsk; and *Osteodiscus rhepostomias* Stein, 2012 from southeast of New Zealand. During a taxonomic study of snailfishes, a single female specimen of *Osteodiscus* (150.3 mm in standard length) collected off Iwate in a depth of 1,997–2,108 m, was discovered in the fish collection of the National Museum of Nature and Science, Japan (NSMT). The specimen, characterized by 60 vertebrae (total), 54 dorsal- and 49 anal-fin rays, a horizontal mouth, simple blunt teeth on both jaws, some teeth with lateral cusps on the tip, an unnotched pectoral fin, and the presence of epipleural ribs and a reduced epural, was identified as *O. andriashevi*, previously known only from the holotype and three paratypes. The present specimen represents the first record of *Osteodiscus* from Japanese waters and the southernmost record of *O. andriashevi*. The new standard Japanese names “Hariban-kusauo-zoku” and “Choja-hariban-kusauo” are proposed for the genus and species, respectively. Based on the present specimen, the species diagnosis was partly revised.

*(*Corresponding author: Institute of Oceanic Research and Development, Tokai University, 3–20–1 Orido, Shimizu-ku, Shizuoka 424–8610, Japan; e-mail: murasaki-619@hope.tokai-u.jp)*

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**Records of the purple eagle ray *Myliobatis hamlyni* from Japan and comparisons with the Japanese eagle ray *Myliobatis tobijei***

Keisuke Furumitsu and Atsuko Yamaguchi*

**Abstract** Six specimens collected from Kochi, Nagasaki, Kagoshima, and Okinawa Prefectures, on the Pacific Coast and the East China Sea, and seven museum specimens, were identified as the purple ray *Myliobatis hamlyni* Ogilby, 1911, based on a combination of specific morphological characteristics. Initially considered an Australian endemic, subsequent studies have shown *M. hamlyni* to have a patchy distribution from the Australian coast to Japan, the latter record being based on a single specimen collected from Okinawa Prefecture. However, the current study has revealed the widespread distribution of *M. hamlyni* in waters

from the surface to 500 m depth off southwestern and western Japan, a specimen from Kanagawa Prefecture representing the northernmost record of the species. Because the distribution of *M. hamlyni* may broadly overlaps that of the Japanese species *M. tobijei*, and morphometric characters and depth preference separating them suggested in the previous study were unclear, detailed comparisons were made so as to establish a basis for distinguishing between the two species in the present study. *Myliobatis hamlyni* differs most clearly from *M. tobijei* as follows: greatest span of pelvic fins 20.9–24.7% (mean 23.5%) of disc width [vs. 27.1–36.3% (30.7%) in *M. tobijei*], greatest span of pelvic fins 44.5–53.6% (50.4%) of pectoral-fin posterior margins [vs. 58.8–78.5% (67.4%)], and distance from edge of disc to first gill slit 51.0–68.3% (57.6%) of distance from pectoral-fin insertion to dorsal-fin origin (horizontal) [vs. 32.4–44.7% (41.3%)]. The new standard Japanese name "Sumire-tobiei" is proposed for *M. hamlyni*.

*(*Corresponding author: Graduate School of Fisheries and Environmental Sciences, Nagasaki University, 1–14 Bunkyo, Nagasaki 852–8521, Japan; e-mail: y-atsuko@nagasaki-u.ac.jp)*

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**Reproductive patterns and early life history of the Indian mackerel *Rastrelliger kanagurta* in the coastal waters of Okinawa Island, Ryukyu Archipelago, Japan**

Masato Uehara*, Fumihiko Motonaga, Itaru Ohta, Akihiko Ebisawa, Yuuki Miyaoka and Katsunori Tachihara

**Abstract** The Indian mackerel *Rastrelliger kanagurta* is an important coastal fishery resource for Okinawa Prefecture, southwestern Japan. However, much is still unknown about its life history. The early development, occurrence, sexual maturation, and reproductive cycle of the species was examined from specimens collected from the coastal waters of Okinawa Island, and management of the fishery evaluated. Larvae [3.4 mm notochord length–12.5 mm standard length (SL)] and juveniles (11.4–16.2 mm SL) of *R. kanagurta* were distinguished from other mackerel species by: 1) numbers of myomeres, 2) absence of spines on the preopercle posterior margins, 3) positional relationship between the upper and lower jaw tips, 4) melanophore pattern, and 5) distribution (allopatric). Both larvae and juveniles occurred in the offshore epipelagic zone of Nakagusuku Bay in May, June, and August, which coincided with the occurrence of high-gonadosomatic value adults in coastal waters. However, specimens were not encountered in extremely shallow coastal areas (e.g., tidal flats), although younger individuals may utilize such the offshore epipelagic zone of the bay, attaining fork lengths (FL) of ca. 8 cm. Individuals mature at ca. 26 cm FL, one year after hatching. *R. kanagurta* are primarily caught by set net fishery near Okinawa, small (immature) individuals accounting for > 45% of netted individuals in all months, except May and June, during the period from April 1985 to April 1987, and for > 35% of the examined individuals in all months, except June and July, between April 2011 and March 2016. These results for both periods suggest growth overfishing. Accordingly, immature individuals must be conserved to

sustain the Okinawan population of *R. kanagurta*.

*(*Corresponding author: Onna Village Fisheries Cooperative, 59 Maeganeku, Onna, Okinawa 904–0414, Japan; e-mail: cladosiphon@lily.ocn.ne.jp)*

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**Mating behavior and early development of *Cobitis* sp. BIWAE type D.**

Kanna Nagae*, Hiroaki Takahashi and Hiromitsu Endo

**Abstract** Mating behavior and early development of *Cobitis* sp. (BIWAE type D, TosaShima-dojo) were observed in the laboratory by inducing spawning of females with human chorionic gonadotropin (HCG). Subsequently, laboratory bred individuals were compared with spawned eggs and larvae obtained from the field. Mature adults, naturally spawned eggs, and larvae were collected from a river in eastern Kochi Prefecture, Shikoku Island, Japan, and a natural spawning ground adjacent to the river. Mating behavior was observed 15 times at night, and distinguished into four stages: phase 1, tracking; phase 2, approaching; phase 3, amplexus; and phase 4, spawning. Egg diameters after water absorption were 2.1–2.3 mm, the spherical, demersal eggs having a light-yellow yolk, no oil droplets, and slight viscosity. Newly hatched larvae [3.3–4.9 mm in total length (TL)] had 46 (32 + 14) myomeres, two pairs of outer gill filaments on the cheek, and melanophores on the head. Notochord flexion started at 6.0–7.2 mm TL (wild individuals at 6.0–6.3 mm TL) and was completed at 8.8 mm TL (6.6 mm TL). The formation of membranous fins and full fin-ray complements were attained in the fin order pectoral, caudal, dorsal, anal, and pelvic, and caudal, dorsal, anal, pectoral, and pelvic, respectively. Some individuals (7.0–8.0 mm TL at the flexion stage) had free neuromasts, each with a short cupula, laterally on the caudal region. In addition, following the postflexion stage, some morphological differences between artificially bred and wild individuals were observed but could not be quantified due to the small sample size.

*(*Corresponding author: Graduate School of Bioresource and Bioenvironmental Sciences, Kyushu University, 4–46–24 Tsuyazaki, Fukutsu-shi, Fukuoka 811–3304, Japan; e-mail: nagae.kanna.760@s.kyushu-u.ac.jp)*

## *Notes*

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**New record of *Epinephelus bontoides* (Perciformes: Serranidae) from Honshu, Japan**

Takatomo Arai and Takashi P. Satoh*

**Abstract** The Palemargin Grouper *Epinephelus bontoides* (Bleeker, 1855), previously recorded in Japan from Tanegashima, Yakushima, Kuchinoerabu, Amami-Oshima Island, and the west coast of Satsuma Peninsula, is newly reported from the southern part of Mie Prefecture, Honshu on the basis of a single specimen, which represents the northernmost

record of the species as well as the first record from the main island of Japan. Possibly having been passively transported by the Kuroshio Current during its planktonic stage, the present specimen may have successfully overwintered due to heightened sea surface temperatures caused by the meandering current.

*(*Corresponding author: The Kyoto University Museum, Yoshida-honmachi, Sakyo-ku, Kyoto 606–8501, Japan; e-mail: sato.takashi.4a@kyoto-u.ac.jp)*

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**Confirmed record of the moray eel, *Gymnothorax reevesii* (Anguilliformes: Muraenidae), collected from Shimane Prefecture and the East China Sea, Japan**

Hiroshi Muto*, Yusuke Hibino, Koichi Hoshino and Hayate Hashimoto

**Abstract** Two specimens [FRLM 60553, 737.0 mm of total length (TL); SNFR 21750, 619.1 mm TL] of the moray eel *Gymnothorax reevesii* (Richardson, 1845) (new standard Japanese name “Mame-utsubo”) are reported from Shimane Prefecture (southwestern coast of Sea of Japan) and the East China Sea, respectively. Although the species has been reported as distributed in the South China Sea to Japan, in addition to Samoa and the Marquesas Islands, verification of the locality and identity of the two records from Japanese waters known to date are problematic. Accordingly, the specimens reported here are the first reliable, voucher supported records of *G. reevecii* from Japan, that from Shimane Prefecture being the northernmost record for the species.

*(*Corresponding author: Mie university, 1577 Kurima Machiya-cho, Tsu, Mie 514–8507, Japan; e-mail: h.m.blue.sea0408@gmail.com)*

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**Discovery of residual Ayu fish in the backwater area of the Yodo River Barrage**

Yuichi Seguchi*, Yoshihiko Yamamoto, Yasuhiro Takemon and Toshifumi Minamoto

**Abstract** A population of freshwater Ayu (*Plecoglossus altivelis altivelis*) was found in the “wandos”, semi-enclosed remnants of artificial pond-like structures along the Yodo River at Shirokita, upstream of the Yodo River barrage. Microsatellite analysis of collected individuals showed their genetic origin to be a Lake Biwa strain, with a hatching date between September and November, estimated by otolith analysis. Otolith strontium and calcium concentrations indicated no history of seaward migration, the individuals analyzed having inhabited freshwater since hatching. In addition, eDNA analysis suggested that they had migrated from the main river course into the “wandos” in November.

*(*Corresponding author: CTI Engineering Co. Ltd., 1–6–7 Doshyou-machi, Chuou-ku, Osaka city, Osaka 541–0045, Japan; e-mail: y-seguchi@ctie.co.jp)*

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**Population structures of four species of the genus *Okamejei* (Rajiformes; Rajidae) around Japan, inferred from gene sequence variations and morphometric data**

Ryo Misawa*, Hiromitsu Endo and Yoshiaki Kai

**Abstract** The population structures of four Japanese species of the rajid genus *Okamejei* were investigated based on sequence variations in the mitochondrial DNA control region and morphometric data. These suggested that geographic barriers, such as straits and ocean currents, had shaped the population structures on a small spatial scale, the Tsushima Warm Current being particularly significant. This may be related to the limited migration ability of *Okamajei* species due to their small body size and habitat preference for shallow waters.

*(*Corresponding author: Demersal Fish Resources Division, Fisheries Stock Assessment Center, Fisheries Resources Institute, Japan Fisheries Research and Education Agency, 25–259 Shimomekurakubo, Same, Hachinohe, Aomori 031–0841, Japan; e-mail: batoideafish@gmail.com)*

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**First records of *Callogobius tanegashimae* in Wakasa Bay, the Sea of Japan coast of central Japan**

Yumi Henmi* and Moyuru Watanabe

**Abstract** Two specimens of *Callogobius tanegashimae* (20.4 and 56.8 mm in standard length), collected from a muddy bottom in Wakasa Bay (bordering Fukui and Kyoto Prefectures), represent the first records of the species from the Sea of Japan. One specimen was collected with an alpheid shrimp using a yabby pump, suggesting that the goby may utilize shrimp burrows. The specimens are described in detail and their identification confirmed by reference to sequence variations on the mitochondrial DNA COI region (595 base pairs).

*(*Corresponding author: Maizuru Fisheries Research Station, Kyoto University, Nagahama, Maizuru, Kyoto 625–0086, Japan; e-mail: henmi.yumi.7c@kyoto-u.ac.jp)*