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Original Papers

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Distribution and color variations of *Carassius auratus* in the Amami-Ryukyu Islands, Japan

Yuichi Kano, Mikumi Takada-Endo, Tomomi Yamashita, Wataru Tanaka, Akihiko Koyama and Kazuki Kanno

Abstract The present-day distribution of *Carassius auratus* was surveyed in 1129 inland water bodies on mainland Kyushu, and the Osumi and Amami-Ryukyu Islands (5 and 31 islands, respectively). The frequency of occurrence of the fish on the Amami-Ryukyu Islands [30 of 516 locations on 10 islands (Amamioshima, Tokunoshima, Iheya, Noho, Izena, Okinawa, Kume, Minamidaito, Miyako and Ishigaki Islands)] was significantly lower than on mainland Kyushu (65 of 241 locations). On the basis of old records and a verbal survey of 266 local residents, it is likely that *C. auratus* has become extinct on 10 islands (Kikai, Kakeroma, Uke, Okinoerabu, Yoron, Yagaji, Tokashiki, Tarama, Iriomote, and Yonaguni Islands), there being no records of its occurrence at any time on 11 additional small islands. Several specimens with unusual body colors, such as orange and blue (transparent-scale) types, were found, their likelihood of occurrence on Amami-Ryukyu (19 individuals from 7 populations) being significantly greater than on mainland Kyushu (1 individual from 1 population). Local Amami-Ryukyu residents also recalled previous occurrences of silver (ordinary type), orange, blue (possibly transparent-scale type), green (possibly transparent-scale type), white and black individuals. It was concluded that Amami-Ryukyu Islands *C. auratus*, characterized by various body color patterns, is now endangered. The color variation could be a conservation symbol for *C. auratus* and the freshwater ecosystem of Amami-Ryukyu Islands, if the native status of the species is verified.

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First Japanese record of *Acanthopagrus taiwanensis* (Perciformes: Sparidae) from Kagoshima Prefecture

Kyoji Fujiwara, Masahide Itou and Hiroyuki Motomura

Abstract A single female specimen (256.4 mm standard length) of *Acanthopagrus taiwanensis* Iwatsuki and Carpenter, 2006, collected off Kasasa, Minami-satsuma, Kagoshima Prefecture, Japan, was characterized by the following combination of characters: 3½ scale rows between fifth dorsal-fin spine base and lateral line; 3 or 4 oblique scale rows on cheek; modally 15 total gill rakers; 3 or 4 rows of flattened molars on each side of upper and lower jaws; second anal-fin spine robust, bluntly pointed; ventral edge of infraorbitals above maxilla nearly straight; anterior edge of dorsal scaly area of head rounded; no black bars on head; a dark streak on each membrane of anal fin; and anal-fin soft rays whitish. The dorsal- head profile of the Japanese specimen was relatively straight, compared with the convex profile in the type specimens of the species. Other characters of the Japanese specimen, however, agreed well with those of *A. taiwanensis* given in the original description. *Acanthopagrus taiwanensis* is very similar to *A. pacificus* Iwatsuki, Kume and Yoshino, 2010, but can be distinguished from the latter by having 3 or 4 oblique scale rows on the cheek (vs. 6 or 7 in the latter), modally 15 total gill rakers (vs. 17), flattened molar teeth on each side of the upper and lower jaws (vs. rounded molariform teeth), a robust, relatively bluntly pointed second anal-fin spine (vs. acutely pointed), and whitish anal-fin soft rays (vs. blackish). *Acanthopagrus taiwanensis* has been previously recorded only from Taiwan, the Kagoshima specimen representing the first record from Japan and northernmost record for the species. The new

standard Japanese name “Iwatsukikurodai” is proposed for the species and distributional implications of *A. taiwanensis* in Japanese waters discussed.

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Interacting effects of lure color and turbidity on foraging response by rainbow trout (*Oncorhynchus mykiss*)

Kouki Nishidai and Atsushi Maruyama

Abstract Increased turbidity is known to affect feeding of predatory fishes through its effect on prey color, but interactions between turbidity and prey color are not well documented. To determine the effects of turbidity, water temperature, and illuminance on lure color selected by rainbow trout (*Oncorhynchus mykiss*), investigations were conducted in a fishing pond in Shiga Prefecture (Central Japan) for 11 days during July–October, 2016. Five fishing series with different lures were conducted on each day, eight differently colored lures being used in random order in each series (10-min trials × 8 colors). Generalized linear models, used to explain catch number variations per 10 min (0–6 individuals; Poisson distribution assumed), indicated that turbidity (1.0–13.6 NTU) significantly influenced lure color selection by rainbow trout. Results indicated that brown lures (followed by dark green, black, and gold lures) were most preferred in low turbidity, but least preferred when turbidity was high. In contrast, lures with a greater reflection intensity [pink, orange, and karashi (mustard yellow)] were moderately preferred, regardless of turbidity. Illuminance (1.2×10^2–2.9×10^5 lux) and water temperature (15.2–25.5˚C) did not affect lure color selected by rainbow trout, but both parameters negatively impacted the number of individuals captured per 10 min. The

findings highlighted the importance of environmental conditions (particularly turbidity) on prey preference by predatory fishes.

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Records of the anthiine fish *Plectranthias sheni* from Japan and proposal of a new standard Japanese name

Kyoji Fujiwara, Satokuni Tashiro, Mayumi Takayama, Hiroshi Senou and Hiroyuki Motomura

Abstract Ten specimens (87.8–126.5 mm standard length) of the anthiine fish *Plectranthias sheni* Chen and Shao, 2002, previously known from Taiwan, were collected off islands in Kagoshima Prefecture, southern Japan, the first reliable records of the species in Japanese waters. The species is characterized by the following combination of characters: X, 17–18 dorsal-fin rays; 13 pectoral-fin rays, uppermost unbranched; 32–33 pored lateral-line scales; 4.5 scale rows above lateral line; 5 oblique scale rows on cheek; 17–18 gill rakers; third dorsal-fin spine longest; caudal fin emarginate; body reddish-pink with upper and lower series of blotches on lateral surface, upper series of blotches (below dorsal-fin base) barely extending below lateral line, posterior portion of lower series usually forming a broad stripe. The new standard Japanese name ‘‘Kiobi-izuhanadai’’ is proposed for the species.

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Extent of genetic introgression in wild populations of minami-medaka in the Nogawa River, Tokyo, Japan

Ryohei Nakao, Yuka Iguchi, Xiangying Zhou, Sakurako Kamide, Tadao Kitagawa and Makito Kobayashi

Abstract Genetic disturbance in Japanese wild medaka populations (*Oryzias latipes* species complex) has resulted mainly from artificial introductions from geographically distinct populations or of commercial varieties, especially an orange-red body color variety (himedaka). Because the extent of genetic introgression within a single water body has remained unclear, the genetic population structure of wild minami-medaka *Oryzias latipes* in the Nogawa River, a tributary of the Tamagawa River system in Tokyo, Japan, was surveyed using three DNA markers (cyt*b* and ND2 genes on mitochondrial DNA and *b*-marker on nuclear DNA) to evaluate the extent of introgression throughout upper and lower reaches. Genotypes originating from himedaka were detected at all sites surveyed. Although different genetic composition of introgressed mitotypes among some sampling sites suggested multiple introductions of non-native populations, high dispersal rates of introgressed genes could not be rejected as a cause of wide-spread introgression. Based on this study, appropriate management strategies for the genetic conservation of wild medaka populations are discussed.

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First specimen-based record of the haemulid fish *Diagramma melanacrum*

(Actinopterygii: Perciformes) from Japan

Taiga Naito, Takeshi Yamakawa and Hiromitsu Endo

Abstract A single specimen [226 mm in standard length (SL)] of a haemulid fish collected from Iriomote-jima Island, Okinawa Prefecture, Japan, in 2012, was identified as *Diagramma melanacrum* Johnson and Randall, 2001, characterized by the following combination of characters: third dorsal-fin spine longest; first dorsal-fin spine length 45 % of second dorsal-fin spine length; pelvic-fin length 23.9 % SL; 57 lateral-line scales; and dorsal 3/4 of caudal fin yellow with many dark spots, and pelvic, anal and remainder of caudal fin black when fresh. The species has been recorded previously from the Philippines, Malaysia, Indonesia (Kalimantan and Bali to West Papua), the Timor Sea and Japan (Miyako-jima and Ishigaki-jima Islands, Okinawa). However, because both Japanese records were based on photographs, the Iriomote-jima Island specimen represents the first reliable, specimen-based record of *D. melanacrum* from Japan, an extension of its known northernmost range. The new standard Japanese name "Hireguro-korodai" is proposed for the species..

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Fish assemblage associated with a spring macroalgal bed off western Nishi-Sonogi Peninsula, Nagasaki, Japan

Tatsuru Kadota, Setuo Kiyomoto, Masahiro Nakagawa, Kousuke Yatsuya and Taku Yoshimura

Abstract Spring macroalgal beds, characterized by the occurrence of subtropical *Sargassum* species and short vegetation periods during spring, occur off western Kyushu

and on the Pacific side of Shikoku, Japan. However, the fish assemblages of such macroalgal beds are poorly known. Fish censuses conducted by divers over a spring macroalgal bed and adjacent comparatively barren ground off Misaki, western Kyushu, from June 2014 to May 2015, noted luxuriant macroalgal stands from March to June in the former, whereas macroalgae were sparse from March to May in the barren area. Forty fish species (22 families) and 39 species (23 families) were recorded in the macroalgal bed and barren area, respectively, with similar mean numbers of species and individuals. In both areas, *Halichoeres tenuispinis, Istigobius campbelli, Pseudolabrus sieboldi, Stethojulis interrupta terina* and *Pomacentrus coelestis* occurred abundantly in all months surveyed. As the luxuriant macroalgal stands were seasonal, only fish species which could inhabit both vegetated and unvegetated habitats could persist yearlong within the area of the macroalgal bed. Two species, *Apogon notatus* and *Chaenogobius gulosus*, were seasonal inhabitants of both areas, the density of *A. notatus* tending to be higher in the macroalgal bed in June. *C. gulosus* occurred in the macroalgal bed and around sparsely distributed macroalgae in the barren area in March and April. Spring macroalgal beds may be an important habitat for seasonal fish species residents.

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First records of the electric ray *Tetronarce formosa* (Torpediniformes: Torpedinidae) from Japan, with a revised species' diagnosis and comparisons with congeners

Ayumi Bandai, Mizuki Matsunuma and Hiroyuki Motomura

Abstract Thirty-five museum-held specimens (238.2–940.0 mm total length, TL) of

the electric ray *Tetronarce formosa* (Haas and Ebert, 2006), collected from the Pacific coast of Japan from Ibaraki to Kochi prefectures, and the East China Sea, represent the first records of *T. formosa* from Japanese waters and include the northernmost record (Ibaraki) for the species (previously recorded only from Taiwan). The specimens are described in detail and the validity of the following characters previously used to separate *T. formosa* from the closely related species *T. tokionis* (Tanaka, 1908), confirmed: dorsal surface of body purplish-brown in *T. formosa* (vs. dark chocolate-brown in *T. tokionis*), disc oval (vs. essentially circular), disc width 63.6–67.9% of TL (vs. 50.1–52.6 %), posterior margin of caudal fin not emarginated (vs. emarginated), and distance from posterior tip of pelvic fin to origin of lower caudal fin lobe less than three-quarters of caudal fin height and less than half pelvic fin width (vs. more than three-quarters of caudal fin height, and more than half pelvic fin width). Although spiral valve turns were previously regarded as diagnostic, separating *T. formosa* from *T. tokionis*, that character is not considered valid, following dissection. Further comparisons of Japanese *T. formosa* with *T. tokionis* based on 35 and 5 specimens, respectively, revealed the former to differ from *T. tokionis* in the following additional characters: cloaca to pectoral fin margin length 27.9–36.5% (mean 32.9%) of TL [vs. 25.1–30.8% (27.5%) in *T. tokionis*]; caudal fin overall height 19.3–25.6% (22.4%) [vs. 14.2–18.9% (17.0%)]; caudal fin height at dorsal lobe 7.2–11.0% (9.5%) [vs. 5.9–6.7% (6.4%)] in males; snout to maximum disc width 28.1–38.8% (32.0%) [vs. 26.5–27.2% (26.9%)] in females; pelvic fin width 26.1–33.1% (30.0%) [vs. 18.5–18.8% (18.7%)] in females; and caudal fin height at ventral lobe 9.3–12.1% (10.7%) [vs. 5.8–7.6% (6.7%)] in females.

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First Japanese record of *Conocara fiolenti* (Alepocephalidae) collected from Hyuga-nada, Japan

Munehiro Takami, Hiromitsu Endo and Atsushi Fukui

Abstract The family Alepocephalidae, comprising about 18 genera and at least 95 species of benthic and pelagic deep-sea fishes, includes 10 species of the genus *Conocara*, known from about 800 to more than 5000 m depth in the Indo-Pacific and Atlantic Oceans. *Conocara* is characterized by the dorsal-fin origin located posterior to the anal-fin origin, the dorsal-fin base shorter than the anal-fin base, the body covered with small scales (>80 in longitudinal row above lateral line), tubular lateral line scales, maxilla toothless, upper jaw equal to or longer than snout and photophores absent. A single specimen of *Conocara fiolenti* Sazonov and Ivanov, 1979, collected from Hyuga-nada, Japan in a depth of 1453–1481 m, on 3 April 1991, is distinguished from all congeners by the following combination of characters: dorsal-fin rays 22, anal-fin rays 28, gill rakers absent on upper limb, number of scales in longitudinal series above lateral line ca. 220, length of anal-fin base 22.7% SL, predorsal-fin length 68.2% SL, head length 29.2% SL, orbital diameter 6.6% SL, anterior margin of premaxilla lacking a bony ridge and posterior margin of maxilla extending beyond anterior margin of eye. *Conocara fiolenti* has been previously recorded from tropical and temperate zones of the Indian, western Pacific and Atlantic Oceans. However, the present specimen represents the first record from Japanese waters and northernmost record in the Pacific Ocean. The new Japanese name “Maru-kuchi-yajiri-iwashi” is proposed for the species.

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First Japanese record of *Paraheminodus kamoharai* (Peristediidae) from Kochi, Japan

Toshio Kawai

Abstract Armored searobins in the Indo-West Pacific genus *Paraheminodus* Kamohara, 1958 (Peristediidae), characterized by upper jaw teeth, the lateral head margin smooth, posterior pairs of lower lateral row bony plates separated from each other, and unbranched barbels on the lower jaw (except for posteriormost lip and chin barbels), include four species: *Paraheminodus laticephalus* (Kamohara, 1952), *P. murrayi* (Günther, 1880), *P. kamoharai* Kawai, Imamura and Nakaya, 2004 (known only from a single record from the Sulu Sea, Philippines) and *P. longirostralis* Kawai, Nakaya and Séret, 2008. To date, only *P. laticephalus* and *P. murrayi* have been recorded from Japan. However, a single specimen of *P. kamoharai* (114.2 mm in standard length) collected from Kochi, Japan, was found in the collection of Kyoto University, Japan, being the second record of the species and first from Japanese waters. *Paraheminodus kamoharai* is re-diagnosed, having 5+1+17–20=23–26 gill rakers, rostral projection length 42.5–47.0% of head length, upper jaw length 40.5–42.3% of head length, lower jaw length 36.5–37.7% of head length, pectoral fin length 57.5–66.4% of head length, preopercular spine length 34.9–40.9% of head length, distance from anus to caudal fin 46.9–49.3% of standard length, and both forwardly and backwardly directed spines on the posterior upper lateral row bony plates. The new Japanese standard name “Kamohara-kihoubou” is proposed for the species.

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First record of the liparid fish *Careproctus zachirus* from Japan

Koji Matsuzaki, Harutaka Taira, Toshiaki Mori, Takahiro Nobetsu and Kaoru Kido

Abstract The genus *Careproctus* Krøyer, 1862, including more than 50 species from the North Pacific, is characterized by a single pair of nostrils, pelvic disk present, fewer pectoral fin rays than anal fin rays, pseudobranchia absent and non-variegated body color (except for fins). Seven specimens [AMF (Marine Science Museum, Aquamarine Fukushima) -2-11-04-00-0025–0031, 232–288 mm in standard length] collected in 2007, 2015 and 2016 in commercial shrimp traps and gill nets off Rausu-cho, southwestern Sea of Okhotsk, Japan, at depths of 200–800 m, were confirmed as the blacktip snailfish *Careproctus zachirus* Kido, 1985, having 28–31 pectoral fin rays, 10–11 caudal fin rays fin rays, 1 suprabranchial pore, a long upper pectoral fin lobe (over 40 % of SL), the posterior part of the upper pectoral fin lobe pigmented with black on both outer and inner sides, and black submarginal bands on the dorsal and anal fins joining in the middle of the caudal fin. Although the species has been previously collected in Pacific waters off the northern Kuril Islands and eastern Kamchatka, and in the Bering Sea off the Aleutian Islands, the present specimens represent the first record from Japanese waters. In addition, observations on feeding behavior and reproductive ecology of the species are reported for the first time.

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Notes

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First records of *Plectranthias xanthomaculatus* (Serranidae: Anthiinae) from

Okinawa and Kochi prefectures, southern Japan, with notes on ontogenetic morphological changes

Mizuki Matsunuma, Makoto Okamoto, Takeshi Yamakawa and Hiromitsu Endo

Abstract Nineteen specimens of *Plectranthias xanthomaculatus* (Serranidae), previously known only from Taiwan (type locality) and the East China Sea off Amami Islands, Kagoshima Prefecture, Japan, are recorded from Tosa Bay, Kochi Prefecture and off Tonaki-jima Island, Okinawa Prefecture, Japan. The Japanese specimens [19.4–43.3 mm standard length (SL)] differed from the two previously known specimens (50.2–57.6 mm SL) in having 0–8, 0–3 and 0 or 1 weakly developed serrae on the posterior margins of the preopercle, interopercle and subopercle, respectively (vs. serrations absent in the latter). The absence of such serrations in the larger specimens, the species having been diagnosed by a smooth preopercle, interopercle and subopercle margins in previous studies, is indicative of an ontogenetic change. The smaller Japanese specimens (less than 34 mm SL) differed from larger examples in having somewhat pinkish pelvic, anal and caudal fins (vs. yellow fins in the latter) and numerous melanophores within yellow markings on the head and body (vs. melanophores absent).

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A second record of *Mola* sp. A (Ushi-manbo), from the Sea of Japan and first record from Toyama Prefecture, Japan

Etsuro Sawai, Yusuke Yamanoue, Tomoharu Kimura and Osamu Inamura

Abstract A specimen of *Mola* sp. A (Ushi-manbo sensu Yamanoue et al., 2010), captured by set net off Uozu, Toyama Prefecture (36˚48'N, 137˚22'E), Japan on 16th

January 2017, represents the second record of the species from the Sea of Japan and first record from Toyama Prefecture. Several examples of the caligid parasite *Lepeophtheirus* sp. (Crustacea: Copepoda) were found on the head of the specimen. Sea surface temperature (SST) on the collection day was 13–14 ˚C, SSTs associated with the occurrence of *Mola* sp. A specimens in the Sea of Japan being lower than those in the Pacific.

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Second Japanese record of *Plectranthias wheeleri* (Perciformes: Serranidae) from Suwanose-jima island, Tokara Islands, Kagoshima Prefecture, southern Japan

Satokuni Tashiro, Mayumi Takayama and Hiroyuki Motomura

Abstract A single specimen (65.1 mm standard length) of *Plectranthias wheeleri* Randall, 1980 (Serranidae) collected off Suwanose-jima island, Tokara Islands, Kagoshima Prefecture, Japan (previously known from a single specimen from Yoron-jima island, Amami Islands) represents both the second record from Japanese waters and northernmost record of the species.

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First record of juvenile spotted scat *Scatophagus argus* from the Matsukawa-ura

lagoon, Fukushima Prefecture, Japan

Manabu Kume, Toshihiro Wada, Junichi Takagi, Tomoya Hori, Hiromichi Mitamura, Nobuaki Arai and Yoh Yamashita

Abstract Four juvenile spotted scat *Scatophagus argus* (30.3–34.6 mm standard length), collected on 28th October 2016 from the Matsukawa-ura lagoon, Fukushima Prefecture, Japan, represent the first record of *S. argus* in Fukushima Prefecture and the northernmost record along the Pacific coast of Japan. Because spotted scat cannot survive below 11.0˚C, the lower winter water temperatures in the lagoon would prevent year-round survival. Accordingly, the specimens are thought to represent abortive migration, likely having been transported to the lagoon by the Kuroshio Current.

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Records of Bearded flathead goby *Glossogobius bicirrhosus* (Weber, 1894) (Teleostei: Gobiidae) from eastern Ishigaki-jima Island, Ryukyu Islands, Japan

Hirozumi Kobayashi and Yusuke Fuke

Abstract Examples of Bearded flathead goby, *Glossogobius bicirrhosus* (Weber, 1894), collected from the sand/gravel bottom of a river draining part of eastern Ishigaki-jima Island, Ryukyu Islands, Japan in 2013 and 2017. It represent the first discovery of the species from the eastern area of the island and first specimen-based records from the island over the past 12 years.

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