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CONTENTS

Full Papers

Short Reports

Full Papers

Japanese Journal of Ichthyology

Vol. 58, No. 1, pp. 1–12

Annual reproductive cycle of a wild population of oriental weather loach *Misgurnus anguillicaudatus* in Gifu Prefecture, central Japan

Atsuko Kimura and Yasunori Koya

Abstract The total length frequency, age and gonadal maturity in wild loach *Misgurnus anguillicaudatus* were monitored over a 12-month period in a small stream in Gifu Prefecture, central Japan, in order to clarify the annual reproductive cycle and life history. Age assessment from otolith analysis indicated that fish in the research area reached 3+ years. Annual changes in total length frequency indicated that newly born fish (less than 40 mm) joined the population from late June through late September, suggesting a spawning period from May to August. Non-yolky oocytes occurred in the ovaries through the year. Oocyte development was asynchronous, the onset of vitellogenesis indicating the beginning of the next reproductive cycle. Vitellogenesis

occurred from October until March. From April to July, females had ovaries containing full-grown oocytes, suggesting that active spawning occurred during those months. Spermatozoa were seen in the testis seminal lobules throughout the year, the proportion being high in winter, low in summer. Spermatogenesis is apparently active from May to September, based on the presence of spermatid cysts in the testis. It was thought that most of the spermatozoa occupying the testis during the non-reproductive period were residual, being absorbed in May at the onset of active spermatogenesis.

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Longitudinal distribution of fishes in the Inohzawa River watershed, southern Izu Peninsula, Japan

Noriyuki Takai, Akifumi Kato, Masaomi Uekusa, Yuko Kimura, Keitaro Dairiki, Shiro Itoi, Haruo Sugita and Kiyoshi Yoshihara

Abstract The longitudinal distribution of fishes in the Inohzawa River watershed, southern Izu Peninsula, Japan, was documented. Water temperature and salinity in the middle and lower reaches were also measured in order to determine the influence of salt water on fish distribution. Forty-one fish species were recorded by collection with throw nets, hand nets, bare hands and angling or by visual observation, from April 2005 to August 2009. Eight additional species listed in other reports brought the total number of fish species found in the watershed to 49. *Zacco platypus* and *Tribolodon hakonensis* were abundant in the upper and middle reaches, and *Mugil cephalus cephalus* and *Acanthogobius flavimanus* in the lower reaches, suggesting that these four species were dominant in the watershed. A clear-cut salt wedge was found in the lower reaches throughout the year, the front reaching 2.6 km upstream of the river mouth. Fish species

composition changed abruptly in reaches 2 km upstream of the salt wedge front, although a transition was apparent at a station 1 km upstream of the front. Therefore, the salt wedge appeared to influence fish distribution within 3.6 km upstream of the river mouth.

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First records of a lionfish, *Pterois mombasae* (Scorpaenidae: Pteroinae), from Japan, and morphological comparisons with *P. antennata*

Mizuki Matsunuma and Hiroyuki Motomura

Abstract Twenty one examples (23.2–136.9 mm standard length) of a lionfish (Scorpaenidae: Pteroinae), *Pterois* (formerly *Pteropterus*) *mombasae* (Smith, 1957), previously recorded from northwestern Australia, southern Indonesia, Papua New Guinea and New Caledonia in the Pacific Ocean, and throughout the tropical Indian Ocean, were collected from Japanese waters off Okinawa, Kochi, Shizuoka and Chiba Prefectures. Individuals have also been photographed in several localities along the Pacific coast of southern Japan. *Pterois mombasae* differs from a closely-related congener, *Pterois antennata* (Bloch, 1787), in having usually XIII, 10 dorsal-fin rays (vs. usually XII, 11), usually 18 or more pectoral-fin rays (vs. usually 17 or less), 44–51 scale rows in longitudinal series (vs. 48–58), pectoral-fin membrane with 6–24 blotches and -fin rays with numerous bands (vs. 3–17 blotches and no bands), and shorter dorsal-fin spines and pectoral-fin rays. The status of *Pteropterus* Swaison is reviewed, although *mombasae* is tentatively retained in *Pterois* Oken in this study, following widespread practice. The Japanese specimens of *P. mombasae* are herein described in

detail, and a new standard Japanese name, “Mizuhiki-minokasago”, proposed for the species.

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Reproductive ecology and life cycle of the invasive alien bitterling *Acheilognathus macropterus* (Cyprinidae, Acheilognathinae) in Lake Kasumigaura, Japan

Tomiji Hagiwara

Abstract To evaluate the impact of an invasive alien bitterling on resident native bitterling, the reproductive ecology and life cycle of former, *Acheilognathus macropterus*, was investigated in Lake Kasumigaura, Japan, to which it was introduced around the year 2000. *A. macropterus* spawned between mid-April and mid-July, three-age classes, with peak ranges of 55–60, 75–80 and 95–100 mm standard length (SL), being observed in April 2007. Adult *A. macropterus* increased in SL from February to April and from September to October. During the spawning period, the ovipositor of females was more than 80 mm in length. The number of eggs in females with ripe eggs accounted for more than 40% of their ovarian weight, being positively correlated with SL. Testis weight in March to May was also positively correlated with SL. The spawning periods of *A. macropterus* overlapped with that of the native bitterling, *A. tabira erythropterus*, *A. melanogaster* and *Tanakia lanceolata*, suggesting that the increase and spread of *A. macropterus* in Lake Kasumigaura may result in competition among bitterling species for host mussels during breeding.

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Seasonal changes in fish assemblages in an area of hermatypic corals in Yokonami, Tosa Bay, Japan

Tomonori Hirata, Sosuke Oguri, Shiori Hirata, Hironobu Fukami, Yohei Nakamura and Kosaku Yamaoka

Abstract A monthly underwater visual census was conducted in the coral-dominated habitat of Yokonami, Tosa Bay, Japan, from June 2006 to January 2009. A total of 12,586 individuals belonging to 168 species in 43 families were recorded during the study period. The number of species and individuals increased from June–August (summer), the highest numbers occurring in September–December (autumn), thereafter decreasing from January (winter) to the lowest point in May (spring). Labridae was the most dominant family in terms of species numbers (28 species), followed by Chaetodontidae (21 species) and Pomacentridae (18 species). In terms of individual numbers, Chaetodontidae was the most abundant (56.3% of total individual numbers), followed by Labridae (15%) and Pomacentridae (12.5%). The most dominant species were *Chaetodon speculum* (33.4%), *Pomacentrus coelestis* (11.1%), and *C. lunulatus* (8.2%). The fish assemblage was divided into 4 groups: (1) temperate fishes (1877 individuals in 26 species), (2) (sub-)tropical fishes (10,648 individuals in 136 species), (3) temperate–tropical fishes (28 individuals in 2 species), (4) unknown fishes (33 individuals in 4 species). Species and individual numbers of temperate fishes were high in summer and low in winter, whereas those of tropical fishes were high in summer and autumn and low in spring, suggesting that typhoons in summer and autumn, and low water temperatures in winter might affect fish recruitment and community density. Moreover, at least 44 tropical species were observed throughout the year during the

study period.

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Introduction of the dark chub *Zacco temminckii* from the Yoshino River system into the Yamato River system via the Yoshino diversion (Yoshino Bunsui)

Fumiko Ishii, Yukiko Anzai, Reika Ito, Naoto Koyama and Tadao Kitagawa

Abstract The Yoshino diversion (Yoshino Bunsui) was established to supply irrigation water from the Yoshino River to the Yamato plain. In order to examine fish introductions through the canals of the Yoshino Bunsui, the genetic structure of 17 populations of dark chub *Zacco temminckii* collected from the Yamato and Yoshino rivers were analyzed and their mtDNA ND2 sequences studied. A total of 16 haplotypes were detected in 261 individuals, 6 haplotypes being present in both rivers. In the Yamato River, the shared haplotypes were found to be associated with the locations of inflows from the Yoshino Bunsui. On the other hand, the majority of haplotypes found in individuals from the Yamato River were not found in those from the Yoshino River. This study confirmed the secondary introduction of dark chub from the Yoshino River into the Yamato River via the Yoshino Bunsui.

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Short Reports

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Ultrastructure of the surface morphology of eggs in the terrestrial spawning blenny, *Andamia tetradactyla* (Blenniidae)

Norio Shimizu, Masako Hara, Yoichi Sakai, Hiroaki Hashimoto and Kenji Gushima

Abstract The rockhopper blenny *Andamia tetradactyla* (Blenniidae) demonstrates terrestrial spawning in supralittoral zones of reefs, the eggs developing fully even in rocky hole nests that are submerged for only a short time during high tide. To ascertain how such eggs tolerate aerial conditions, their morphological characteristics were investigated by SEM (scanning electron microscope). The chorion was thick comprising seven lamellae, and the egg surface covered by clasping filaments forming an "adhesive disc". These allowed the deposited egg to remain firmly attached to the substratum, even when battered by wave at high tide. Moreover, some surface parts of the chorion remained at the adhesive site in the nest, after hatching. It is likely that these species-specific morphological characteristics of the eggs of *A. tetradactyla* developed as adaptive phenotypes in alternate conditions of dryness and turbulent water movement.

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Genetic composition of commercial strains of *Oryzias latipes* revealed by mtDNA analyses

Naoto Koyama, Tomohiro Mori, Koji Nakai and Tadao Kitagawa

Abstract Genetic disturbance in wild populations of Medaka (*Oryzias latipes*) has resulted from the introduction of populations originating from commercial strains. To

clarify the genetic composition of orange-red type and wild type commercial strains of *O. latipes* (‘himedaka’ and ‘kuromedaka’, respectively), polymerase chain reaction-restriction fragment length polymorphism (PCR-RFLP) and sequencing analyses of the mitochondrial cytochrome *b* gene were conducted for Medaka populations cultured in 2 fish farms and others purchased from 21 aquarium fish shops. All ‘himedaka’ populations showed a high frequency of the B27 mitotype, an original mitotype of ‘himedaka’, and a low frequency of the B1a mitotype, an introduced mitotype from wild populations in Okayama or Nara Prefectures. ‘Kuromedaka’ populations, originating from cultured populations, were characterized primarily by the B27 and B1a mitotypes, being a result of hybridization between wild populations and ‘himedaka’. All ‘kuromedaka’ populations originating from wild populations had their own native mitotypes, although some also had the B1a mitotype, which was inferred as being of ‘himedaka’ origin.

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First records of a silverside (Atheriniformes: Atherinidae), *Hypoatherina temminckii*, from Japan

Daichi Sasaki and Seishi Kimura

Abstract An atherinid fish, *Hypoatherina temminckii*, is reported from Japan for the first time, on the basis of 27 specimens collected from Iriomote-jima Island, Okinawa-jima Island and adjacent waters, and Amami-oshima Island. A description of the specimens is given and a new Japanese name, “Minami-gin’isoiwashi”, proposed for the species. The genus *Hypoatherina* is distinguished from other marine Indo-Pacific

atherinid genera by having the anterior edge of the preopercle notched just above the angle, the premaxilla with a long and slender anterior process and a deep narrow lateral process, and the dentary with a prominent posterior ramus. *Hypoatherina temminckii* is distinguishable from its congeners, including the most similar species *H. tsurugae*, by the following combination of characters: body cylindrical, anus located posterior to pelvic-fin tip, axillary scale elongated posteriorly, first dorsal fin with 5–9 spines, vertebrae 41–44, midlateral scales 39–42, and narrow interorbital width (29–39% of head length).

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First record of a deep-sea ophidiid fish, *Bassozetus glutinosus*, from Japan

Shinichi Tomiyama, Munehiro Takami and Atsushi Fukui

Abstract The glutin assfish (new Japanese name: Nanyou-fukumen-itachiuo) *Bassozetus glutinosus* (Alcock, 1890) is reported for the first time from Japanese waters, based on three specimens collected from Suruga Bay and the Ryukyu Trench, Japan. The species is distinguishable from all other congeners by the following combination of characters: 120–130 dorsal fin rays; 98–108 anal fin rays; 24–30 pectoral fin rays; 13–15 precaudal vertebrae; 15–21 long gill rakers on first gill arch; 25–35 oblique scale lows between anus and dorsal fin; pelvic fin length 13.6–19.0% of standard length; a significant tooth patch developed on basibranchial; sagitta from posterior ca. 1/3 to anterior region protruding along dorsal margin, its sulcus slightly below center on inner side. A description of the specimens is provided. The two Suruga Bay specimens constitute the northernmost record of the species.

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