Papers Published in *Japanese Journal of Ichthyology*

Vol. 53, No. 2 November 25, 2006

Full Papers

Japanese Journal of Ichthyology
Vol. 53, No. 2, pp. 117–131

Geographical distribution of genuine freshwater fishes in Fukuoka Prefecture, northern Kyushu, Japan

Jun Nakajima, Norio Onikura, Seiichi Matsui, and Shin Oikawa

Abstract Genuine freshwater fish faunas of 32 rivers in Fukuoka Prefecture, northern Kyushu, Japan, were surveyed between 1998 and 2005, in order to clarify their geographical distribution patterns. A total of 39 fish species/subspecies (10 families) were recorded in the field survey and from existing literature, a cluster analysis separating them into the Chikuzen–Chikugo and Chikuho–Buzen groups. The former was considered to include fauna influenced by mainland China and the Korean Peninsula, the latter being similar to the freshwater fish fauna of rivers flowing to the Seto Inland Sea. The freshwater fish species in Fukuoka were roughly divided into those that occurred in rivers regardless of river length and those that tended to be present in rivers exceeding a certain length. The genuine freshwater fish fauna in Fukuoka is considered to have evolved through geographical isolation and the restriction of river length.

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Japanese Journal of Ichthyology
Vol. 53, No. 2, pp. 133–141

Genetic population structure of the mudskipper *Boleophthalmus pectinirostris* inferred from mitochondrial DNA sequences

Yuichi Kanemori, Takeshi Takegaki, and Yutaka Natsukari

Abstract The genetic population structure of the mudskipper *Boleophthalmus pectinirostris* was investigated based on nucleotide sequence data from the mitochondrial control region (472 bp) of 131 individuals collected from four localities in Ariake Bay, two in Yatsushiro Bay, Kyushu, Japan, one in Korea (Suncheon) and one in China (Zhe Jiang). A total of 53 composite haplotypes were observed from 49 permutation sites. The estimated haplotype tree and pairwise *F*st showed genetic differentiation among the Suncheon, Zhe Jiang and Japanese populations. The structures of the haplotype tree and network, and low genetic diversity of the Japanese populations compared to that at Zhe Jiang suggested that a bottleneck effect had occurred in the former after being isolated from the continental population by rising sea levels (i.e., relictual species). Based on the number of unique haplotypes in the Japanese populations and nucleotide substitution rate, the estimate of the divergence time for the Japanese and Zhe Jiang populations was much greater than that expected for the apparently relictual species distributed in Ariake Bay. The Ariake and Yatsushiro populations formed a single group in the haplotype tree, although the estimate of pairwise Fst showed a significant difference between the populations, probably associated with the differences in frequency of the most dominant haplotype. Accordingly, the two populations seemed to be genetically differentiated from each other, probably due to the geographical isolation.

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Japanese Journal of Ichthyology
Vol. 53, No. 2, pp. 143–149

The behavior of Ryukyu-ayu *Plecoglossus altivelis ryukyuensis* larvae during downstream migration from the Yakugachi River flowing into Sumiyo Bay, Amami-oshima Island, southern Japan

Tei Kishino and Akihiko Shinomiya

Abstract Downstream (seaward) migration of Ryukyu-ayu (*Plecoglossus altivelis ryukyuensis*) larvae after hatching was investigated in the Yakugachi River flowing into

Sumiyo Bay, Amami-oshima Island, southern Japan. Larvae collected near the spawning ground and in brackish water had notochord lengths of 4.5 - 5.9 and 4.5 - 24.4 mm, respectively, larval densities in the brackish water being greater. During day time, larvae were found only in the bottom layer, but at night time were also evident in the surface layer, such behavior probably acting so as to prevent the larvae from drifting away from the brackish water area.

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Japanese Journal of Ichthyology
Vol. 53, No. 2, pp. 151–158

Genetic population structure of the mudskipper, *Periophthalmus modestus*, in Japan inferred from mitochondrial DNA sequence variations

Takahiko Mukai and Manami Sugimoto

Abstract The geographical distribution of mitochondrial DNA (mtDNA) haplotypes in the Japanese mudskipper, *Periophthalmus modestus*, were investigated. Twenty-one mtDNA haplotypes were obtained from 48 individuals representing 7 populations (5 from major Japanese Islands and 2 from the Ryukyu Islands), some haplotypes being shared among the 5 Japanese populations. Each Ryukyu population (Tanegashima and Okinawajima Islands) had endemic haplotypes. The analysis of molecular variance (AMOVA) and nested clade parsimony analysis (NCPA) indicated that the Ryukyu and Japanese populations were isolated from each other, whereas the mtDNA phylogeny indicated that the Ryukyu population haplotypes were included within the clades of the Japanese haplotypes. These results suggested that the duration of isolation of the Ryukyu populations from those of the major Japanese Islands was insufficient for the establishment of reciprocal monophyly of the mtDNA phylogeny.

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Japanese Journal of Ichthyology
Vol. 53, No. 2, pp. 159–165

Reproductive ecology and distribution of juveniles of the mudskipper

***Periophthalmus modestus* (Gobiidae) at Shinhamako Lagoon, recess of Tokyo Bay, Japan, with a note on its conservation**

Masanori Taru, Tomoki Sunobe, and Tohru Uchino

Abstract Reproductive ecology of the mudskipper *Periophthalmus modestus* was studied at Shinhamako Lagoon, inner part of Tokyo Bay, the northernmost habitat in Japan, in terms of conservation biology. Observation of courtship behavior and monthly capturing of fish to measure body length and weight were made from May to October 2004. Courtship behavior was recorded from June to August, indicating that spawning season ran this period. It took place at the low tide that occurred after 10 : 00 A.M. and only at the part of mud flat near reed field. Body length of the females were significantly larger than that of the males. Condition factor decreased from June to July, and moderately increased until October. Energy preserved in body mass may be converted to reproductive activity after start of spawning period. Distribution of juveniles was observed weekly from July to September 2005. Most of the juveniles were observed near reed field, not at the open part of the mud flat. These results indicate that continuity between mud flat and reed field is important for the conservation of this species.

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Short Reports

Japanese Journal of Ichthyology
Vol. 53, No. 2, pp. 167–173

Predation on bluegill (*Lepomis macrochirus*) broods by native snails

Hiroyuki Nakao, Taketo Kawabata, Kentarou Fujita, Katsuki Nakai, and Hiroichi Sawada

Abstract Predation of eggs and larvae of bluegill (*Lepomis macrochirus*), by snails (*Semisulcospira* spp. and *Sinotaia quadrata histrica*) were examined during the bluegill reproductive period (July and August) in 2003 and 2005. At a littoral study site in the northern basin of Lake Biwa, population densities of snails were significantly higher in bluegill nests than in their surroundings, indicating deliberate aggregation of the former.

Laboratory experiments to assess the degree of predation on bluegill eggs and larvae by snails showed a significant decrease in egg and larval numbers when established in aquaria together with *Semisulcospira* spp., and *Sinotaia quadrata histrica*, respectively. During experimentation, predatory behavior by snails was also directly observed, indicating that snails aggregating in bluegill nests probably predate eggs and larvae despite parental care of the latter.

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Japanese Journal of Ichthyology
Vol. 53, No.2, pp. 175–179

Geographical and between-habitat variations in the body shape of *Hemigrammocypris rasborella*

Jinsuke Akada and Taiga Yodo

Abstract Between-habitat variations in the body shape of *Hemigrammocypris rasborella,* a small freshwater cyprinid fish included in the Red List by the Ministry of Environment of Japan (Category EN), were analyzed using photographs of anesthetized specimens (n = 323) collected from eight ponds on the Ise (Mie Prefecture) and Nobi Plains (Aichi and Gifu prefectures). Twenty-two morphometric variables were measured, and principal component and discriminant analyses conducted. The results indicated that body shape was variable among the ponds but similar within each plain. It is suggested that the original Ise and Nobi Plain populations differed in body shape, the subsequent restriction to isolated populations on each plain further enhancing the original morphological variations.

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Japanese Journal of Ichthyology
Vol. 53, No. 2, pp. 181–187

Records of the bull shark, *Carcharhinus leucas*, from marine and freshwater areas in Japan

Rui Matsumoto, Senzo Uchida, Minoru Toda, and Kazuhiro Nakaya

Abstract The bull shark, *Carcharhinus leucas* (Müller and Henle, 1839), previously reported from Japanese waters but without voucher specimens, is herein reported and its status as a Japanese species confirmed, from 33 specimens, including three from a riverine habitat, collected from Okinawa and Iriomote Islands, Okinawa Prefecture, Japan.

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Japanese Journal of Ichthyology
Vol. 53, No. 2, pp. 189–193

First record of a callionymid fish, *Eleutherochir mccaddeni* Fowler, from Japan

Hidenori Yoshigou, Itaru Ohta, and Tetsuo Yoshino

Abstract Eleven specimens of *Eleutherochir mccaddeni* Fowler, 1941 (Perciformes; Callionymidae) were collected in the Ryukyu Islands, from the surf zones of sandy beaches on Iriomote and Okinawa Islands. The specimens were characterized by the following characters: first dorsal fin blackish with 4 spines; 10 to 11 (mostly 10) anal fin rays; lower jaw protruding anteriorly; 9 to 11 pairs of fleshy papillae on lower lip; small brown and white spots scattered on back. *Eleutherochir mccaddeni* is not a junior synonym of *E. opercularis* (Valenciennes). This occurrence represents the first record from Japan and the northernmost record for the species, *E. mccaddeni* generally being limited to sandy beaches (i.e. beach substrate not of coral reef origin). Such a habitat, however, is rare in the Ryukyu Islands, still existing examples being seriously threatened by recent reclamation.

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