

Molecular-based ecological approaches for understanding migratory ecology of the freshwater eels(Sustainable Yield and Population Conservation for Marine Organisms from the Point of View of Genetic Resources, International Workshop in Faculty of Agricultural Science and Field Science Center in Tohoku University 2008)

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Molecular-based ecological approaches for understanding migratory ecology of the freshwater eels

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Recent progress in molecular techniques and establishment of mitochondrial DNA sequence database for all species of the genus *Anguilla* (Aoyama et al. 2001, Minegishi et al. 2005) have enabled us to genetically identify anguillid larvae (leptocephali), even eggs and newly hatched larvae that are difficult to identify under natural conditions since only limited number of morphological characteristics have been obtained in laboratory settings through artificially induced spawning. The leptocephali of many sympatric tropical species that are morphologically similar also have long been impossible to identify to species level, and their spawning areas are virtually unknown.

Recent findings relevant to the spawning areas of the genus *Anguilla* based on such molecular species identification are greatly changing our understanding of the migratory ecology and evolutionary history of these fascinating catadromous species.

The spawning area of the Japanese eel (*Anguilla japonica*) were recently determined as a pinpoint location near the Suruga Seamount (14°13.7N, 142°53.0E, Tsukamoto 2006), and small leptocephali of two tropical anguillid species, *A. celebesensis* (12.3 mm total length, TL) and *A. borneensis* (8.5 mm TL), were collected around Sulawesi Island, Indonesia (Aoyama et al. 2003). This finding indicates that much shorter migrations of a few hundred kilometers are made by tropical eels which were molecular phylogenetically suggested to be the most ancestral species, to spawn in areas near their freshwater habitats. This clearly contrasts with the long distance migrations of their counterparts in temperate regions, such as European *A. anguilla*, American *A. rostrata* and Japanese eels *A. japonica*, and suggests an evolutionary cline of migratory behavior in freshwater eels from tropical to temperate regions (Tsukamoto et al. 2002, Kuroki et al. 2006).