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I. Preface

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The review papers comprising this collation were presented at an International Symposium on Fish Migration, held May 31-June 2, 1996, at Lake Toya, Hokkaido, Japan. The symposium addressed the most recent advances in all aspects of fish migration including physiology, ecology, evolution, behavior, population dynamics, genetics, and bioengineering. The rapidly accumulating new data are proving valuable in our better understanding of fish migration, particularly anadromous salmon migration, catadromous eel migration, and long distance migration of various marine fishes.

We are especially grateful to Professor Kohei Yamauchi, Dean of the Faculty of Fisheries of Hokkaido University, for his encouragement to hold this symposium following the Third International Symposium on Fish Endocrinology in Hakodate, and to the students of the Toya Lake Station (Masahiro Fukaya, Kiyoshi Orito, Hiroyuki Sakano, Ayako Sato, Koji Sato, Munetaka Shimizu and Toshiaki Yamamoto) for their help in organizing the meeting. Finally, we would like to thank the participants whose contributions made the symposium a success.

II. MOLECULAR PHYLOGENETIC APPROACH TO THE EVOLUTION OF THE FRESHWATER EELS, *ANGUILLA*

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Abstract

The phylogeny of 12 *Anguilla* spp. collected from various areas of the world was constructed from mitochondrial cytochrome b sequences. Considering paleogeography and global paleocirculation, a hypothesis on the evolutionary process of freshwater eels is also presented. The phylogenetic tree obtained by neighbor-joining analysis placing *A. celebesensis* as an out-group suggests that *A. mossambica*, *A. australis australis*, *A. rostrata* and *A. anguilla* form a clade; *A. japonica* is placed in another clade. Most of the speciation in the lineage occurred mainly in the Eocene (57-36 million years ago); however, the separation of two Atlantic species, *A. anguilla* and *A. rostrata*, is estimated to have occurred much later, approximately 10 million years ago. The hypothetical evolutionary process of eels is as follows: in the Eocene, the ancestor of eels originated from the western Pacific