

# Early life history traits and the evolutionary dynamics of migration in freshwater eels

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Early life history traits of the catadromous anguillid eels were examined to help understand the early life history characteristics and evolutionary processes of their oceanic migrations in comparison with their migration distances and the geography of their species ranges. The eel larvae, called leptocephali, for this research were collected during many sampling surveys throughout the Indo-Pacific. It was found that the tropical species had higher growth rates, shorter larval durations, and smaller maximum larval sizes than temperate eel species. The relationships among larval characteristics such as growth rate, age at metamorphosis, and maximum larval size differed among tropical and temperate species and corresponded with the maximum latitudes of their species ranges. Temperate eel leptocephali with slow growth and large maximum size appear to be specialized for long migrations and dispersal over a wide range of distances to higher latitudes, while having flexible sizes of metamorphosis and recruitment. In contrast, tropical eel species with faster growth metamorphose earlier at a relatively fixed size, which would facilitate larval retention near their species ranges at low latitudes. The extensive life history data from the research cruise collections and recently derived molecular phylogenetic relationships among all anguillid eel species distributed in the world suggest that the long spawning migrations of temperate eels evolved from much shorter migrations of tropical species, whose larval growth was faster and whose maximum larval sizes were smaller. Changes in the early life history traits of tropical eels appear to have occurred during the evolution of longer migrations as they entered higher latitude regions and this resulted in the creation of temperate anguillid eel species.

## References

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