Using DNA Barcodes to Aid the Identification of Larval Fishes in Tropical Estuarine Waters (Malacca Straits, Malaysia)

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Larval descriptions of tropical marine and coastal fishes are very few, and this taxonomic problem is further exacerbated by the high diversity of fish species in these waters. Nonetheless, accurate larval identification in ecological and early life history studies of larval fishes is crucial for fishery management and habitat protection. The present study aimed to evaluate the usefulness of DNA barcodes to support larval fish identification since conventional dichotomous keys based on morphological traits are not efficient due to the lack of larval traits and the rapid morphological changes during ontogeny. Our molecular analysis uncovered a total of 48 taxa (21 families) from the larval samples collected from the Klang Strait waters encompassing both spawning and nursery grounds of marine and estuarine fishes. Thirty-two (67%) of the larval taxa were identified at the species level, two taxa (4%) at the genus level, and 14 taxa (29%) at family level. The relatively low rate of species-level identification is not necessarily due to the DNA barcoding method per se, but a general lack of reference sequences for speciose and non-commercial fish families such as Gobiidae, Blenniidae, and Callionymidae. Larval morphology remains important in species diagnoses when molecular matches are ambiguous. A lower ethanol percentage (50%) for larva preservation is also useful to keep the body of larvae intact for morphological identification, and to preserve DNA for subsequent molecular analyses. The 10% Chelex resin used to extract DNA is also cost-effective for long term monitoring of larval fishes. Hence, the DNA barcoding method is an effective and easy way to aid the identification of estuarine larval fishes at the species level.

Key words: Molecular identification, Morphology, Fish larvae, Coastal fishes, Mangrove-associated.

BACKGROUND

One major reason why studies of fish larval in the tropics are not progressing as fast as in temperate regions is the problem of larval fish identification. In the Indo-Pacific region, recent publications on fish larvae descriptions are now more accessible since the period prior to the first Indo-Pacific Fish Conference held in 1981 (Leis 2015). Tropical larval fish descriptions for marine and coastal fishes are very few; notable ones include Chayakul (1990) for Gulf of Thailand, Shadrin et al. (2003) for Vietnamese waters, and Leis and Carson-Ewart (2004) for the 124 families that occur in the Indo-Pacific region; this last publication is the compilation