Adaptive Features of Semiaquatic Mass Migrating Shrimp Macrobrachium dienbienphuense

Techanitisawad, Atid (School: Bangkok Christian College)
Suppawittaya, Piwat (School: Bangkok Christian College)

Shrimps (Crustacea: Decapoda) are aquatic animals which are normally incapable of moving on land. Recently, Thai locals discovered a unique mass migration of freshwater shrimp in which the shrimp leave the water and continue to walk on land in the upstream direction. This so-called “Parading Behavior” has rarely been explored in any aspect. In this study, we (1) described species of the parading shrimp using 16S rRNA-based phylogeny, (2) investigated environmental factors that contribute to the migration, (3) compared walking performance and morphology of the parading shrimp with another related shrimp from the same habitat, and (4) studied the shrimp walking pattern. The results revealed that shrimps found in the investigated habitat were Macrobrachium dienbienphuense and Macrobrachium. lanchesteri. However, only M. dienbienphuense was found with the ability to walk on land during mass migration. Environmental factors such as temperature, water velocity, and humidity seem not to stimulate the walking. While M. dienbienphuense had significantly better walking performance than M. lanchesteri on land, we found no difference of walking leg structure between the two types of shrimp. Nevertheless, we found that M. dienbienphuense had unique walking patterns, which has not previously been documented for hexapod walking gaits. This walking pattern might be the key factor that allows the parading shrimp to perform the walking behavior. Our research explains how these parading shrimps have adapted to walk efficiently on land which allows semiaquatic mass migration to be possible. This knowledge could provide insights on the evolution of water-to-land transition in decapod crustaceans.

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