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## Geographic division and cryptic speciation of planktic foraminifer in the Indo-Pacific Warm Pool

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The Indo-Pacific Warm Pool (IPWP) has strong correlation with the tropical climate change and oceanic circulation system due to its largest heat capacity on the Earth. This area is a key to document the presence of the boundary for the dispersal of marine organisms, though no study from zooplankton. *Pulleniatina obliquiloculata* is the most representative species of tropical water, in particular, the IPWP and the surface currents originated from this area. We examined the phylogeography of *P. obliquiloculata* by using 893 single cell samples collected from the world oceans; Pacific, Indian, and Atlantic Oceans. The phylogenetic analysis of the partial Small Subunit ribosomal DNA (SSU rDNA) sequences clearly shows the occurrences of three genetic types (Types I to III) with specific biogeographic distributions. Type I is commonly found in temperate water area of the world oceans, whereas Type II is found along the South Equatorial Current in the Pacific and Type III is between tropical and subtropical area of the northwestern Pacific. The geographic distributions of Types II and III were separated in the boundary to dispersal of pelagic zooplankton between the Indian and Pacific sides of the IPWP. Moreover, the divergence time estimation of these genetic types correlated to the development of modern IPWP system. Type I and others diverged around 4.2 Ma, when more Pacific gyre system was reconstructed due to the Panama Isthmus closure. Types II and III branched around 2.6 Ma according to the closure of the Indonesian Seaway. These physical boundaries divided water masses and provided thick mixed layer, where *P. obliquiloculata* invaded as new habitats. Thus, the diversification of pelagic zooplankton could be influenced by the marine environmental change leading the marine boundary.

Keywords: geographic division, cryptic species, planktic foraminifera, Indo-Pacific Warm Pool