

**Unexpectedly high levels of lineage diversity in Sundaland puddle frogs  
(Dicroglossidae: Occidozyga Kuhl and van Hasselt, 1822)**

**ABSTRACT**

One of the most urgent contemporary tasks for taxonomists and evolutionary biologists is to estimate the number of species on earth. Recording alpha diversity is crucial for protecting biodiversity, especially in areas of elevated species richness, which coincide geographically with increased anthropogenic environmental pressures - the world's so-called biodiversity hotspots. Although the distribution of Puddle frogs of the genus *Occidozyga* in South and Southeast Asia includes five biodiversity hotspots, the available data on phylogeny, species diversity, and biogeography are surprisingly patchy. Samples analyzed in this study were collected throughout Southeast Asia, with a primary focus on Sundaland and the Philippines. A mitochondrial gene region comprising ~ 2000 bp of 12S and 16S rRNA with intervening tRNA Valine and three nuclear loci (BDNF, NTF3, POMC) were analyzed to obtain a robust, time-calibrated phylogenetic hypothesis. We found a surprisingly high level of genetic diversity within *Occidozyga*, based on uncorrected p-distance values corroborated by species delimitation analyses. This extensive genetic diversity revealed 29 evolutionary lineages, defined by the > 5% uncorrected p-distance criterion for the 16S rRNA gene, suggesting that species diversity in this clade of phenotypically homogeneous forms probably has been underestimated. The comparison with results of other anuran groups leads to the assumption that anuran species diversity could still be substantially underestimated in Southeast Asia in general. Many genetically divergent lineages of frogs are phenotypically similar, indicating a tendency towards extensive morphological conservatism. We present a biogeographic reconstruction of the colonization of Sundaland and nearby islands which, together with our temporal framework, suggests that lineage diversification centered on the landmasses of the northern Sunda Shelf. This remarkably genetically structured group of amphibians could represent an exceptional case for future studies of geographical structure and diversification in a widespread anuran clade spanning some of the most pronounced geographical barriers on the planet (e.g., Wallace's Line). Studies considering gene flow, morphology, ecological and bioacoustic data are needed to answer these questions and to test whether observed diversity of Puddle frog lineages warrants taxonomic recognition