



Morphological variation and genetic diversity of Caspian pipefish *Syngnathus caspius* (Pisces: Syngnathidae) across the southern Caspian Sea

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The morphological variation, genetic diversity, population differentiation and demographic history of pipefish *Syngnathus caspius* (Pisces: Syngnathidae) were investigated across the southern Caspian Sea. A total of 82 specimens were collected from two lagoons and two open sea sites. Using meristic and morphometric traits, the pipefish in two lagoons completely separated from each other and those in open sea sites. Whereas, the pipefish collected from open sea sites completely overlapped each other. Genetic diversity, population differentiation and demographic history were explored based on the mitochondrial DNA control region and nuclear genes. The result of maximum likelihood (ML) phylogeny analyses showed no separated clusters of *S. caspius* populations across the southern Caspian Sea. Using the sequencing data from this study coupled with those in NCBI, the phylogenetic ML tree displayed four separate clades including: (1) European group consisting of two species of *S. abaster* and *S. typhle*; (2) the southern Caspian Sea clade of *S. caspius*; (3) Italian mainland group of *S. abaster*; and (4) Tunisian group of *S. abaster*. While the southern Caspian Sea clade was minimally distinct from European group, these two clades were significantly separated from Italian mainland and Tunisian groups. This result suggests the occurrence of a species complex in the study area. A total of 19 haplotypes from 25 *S. caspius* individuals were obtained from four populations in the southern Caspian Sea. High mean haplotype diversity ($h = 0.96$) versus low nucleotide diversity ($Pi = 0.007$) was detected across these populations. The lack of separate clusters identified in the ML tree and geographical regions across the southern Caspian Sea was also indicated by AMOVA and pairwise F_{ST} estimates.

Keywords: Phylogenetics, Phylogeography, Conservation and management, *Syngnathus caspius*