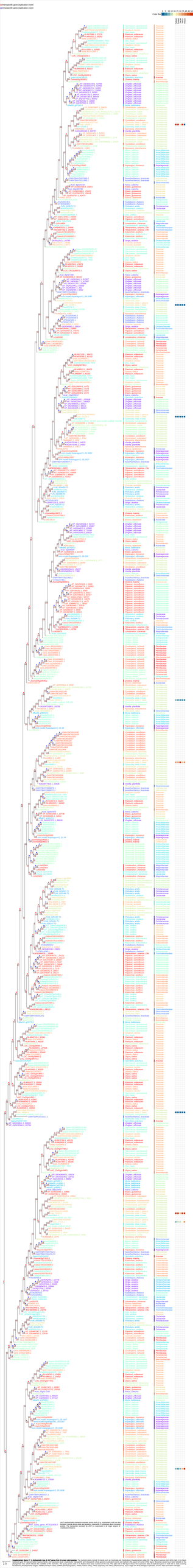


**Supplementary figure 17: A phylogenetic tree of 407 genes from 50 gnathostomata species.** The Actinopterygii gene duplication occurred in Cypriniformes and Characiformes (Ostariophysi) species (OS). The ancestral vertebrate genome (ancestral karyotype) had undergone two rounds of whole genome duplication (2R) before the divergence of the ancestral gnathostomata species. The Actinopterygii gene duplication occurred after the divergence of the ancestral teleost species (TS) but before the divergence of the ancestral Ostariophysi species (OS). The Actinopterygii gene duplication is a lineage specific gene duplication event. The Actinopterygii gene duplication is not shared with other vertebrate species. The Actinopterygii gene duplication is not shared with other vertebrate species. The Actinopterygii gene duplication is not shared with other vertebrate species