

SHEDDING LIGHT ON THE HOLOCEPHALI TAXONOMY, THE MITOGENOME OF CHIMAERA OPALESCENS

Nair Vilas-Arrondo^{*1,2}, Andre Gomes-dos-Santos^{3,4}, Montse Perez¹, Francisco Baldo⁵, Ana Veríssimo⁶, André M. Machado³, Esther Román-Marcote⁸, Rafael Bañón⁷, Elsa Froufe³ and L. Filipe C. Castro^{3,4}

¹AQUACOV, Instituto Espanol de Oceanografía (IEO, CSIC), Centro Oceanográfico de Vigo, SPAIN

nair.vilas@ieo.csic.es, montse.perez@ieo.csic.es

²UVIGO, PhD Program “Marine Science, Technology and Management” (Do*MAR), Faculty of Biology, University of Vigo, Vigo, SPAIN

nair.vilas@ieo.csic.es

³CIIMAR/CIMAR – Interdisciplinary Centre of Marine and Environmental Research, University of Porto, Matosinhos, PORTUGAL

andrepousa64@gmail.com, andre.machado@ciimar.up.pt

⁴Department of Biology, Faculty of Sciences, University of Porto, Porto, PORTUGAL

andrepousa64@gmail.com, andre.machado@ciimar.up.pt

⁵Instituto Espanol de Oceanografía (IEO, CSIC), Centro Oceanográfico de Cádiz, Cádiz, SPAIN

francisco.baldo@ieo.csic.es

⁶BIOPOLIS Program in Genomics, Biodiversity and Land Planning, CIBIO, Vairao, PORTUGAL

averissimo@cibio.up.pt

⁷Servizo de Planificación, Consellería do Mar, Xunta de Galicia, Grupo de Estudos do Medio Marino (GEMM), Ribeira, Santiago de Compostela, SPAIN

anoplogaster@yahoo.es

⁸BIOPEOPLE, Instituto Español de Oceanografía (IEO, CSIC), Centro Oceanográfico de Vigo, Vigo, SPAIN

esther.roman@ieo.csic.es

Abstract: Cartilaginous fish (Chondrichthyes), i.e. sharks, rays, and chimaeras, are extremely interesting from a biological perspective as they represent one of the oldest and most ecologically diverse groups of jawed vertebrates. Their K-selective reproductive traits, make them vulnerable to overfishing. Chimaerid are also a frequent by-catch of deep-water fisheries. Holocephalans comprise a single surviving order, the Chimaeriformes, and are allocated into three different families: Callorhynchidae, Rhinochimaeridae and Chimaeridae (Weigmann 2016). Furthermore, the family Chimaeridae only includes two genera: *Chimera* and *Hydrolagus*. Recently, several new species have been described (Iglesias et al., 2022), including *Chimera opalescens* from deep-sea assemblages (Luchetti et al., 2011).

However, previous records of *C. opalescens* were erroneously classified as *Chimera monstrosa* (Luchetti et al., 2011; Catarino et al., 2020), due to the similar morphology (Luchetti et al., 2011), which highlights the critical importance of molecular approaches to support species identification. Mitogenomes have been a powerful tool used to elucidate

phylogenetic relationships, both at deep and at shallow evolutionary nodes.

The development of long-read sequencing technologies a precise and reliable assembly of complete mtDNA genomes. The sequencing and characterization of the complete mitogenome of the opal chimera *Chimera opalescens* (Luchetti, Iglesias et al., 2011) was carried out, using the long-read technique PacBio HiFi. The entire mitogenome was 23,411 bp long and shows the same overall content, i.e. 13 protein-coding genes, 22 transfer RNA and 2 ribosomal RNA genes, as all other examined Chondrichthyan mitogenomes. Phylogenetic reconstructions using all available Chondrichthyan mitogenomes, including 11 Holocephali (chimeras and ratfishes), places *C. opalescens* within the Chimaeridae family. Furthermore, the results reinforce previous findings, showing the genus Chimera as paraphyletic and thus highlighting the need to expand molecular approaches in this group of cartilaginous fishes.

Key words: Chondrichthyes; Chimaeridae; Short-nosed chimeras; PacBio

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References: please follow the examples below

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