Title of abstract:

History of the coelacanth fishes: phylogeny, disparity and diversification

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Abstract:

More than 30 years ago, the first phylogenetic analyses of coelacanths suggested an early burst of evolution followed by a slow and conservative evolution over a period of 380 million years. In 1998, Peter Forey published "*History of the Coelacanth Fishes*", a landmark in coelacanth morphology and phylogeny. Subsequently, 19 phylogenetic analyses addressed partial or complete phylogeny of this clade, 16 of which were strictly built on minor modifications of Forey's matrix (30 genera, 108 characters). Over a period of 23 years, 18 genera and 2 new characters have been added without major revision of the original coding. To assess the phylogeny, disparity and diversification of coelacanths, we designed three new phylogenetic matrices for 87 species: 268 discrete, 40 morphometric and 14 meristic characters. Bayesian and maximum parsimony analyses were used to present a new phylogeny of the group. In addition, 2D geometric morphometrics of the body shape and skull on a reduced sample was used to describe evolutionary changes over the history of the group. As expected the Carboniferous *Allenypterus* and the Triassic *Foreyia* differ from a more classical coelacanth body shape accounting for approximately 40% of the total variation. The second source of variation (ca. 20%) considers the discrepancies associated with the heterocercal and triphycercal caudal fins. Bayesian and principal component analyses for incomplete data on the morphometric and meristic matrices permitted to recognize conservative and disparate anatomical traits responsible for evolutionary shape variation. Time-binned disparity and diversification are interpreted in the light of the morphometric trends.

Key words:

Sarcopterygians; actinistians; phylogeny; disparity; geometric morphometrics