
Cylindraspis - from whence thou hast com'st to thine home? Mitogenomes give the answer

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Abstract

Cylindraspis is a genus of extinct giant tortoises endemic to the Mascarene Islands. Recently it has been suggested that humans have introduced these tortoises, spurring a debate about their origin. To contribute further insights into this matter, we produced almost complete mitogenomes for all five currently recognized species. We applied optimized NGS protocols for ancient DNA approaches, including single-stranded library preparation, and in-solution hybridization capture. We included the resulting data in phylogenetic, molecular clock, and biogeographic analyses using mitogenomes of representatives of all extant genera and species groups of tortoises (Testudinidae) with all extant taxa from Madagascar and the Seychelles represented. The mitogenomes of all five *Cylindraspis* species were deeply divergent from those of any other extant tortoise. In phylogenetic analyses of the mitogenomes, all *Cylindraspis* species are monophyletic and sister to a clade containing tortoise taxa from Africa, Asia, Madagascar, the Seychelles, and South America. The divergence date inferred for *Cylindraspis* exceeds by far the age of the Mascarene Islands, while the divergence dates for the mitogenomes of two species pairs (*C. indica* vs *C. inepta* and *C. peltastes* vs *C. vosmaeri*) suggest dispersal and vicariance within the Mascarenes, explaining also the former occurrence of two sympatric species on Mauritius and Rodrigues. Biogeographic analyses including our complete data set suggest that the ancestor of *Cylindraspis* lived in Africa and arrived on the Mascarenes circumventing Madagascar. According to our data, the Mascarene giant tortoises were definitely not introduced by humans.

Keywords: ancient DNA, biogeography, *Cylindraspis*, giant tortoise, Mascarenes

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