Phylogeography of the dugong (*Dugong dugon*) based on historical samples identifies vulnerable Indian Ocean populations

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Abstract
We investigated the phylogeography of the dugong (*Dugong dugon*) throughout its original range using museum material from 14 natural history museum and university collections mainly in Western Europe. Samples of dugong bones and teeth were acquired and drilled for tooth/bone powder and DNA was extracted. The mitochondrial DNA control region was successfully amplified from 162 individuals. These samples range in date from 1827 to 1996 and span the historical distribution range of the dugong. We were able to successfully amplify overlapping fragments of the D-loop region of the mitochondrial DNA (mtDNA) resulting in sequences of a 355 bp fragment for 162 individuals for the final analyses. This included a new sequence (189 bp) from a previously unidentified piece of skin of the extinct Steller’s sea cow (*Hydrodamalis gigas*), as an outgroup. The resulting dugong sequences match those from previous studies of dugong from Australia and Indonesia, but revealed several new and divergent mtDNA lineages in the Indian Ocean. One mtDNA lineage includes most specimens from the Western Indian Ocean, with another distinct lineage isolated to nearby Madagascar and Comores. There is little geographic structuring detectable among other populations in the Western Indian Ocean and all populations from that region appear to have historically contained comparatively low levels of genetic diversity. There was a drop in the genetic diversity detected within most Indian Ocean samples collected after 1950, matching observed reductions in population size. The new lineages and potential loss of diversity highlight the particular conservation importance and vulnerability of dugong populations in the Western Indian Ocean.