

**119 - T112. Halo-Dash: The Deep and Shallow History of Aquatic Life's Passages between Marine and Freshwater Habitats**

Monday, 10 October 2022

1:30 PM - 5:30 PM

[119-6: ASSESSING AQUATIC ADAPTATION IN SECONDARILY AQUATIC TETRAPODS](#) UHEN, Mark D., PhD, George Mason University, Fairfax, VA 22030  
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**Abstract**

Tetrapods evolved a suite of characteristics to allow them to live and thrive in subaerial instead of subaqueous environments just once, so it is worth exploring how, and how fully, numerous different groups of tetrapods evolved suites of morphological characteristics and behaviors to allow them to live and thrive in subaqueous instead of subaerial environments during the reverse transitions. Here I do that by calculating an index of aquatic adaptation that scores taxa for features that indicate adaptation to or use of an aquatic environment, and scales the score between 0 and 1, where 0 would represent no aquatic adaptation (e.g. a cow) and 1 would represent complete aquatic adaptation (e.g. a fish). Scores indicate that no secondarily aquatic tetrapod has fully re-adapted to aquatic life because all still breathe oxygen from air instead of oxygen dissolved in water. That said, some, like Ichthyosauria and Pelagiceti have high scores. Others, like Pinnipeds reach a moderate level of aquatic adaptation then stabilize, because they still reproduce and give birth to their young on land, as well as have the ability to locomote on land. For those with high scores, in all cases that have a reasonable fossil record of transitional forms, one can show that, as one would expect, the scores start out lower for basal representatives (similar to but often slightly higher than their terrestrial sister group) and progressively increase in a crownward direction. Some authors have suggested that taxa such as the marine iguana (*Amblyrhynchus cristatus*), crab eating macaque (*Macaca fasciculata*), or even humans (*Homo sapiens*) should be considered aquatic because they (or some populations) use marine food resources, but this is only one factor of many, and these taxa score near 0. This analysis suggests that future work on aquatic tetrapods should determine an appropriate level of aquatic adaptation prior to any analysis to ensure that results reflect the true intention of the study, and do not include taxa that are barely aquatic along with those that are maximally aquatic, unless such inclusion is warranted.

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