



Paleobiologists Observe Oldest Record of Monk Seals from the North Pacific

A Glimpse Into Which Marine Mammals Swam off California Coast 7-8 million years ago

May 8, 2019 — Scientists Jorge Velez-Juarbe, Curator of Marine Mammals at the Natural History Museum of Los Angeles, and Ana M. Valenzuela-Toro, PhD student in the Ecology and Evolutionary Biology Department at UC Santa Cruz, recently discovered evidence of the oldest known true seal in the North Pacific, pushing back the date of the oldest known phocid — the family of seals describing earless or true seals — in this area from a few thousand years old to over seven million years old. They did this through analyzing and describing fossil molariform teeth excavated in Laguna Niguel, Orange County, California in 1969 and 1982. Velez-Juarbe and Valenzuela-Toro describe their scientific findings in their article “Oldest Record of Monk Seals from the North Pacific and Biogeographic Implications” published in *Biology Letters* this week.

In observing and analyzing details in the shape of the two teeth, the paleobiologists noticed a resemblance to that of present-day Hawaiian monk seals, a type of true seal. The morphology of the tooth was compared to others belonging to aquatic carnivores of the time, previously excavated in the area deposits referred to as the Monterey Formation, including the stem pinniped *Allodesmus* and crown pinnipeds like the eared seal *Pithanotaria starri* as well as several species of walruses (today there is only one living species of walrus). The teeth didn't resemble any of these previously identified species or any other known species in the area at any point in history. Although the fossils are unique in their form, details such as wrinkled surface of the enamel, the height-to-width ratio of the crown and low separation of the points or cusps of each tooth, allowed Velez-Juarbe and Valenzuela-Toro to determine similarities between the specimens and those belonging to a subfamily of earless seals called Monachinae and hypothesize their relation to the Hawaiian monk seal.

This research is a significant contribution to understanding geographical history of this family of pinnipeds. The researchers proposed several hypotheses of where the seals may have traveled from in order to reach their Southern California destination 7-8 million years ago. The Hawaiian monk seal hypothesis would mean that the seals traveled from the Caribbean via the Central American Seaway, an ocean channel that once separated North and South America before volcanic activity in the region created the Isthmus of Panama around 3-5 million years ago. This hypothesis would be “consistent with the hypothesis of the origin and dispersal for *Neomonachus*,” the genus of earless seals that includes both the extinct Caribbean monk seal and the Hawaiian monk seal that can still be found swimming in Hawaiian waters today,

although they themselves have been on the endangered species list since being hunted to the brink of extinction in the 19th century.

Although the extinct fossil species described here wasn't so lucky, the observation of this phocid's inclusion in the biodiversity of the Monterey Formation represents another interesting discovery: the oldest example of sympatry among three types of pinnipeds that are still alive today: eared seals (including fur seals and sea lions), earless seals (phocids/true seals, including monk seals and harbor seals), and odobenids (walruses). Sympatry occurs when several distinct species co-exist with one another. Understanding how species evolve and travel across time through research like this gives us a wealth of insight into the record of life on earth as well as contributes to a rich narrative of our planet's history, helping us to better understand our planet today.

"The monk seal fossils and others found in the same site, gives us a glimpse of what kind of marine mammals we would encounter if we could travel back in time 7-8 million years ago and go on a whale-watching trip off the coast of California," Velez-Juarbe said.

"To me this was an unexpected discovery, and highlights the importance of museum collections and how they are an invaluable resource of the natural history of a place."