

Grant Information:

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Technical Session V (Wednesday, October 9, 2019, 3:00 PM)

**A NEW SPHENISCIFORM FOSSIL FROM THE NORTH ISLAND OF NEW ZEALAND FURTHER RESOLVES THE BAUPLAN OF EXTINCT GIANT PENGUINS**

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New Zealand is a key area for understanding the ancient history of penguins (Order Sphenisciformes). Fossils from New Zealand range in age from Paleocene up to Pleistocene, constituting a sampling period that spans more than 60 million years. The New Zealand fossil record includes many 'giant' penguin species (i.e., larger than living penguins) which may have represented an extinct foraging guild. *Kairuku*, *Pachydyptes*, *Palaeudyptes* and *Kumimanu* were all from New Zealand but taxa belonging to this guild were found also in Antarctica, South America and Australia. These taxa are characterized by different forelimb proportions and elongated spear-like beaks in addition to their large body sizes. These traits hint at differences in locomotion and foraging when compared with living species, although most body plans for ancient penguins are inferred from largely incomplete skeletons. Here we describe a mostly-complete giant-sized penguin with many bones articulated in life position. The fossil was found in an Oligocene silty mudstone from the North Island of New Zealand and currently represents the most complete pre-Pleistocene vertebrate reported from this region. The specimen shares several morphological features with the New Zealand-endemic taxon *Kairuku* and in preliminary phylogenetic analyses the new fossil forms a clade with this genus. Furthermore, the forelimb elements of *Kairuku grebneffi*, a similarly-aged giant penguin from the South Island of New Zealand, are almost identical in size when compared with the North Island specimen. The hindlimbs elements of the North Island fossil are significantly longer, exceeding in length all previously described specimens of *Kairuku*. Moreover, the specimen presents a mixture of characters that show a transitional state between the ancestral body plan found in other Eocene-Oligocene giant penguins and the apomorphic body plan found in *Kairuku*, providing insight into the diversification of 'giant' penguins.

Grant Information:

Massey University Doctoral Scholarship

Regular Poster Session III (Friday, October 11, 2019, 4:15 - 6:15 PM)

**A DIVERSE MIOCENE TOOTHED WHALE (ODONTOCETI) FAUNA FROM CALVERT CLIFFS, ATLANTIC COASTAL PLAIN, U.S.A.**

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A diverse odontocete fauna of 29 extinct species is known from along Calvert Cliffs, Maryland, U.S.A and other Miocene-age outcrops within the Chesapeake Bay region (comprising the Calvert, Choptank, and St. Marys formations). Squalodontidae is represented by three species; *Squalodon calvertensis*, *S. whitmorei*, and a new species intermediate in size between the two aforementioned forms. Physeteroidea includes the physeterids *Aulophyseter mediatlanticus* and *Orycterocetus crocodilinus*, and an unnamed taxon with macroraptorial teeth. Ziphiidae includes two unnamed species: cf. *Messapicetus* sp. and Ziphiidae incertae sedis. Squalodelphinidae is known by two species: *Phocageneus venustus* and *Notocetus* sp., and Platanistidae by four species: *Aræodelphis natator*, *Zarhachis flagellator*, *Pomatodelphis inaequalis*, and a new species. Eurhinodelphinidae features prominently with at least four species; *Xiphiacetus bossi*, *X. cristatus*, *Schizodelphis barnesi*, and *S. morckhoviensis*. Early delphinids are the most diverse, including *Delphinodon dividum*, *Kentriodon pernix*, *Hadrodelphis calvertense*, *Macrokentriodon morani*, *Liolithax pappus*, *Pithanodelphis cornutus*, *Lophocetus calvertensis*, and at least three new species. Finally, Pontoporiidae is represented by *Stenasodelphis russellae*. Four of these families have living representatives: Physeteridae (sperm whales), Ziphiidae (beaked whales), Platanistidae (Ganges river dolphin), and Pontoporiidae (La Plata dolphin). The long and slender-snouted eurhinodelphinids are the most common odontocetes along Calvert Cliffs, squalodontids the most archaic, and physeteroids the largest. Squalodelphinids, ziphiids, and pontoporiids are

known only from a few incomplete skulls, so much remains to be learned from future discoveries and the reassessment of collection specimens.

In terms of its taxonomic diversity and number of specimens, this fauna rivals the Neogene odontocete faunas in Peru, Antwerp basin (Belgium), Belluno (Italy), Mexico, and elsewhere in the United States (Lee Creek Mine in North Carolina, Florida, Shark Tooth Hill in California, and Pollack Farm site in Delaware).

As for their stratigraphic distribution, these odontocetes range in age from the Aquitanian through to the Tortonian, with the large majority occurring within the Burdigalian and Langhian (the latter being the most speciose). These two stages encompass the Mid Miocene Climatic Optimum (MMCO), a time (ca. 16-14 Ma) when average global temperatures may have been ca. 3° C warmer than today.

Regular Poster Session III (Friday, October 11, 2019, 4:15 - 6:15 PM)

**THE OLDEST RECORD OF BASILOSOURID WHALES FROM AFRICA AND ITS IMPLICATION ON THE EARLY EVOLUTION OF PELAGICETI (MAMMALIA, CETACEA)**

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Pelagiceti is a clade of the obligatory aquatic cetaceans, comprising basilosauridae and living cetaceans, Neoceti. Broadly speaking, Basilosauridae is the basal fully aquatic cetaceans in whale evolutionary history. Except for specimens reported from the late Early Eocene (Ypresian) of Antarctica, basilosauridae is known from the late middle and late Eocene (Bartonian and Priabonian) worldwide, and it is the key for understanding the evolutionary transition from terrestrial whales' ancestors to completely aquatic living cetaceans. Eocene basilosaurid archaeocete whales of Africa have been reported from Egypt, Libya, Tunisia, Senegal and Western Sahara. The African fossil record of basilosaurid whales is especially limited for the Bartonian and Priabonian of the Eocene.

Here we document a new remains of basilosaurid whale from early middle Eocene (Lutetian) of Wadi El-Rayan Group of the Fayum Depression, Egypt. X-ray computed tomographic (CT) scanning has been highly informative in studying these remains. CT scans of the Wadi El-Rayan marl block have revealed a nearly complete skull, isolated auditory bullae, both left and right sides of the mandible with associated teeth and the first cervical vertebra (the Atlas). The presence of multiple accessory denticles (cusps) on cheek teeth, a flat palate narrowing anteriorly and well-developed pterygoid sinuses around the ear are shared diagnostic features of basilosaurids and the newly unearthed remains.

Given the age of the Wadi El-Rayan Group that has been assessed to the middle Lutetian-early Bartonian (46-40 Ma), this material constitutes the oldest record of basilosaurid whales from Egypt and indeed the oldest from the whole Africa. In addition, this record is among the oldest occurrences of basilosaurids worldwide, indicating a vast radiation and dispersal of the Pelagiceti since at least the early middle Eocene. This discovery confirms the presence of Basilosauridae (and indeed the Pelagiceti) in the early middle Eocene of Africa and extends the basilosaurid whales fossil record of Africa further back into the early middle Eocene, helping to fill in an important biogeographic and evolutionary gap and increasing our knowledge of the paleobiogeographic distribution of basilosaurids and whole Pelagiceti during the middle Eocene. Finally, this discovery underscores the importance of surveying the basilosaurids in early-middle Eocene strata generally and Wadi El-Rayan Group especially.

Regular Poster Session IV (Saturday, October 12, 2019, 4:15 - 6:15 PM)

**A NEW DREPANOSAURMORPH FROM THE CHINLE FORMATION OF PETRIFIED FOREST NATIONAL PARK, ARIZONA**

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Drepanosauromorpha is an extinct group of basal diapsid reptiles known from the Middle to Late Triassic (237–212 MA). The clade currently includes seven genera (*Avicranium*, *Dolabrosaurus*, *Drepanosaurus*, *Hypuronektor*, *Kyrgyzsaurus*, *Megalancosaurus*, and *Vallesaurus*) that are known from fossils collected in Europe (Italy, U.K. ), North America (Arizona, New Mexico, New Jersey), and Asia (Kyrgyzstan). The first described drepanosauromorph, *Drepanosaurus unguicaudatus*, was based on a flattened holotype preserving