



A new look at the mammalian fauna of the Prince Creek Formation, North Slope, AK

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Introduction

The Prince Creek Formation (PCF) on the North Slope of Alaska contains well preserved remains from a rich array of dinosaurs, birds, fish and mammals from 73 million years ago. Of these, mammals are not well known. On the basis of their tiny tooth fossils, four species of mammals are believed to occur in the PCF. These are *Unnuakomys hutchisoni*, a metatherian (ancestral marsupial), *Sikuomys mikros*, a eutherian (ancestral placental mammal) and two unnamed multituberculates (an extinct rodent-like group).

Most Mesozoic mammals are named exclusively based on teeth as they are very diagnostic and complete skeletons are incredibly rare. However, these teeth do not show the full picture of mammalian diversity in the PCF. Newly discovered material, mostly toothless jaws, reveals a much greater diversity of mammals.

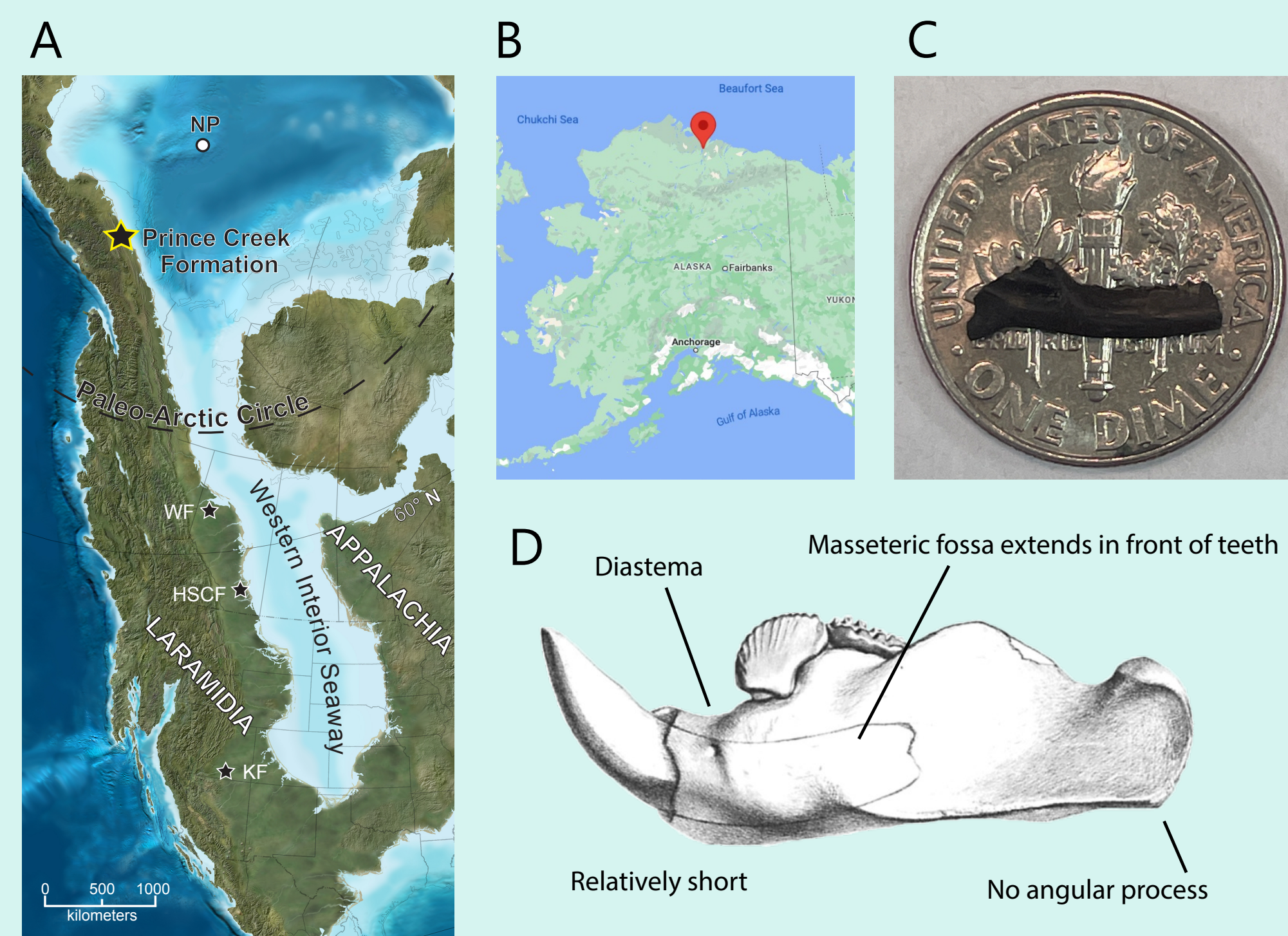


Fig. 1. A, Paleogeographic reconstruction showing the location of the Prince Creek Formation (PCF) by Ron Blakey, Colorado Plateau Geosystems. MAT, mean annual temperature, CMMT, cold month mean temperature. B, Location of PCF today. C, Photo of UAMES 53012 on a dime. D, Labial view of multituberculate *Stygomys kuszmauli* from Adams et al. (2019).

Geology

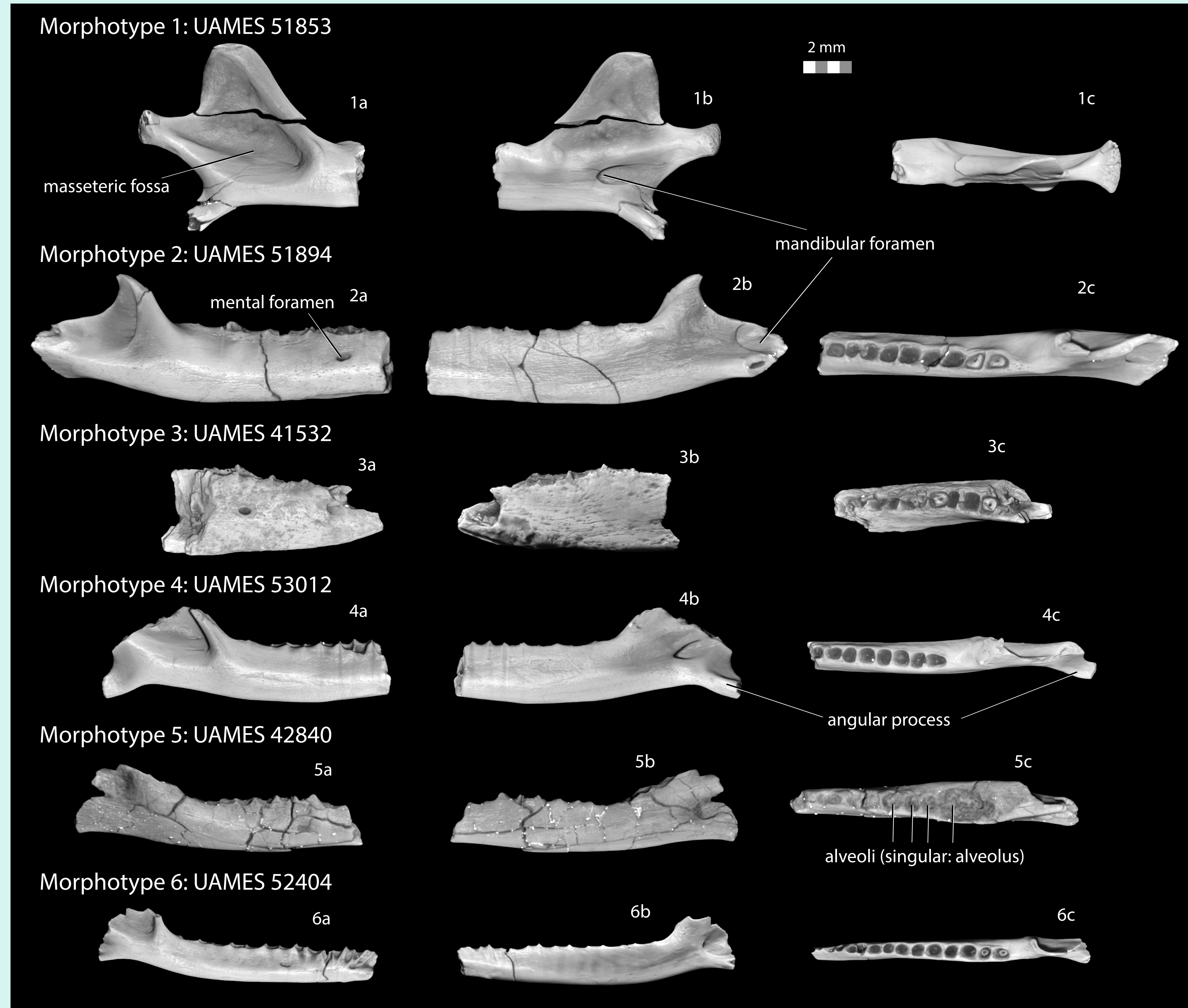
The Prince Creek Formation was deposited on a flood plain at 80-85° N paleolatitude. These jaws were found in lag deposits, in which coarse grain material (including teeth and bones) accumulate at the base of a river channel.



Fig. 2. The PCF during winter fieldwork.

Comparative morphology

We recognize six morphotypes of non-multituberculate* mammals from toothless jaws.



* Multituberculate jaws are very distinct as shown in Figure 1 (D). Fig. 3. Comparisons of six morphotypes of mammals from the PCF shown in labial view (a) lingual view (b) and occlusal view (c). All the jaws are proportionately scaled to one another. Jaws have been reflected to all be right sides for comparison.

Large Mammal

A comparatively large ulna and vertebrae show evidence of a cat sized mammal which is very large for the Mesozoic and much larger than any of the previous named mammals and the jaw morphotypes.

Fig. 4. Comparisons of large mammal ulna and vertebrae to common PCF sized ulna and vertebrae. (a) UAMES 36413, (b) UAMES 52503 (c) UAMES 41995 (d) UAMES 51914.



Internal Anatomy

CT-scans allow us to see inside the fossils which can provide valuable information.



Fig. 5. Cross sections of UAMES 353888.

Morphotype 4-*Sikuomys*?

Morphotype 4 is the most common morphotype of toothless jaw. Based on its similarities to gypsonictopids, this morphotype may correspond to the PCF gypsonictopid, *Sikuomys mikros*.

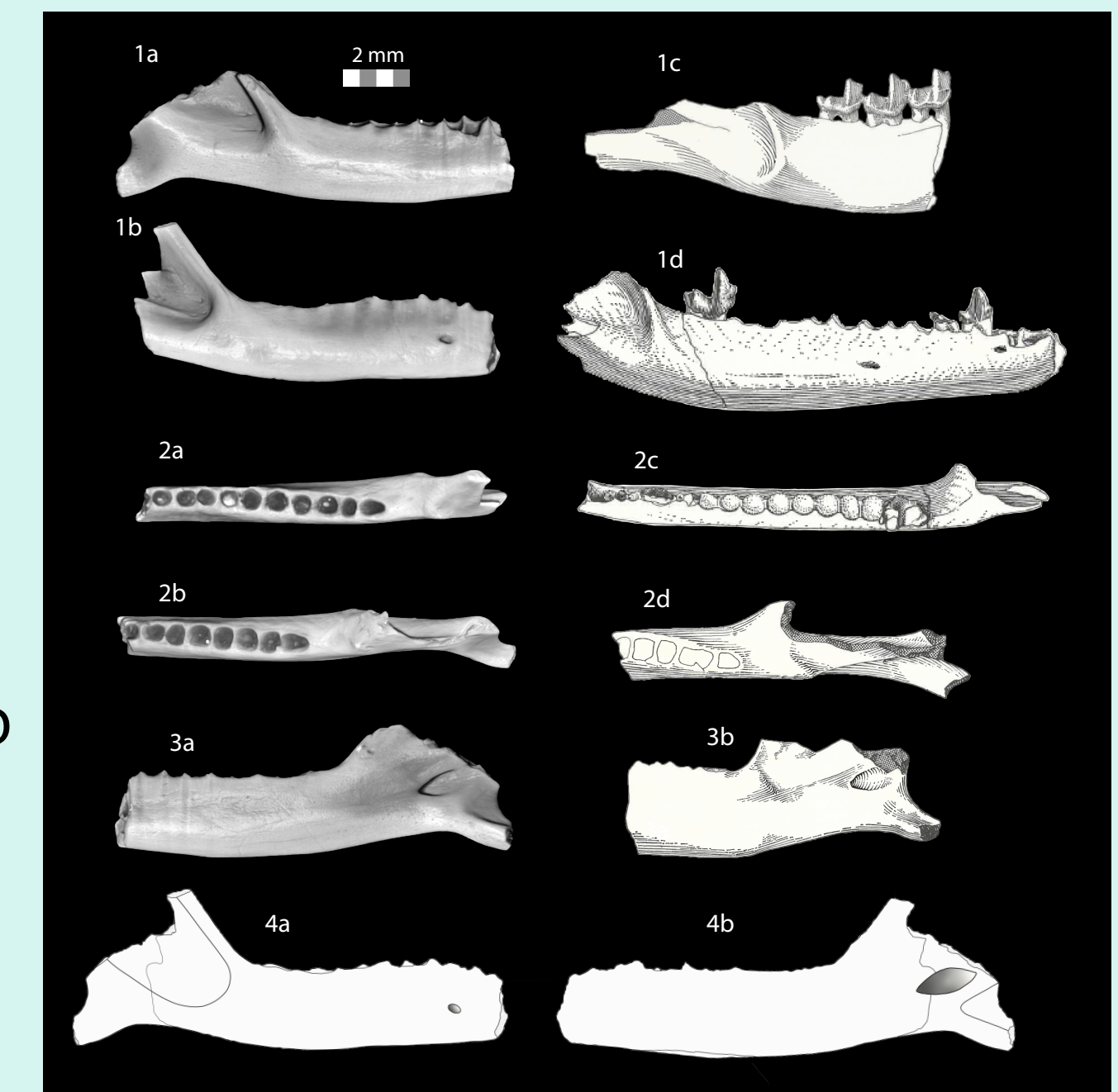


Fig. 6. 1, Comparisons of the most common PCF morphotype to illustrations of *Gypsonictops hypoconus* from Clemens 1966 in labial (1), occlusal (2) and lingual (3) views. 1a, 2b and 3a, show UAMES 53012. 1b and 2a show UAMES 51897. Illustrations are not to scale. 4, Composite outlines of the PCF common morphotype in labial (a) and lingual (b) views. Jaws have been reflected for comparison.

Conclusions

- Although multituberculates are known from isolated teeth, they are not represented by toothless jaws.
- Two of the toothless jaws potentially represent the tooth taxa *Unnuakomys* and *Sikuomys*, suggesting at least four other non-multituberculate taxa exist in the formation.
- The large mammal represented by the ulna and vertebrae does not belong to a previously recognized mammal from the PCF or to any of the toothless jaw morphotypes.
- At least nine morphotypes of mammals existed in the PCF, and this study has more than double the previous known number of mammals.
- Toothless jaws and postcranial material can be an important source of data on mammalian diversity in formations and show taxonomically informative characters.

Acknowledgements and References

Thank you to Zackary Perry, Benjamin Cragun and Kevin May for all the advice and support. Thank you to Adrian Gestos for help with CT-scanning and Dragonfly, Florian Hofmann for help with Dragonfly and access to the Geochronology Laboratory and Jacob Van Veldhuizen and Emily Braker for help with collections. We would also like to thank URSA for their generous support and funding of this project. In addition, we would like to thank the lab volunteers who picked through sediment for countless hours to find these fossils and JP Cavigelli for help in the field and lab. Thank you to the US Bureau of Land Management, State of Alaska Department of History and Archaeology, and the North Slope Bureau for permitting and logistical support. This work was also supported by National Science Foundation grants EAR 1226730 (to P.S.D. and G.M.E.) and EAR 1736515 (to P.S.D., G.M.E., and J.J.E.) Fig. 1, the paleogeographic reconstruction, was created by R. Blakey (NAU).

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