

## 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, making it the most important site for Mesozoic Arctic vertebrate fossils worldwide. Mammals are poorly studied and on the basis of their tiny tooth fossils, four species are believed to occur in the PCF:

- *Unnuakomys hutchisoni*, a metatherian (marsupial)
- a small gypsonictopid (a eutherian/placental mammal)
- *Cimolodon* sp., a multituberculate (an extinct rodent-like group)
- An indeterminate multituberculate

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.

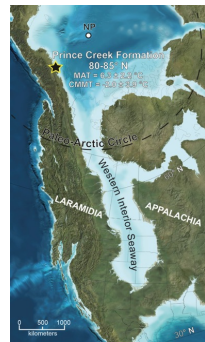


Fig. 1. North American paleogeographic reconstruction showing the location of the Prince Creek Formation by R. Blakey. MAT, mean annual temperature, CMMT, cold month mean temperature.

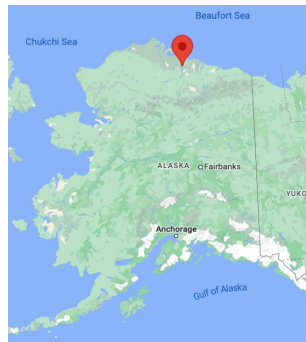


Fig. 2. The location of the Prince Creek Formation today.

## 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) accumulates at the base of a river channel.

## Comparative Morphology



Fig. 3. Jaws of Prince Creek Formation mammals shown in lingual (side facing tongue) (a), labial (side facing out) (b), and occlusal views (view from above) (c). 7a is in labial view. Jaws have been reflected to all be right sides for comparison. 1, UAMES 52404; 2, UAMES 35327, micro CT scans of *Unnuakomys hutchisoni*, from Eberle et al. 2019; 3, UAMES 41541, *Unnuakomys* sp; 4, UAMES 53012; 5, UAMES 42840; 6, UAMES 51894; 7a, UAMES 51853, shown in only labial view because still in sediment.

| Morphotype                    | 1                           | 2    | 3                 | 4              | 5                           | 6                           | 7                 |
|-------------------------------|-----------------------------|------|-------------------|----------------|-----------------------------|-----------------------------|-------------------|
| Masseteric fossa              |                             | —    |                   |                |                             |                             |                   |
| Mandibular foramen            |                             | —    | —                 |                |                             | —                           | —                 |
| Angular Process               | Angular process incomplete? | —    | —                 | ~30° inflected | Angular process incomplete? | Angular process incomplete? | ~30° inflected    |
| Alveolar Morphology           |                             | —    | —                 |                |                             |                             | —                 |
| Height at first alveolus (mm) | 1.54                        | 1.51 | 1.67 (incomplete) | 2.31           | 2.01                        | 3.17                        | 2.81 (from break) |

Fig. 4. Table comparing features of Prince Creek Formation mammals. Morphotype numbers correspond to the numbers in Fig. 3.

## Conclusions

- There are at least 5 different morphotypes of mammals that we have jaws for, these being morphotypes 1 and morphotypes 4-7 shown in Fig. 3.
- We do not have any multituberculate jaws as they are very distinctive in part due to their greatly extended masseteric fossa, complete lack of an angular process, and relatively short length.
- Since multituberculates account for 2 of the 4 previously known mammals from the Prince Creek Formation, there are at least 7 morphotypes of mammals from the PCF
- 3 of these morphotypes are not known through teeth

## Acknowledgements

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## References

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Jaelyn J. Eberle, William A. Clemens, Paul J. McCarthy, Anthony R. Fiorillo, Gregory M. Erickson & Patrick S. Druckenmiller (2019): Northernmost record of the Metatheria: a new Late Cretaceous pelyomyid from the North Slope of Alaska, *Journal of Systematic Paleontology*, DOI: 10.1080/14772019.2018.1560369