

# Tooth Mark Distribution: An Analysis of Tooth Marks on *Edmontosaurus regalis* Rib Specimens from the Danek Bonebed

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## INTRODUCTION

- When a carnivore feeds on the flesh of an animal, their teeth will leave marks on the bone<sup>1</sup> that will sometimes remain when the specimen becomes a fossil.
- Of these tooth marked specimens, many are ribs from the Danek Bonebed<sup>5</sup>, a site in Edmonton which has been a history of excavation dating back to 1989.

## PURPOSE

- Gain insight into dinosaur feeding habits through the layout of tooth marks on the ribs.
- Compare layout of tooth marks to find patterns<sup>2</sup>.
- Propose reasons for the high concentration of tooth marks in certain areas.
  - Ribs are a high-economy element for tooth marks because of the organs they conceal.

## METHODS

- Analysis of approximately 20 UALVP rib specimens originating from the Danek Bonebed.
  - Mapping photographed tooth marks from specimens onto a virtual diagram (Fig 1-3).
  - Visual analysis of results.
- Compare the number of definitive tooth marks found on the rib head versus those on the rib shaft.
  - Wilcoxon test - compares the medians of small sample groups and determines significance.
- Create a rose diagram<sup>3</sup> using measured angles to determine directionality of the marks.



Fig 1. A photograph of a tooth-marked bone.



Fig 2. Outlining the tooth marks.

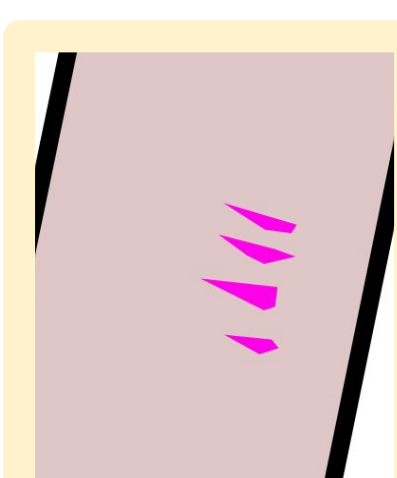


Fig 3. The tooth marks transferred to the diagram.

## RESULTS

### Layout of Tooth Marks on Rib Specimens

*Rib head vs. rib shaft tooth marks*

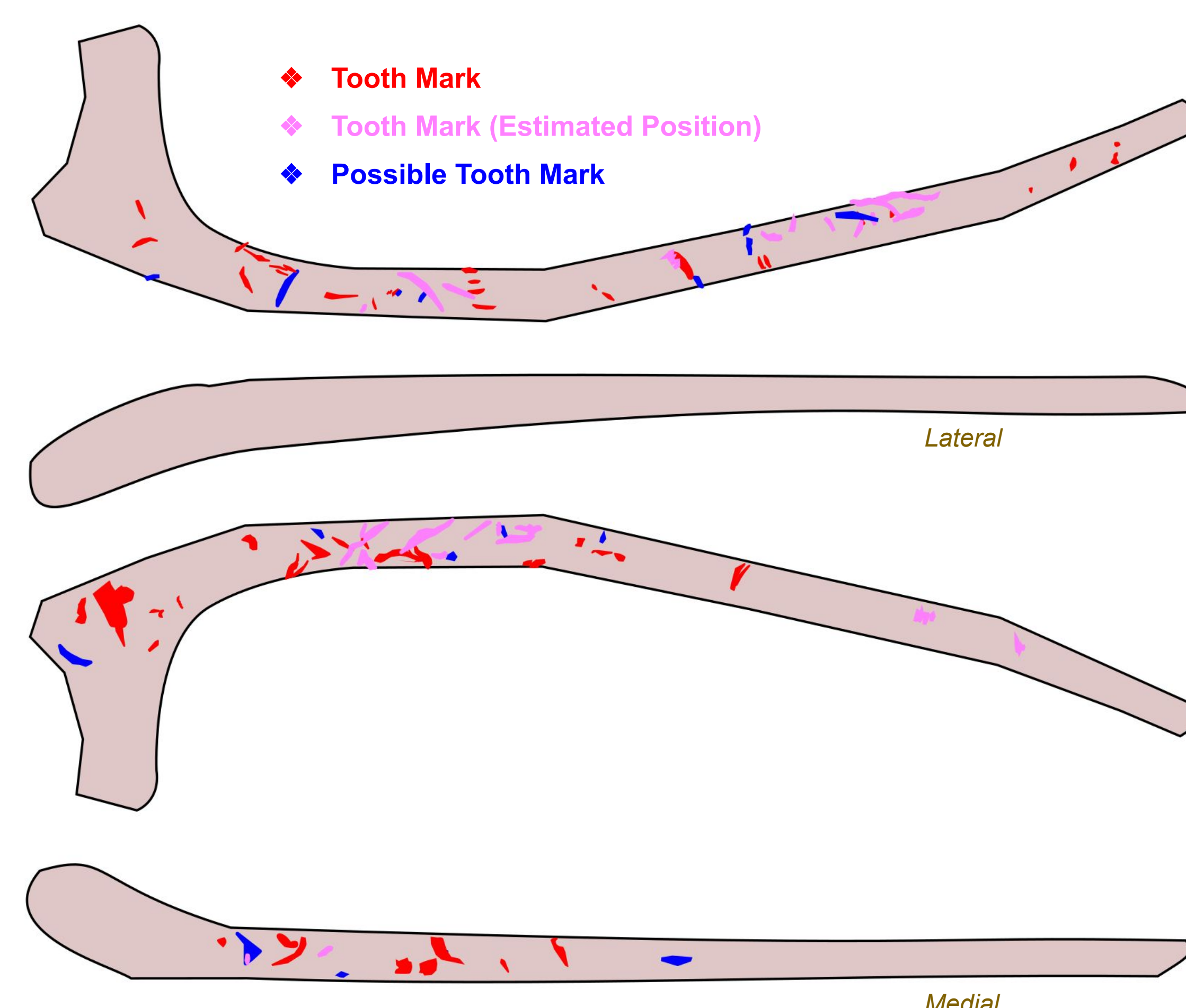


Fig 4. Tooth marks are left along various sections of the rib and nearly every surface of the bone. Fragment placement must be estimated.

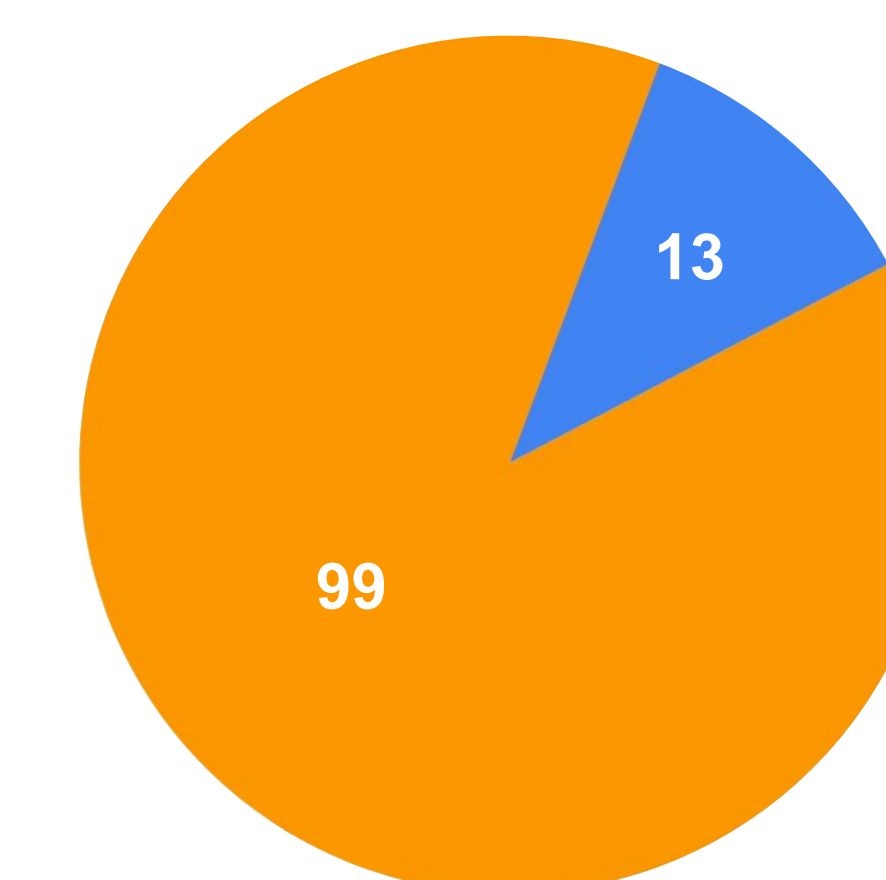


Fig 5. Number of tooth marks on the Rib Head compared to the Rib Shaft.

- 112 tooth marks were counted on 17 Danek rib specimens.
- 11.6% of tooth marks were on the rib head.
- 88.4% of tooth marks were found on the rib shaft.
- Wilcoxon test resulted in **significantly different** medians between the rib head and rib shaft.

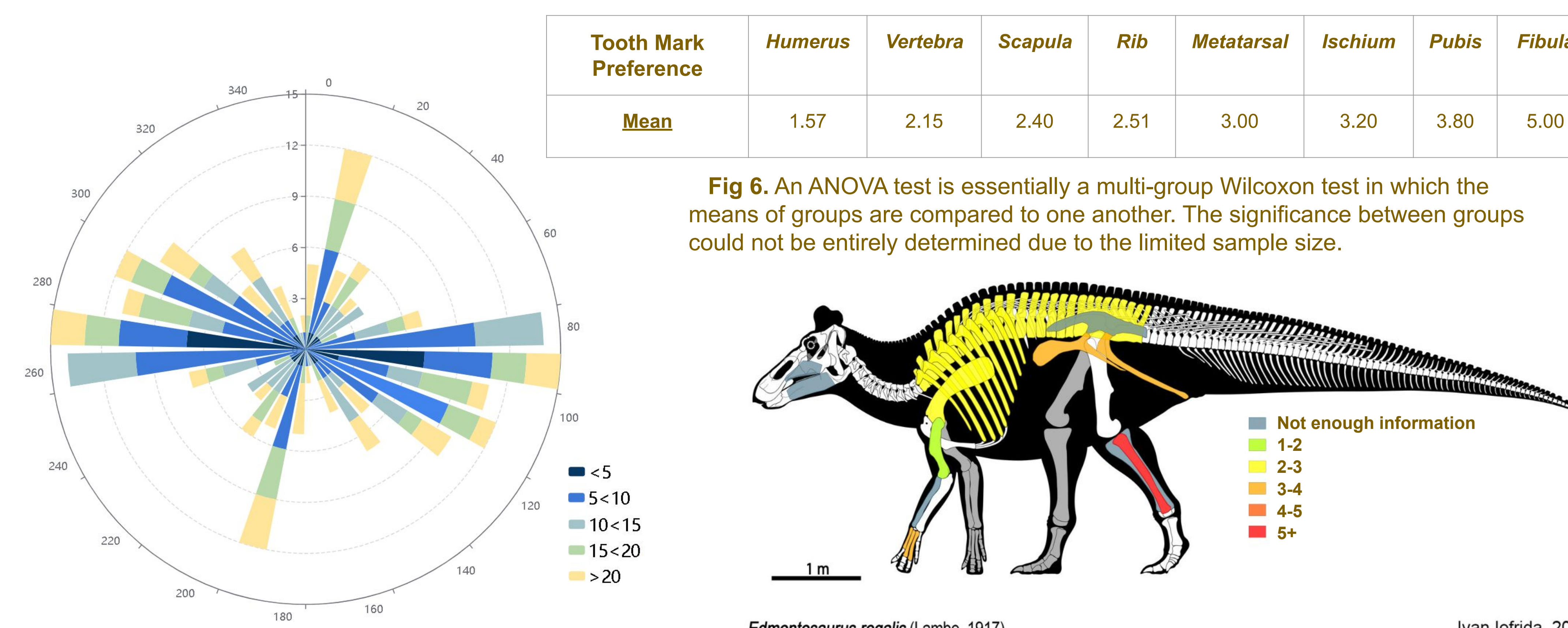
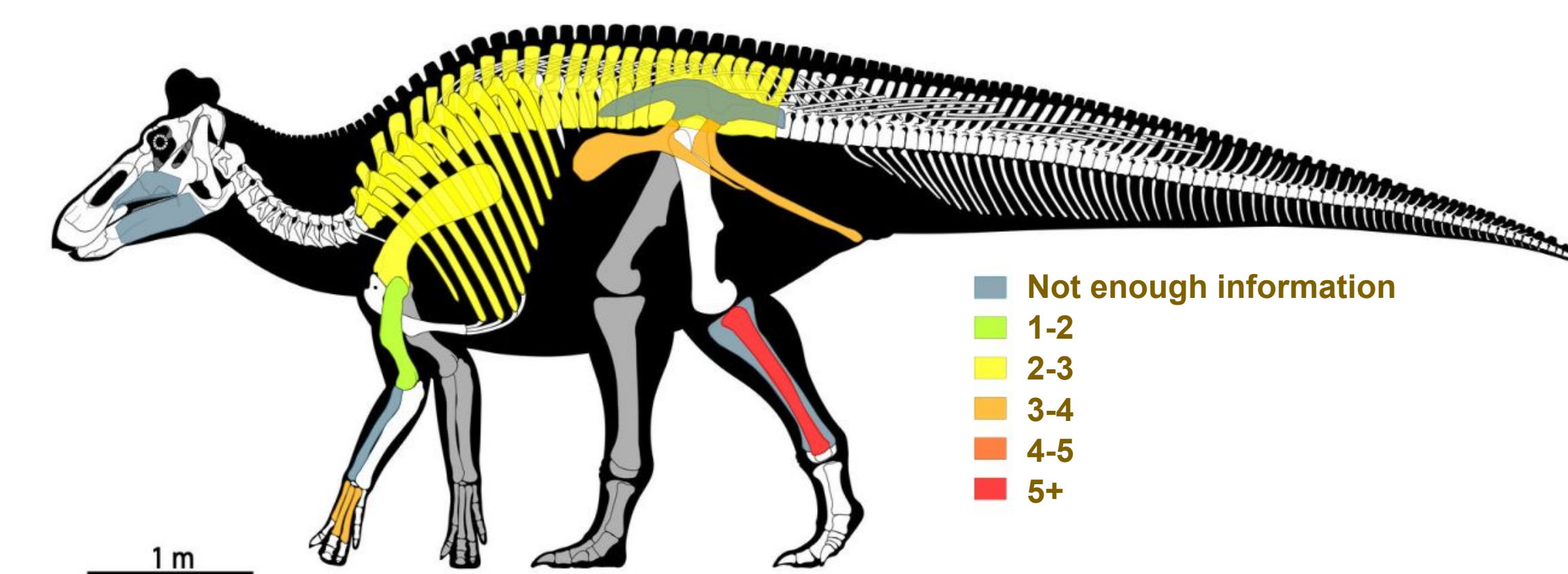


Fig 7. After splitting tooth marks into categories based upon angle, a directional tendency can be determined through a sort of circular bar chart (rose diagram).

- Tooth marks tend to appear across the width of the bone, perpendicular to the length.



*Edmontosaurus regalis* (Lambe, 1917)

Ivan Iofrida, 2022

Fig 8. A Visual Representation of Tooth Mark Preference on *Edmontosaurus regalis* (Original Art by Ivan Iofrida, 2022).

- Ribs have a similar focus level to other bones in the thoracic area.
- Many bones were left out of analysis due to small sample sizing.

## CONCLUSIONS

- More tooth marks are found on the rib shaft than the rib head, possibly due to a desire for organs or the accessibility of the rib shaft structure.
- The area of bone attributed to each section may also be a factor.

Next steps in furthering research:

- Apply a similar study to other bones of focus.
- Consider flesh and predatory motivations.
  - Studies in modern animals
- Consider softness of rib bones in comparison to other bones of the body.<sup>4</sup>

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