Dental and temporomandibular joint pathology of the walrus

Maxillae and/or mandibles of 76 walruses *(Odobenus rosmarus)* housed in the Museum of the North, University of Alaska, Fairbanks were examined macroscopically according to predefined criteria. The museum specimens were acquired between 1932 and 2014. Forty-five specimens (59.2%) were from male animals, 29 (38.2%) from female animals and two (2.6%) from animals of unknown sex, with 58 adults (76.3%) and 18 young adults (23.7%) included in this study. The number of teeth available for examination was 830 (33.6%); 18.5% of teeth were missing due to post-mortem artefactual loss, 3.3% were deemed to be absent due to acquired tooth loss during the animal's life, and 44.5% were absent because either the animal was born without that tooth or it was lost early in life.

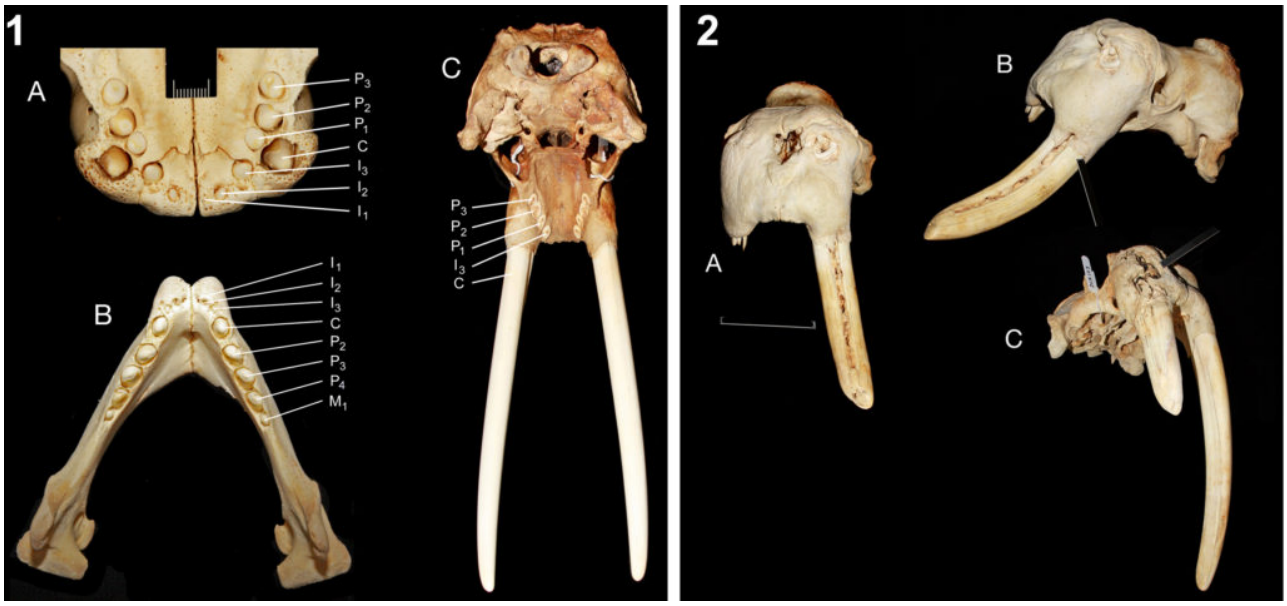

Fig. 1. Representative dentition of the walrus. (a) Maxilla of a juvenile specimen. (b) Mandible of a juvenile specimen. (c) Maxilla of an adult specimen. Bar, 1 cm.
2. Complicated crown-root fractures of the right and left maxillary canine teeth (tusks) of an adult male specimen (a, b) and a complicated crown fracture of the right maxillary canine tooth (tusk) in an adult male specimen (c). Note the associated periapical lesions of the left (a, b) and right (c) maxillary canine teeth. End of the scale bar, 1 cm.

The theoretical complete dental formula was confirmed to be I 3/3, C 1/1, P 4/3, M 2/2, while the most probable dental formula is I 1/0, C 1/1, P 3/3, M 0/0; none of the specimens in this study possessed a full complement of theoretically possible teeth. The majority of teeth were normal in morphology; five teeth (0.6% of available teeth) were malformed. Only one tooth had an aberrant number of roots and only one supernumerary tooth was encountered. No persistent deciduous

teeth were found in any of the young adult or adult specimens, nor were any specimens affected by enamel hypoplasia. The majority of teeth (85.5%) displayed attrition/abrasion (wearing down of the tooth). Of the adult and young adult specimens, 90.8% showed some degree of attrition/abrasion on at least one tooth. Walruses do not utilize their teeth to masticate their prey, but their thin enamel layer likely wears down when sand enters their mouth in the process of procuring sea-floor food items. Dental fractures (broken teeth) were noted in eight walruses, affecting 10.5% of specimens and 1.3% of the total number of teeth, nearly three-quarters of which were maxillary canine teeth (tusks). Three specimens (3.9%), all adult males, displayed overt periapical disease (i.e., tooth-root infection). The majority (99.2%) of tooth sockets did not show bone loss secondary to periodontal disease, with only five specimens (6.6%) affected by periodontitis. Lesions consistent with temporomandibular joint osteoarthritis (TMJ-OA) were found in 46 specimens (60.5%) and TMJ-OA was significantly more common in adults than young adults and males than females. Although the clinical significance of dental and TMJ pathology in the walrus remains unknown, the occurrence and severity of these lesions may play an important role in the morbidity and mortality of this species.

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