Dental and temporomandibular joint pathology of the North American brown bear

Maxillae and mandibles of 393 North American brown bears *(Ursus arctos)* housed in the Museum of the North, University of Alaska, Fairbanks were examined macroscopically according to predefined criteria, with 204 specimens meeting inclusion criteria. The museum specimens were acquired between 1905 and 2012. There were 99 specimens (48.5%) from male animals, 87 (42.7%) from female animals and 18 (8.8%) from animals of unknown sex, with 92 adults (45.1%) and 112 young adults (54.9%). The dental formula of the brown bear is I 3/3, C 1/1, P 4/4, M 2/3.

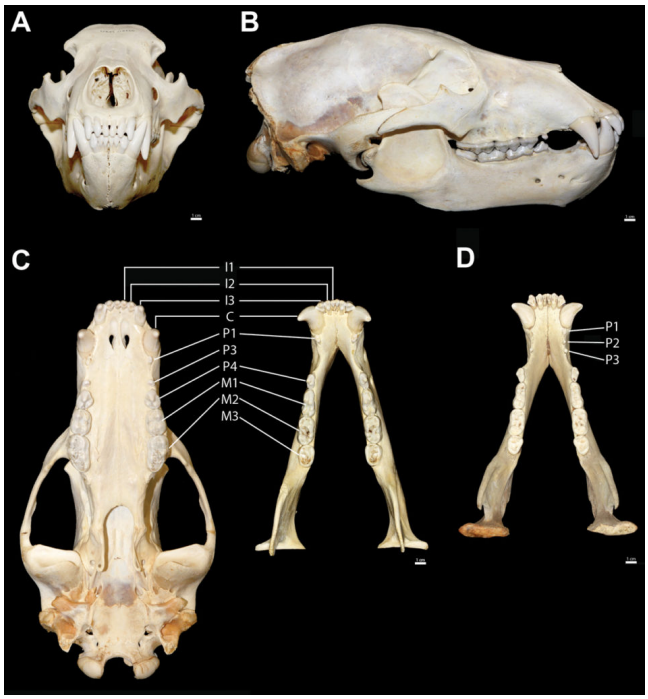

Fig. 1. (A-C) Representative occlusion and dentition of the brown bear. Note that the maxillary second premolar teeth and mandibular second and third premolar teeth are absent in this specimen. (D) Mandible of a specimen with first, second and third premolar teeth present.

The number of teeth available for examination was 6,525 (76.2%); 8.6% of teeth were missing due to post-mortem artefactual loss, 0.8% were deemed absent due to acquired tooth loss during the animal's life, and 14.5% were absent because either the animal was born without that tooth (congenitally missing) or it was lost early in life. None of the brown bears had supernumerary (extra) teeth, persistent deciduous teeth or abnormally formed crowns. Only four of the specimens in the present population were affected by enamel hypoplasia and one specimen contained two mandibular fourth premolar teeth with one root instead of two. All 204 specimens displayed at least

some degree of attrition/abrasion (wearing down of the tooth), affecting 63% of all teeth, ranging from mild wear of the enamel to deep abrasion associated with pulp (inner nerve and blood vessel) exposure. Ten-times more adult than young adult specimens had abrasion causing pulp exposure, while more young adults showed mild attrition/abrasion. Dental fractures (broken teeth) were noted in one-third of brown bears and in 3.0% of the total number of present teeth. More adult brown bears had dental fractures than young adults. There were 11 specimens (5.4%) that displayed overt periapical disease (i.e., tooth-root infection), affecting a total of 20 dental sockets (0.22%), with adults significantly more affected than young adults. Some degree of periodontitis (bone loss secondary to periodontal disease) was seen in 145 specimens (71.1%), affecting 13.6% of all dental sockets.

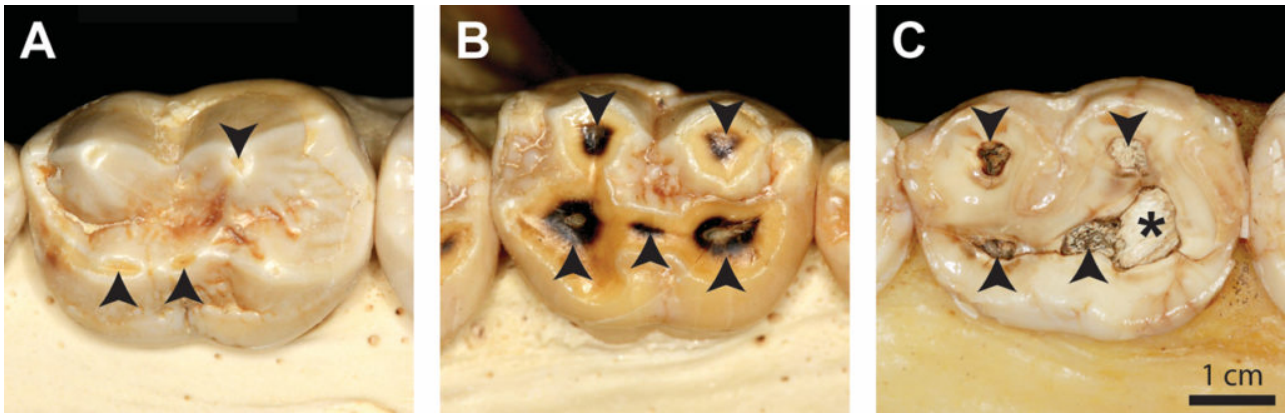

Fig. 2. Maxillary first molar teeth from different brown bear specimens demonstrating attrition/abrasion (arrowheads) stage 2 (A), stage 3 (B) and stage 4 (C). The asterisk in image C labels foreign material lodged in the enamel and dentine defect formed by stage 4 attrition/abrasion (pulp exposure).

Nearly one-third (29.9%) of skulls displayed skeletal and/or dental malocclusion, most commonly a level bite. Lesions consistent with temporomandibular joint (TMJ) osteoarthritis were found in 27 specimens (13.2%). Caries (“cavity”) lesions were discovered in four specimens (2.0%), affecting eight teeth in total. Although the clinical significance of dental and TMJ pathology in the brown bear remains elusive, the occurrence and severity of some of these lesions may play an important role in the morbidity of this species.

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Publication

Dental and Temporomandibular Joint Pathology of the North American Brown Bear (Ursus arctos horribilis, Ursus arctos middendorffi and Ursus arctos sitkensis).
Winer JN, Arzi B, Döring S, Kass PH, Verstraete FJM
J Comp Pathol. 2017 Aug - Oct