Beyond Basic Zooarchaeological Analyses: A Preliminary Catalogue of Skeletal Remains with Pathological Conditions in the UTM Comparative Faunal Collection

Nina LE, Ya Qi MO, Trevor J. ORCHARD, and Michael BRAND
Department of Anthropology, University of Toronto Mississauga

Land Acknowledgement

We wish to acknowledge this land on which the University of Toronto operates. For thousands of years it has been the traditional land of the Huron-Wendat, the Seneca, and most recently, the Mississaugas of the Credit. Today, this meeting place is still the home to many Indigenous people from across Turtle Island and we are grateful to have the opportunity to work on this land.

Introduction

- The Deborah J. Berg Faunal Collection resides in the Department of Anthropology at the University of Toronto Mississauga and serves as a comparative library for teaching purposes and zooarchaeological identification.
- The collection was largely created by Debbie Berg during her more than 25-year tenure as the departmental technician and is currently managed by Dr. Trevor Orchard.
- The collection contains over 1500 animal skeletons, representing more than 460 species.
  - These specimens represent donations from a wide range of sources, including the Metro Toronto Zoo.
- Numerous specimens exhibit intriguing pathological lesions, but these data were not previously catalogued systematically.
- The goal of this project was to create, through visual observation and photographic documentation, a reference catalogue of the pathological specimens in the collection to facilitate teaching and research related to skeletal pathology.
- This poster summarizes the results and highlights some of the interesting pathological specimens encountered during the project.

Data

Pathology Among Specimens in the Collection

We examined 1118 specimens of mammals (469), birds (555), reptiles (71), and amphibians (23).

Table 1. 56 specimens – including 34 mammals, 16 birds, and 6 reptiles – were documented with evidence of pathological conditions.

	Mammals	Birds	Reptiles
Trauma	9	5	0
Other Lesions	25	11	6
Total	34	16	6

Osteoarthritis Among Mammals

Zoo specimens are kept alive to old age in artificial and restrictive environments.

Table 2. There is a relatively high percentage of osteoarthritis among zoo specimens in comparison to their wild counterparts.

	Total in Collection	Speculated with Osteoarthritis	Percentage
Zoo Specimens	35	5	14.29%
Non-Zoo Specimens	434	2	0.46%
Total	469	7	1.49%

Interesting Specimens

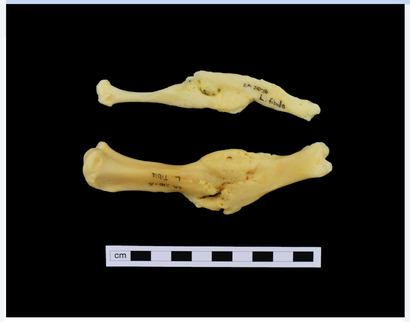

Figure 1. Abnormal bone remodeling in the left tibia and fibula diaphyses of a raccoon (*Procyon lotor*). Speculation: Malunion fracture (Katt et al., 2020).

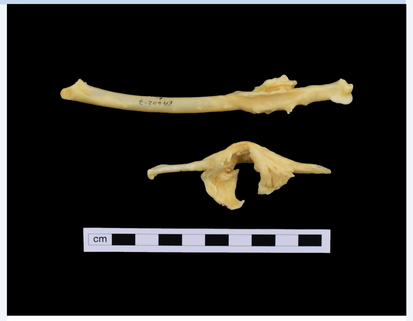

Figure 4. Abnormal bone growth extending outwards from the interstitial space between the left ulna and radius of a red-tailed hawk (*Buteo jamaicensis*).

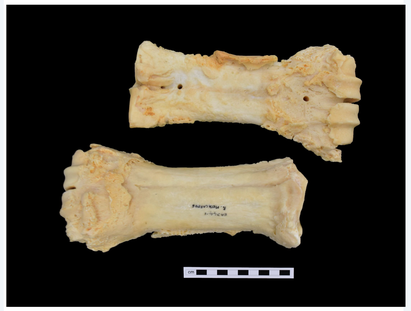

Figure 2. Abnormal bone growth on the sides of the left and right metacarpus of an American bison (*Bison bison*). Speculation: Osteoarthritis (OrthoInfo, 2021).

Figure 5. Abnormal bulbous growth on sternal end of right 13th rib of a domestic cow *(Bos taurus*). Speculation: Osteomyelitis on sternal end of right rib (Johns Hopkins Medicine, 2021).

Figure 3. Abnormal bone growth on the proximal end of the left tarsometatarsus of a broad-winged hawk (*Buteo platypterus*). Speculation: Osteoarthritis (OrthoInfo, 2021).

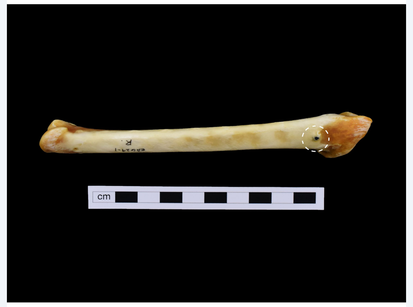

Figure 6. Small metal ball embedded in the proximal end of the right ulna of a wild turkey (*Meleagris gallopavo*). Speculation: Bone remodeling over a lead shotgun pellet (Green et al., 2022).

Interesting Specimens (cont'd)

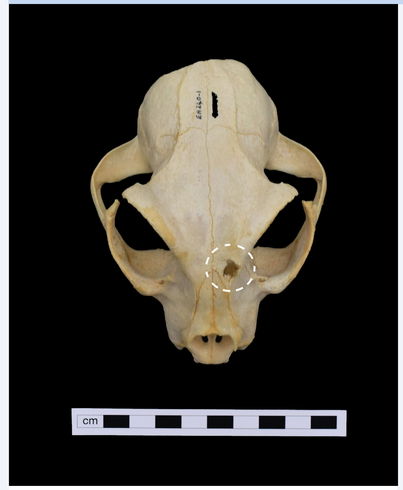

Figure 7. Circular hole through the anterior view of the cranium of a bobcat (*Lynx rufus*). Speculation: Firearm injury (Bird & Fleischman, 2015).

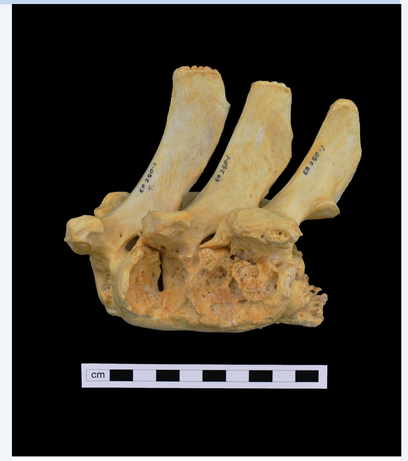

Figure 8. Abnormal bone growth on the thoracic vertebrae of an American black bear (*Ursus americanus*). Speculation: Ankylosing spondylitis (Mayo Clinic, 2022a).

Discussion

- This project represents a first attempt to comprehensively summarize the abundance and diversity of pathological lesions on specimens within the UTM comparative faunal collection.
- The catalogue generated through this project is a work in progress and additional research is needed to better interpret the etiology of the pathological lesions documented.
- In its current form, the catalogue will facilitate the use of the comparative collection for teaching paleopathology.
- The availability of this catalogue will aid future researchers in identifying specimens that may be relevant to a wide range of research topics on animal pathology.

References

Bird, C. E., & Fleischman, J. M. (2015). A rare case of an intact bone plug associated with a gunshot exit wound. *Journal of Forensic Sciences*, *60*(4), 1074–1077. https://doi.org/10.1111/1556-4029.12756

Green, R., Taggart, M., Pain, D., & Smithson, K. (2022). Implications for food safety of the size and location of fragments of lead shotgun pellets embedded in hunted carcasses of small game animals intended for human consumption. *PLOS ONE*, *17*(8), e0268089. https://doi.org/10.1371/journal.pone.0268089

Johns Hopkins Medicine. (2021, August 8). Osteomyelitis. https://www.hopkinsmedicine.org/health/conditions-and-diseases/osteomyelitis#:~:text=Osteomyelitis%20is%20inflammation%20or%20swelling,can%20happen%20at%20any%20age

Katt, B., Seigerman, D., Lutsky, K., & Beredjiklian, P. (2020). Distal radius malunion. *The Journal of Hand Surgery*, *45*(5), 433–442. https://doi.org/10.1016/j.jhsa.2020.02.008

Mayo Clinic. (2022a, September 13). *Bone Spurs*. https://www.mayoclinic.org/diseases-conditions/bone-spurs/symptoms-causes/syc20370212#:~:text=spurs%20on%20spine-,Bone%20spurs%20on%20spine,of%20motion%20in%20your%20joints

OrthoInfo. (2021). *Osteoarthritis.* https://orthoinfo.aaos.org/en/diseases--conditions/osteoarthritis/