H15 The Birds and the Bones: Differential Avian Scavenging Patterns in Determination of Postmortem Interval

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After attending this presentation, attendees will understand the importance of avian scavenging patterns in the taphonomic process and in determining postmortem interval, as well as recognizing a wider range of scavenging bird species and the marks they leave in skeletal material.

This presentation will impact the forensic science community by illustrating the presence and use of differential taphonomic markings left by avian scavenging, which will provide valuable information about postmortem interval and the taphonomic process.

Postmortem interval is measured largely by taphonomic processes, in many cases specifically by insect scavenging activity. Similarly, scavenging by mammals (most notably carnivores and rodents) and avians has been noted and studied in taphonomic and postmortem interval contexts. However, of the eight avian species known to scavenge on the carrion of large animals (including humans) in North America, only two species have had their scavenging patterns studied in-depth. Reeves studied "the accelerated rate of decomposition and the signature markings on the bones" of pig carcasses (*Sus scrofa*) that were scavenged upon by Turkey Vultures (*Cathartes aura*) and American Black Vultures (*Coragyps atratus*).[1]

This study investigates specifically the markings on bones left by the American Black Vulture, the Andean Condor (*Vultur gryphus*), the Bald Eagle (*Haliaeetus leucocephalus*), the Chihuahuan Raven (*Corvus cryptoleucus*), the Common Raven (*Corvus corax*), the Golden Eagle (*Aquila chrysaetos*), and the Turkey Vulture, all of which were housed at the Phoenix Zoo. The Phoenix Zoo does not display all eight species of known North American avian scavengers, including the American Crow (*Corvus brachyrhynchos*) and the California Condor (*Gymnogyps californianus*). Consequently, the results from the Andean Condor are assumed to be representative of the California Condor and the results from the two Raven species are assumed to be representative of the American Crow, due to similarities in their respective sizes, natural habitats, and diets. All of the species were kept in separate enclosures, with the exception of the Turkey and American Black Vultures, which share an enclosure. This ensured a controlled environment free of terrestrial and overlapping avian scavenging which could potentially confuse resulting data. Every species was represented by two birds, except for the Turkey/American Black Vulture population, which were represented by four Turkey Vultures and three American Black Vultures. Over a one-month period, the birds were first given ham hocks (*Sus scrofa*) for two weeks followed by pork ribs and beef ribs (*Bos primigenius taurus*) for two weeks. The specimens were left in the enclosure for several days until completely de-fleshed or until the next scheduled feeding (approximately every two to three days). The bones were then collected, macerated at the forensic anthropology and odontology laboratory, and examined grossly and microscopically.

No visible evidence of scavenging was found on the ham hock bones that were placed in the enclosures during the initial phase of the research. The pork and beef ribs, however, yielded multiple notable results. Grooves and scratches were noted among the specimens recovered from the Bald Eagle, Raven, and Turkey/American Black Vulture exhibits. None of the observed marks appeared to be consistent with rodent scavenging, implying that only avian scavenging marks were present. The marks observed on the specimens provided to the Turkey and American Black Vulture population appear consistent with those described by Reeves.[1] Initial observations of the marks left on the specimens provided to the respective Bald Eagle and Raven populations appear macroscopically to be distinct in overall morphology (i.e., length and overall appearance), from those noted in the Vulture populations, and from those noted in Reeves.[1] Microscopically, however, all marks appeared to display a similar, rounded cross-section very similar to that of the aforementioned populations.

Because the ranges of these birds vary between species, especially due to seasonal migration, analysis of differential taphonomic markings left by avian scavenging will provide valuable information about postmortem interval and location of death (i.e., if the remains are moved postmortem). For example, Bald Eagles are normally only present in the Desert Southwest and the Midwest during the winter (with the exception of a small, year-round population in south-central Arizona).[2] Human skeletal remains found in non-winter months in these geographic regions and displaying marks that are consistent with Bald Eagle scavenging can then be inferred to have been exposed for at least a portion of one winter, further refining postmortem interval and taphonomic processes.[1]

References:

1. Reeves NM. Taphonomic effects of vulture scavenging. *J Forensic Sci* 2009;54(3):523-8.
2. Dunn JL, Alderfer J. National Geographic field guide to the birds of North America, 6th ed. Washington: National Geographic Society, 2011.

Avian Scavenging, Postmortem Interval, Taphonomic Processes

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