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OSTEOARTHROSIS IN A WOLF *(Canis lupus)* RADIO-TRACKED IN MINNESOTA

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Abstract: Osteoarthrotic changes are described in the skeleton of an old wolf *(Canis lupus)* from Minnesota. Osteophyte formation appeared sufficient to restrict severely the range of motion of the joints. Despite this impairment the wolf ranged over 100 km^2 and killed a minimum of one or two adult white-tailed deer *(Odocoileus virginianus)* during a 6-week period between capture and death.

INTRODUCTION

Osteoarthrosis appears to be rare in wild canids,[4] and few cases have been reported in wolves.[2,7,13] Unlike dogs *(Canis familiaris),* in which this condition is common in older individuals,[1,12] wolves rarely reach an age at which the condition becomes significant. Mahan and Gipson[8] described a severely arthrotic 14-year-old coyote × dog hybrid from Nebraska. With one possible exception,[7] the literature contains no information on how wolves affected by degenerative joint disease may fare in the wild. In this report we describe the condition and behavior of an arthrotic wolf that was captured and radio-tracked in Minnesota.

CASE HISTORY

During a field study of wolf ecology in Minnesota,[5] an adult male wolf was steel-trapped in Beltrami County on 19 July 1975. The wolf (#5157) was anesthetized, examined, weighed, measured, ear-tagged, blood-sampled, fitted with a radio-collar and released. No injury to the foot from the trap was detected. The animal was thin, weighing 33.5 kg ($\bar{x}$ wt of six other adult males captured in the study area was 38.3 kg); body measurements suggested he once weighed considerably more. Tooth wear and graying of the pelage suggested advanced age. Although subjectively judged to be in poor condition at capture, the wolf struggled a great deal in attempting to pull free of the trap.

After release, #5157 was located via a tracking aircraft on eight occasions: 23 and 29 July and 1, 4, 11, 15, 20, and 26 August. He was observed alone resting or sleeping on 4 of these dates. Unfortunately, he was not observed walking or running. The wolf was thought to be associated with a telemetered pack whose pups were located within 1 km of his capture site, although he was not located with them after being captured. The eight radio-fixes covered a minimum area[11] of 100 km^2, which generally corresponded with the territory of that pack.

On 29 July, #5157 was located 2 km outside the known territory of his pack and was seen resting in a dry marsh within 3 m of a dead adult deer which he apparently had just killed but had not yet fed upon. No other wolves were observed at the location, and the other instrumented members of the pack were not in the area.

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Therefore it appeared that #5157 had killed the deer alone. He was at the same location on 1 August, at which time the deer was virtually consumed. Examination of remains of this deer revealed it to be female, 12 years of age; age was based on cementum layers in roots of the incisors.[6]

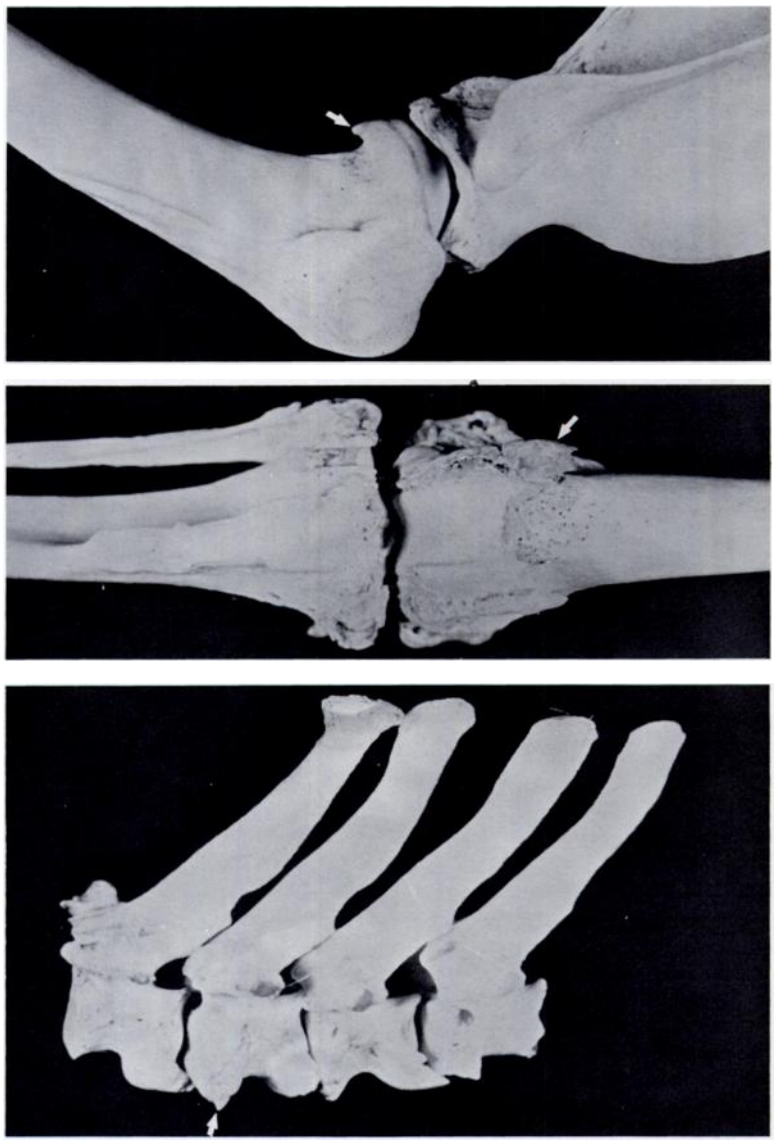

FIGURE 1 a-c. Osteophyte formation at various points on skeleton: (a) scapulohumoral joint, (b) stifle joint, (c) vertebrae.

After 26 August the radio signal became stationary at another location. On 4 September this site was checked from the ground, and the wolf was found dead. Also present were fresh remains of a 6-year-old male deer that appeared to have been eaten by a wolf (wolves?). The wolf's skeleton was not dismembered, but cause of death could not be determined because the carcass was decomposed.

Examination of #5157's skeleton revealed extensive periarticular osteophyte formation at the scapulohumoral and stifle joints (Figs. 1a and 1b). Osteophytes were particularly prominent along the medial and lateral trochleae of the distal femora and the margins of the medial and lateral condyles of the proximal tibiae. Osteophytes were evident on the ventral aspect of the 7th cervical, the 1st, and 5th-8th thoracic vertebrae (Fig. 1c). Although not complete, these lesions were progressing toward spondylosis. Osteophytes also were noted at the cranial and caudal articular processes of C7-T1. Unfortunately, it was impossible to determine the etiopathogenesis of the arthrotic changes from the skeleton.

Several traumatic bony lesions were present. Healed fractures were observed at the angle and midbody of 2 ribs and at the dorsal tip of the 4th thoracic vertebra (Fig. 2). A bony projection was evident at the medial angle of the right ischiatic

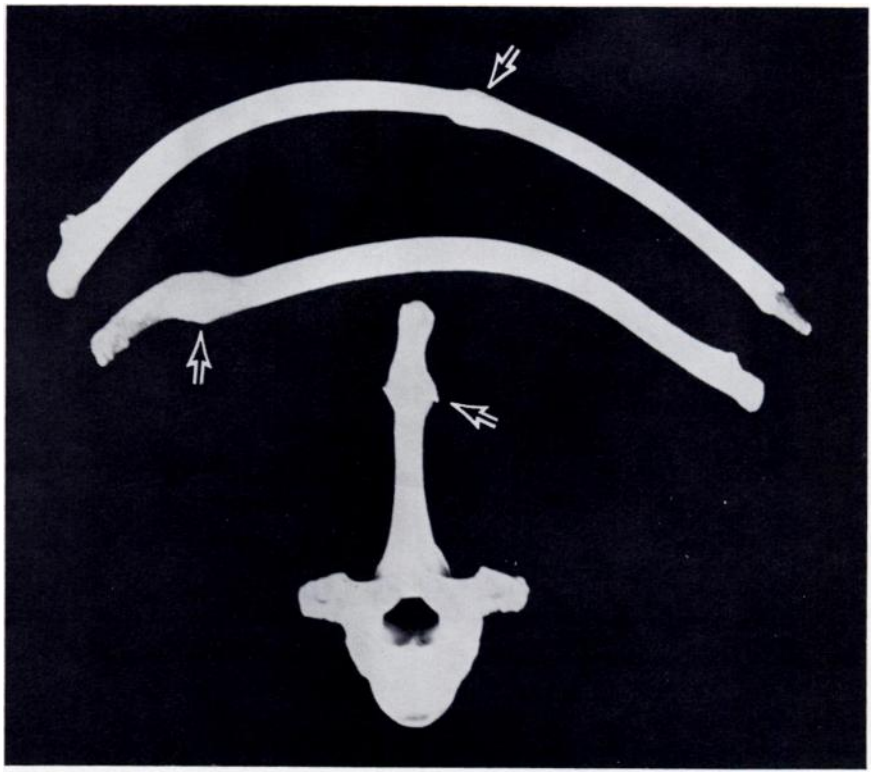

FIGURE 2. Healed fractures of 2 ribs and healed fracture at the dorsal tip of the 4th thoracic vertebra.

tuberosity near the origin of the semimembranosus muscle (Fig. 3). This lesion appeared to be the result of a traumatic stretching or pulling of the periosteum at the muscle's origin.

The osteoarthrotic changes observed, particularly those involving the stifle, could have severely restricted the range of motion of the joints and reduced mobility and agility of the wolf. Considerable agility normally is necessary to capture prey and survive in the wild.[9] Therefore it is remarkable that the wolf was able to kill at least one and possibly two deer. Ages of the two deer involved are noteworthy. Deer over 6 years old are rare in northern Minnesota.[3,10]

The 12-year-old deer was the second oldest within a sample of 48 deer killed by wolves in northwestern Minnesota.[5] Among 715 deer killed by hunters in that general part of the state in winter of 1974-75 and 1975-76, none were over 11.5 years. Therefore, it is likely that the extreme age of at least one of the two deer was a major factor in the wolf's being able to kill it.

The survival of #5157 to his age and condition at death is remarkable because wolves were heavily exploited by humans in that part of Minnesota until 1974. Longevity of this wolf implies considerable experience at hunting and killing deer and avoiding humans. That experience probably could partially compensate for the loss in mobility that must have accompanied his osteoarthrotic condition.

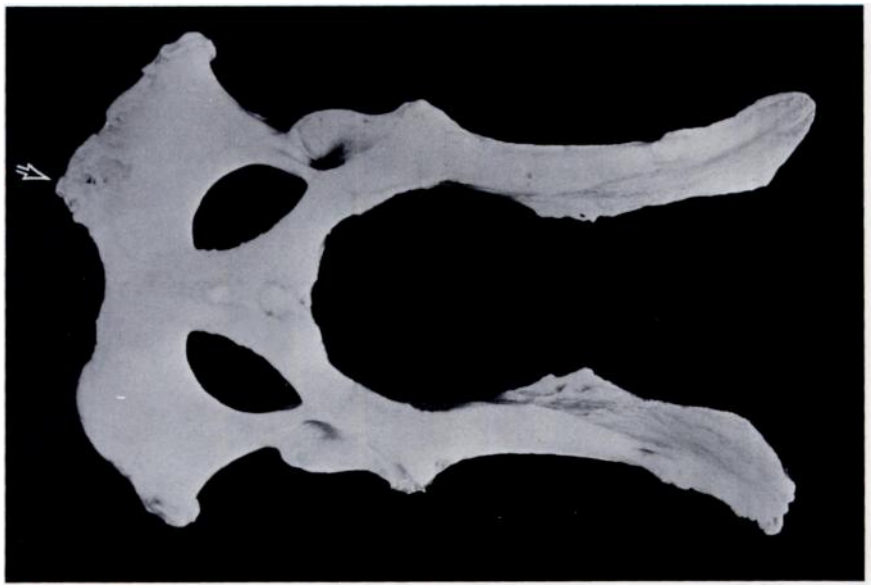

FIGURE 3. Bony projection at medial angle of the right ischiatic tuberosity.

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