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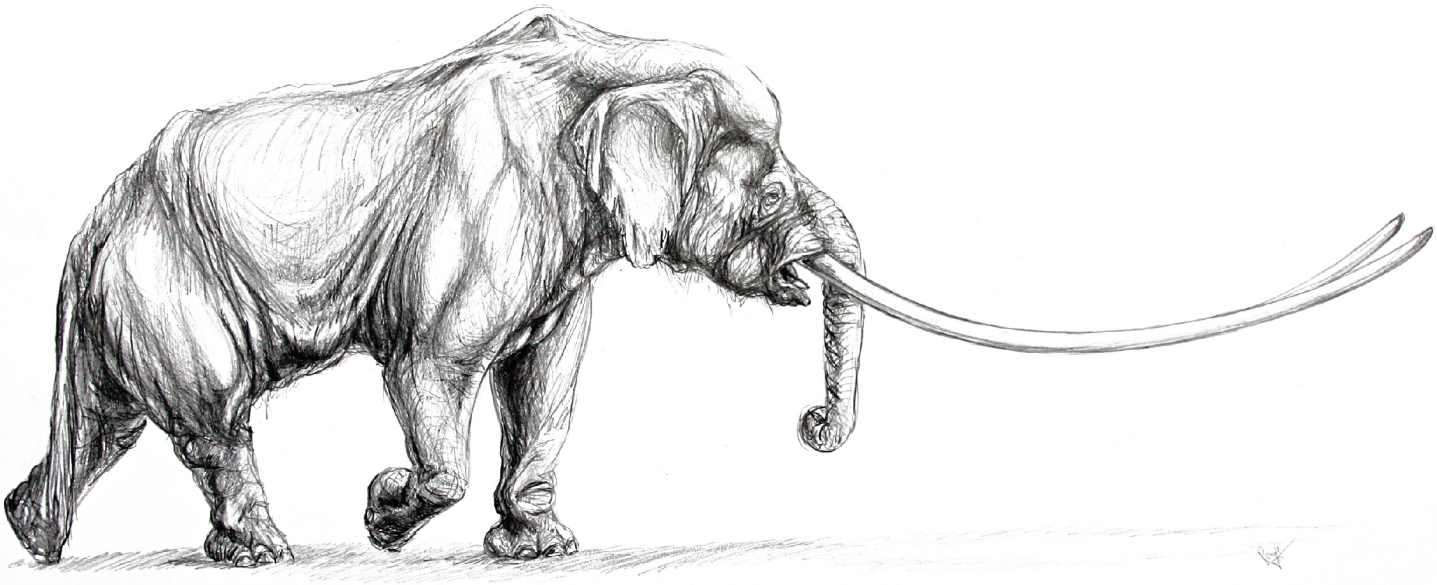

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ABSTRACT BOOK

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Trauma, injury, and bone lesions in an African elephant population

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A number of pathological or abnormal specimens of bones, tusks, and teeth have been observed in a sample of nearly a thousand African elephant skeletons examined during three decades of actualistic fieldwork in Zimbabwe's wildlife reserves (Fig. 1). This presentation describes some specimens and compares them to similar prehistoric examples seen in mammoth and mastodon assemblages.

The most common traumatic injury to *Loxodonta* osseous tissue is tusk-fracturing from head-on fighting or aggressive jostling at water sources. Elephants in different regions of Africa break tusks to different degrees, depending on annual rainfall variations that affect competitive feeding and drinking behavior (Steenkamp et al. 2007). In Zimbabwe, the breaks do not result from the use of tusks in digging or lifting, but from direct percussive impact of the tips against the bodies or tusks of other individuals.

Loxodonta ribs are frequently broken. This sort of injury is not uncommon in very large animals. The famous *Tyrannosaurus rex* dinosaur skeleton nicknamed "Sue" has three fractured ribs of unknown cause, one of which did not form a union of the broken segments, and marine megamammals such as Fin and Humpback whales also suffer rib fractures from (presumably) killer whale attacks (Hellier et al. 2011), similar to what has been recorded on North American Mosasaur skeletons of the Late Cretaceous (Everhart 2001-2012; http://www.oceansofkansas.com/mosapath.html). *Loxodonta* has no predators capable of inflicting such injuries; their traumatic fractures result most likely from aggressive shoving, although accidental falls or deliberate rolling in dust or mud also may account for the blunt trauma. Fully or imperfectly healed rib fractures are surprisingly common in male and female *Loxodonta* in Zimbabwe's game reserves, occurring at a very roughly estimated frequency of 10% of individuals, based on observations of skeletons from drought/starvation deaths and culling operations. Instances of incomplete healing and complete repair of broken ribs also have been noted with mammoths (e.g., Kirillova et al. 2012).

Traumatic spiral-fracturing of *Loxodonta* limb bones are known from a few cases that led to death before callus-formation or in the first stage of it, probably 1-3 weeks or less after the injury was suffered. Such fracturing produces rounding and polishing of fracture edges. No healed fractured limb elements have been seen in *Loxodonta*, but a fractured and completely healed mammoth fibula from Krakow-Spadzista B site was described by Krzemińska (2008). The traumatic fracturing in *Loxodonta* may result from torsion breaks when individuals move

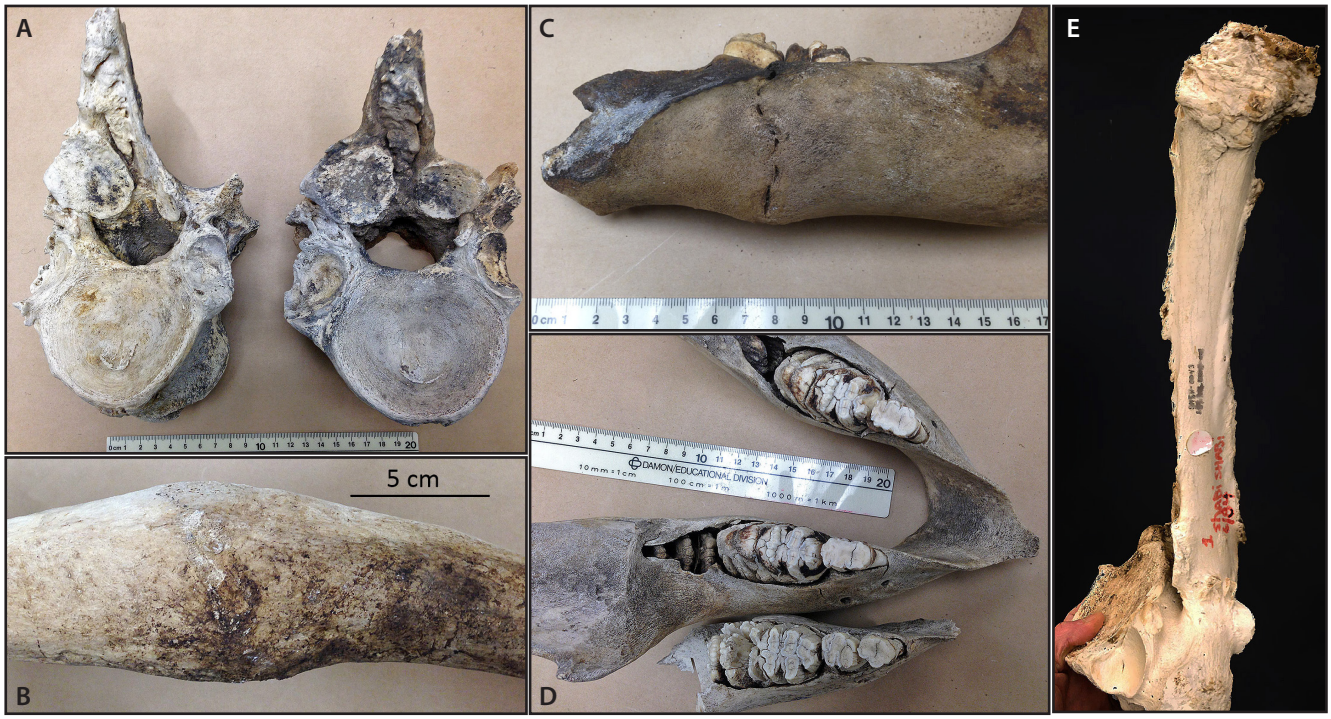

Fig. 1. **A**, Two thoracic vertebrae (which articulate) from an old female elephant; note the sharp bone growths and the extreme asymmetry of the left and right articular facets. **B**, a broken and nearly completely healed rib of an adult female elephant. **C**, a broken but healing half-mandible of an elephant calf in Laws age class III (~1 year old), possibly broken during birth; the M1/dp2 has very light wear. **D**, a normal mandible of an elephant calf in Laws age class III, ~ 1 year old, next to a fragment of a half-mandible of a similarly aged calf showing a supernumerary first tooth, a duplicate M1/dp2. **E**, a thoracic vertebra from an old male elephant, showing calcified ligaments and 'lipping' on articular facets.

across rough ground and one leg becomes twisted, or from heavy falls down hills or inclines, or from some other as-yet unknown events. Complete healing of the largest limb elements has been recorded for large terrestrial ungulates such as Pleistocene bison (Kierdorf et al. 2012) and modern cattle, but apparently proboscideans do not survive such major trauma.

Probable arthritic bone lipping on limb elements and vertebrae has been recorded in very old *Loxodonta* individuals. Two thoracic vertebrae from a young adult *Loxodonta* (possibly male) present lesions (abscesses) where interspinous ligaments attach, similar to what has been recorded on Krakow-Spadzista Street B mammoths (Krzemińska 2008). The cause may be disease organism (IVD, intervertebral disc disease?) or, equally likely, severe reaction to strain on the spine, perhaps caused by chronic head-to-head fighting (Krzemińska 2013, pers. comm.).

Tooth abnormalities or extreme wear have been seen in a few *Loxodonta* individuals. In one case, a lower M3 appeared to have broken medio-laterally, interfering with occlusion and the normal progression of forward movement in the bone. Extreme dental wear, showing complete loss of enamel from tooth surfaces, has been recorded, although not frequently, possibly because the region's recurring droughts may have removed older and hence more vulnerable animals from populations before they reach an advanced age. Several cases are known of supernumerary teeth, notably of the first molariform tooth (called M1 by biologists, or dp2 by paleontologists).

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