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Brief Communication

Care in the community? Interpretations of a fractured goat bone from Neolithic Jarmo, Iraq

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ABSTRACT

A case study of a goat metatarsal exhibiting a complex diaphyseal fracture from Pottery Neolithic Jarmo in the Central Zagros region of the eastern Fertile Crescent is here described and analysed. The Central Zagros is one of the areas with the earliest evidence for goat domestication. The significance of the pathology may be viewed within the context of domestic goat ecology in the landscape of Jarmo, potentially impacting browsing behaviour (goats raise themselves on their hind limbs to browse) and movement with the herd in the landscape (the terrain around Jarmo is very steep in places, which would be difficult for an animal to navigate on three legs). In the light of this, possible levels of care that the Neolithic human community may have afforded this animal are discussed – from a situation where therapeutic intervention may have occurred, to one of stall confinement of the animal to allow the pathology to heal, to a position of simple awareness of the condition – and how this impacts on our understanding of changes in attitudes towards animals through the process of domestication.

1. Introduction

Past cultural attitudes towards animals can be revealed through the study of pathologies in zooarchaeological material (Bendrey, 2014; Upex and Dobney, 2012). Traumatic injuries, as discussed below, can give insights into possible cases of accident, abuse, 'occupational' injury, care and treatment of domestic animals (e.g. Baker and Brothwell, 1980; Groot, 2008; MacKinnon, 2010).

A pathological goat (*Capra hircus*, L. 1758) metatarsal from the site of Jarmo, Iraq, is described here, and the possible insights that this specimen provides in terms of past human–animal relationships are briefly explored. These potential insights begin to take on some significance when viewed within the context of animal domestication. Domestication is now regarded as a long and gradual process, involving an intensification of human–animal relationships (Dobney and Larson, 2006; Vigne, 2011; Zeder, 2011, 2006). Further, the site of Jarmo is located in the eastern Fertile Crescent, one of the regions of early goat domestication, and is one of the earliest sites in this region where there is clear and unequivocal evidence for domestic goat husbandry (Stampfli, 1983; Zeder, 2008; Zeder and Hesse, 2000).

2. The site of Jarmo

Jarmo is a late Pre-Pottery Neolithic (PPN) and Pottery Neolithic (PN) settlement located in north-east Iraq (Fig. 1) and was excavated by Robert Braidwood between 1948 and 1955 (Braidwood and Howe, 1960; Braidwood et al., 1983). The site is located on a promontory above the Cham-Gawra wadi (Fig. 2) in the intermontane valley of Chemchamal, at around 800 m above sea level. At the time of excavation, Jarmo was one of the earliest settlements with evidence for a farming economy. Jarmo is interpreted as a permanent, year-round settlement of an early village-farming community. It reached 1.3 hectares (3.2 acres) at its greatest extent and was inhabited by an estimated 150 or more people (Braidwood et al., 1983). The Neolithic inhabitants husbanded animals, cultivated plants, and also hunted and collected wild resources (Braidwood et al., 1983).

Caprine bones (those of goats and sheep) dominate the zooarchaeological assemblage recovered during Braidwood's excavations, with goats predominant (Stampfli, 1983). Analysis of the caprine assemblage by Stampfli (1983) and Zeder (2008) indicate that both domestic goats and sheep were exploited at the site. Domestic pigs are also identified from Neolithic Jarmo, alongside a range of wild animals (Flannery, 1983; Price and Arbuckle, in press; Stampfli, 1983).

Current evidence for the antiquity of domestic goat populations in the Zagros region extends back to *c.*7900 cal BC at Ganj Dareh,

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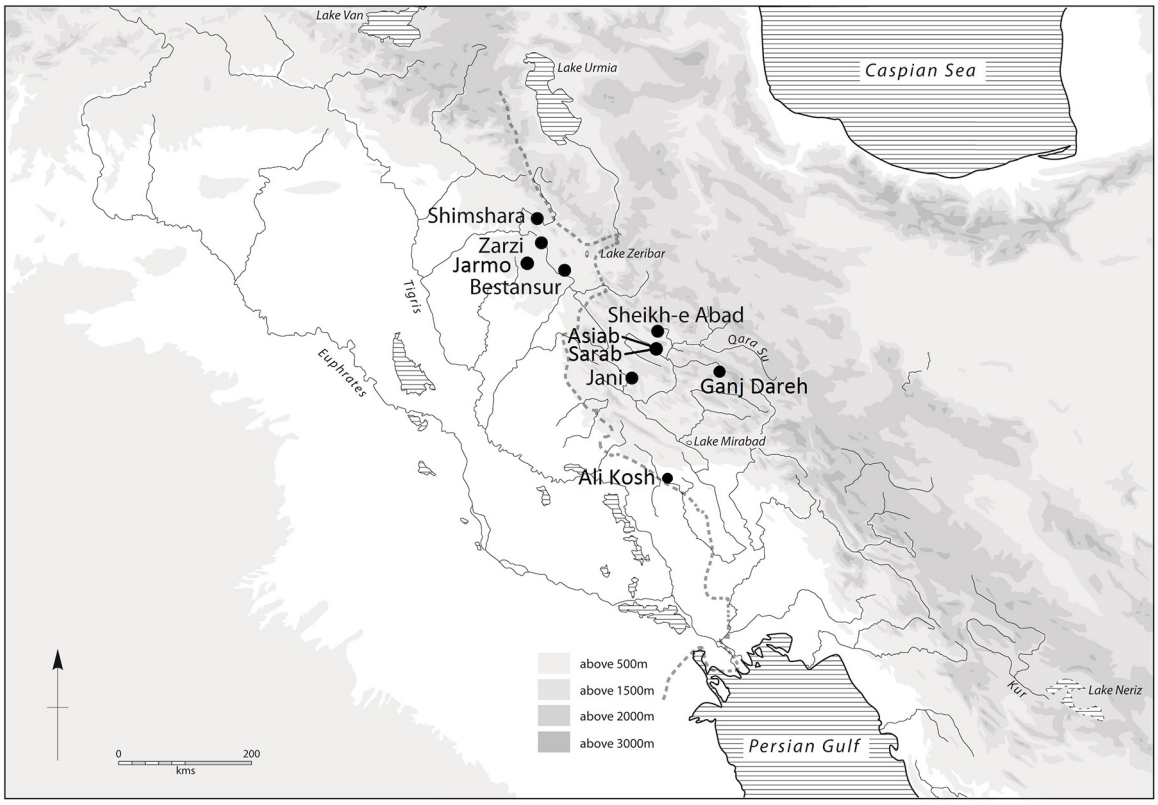

Fig. 1. Location map showing Jarmo in the piedmont zone on the western side of the Zagros mountains and some other key Early Holocene sites in the region.

Fig. 2. The steep escarpment dropping down to the Cham-Gawra wadi from the north-west edge of the site of Jarmo
Photo: author, April 2012.

located in the higher parts of the Zagros mountains (Fig. 1) (Hesse, 1978; Zeder and Hesse, 2000; Zeder, 2005, 2008). The movement of domestic goat husbandry from the uplands, in the natural habitat of goats, has been tracked to the lowland sites of Ali Kosh by c.7500 cal BC (Hole et al., 1969; Zeder, 2008) and to PPN Jarmo by the later eighth millennium BC (Stampfli, 1983) (Fig. 1). The specimen considered here derives from the Pottery Neolithic at Jarmo, dating to around 7000–6500 cal BC (Braidwood et al., 1983, pp. 160–163; Zeder, 2008). See the supplementary material for details of the stratigraphic provenance of the specimen.

3. The specimen: osteological description

The specimen is a left goat metatarsal (Figs. 3 and 4; museum catalogue number PM 61481). The bone exhibits a complex diaphyseal fracture, which has subsequently healed to the point that it is difficult to judge fully the original extent and direction of the breaks. The fractured ends of the diaphysis have united and become stabilised. See the supplementary material for further details and discussion of the specimen.

4. Discussion

Discussions of isolated pathological specimens are clearly limited in terms of what they can contribute to our understanding of past human–animal relationships (Bendrey, 2014; Thomas and Mainland, 2005; Upex and Dobney, 2012). However, this traumatic injury raises interesting questions in terms of human attitudes towards early domestic goats and the level of care that may have been afforded them. These can bring to the fore issues that, as a discipline, we need to be addressing, especially in terms of our understanding of the processes of animal domestication. In this respect, a key question relates to whether there is evidence for therapeutic intervention.

Fig. 3. Medial (a), anterior (b), lateral (c) and posterior (d) views of the pathological goat metatarsal. Lines indicate the three different axes identifiable in the proximal view of the diaphysis – changes in alignment are marked '1' and '2'. Arrows indicate the 'ridge'-like pathological bone formed protruding from the lateral and medial edges of the posterior diaphysis surface.

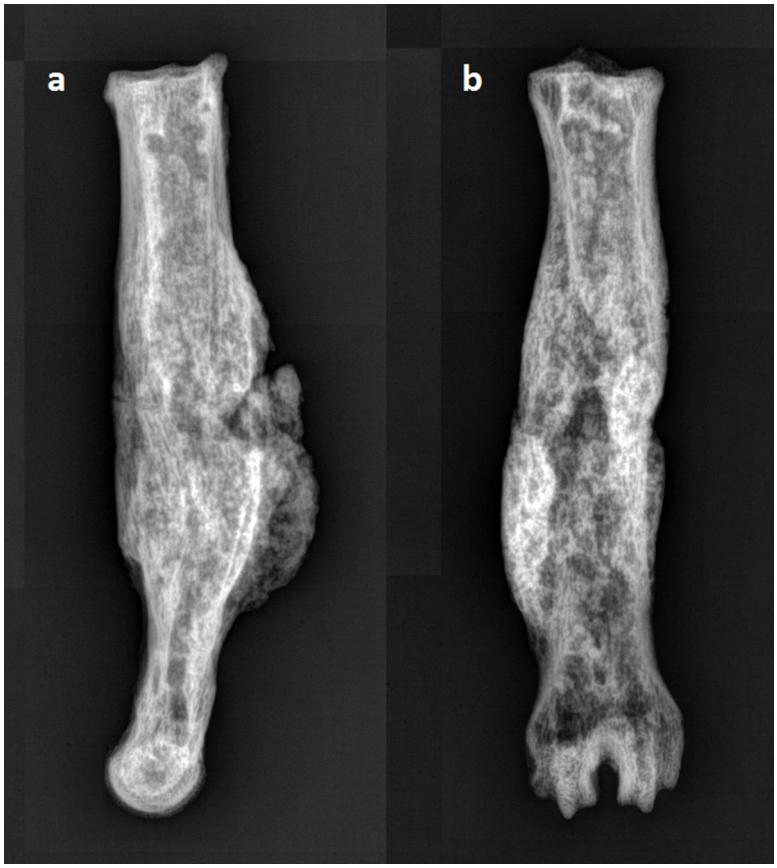

Fig. 4. X-rays of the goat metatarsal in lateral (a) and posterior (b) views
X-rays courtesy of William Simpson, FMNH, Chicago.

Fig. 5. A goat, with most of its weight acting through its hind limbs, browsing near Bestansur, north-east Iraq
Photo: author, April 2012.

The fracture in the goat metatarsal is well-healed and while it is foreshortened there is little medio-lateral deviation (Figs. 3 and 4). This is similar to a number of specimens described by Udrescu and Van Neer (2005) argued to be possible cases of human intervention through reduction and splinting. This interpretation was reached because the bones healed in good anatomical alignment in the absence of a natural splint or surrounding muscle mass to immobilise the fracture (Udrescu and Van Neer, 2005). However, Udrescu and Van Neer (2005) have identified two similar cases of healed fractures occurring in roe deer metacarpals, suggesting that such healing of fractures could also occur naturally. Indeed, small ruminants such as goats and roe deer can fully function on three legs, bearing no weight on an injured limb (e.g. Newman and Anderson, 2006; Smith and Sherman, 1994, pp. 71). As such it is possible that a degree of healing could have been achieved without assistance, such as external immobilisation, assuming the animal was careful.

The potentially serious nature of a complex metatarsal fracture, however, may be viewed within the context of domestic goat ecology at and around the site of Jarmo, in relation to the movement and feeding of the animal. Such damage to a hind limb could have affected the animal's ability to feed, due to the forces exerted through the hind limbs during browsing (Nonga et al., 2009; Fig. 5). Further, around Jarmo the terrain is very steep in places (Fig. 2), and the severity of the fracture could have compromised the goat's ability to move over some of this terrain on three legs. Thus, although there is no evidence for splinting, care or protection may have been provided for this animal by human inhabitants of Jarmo to allow the bone to heal, such as stall confinement. Udrescu and Van Neer (2005, 31) suggest that the natural healing of such fractures "in small livestock can take place without much distortion if the animals are young and if they are nourished and protected by stall confinement for several weeks, with the application of bandages or not". This could have been accomplished in different ways, for example there is evidence for domestic animal pens as far back as c.7600 BC at Sheikh-e Abad (Fig. 1; Matthews et al., 2013). Lastly, the pathology must have been visible to the herders and a conscious decision made not to cull the animal immediately (whether or not any level of care was given in relation to this pathology).

Although we cannot decipher the precise level of care and attention afforded to this goat by the Neolithic herders of Jarmo, the pathology does present a few insights into potential human attitudes. These range from a situation where therapeutic intervention may have occurred, to one of stall confinement of the animal to allow the pathology to heal, to a position of simple awareness of the condition with the decision to not cull the animal. These would all point to differing levels of concern and care for domestic livestock, which may be linked into issues such as herd management decisions and retention of stock/protection of resources, but also perhaps more personal or emotional bonds between humans and their animals. What this find from Jarmo does bring to the fore, when asking these questions, are issues related to the tempo of changes in attitudes towards animals through the process of domestication and precisely how, and when, did early farmers *care* for their stock.

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.ijpp.2014.06.003.

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