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## Horse demography and use in Bronze Age Mongolia

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### ABSTRACT

This paper presents new archaeozoological evidence for horse pastoralism and transport in Mongolia's *Deer Stone–Khirigsuur* (DSK) Complex (circa 1300–700 BCE). As both livestock and transport, the domestic horse fundamentally altered life in the dry steppe of eastern Eurasia. However, the timing and process of mobile pastoralism's adoption in Mongolia and Northeast Asia remains poorly understood. To evaluate previous suggestions of late Bronze Age horse herding in the DSK complex, I produced age and sex estimates for archaeological horse crania from DSK sites across Mongolia. This sample yielded a high proportion of juvenile animals and an elderly female specimen, consistent with the culling practices of contemporary equine pastoralists. However, the sample also contained a significant proportion of 'prime age' adult male animals. This finding is seemingly inconsistent with the practical requirements of pastoral herd management, but comparable with other archaeological assemblages of ritually-sacrificed transport horses. Spatial comparison suggests that these adult males were buried in specific ritual contexts, along the eastern edge of stone mounds known as *khirigsuurs*, while osteological features of the premaxilla point to harnessing or heavy exertion. Together, these data provide compelling evidence that adult male DSK horses were used for chariotry or mounted riding. Results support the interpretation of DSK people as early mobile pastoralists, and suggest an important role for horse transport in late Bronze Age social dynamics and the development of herding societies in Northeast Asia.

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### 1. Introduction

This paper investigates the role of the horse in late Bronze Age Mongolia and its implications for the origins of pastoral nomadism in the eastern Steppe of Asia. As defined here, *pastoralism* refers to the tending of domestic animal herds (Chang and Koster, 1986:99), while *mobile* or *nomadic* pastoralism refers to those types of herding which rely on coordinated movement, and lack permanent settlements (Salzman, 2004:3–6). *Horse transport* will refer to the use of horses for mounted riding, as well as to pull chariots or other vehicles. In modern Northeast Asia, mobile pastoralism is characterized by reliance on the horse as both livestock and transport (Barfield, 2011:109). During the last three millennia, nomadic people from the dry steppes of eastern Asia developed new forms of social organization, forming complex societies and empires that shaped much of modern Eurasia (Rogers, 2012; Honeychurch, 2015). Although horses were domesticated by circa 3500 BCE in western areas of the Eurasian steppes (Olsen, 2003; Outram et al., 2009), a systematic understanding of when and how horse-using

pastoral societies first emerged in Northeast Asia remains elusive. Here, I present demographic and paleopathological analysis of 25 horse crania from late Bronze Age archaeological sites of Mongolia's *Deer Stone–Khirigsuur* (DSK) cultural complex. Using data from dental eruption and wear patterns, I estimated the age and sex of all specimens, evaluating each for cranial pathologies and osteological features related to equine transport using a NextEngine3D scanner. Results provide support for DSK horse herding, with a high proportion of juveniles and senescent mares indicative of management and breeding. Unlike previous studies, this sample also contained a significant proportion of adult male animals. Spatial patterns suggest that these horses were buried in prominent ritual locations along the eastern axis of stone monuments, while osteological features of the skull provide preliminary evidence of their use in transport. Taken together, these data support characterizations of the DSK complex as an early mobile pastoralist society, utilizing the domestic horse for subsistence, ceremony, and transport. Results suggest a sophisticated knowledge of equine ecology, and raise new questions about the environmental and economic conditions under which early nomadic pastoral societies formed in Northeast Asia.

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## 2. Regional setting

The political boundaries of contemporary Mongolia correspond largely with the ecological boundaries of the eastern Steppe (Fig. 1), which extends across a vast plateau extending from Kazakhstan in the west to the mountains bordering Manchuria in the southeast (Barfield, 2011; Goulden et al., 2011). The plateau's location inland of the Himalayas prevents rain-heavy monsoon from reaching the interior, and causes westerly winds to lose much of their moisture as they meet the high Altai mountain range. The result is an arid climate, at both high latitude and high elevation. Winters are long, cold, and dry in Mongolia, although the short summer boasts mild temperatures and is comparatively wet (Goulden et al., 2011:91). Due to extreme seasonality of precipitation, Mongolian herders must move often to prevent overgrazing (Goulden et al., 2011:99), and the horse is the most important form of transport (Bold, 2012:91–92). The horse is also an important livestock animal, providing, meat, dairy, leather, dung, and other important products. As a result, horses remain critically important to subsistence in the modern Mongolian Steppe (Bold, 2012:130).

The development of specialized, nomadic pastoral societies has often been linked to growth of agricultural societies (Lees and Bates, 1974; Khazanov, 1984), and framed as a response to resource scarcity, climate deterioration, and other political and economic consequences of sedentary state formation (Khazanov, 1984:95; Chang and Koster, 1986:105; Cribb, 2004:12–15). In his classic work, Lattimore (1940:58–61) argued that mobile pastoralism in Northeast Asia developed in peripheral groups along the steppe frontier of northern China, as a result of increased

agricultural specialization in Chinese polities during the 3rd and 4th centuries BCE. As access to the Mongolian archaeological record has improved, however, it has become clear that hunting and gathering directly preceded pastoralism as a subsistence strategy in many areas (e.g. Wright, 2006:285; Janz, 2012:185; Clark, 2014:26). Some scholars have suggested that equestrian herding in Mongolia may date as far back as the late Bronze Age, to the late second millennium BCE's *Deer Stone–Khirigsuur* (DSK) complex (Houle, 2009; Fitzhugh, 2009a). This interval might have seen the onset of a comparatively wet and productive climate regime (Wang et al., 2011; Fukumoto et al., 2012:88), and steppe people might have controlled important trade routes across the continental interior at this time (Christian, 2000). If DSK people were indeed mobile pastoralists, this context might warrant reevaluation of the chronology and causes of the formation of nomadic herding societies.

Material remnants from the DSK period with which to evaluate horse use are scarce, consisting primarily of stone monuments (*deer stones* and *khirigsuurs*), and associated sacrificial animal deposits. '*Khirigsuur*' is the Mongolian term for large stone mounds dating to the late Bronze Age, which were built across a wide geographic area, from Baikal to the northern Gobi, starting in the late second millennium BCE. These monuments are typically encircled by a rectangular or circular stone fence (Fig. 2A, Fitzhugh, 2009a). '*Deer stones*' are anthropomorphic standing stones frequently associated with *khirigsuurs*. These stelae are regularly decorated with elaborate deer carvings, from which their name derives, as well as weapons and other images interpreted as warrior motifs (Fitzhugh, 2009a). Some deer stones depict 'bow-shaped'



Fig. 1. Khirigsuur and deer stone sites included in the study (filled dots), as they relate to modern political boundaries and other locations mentioned in the text.

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