Tracking the Bronze Age fauna: preliminary investigations of a new Late Holocene tracksite, Lodbjerg dune system, northwest Jylland, Denmark

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Introduction

The Lodbjerg dune system lies on the North Sea coast in Thy, northwestern Jutland (Fig. 1) (Clemmensen et al., 2001a). It is bounded towards the sea by a coastal cliff lined with by partly fixed cliff-top dunes. The inland part of the aeolian system is formed by stabilized parabolic dunes and a vegetated aeolian sand plain. The dunefield can be characterized as transgressive and evolved episodically since about 2200 BC. The coastal cliff is retreating and displays high quality exposures of the aeolian system, which attains thicknesses of 10-15 m below the present sand plain. The aeolian system, which overlies a Weichselian till, is composed of alternating aeolian sand units and peaty paleosols. The paleosols record periods of dunefield stabilization and are typically of large lateral distribution. Locally the paleosol develops into relatively thick peat deposits of shallow lake origin.

Tracks of domesticated animals have been observed in the aeolian sand deposits as well as in the peaty paleosols (Clemmensen et al., 2001a). In this study we document in some details an Early Bronze Age track fauna observed on the upper surface of a peaty paleosol/lake bog deposit from the Older Bronze Age.

Human settlement

As documented by Liversage et al. (1987) and Liversage & Robinson (1992-93) humans have lived in the study area in a number of periods since about 3200 BC. People began to clear the forest around 2200 BC leaving the area exposed to wind erosion and dune formation during stormy periods. However, during periods of decreased storminess aeolian sand movement diminished, vegetation was re-established and people settled in the area.

In the Late Bronze Age (1100-500 BC) there was a considerable amount of settlement in the area. Settlements were year-round and the Bronze Age farmers probably kept large herds of cattle, and sheep or goats as indicated by the finds of ruminant teeth in midden deposits, and by the common occurrence of tracks of these animals in the aeolian deposits (Clemmensen et al., 2001a).

Fig. 1 — Location map. The Lodbjerg dune system is located in the northwestern part of Jutland, Denmark, just north of the small town Agger. The track-bearing peat horizon is exposed along the beach below Lodbjerg Fyr, indicated by asterisk. Modified from Clemmensen et al. (2001a).

The study site

The new site with tracks is situated at the northern edge of the Lodbjerg aeolian system. The Weichselian till is here draped by a well-developed peaty paleosol and overlain by a relatively thick unit of aeolian sand with internal palesols (Fig. 2). Till and palaeosol dip

towards the north and in this direction the paleosol gradually increases in thickness and develops into a lake bog with a total thickness of 1 m. There is a thin aeolian sand layer near the base of the bog deposit. Tracks are seen in the upper part of the lake bog. Part of the bog is exposed on the modern beach; wave action has removed the overlying aeolian sand revealing the original tracking surface. The top of the lake bog, constituting the trackbearing surface, has been radiocarbon dated to 1265 ± 145 cal. yr. BC, which corresponds to the Early Bronce Age in Denmark. The top of the adjacent peaty palesol has been dated to 608 ± 173 cal. yr. BC (Clemmensen et al., 2001a).

Fig. 2 — The tracksite is part of an extensive horizon with a topographic relief ranging from present day sea level to approximately five metres above present day sea level. The tracks were found on the surface of bog deposits in the lower parts of the horizon, close to present day sea level. The picture is taken from north and show the peat horizon rises to more than 5 metres above sea level in the background of the picture. Human for scale.

The overlying aeolian sand has ages between 700 and 200 years BC (Clemmensen et al., 2001b). The onset of large-scale aeolian sand movement in the Late Bronze Age was probably related to a marked climatic shift and related increase in storminess in northwestern Jutland at about 800-700 BC (Clemmensen et al., 2001b). This event has also been observed at Bjerre in northern Thy, where Bronze Age settlements were covered by aeolian sand at about 700 BC (Clemmensen et al., 2001b).

Tracks

The peat horizon containg the tracks were exposed at the beach at the base of the dune succession. The hardened peat horizon is more resistant to erosion from the sea, than the unlithified dune sands, and thus a large surface had been uncovered due to removal of the overlying aeolian sands by wave erosion (Fig. 2). Where the track bearing surface was exposed to swash from the waves, the shape of the tracks was altered and appeared as undiagnostic depressions in the surface.

The surface carried a high density of tracks, up to 5 to 6 tracks/m^3 in the most heavily trampled areas, and in the best preserved areas the tracks constituted recognizable trackways (Fig. 3). An area of 5x2.7 metres with especially well-preserved tracks was recorded in detail directly on large sheets of transparent plastic, and casts were made of selected tracks using Plaster of Paris.

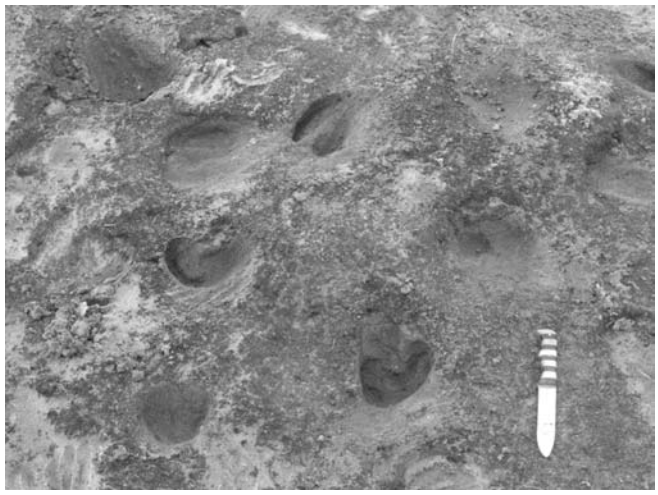

Fig. 3 — Part of the track-bearing surface showing a high density of tracks. The tracks in the left side of the picture is hoofshaped and presumably from an unshod horse, and the tracks in the right side consist each of two crescent shaped impressions and are interpreted as cattle tracks. Scale on knife handle equals 10 cm.

The recorded tracks fall into four distinct different types. Most abundant is a type of bilobed tracks from even-toed artiodactyls. The outline of the tracks is sub circular and the tracks consist of two crescent shaped hoof impressions separated by a raised area. These tracks occur in two distinct size groups; One group has foot lengths between 10 to 13 cm (Fig. 4A) are interpreted as tracks of bovids, in this case domesticated cattle. A group of smaller tracks from 5 to 7 cm length has the same bilobed shape, and are interpreted as tracks of either domesticated sheep or goats (Fig. 4B). These tracks are often occurring paired, as manus/pes couples, and are in many instances partly overprinting each other. A third group of tracks consists of single semilunate hoof imprints with lengths around 10 cm. This morphology suggests the trackmaker to be an unshod horse (Fig. 3). In addition to the tracks of livestock, two tracks of canids were found. The tracks are 8 cm long, with vague im-

pressions of the individual digits and the metatarsal pad (Fig. 4D). The prescence of these tracks in connection with the tracks of the livestock makes it likely that the tracks are from a rather large domesticated dog, although the possibility that the tracks are from a wolf can not be ruled out.

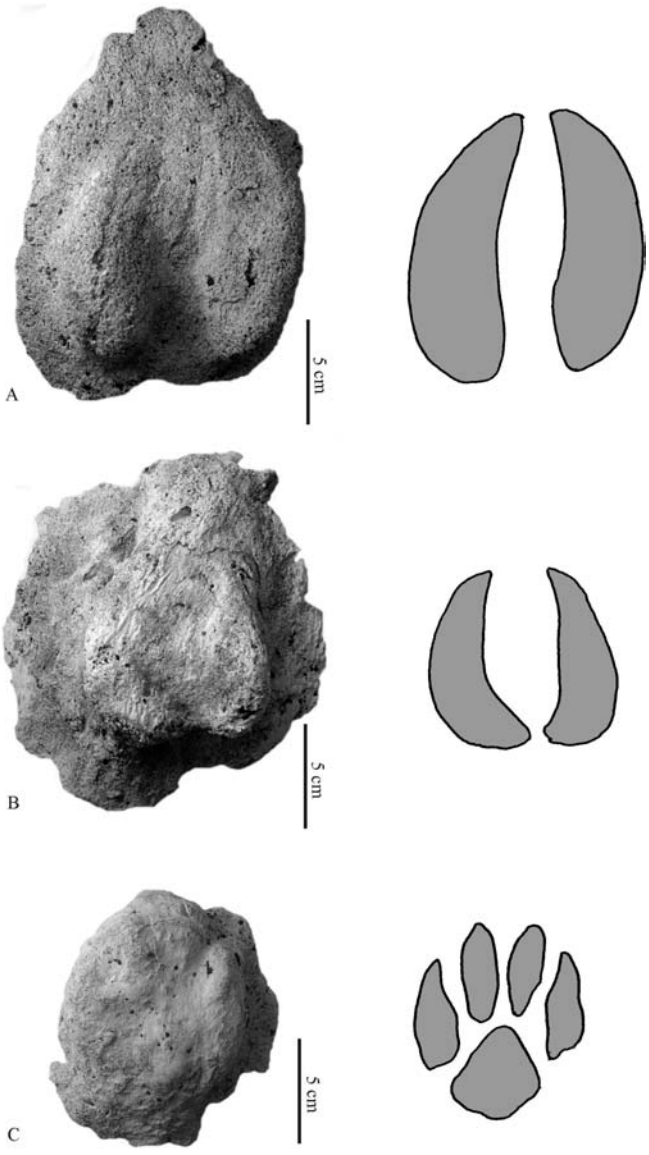

Fig. 4 — Plaster casts of three tracks from the track-bearing surface and interpretative drawings. **A**: large footprint consistening of two crescent shaped hoof impresions. The size and shape suggests that it was made by a bovid. **B**: smaller footprint, possibly made by a sheep or goat. **C**: large canid footprint, probably from a domesticated dog.

Discussion

Reports of Holocene tracks and trackways are scarse in the litterature, in contrast to Mesozoic ichnology which has experienced an enormous increase in interest the last 30 years. Mesolithic footprints of bare-footed humans are described in estuarine clay from the Severn Estuary, Wales (Aldhouse-Green et al., 1993). Early Holocene trackways from artiodactyls, birds and humans have been described from shore-near settlements in Argentina, where the footprints were found in association with bones of sea mammals, artiodactyls and birds (Politis & Bayón, 1995). 145 trackways of red deer, roe deer, aurochs and cranes and humans are described from intertidal silts and sands dating from the Neolithic to Bronze Age from the Formby Point at the Mersey estuary, northwest England (Roberts et al., 1996; Huddart et al., 1999). Recently, Kim et al. (2004), has renewed the focus on Quaternary ichnology, and especially hominid ichnology.

The tracks found in Lodbjerg are well-preserved and are preserved as true tracks, i.e. the direct impression of the trackmakers foot (Lockley, 1991). The tracks were emplaced in the soft peaty surface and subsequently infilled with eaolian sands. There is no evidence of the tracks having been exposed to erosion before burial, as erosion would have altered and blurred the shape of the tracks and giving them a more undefined appearance (Milàn & Bromley, 2006), and the infilling of aeolian sand demonstrate that the tracks are indeed true tracks emplaced directly on the peat surface, and not undertracks.

Although there is scant evidence of Early Bronce Age settlements in the Lodbjerg area, elsewhere in the region the constructions of settlements began early in the Early Bronze Age and continued into the Late Bronce age, i.e. about 1500 to 500 BC (Bech, 1997). A settlement in Bjerre, approximately 25 kilometres north of Lodbjerg, has a revealed skeletal remains of a livestock composed of predominantly cattle, followed by sheep, goats, pigs, and indications of horses and dog (Bech, 1997). This fauna composition is very similar to the trackfauna from Lodbjerg, in that tracks of large cattle are predominant, followed by smaller tracks from sheep or goats, and then single tracks of dogs and horses.

Conclusion

The Late Holocene Lodbjerg tracksite contains a trackfauna comprising tracks of cattle, sheep or goats, horse and dogs. This is in agreement with similar aged skeletal remains of livestock excavated in the nearby area. Increased utilization and inclusion of ichnological data and methods, will provide valuable additional information about fauna compositions, palaeoecology and sedimentary conditions in the Lodbjerg dune system, and thus help create a more complete palaeoecological reconstruction of the area.

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