Seasonal hunting of mammoth in the Ach-Valley of the Swabian Jura

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SUMMARY: This poster discusses the seasonality of mammoth hunting in the Ach Valley of the Swabian Jura during the Early Upper Palaeolithic. The aging of the infantile mammoth remains of two cave sites, the Geissenklösterle and the Hohle Fels, are discussed. Some of the infant mammoth bones bear cut marks suggesting an anthropogenic origin. In all three main occupation layers of the Geissenklösterle (AH I: Gravettian, AH II: Upper Aurignacian, AH III: Lower Aurignacian) as well as in the Gravettian layers of the Hohle Fels infantile mammoth remains were found, indicating that mammoth hunting took place repeatedly in spring and early summer.

1. Introduction

The region of the Ach Valley has a long history of research conducted by the Institute of Prehistory and Archaeology of the Middle Ages at the University of Tübingen. During the last decades, this research focused on the Geissenklösterle and Hohle Fels sites. Other important cave sites in the Ach Valley are Grosse Grotte (Wagner 1983, Weinstock 1999), the Brillenhöhle (Riek 1973, Boessneck & v.d. Driesch 1973) and Sirgenstein (Schmidt 1912).

The analysis of the Geissenklösterle fauna was recently completed (Münzel *et al.* 1994, 1997, 1999) and an analysis of the Hohle Fels fauna is currently being undertaken (for a detailed archaeological introduction of the two sites see my contribution 'The Production of Upper Palaeolithic Mammoth Bone Artifacts from Southwestern Germany')

2. Material

2.1 The infant mammoth remains of the Geissenklösterle

In the Gravettian layer only a few pieces of infant material were found including a fragment of a M2-lamina, three carpal and tarsal bones and a first phalanx of the middle digit. All of these remains are comparable in size to the main group in the AH II (see below), only the first phalanx is bigger, probably belonging to an older infant.

The majority of the infantile mammoth remains was found in the Upper Aurignacian layer (AH II). The abundance of mammoth calf remains in this layer does not reflect specialisation on calf hunting during the Upper Aurignacian. Remains of young mammoths are present in all three archaeological levels. The better preservation of all faunal remains in AH II is probably related to the presence of the big hearth area with burnt bone ashes.

In AH II there are: one right and two left upper jaws with M1 (dP2) and M2 (dP3) (Fig. 1), several large skull fragments including parietal, temporal, frontal and occipital, and many small unidentified skull fragments (three of them with cut marks). Additionally two right milk tusks (Fig. 2), a distal diaphysis of an ulna without epiphysis (with cut marks) and several carpals, tarsals and phalanxes are present.

In the Lower Aurignacian horizon, AH III, only a pair of milk tusks (Fig. 3) were found and some tarsal or carpal bones.

Cut marks on some of the bones clearly show that these mammoth infants were hunted by man and not by carnivores.

Fig.1 - Upper left jaw, M1 in place, M2 erupting. Geissenklösterle AH II.

Fig.2 - Milk tusks, open root (left), broken root (right), Geissenklösterle AH II.

Fig.3 - Pair of milk tusks with slightly resorbed or reduced roots, Geissenklösterle AH III.

2.2 The infant mammoth remains of the Hohle Fels

Several remains of mammoth infants were also found in the Gravettian layer of the Hohle Fels. They include a talus, a calcaneus, one complete and one fragmented finger bone with a cut mark. The talus and the calcaneus are smaller than the comparable elements of the AH II in the Geissenklösterle, indicating a younger age.

3. Results

3.1 Aging of the calves

The exact age at death is still difficult to evaluate. The majority of the remains in the AH II, especially the postcranial elements, but also the skull fragments and the upper jaws, are comparable in body size with a $^3/_4$ year old (Laws 1966) African elephant, which was used as reference skeleton. This indicates that the majority of the Geissenklösterle mammoth infants belong to a homogenous age group. The first two molars of the African calf show tooth wear, while the teeth in the upper jaws from Geissenklösterle are still erupting and come from younger animals than the African reference skeleton.

The three upper jaws of the Geissenklösterle contain the first and the second molars. In two of the jaws the first molar is in place and in one it is not fully above the alveolar border. None of the teeth show tooth wear. The second molars are erupting, the lamellae are connected at the base, but not connected with cementum.

Recently Kusmina (1999) published on the ages of several baby mammoth mummies from the Siberian permafrost. The description of the teeth development of a 2-4 week old mammoth from Sjewsk and of a 4 week old from Yamal fits the best to the tooth eruption stage of the upper jaws from the AH II of the Geissenklösterle. That means, the main group of the infant mammoths were probably ca. 1 month old at death.

But slightly younger as well as slightly older calves are also represented in the teeth material by two laminae of a M2, smaller than the M2‘s in the upper jaws. Also two laminae of the M3, that do not fit into the M3-alveole of the upper jaws, evidently belong to older individuals.

The milk tusks in AH II are of two mammoth infants of different age. One tusk is still open at the tip of the root, while the root of the other one is broken off, but must have been complete.

The pair of milk tusks found in the AH III, already shows reduction at the tip of the roots, caused by the permanent tusk, which was already protruding. It is not clear, which stage of milk tusk development belongs to one of the above mentioned upper jaws from the, main age group, because they were found separately. Following the description of Kusmina (1999) the milk tusk with the open root should belong to a 2 week old mammoth and the pair of milk tusks with the resorbed roots to a 2-4 week old animal. But Lazarew (1994) ages a mammoth infant from the Indigirka river in Jakutien, which shows resorbtion at the milk tusk roots, with 2 months. So the exact aging of the milk tusks remains uncertain.

3.2 Calving season of mammoth and annual cycle

Considering the vegetational conditions during the Pleistocene, mammoth most probably had a calving season in spring like other grazing and browsing species in subarctic climate. Mammoth infants must have arrived synchronously in the early spring to maximise their growth during the first summer and survive the following winter (Guthrie 1990). Therefore we can suggest a calving season for mammoth in spring.

The seasonal classification adopted here is that of a wood steppe zone, a continental region as it is described in the Ukraine by Walter & Breckle (1983):

- Spring is from the end of April till the end of May: deciduous cover of the trees is completed;
- Early summer runs from the beginning of June until the middle or end of June: relatively wet, the herbaceous layer blooms;
- Summer goes from middle or end of June

until the end of August: herbaceous cover is dried out;

• Late Summer is from end of July til the end of August: slight phase of precipitation, new green puts forth;

• Autumn goes from end August until mid-October: fall of the leaves;

• Winter is from end-October until the middle or end of April and starts with the first snowfall.

Following Guthrie (1990) and Walter & Breckle (1983), the month of May can be viewed as the major calving season for mammoth.

3.3 Hunting season for mammoth and season of occupation

Having evidence for slightly younger as well as slightly older infants between the remains of the main age group of mammoth infants, there are two possible explanations. Either they were hunted during a longer period or calves of different ages are represented in a mammoth herd like in modern elephant herds (Haynes 1991). The first explanation is more likely, considering the postulated synchrony of the calving season. In this case the hunting of mammoth can be placed in the spring with a range in age of about one month documented in the Ach Valley assemblages (Fig. 4).

4. Conclusions

Until now, there was a general consensus that the valleys of the Swabian Alb only had enough nutritional supply for grazers during the warm season of the year and therefore the occupation of the caves also occurred during the warm and temperate seasons of the year (Hahn 1983).

The new archaeozoological results from Geissenklösterle and Hohle Fels show that horse was repeatedly hunted during winter (fetal horse bones) and mammoth in the spring. Additionally cave bear was exploited during the winter time until spring, during their hibernation. Cave bear hunting is evidenced by the vertebrae with a projectile point found in the Hohle Fels, and exploitation by cut and blow marks on bones, which represent all stages of the butchering process as it is known from other game (Münzel *et al.*, in press).

In other words, the mammoth hunting in

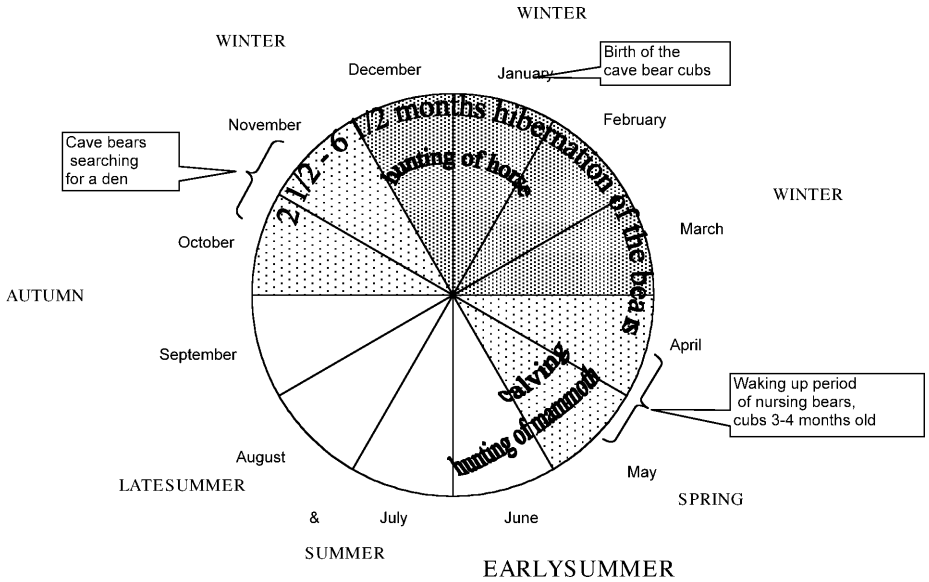

Fig.4 - The hunting season of mammoth and horse and the annual cycle including the activities of cave bear in the Ach Valley.

spring reflects the end of a winter occupation in the caves of the Ach Valley. A summer and autumn hunt of other game cannot be excluded, but the archaeological best recognisable season of occupation in the Ach Valley is winter and spring.

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