THE FAUNAL REMAINS OF THE MIDDLE PLEISTOCENE TRAVERTINES OF STUTTGART - BAD CANNSTATT, SOUTH GERMANY (PRELIMINARY REPORT)

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Summary

The function of the Holsteinian period Cannstatter Bunker site is discussed, based on large mammals remains. Comparison with several other Holsteinian faunas shows a clear selection of the osteological material. The inhabitants of the site were specialized hunters. Aurochs and steppe bisons were their favourite preys. The red deer was an important nutrional complement. The analysis of the frequencies of skeletal elements indicates that animals were butchered outside of the site. Only the rich meaty parts were brought back. We note also that deer antlers were used for artefacts. The Cannstatter Bunker site seems therefore to have been used as a central halt station.

Résumé

Les restes fauniques des travertins du Pléistocène moyen de Stuttgart-Bad-Cannstatt, Allemagne du Sud (rapport préliminaire).

La fonction du site de Cannstatt-Bunker, daté du Holsteinien, est discutée sur la base des restes des grands mammifères. La comparaison avec plusieurs autres faunes holsteiniennes montre ici une nette sélection du matériel osseux. Les anciens occupants du site étaient des chasseurs spécialisés. L'aurochs et le bison de steppe étaient leurs proies préférées. Le cerf élaphe représentait un important complément nutritif. L'analyse des fréquences des éléments squelettiques montre que les animaux étaient dépecés hors du site. Seules les parties riches en viande étaient rapportées. De plus, on note que les bois de cerf furent utilisés à la confection d'artefacts. Le site de Cannstatt-Bunker semble donc avoir fonctionné comme une halte centrale.

Zusammenfassung

Die Faunen der mittelpleistozänen Travertine von Stuttgart-Bad Cannstatt, Süddeutschland (Vorläufiger Bericht).

In der vorliegenden Arbeit werden anhand von Großsäugerresten aus der holsteinzeitlichen Travertinfundstelle Cannstatter Bunker mögliche Rückschlüsse auf die ehemalige Funktion der Fundstelle diskutiert. Aufgrund einer Gegenüberstellung mit weiteren, holsteinzeitlichen Faunenkomplexen konnte aufgezeigt werden, daß es sich bei den Knochenfunden größtenteils um stark selektiertes Material handelt. Die einstigen Nutzer des Cannstatter Bunkers waren ausgesprochene Jagdspezialisten, die vor allem den Ur und Steppenbison als Beutetiere bevorzugten. Der Rothirsch stellte eine weitere, wichtige Nahrungsquelle dar. Die Analyse der Häufigkeitsverteilungen von Skelettelementen dieser Tierarten ergab, daß die Beute außerhalb der Fundstelle zerlegt bzw. portioniert wurde und nur die fleischtragenden Körperpartien eingebracht wurden. Daneben ergaben sich Hinweise auf eine mögliche Gewinnung von Hirschgeweih zur Artefaktherstellung. Insgesamt gesehen scheint es sich bei der Fundstelle Cannstatter Bunker demnach um einen zentralen Rastplatz bzw. Aufenthaltsort des Urmenschen gehandelt zu haben.

Key Words

Holsteinian faunas, Hunting strategies, Bovines, Red Deer, Carcass exploitation.

Mots clés

Faunes holsteiniennes, Pratiques de chasse, Bovinés, Cerf élaphe, Exploitation des carcasses.

Schlüsselworte

Holsteinzeitliche Faunen, Jagdstrategien, Bovinen, Rothirsch, Beuteverwertung.

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The travertines of the depression of Stuttgart are deposits of numerous mineral water springs. The mineral waters rich in calcium carbonate and carbon dioxide reach surface along deep-seated faults within the River Neckar valley. The travertine sedimentation started about 500.000 years ago and is still going on. During the warmer stages of the Pleistocene and Holocene periods the mineral springs built up calcareous deposits of considerable extensions. Not all of them are travertines in *sensu stricto*; according to new genetic classification for non-marine carbonates the deposits should be differentiated in lacustrine limestones, calcareous tufas, calcareous sinters and travertines (Koban, 1993). Due to simplification they are subsequently generally called "travertines". The travertines of Stuttgart have some general features in common (fig. 1). They rest on fluvial terraces of the River Neckar. These terraces have been accumulated at the end of each glacial stage. At the beginning of the following cold phase, the River Neckar deepened its bed into its former terrace. Thus the terraces of the older ice phases occupy topographically higher altitudes than the chronological younger ones. Therefore, judging their vertical situation and thickness they can be set in a chronological frame (Reiff, 1986). Over the terrace base built of fluvial gravel and flood plain deposits follow calcareous tufas which are succeeded by travertines of different facies types. The travertin bodies are occasionally interrupted by terrestrial sediments of restricted lateral extension brought in by erosional fans. These muddy, marly or sandy terrestrial deposits mainly occur in shallow depressions caused by suberosion of the underlaying evaporitic sediments. They often show slumping structures or convoluted bedding. The upper parts of travertin succession are characterized by poorly consolidated calcareous tufas overlain by loess. During the Pleistocene period the deposition area little changed. The conditions might have resembled the Mammoth Hot Springs of the Yellow Stone National Park, USA. The sediments were deposited on a plain with a gentle slope towards the River Neckar. Due to the smooth

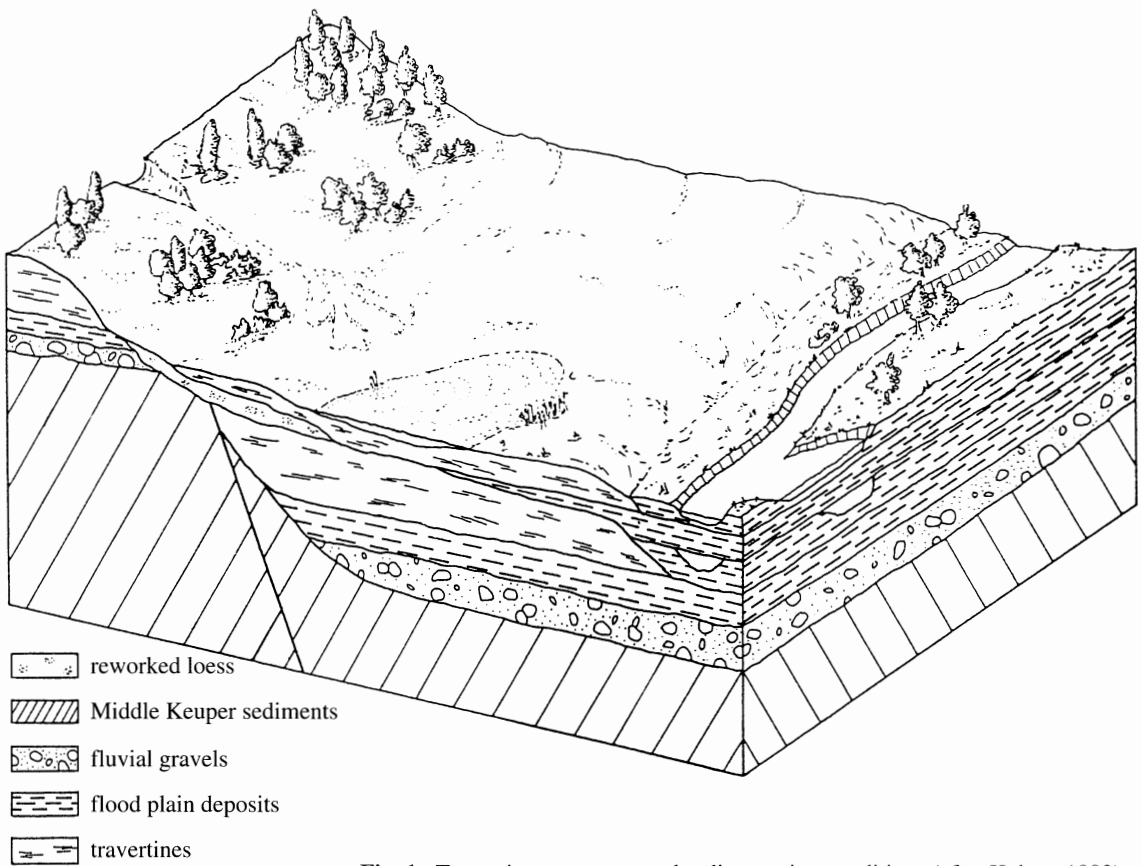


Fig. 1 : Travertine sequences and sedimentation conditions (after Koban, 1993).

topographical relief no cascade formation took place. Tepee- and gas-bubble structures and plant imprints, also the terrigene inputs indicate that the deposition area was not completely under water cover. The mineral waters ran in thin sheets over a part of the slope or formed shallow pools while other areas fell dry at the same time (Koban, 1993). Thus the travertin complexes could probably be walked on by animals as well as by man.

Up to the middle of this century the travertines of Stuttgart were quarried extensively. The exploitation of the valuable raw material brought up numerous vertebrate remains and artefacts of ancient man. Thus in the eighties the travertine sites were examined and excavated systematically by the Landesdenkmalamt Baden-Württemberg.

The discussed faunal remains derive from the site Cannstatter Bunker, which has involved the highest amount of bones and artifacts out of the Middle Pleistocene travertine sites of Stuttgart. The Cannstatter Bunker was brought to light during excavation works for a fundamental pit of an industrial building. Thus the site was accessible only for a relative short time and not in its whole extension. Altogether an area of about 100 m^2 could be examined. The finds were embedded in a 30 cm thick horizon in average, consisting of travertin sands, travertin brecia and clay material. The bone supporting horizon is part of a fining upward sequence of travertin brecia in clay matrix of 1.20 m thickness and restored loess material. The top of the profile is built of heavily impregnated travertine sandstone. The described sequence is dated to the Holsteinian age by lithostratigraphical evidence. Close to Cannstatter Bunker, two sites showing similar lithostratigraphical features were examined radiometrically. The Uranium/Thorium and electron-spin-resonance investigations showed results ranging from 145,000 - 295,000 (Wagner, 1990). Thus the sites could be fitted into a younger phase of the Holsteinian warm stage. Also, the determined species, especially of Cannstatter Bunker, witness the great Mindel/Riss-Interglacial as to be mentioned later. The alpine Mindel/Riss-Interglacial is more or less equivalent to the northern German Elster/Saale-Interglacial or the British Hoxinian warm phase.

The vertebrate remains of Cannstatter Bunker consist exclusively of mammal bones. Almost 5000 bone fragments were accompanied by nearly 2000 pebble and chopping tools. Both were scattered over the whole site area without any significant concentration. The stone artifacts are made of easily available fluvial pebbles deriving from the River Neckar bed. The main raw materials used are Triassic and Jurassic limestones, whereas silices are rare (Wagner, 1990). Regarding the high density of finds, it could be supposed that they were left almost in situ by ancient man. Current archeological investigations consider the Cannstatter Bunker site a central resting and butchering place (Wagner, 1990; Keefer, 1993). A close look to the faunal remains should thus consolidate the hypothesis and give more detailed information concerning hunting habits and further treatment of the gained prey. But application of faunal analysis to Pleistocene material is often rather difficult. Above all, the taphonomic processes are very complex and require some preliminary investigations. Therefore precedence should be given to the main questions: how much time is enclosed in the bone carrying stratum; is there any further evidence that the bones and artifacts are contemporary; is there any selection due to transport mechanisms; what is the degree of diagenetic loss? As mentioned above the bone bearing stratum is a lense of terrestrial sediment within travertine deposits. Thus travertine genesis and terrestrial influx probably took place at the same time. The most convincing explanation to genesis of the bone carrying horizon is that the terrestrial sediments accumulated within a suberosional caused depression, thus being protected of further transport. During times of less humidity the stratum fell completely dry and thus could be used as resting place by ancient man. Increasing rain fall then caused the deposition of the steril clay horizon showing slumping structures. After the depression relief was balanced, travertine sedimentation started again in this area. So the period of time when the site area could be walked on was restricted. It probably did not exceed some years. There is nothing to be said against the suggestion that the bones and artifacts are contemporary deposited. Besides they are mingled in all three dimensions. Direct hints such as butchering marks are rare, because in most cases the bone surfaces are weathered. In this context one remarkable find is to be mentioned. A limestone pebble tool was found sticking within the foramen of a rhino's *vertebra thoracicalis*. Thus the tool was either used for working the cadaver or slipped in the foramen short time after the maceration of the bone. Otherwise the opening would have been filled up with sediment.

Concerning the high concentration of bones and artefacts, natural transport mechanisms such as water transport or slumping sediment can be nearly excluded. Though only 2.1% of the bones are completely preserved. The breakage edges of the fragments show no sign of rolling transport. Besides some vertebrae thoracalis of red deer are preserved with their processus spinalis complete. This tiny bone parts would propably have been damaged during fluvial or slumping transport. Also there is no discernable sorting due to different densities or shapes. Concerning the completely

preserved bones, bone types of all three water transport groups defined by Shipman (1981) are represented. Moreover the horizontal and vertical mixture of pebble tools, having densities over 2.3 g/cm^3 and bones or teeth with densities ranging between 1.10g/cm^3 and 2.12 g/cm^3 (Behrensmeyer, 1975) negotiate natural transport selection. Solely the degree of diagenetic loss is not calculable in case of Cannstatter Bunker site. Probably the sedimentation rate was rather high. On the one hand slumping structures indicate short timed, catastrophic input. On the other hand, gnawing imprints made by animal predators or scavengers are rare. This fact implicates that the bones were burried rapidly, thus being not available for scavengers. Rapid burrying would increase the preservation potential of bones.

Though being aware of the general restrictions given by Pleistocene materials, an approach to the habits of the humans formerly occupying Cannstatter Bunker site is made by means of faunal analysis.

Altogether almost 5000 mammal bones were digged up. Due to the high degree of fragmentation, almost 30% of the fragments were weighing less than 2 gramms, only about 2000 bones could have been determined (fig. 2). Generally speaking, the determined species support the lithostratigraphical investigations, though the Cannstatter Bunker fauna lacks precise biostratigraphical indicators like *Dama clactonianus*. The poor *Dama* remains did not enclose antler rests, thus they could not be determined up to species level (compare Reynolds, 1927; Adam, 1975). Nevertheless this species assemblage represents a typical fauna of the Great Middle Pleistocene Interglacial same as the british sites Grays Thurrock and Clacton-on-Sea or the German sites Steinheim, Heppenloch and Bilzingsleben (compare Adam, 1954; Zeuner, 1959; Adam, 1975; Mania, 1990). The presence of *Bos primigenius* witnesses that the site could not be older than Holsteinian age. The urus migrates to Central Europe not before this interglacial. Moreover, the ancient Cromer faunal elements as for example *Ursus deningeri*, *Dicerorhinus etruscus* or *Canis mosbachiensis* have been replaced by their "modern" successors. In case of the Ursidae, both *Ursus*

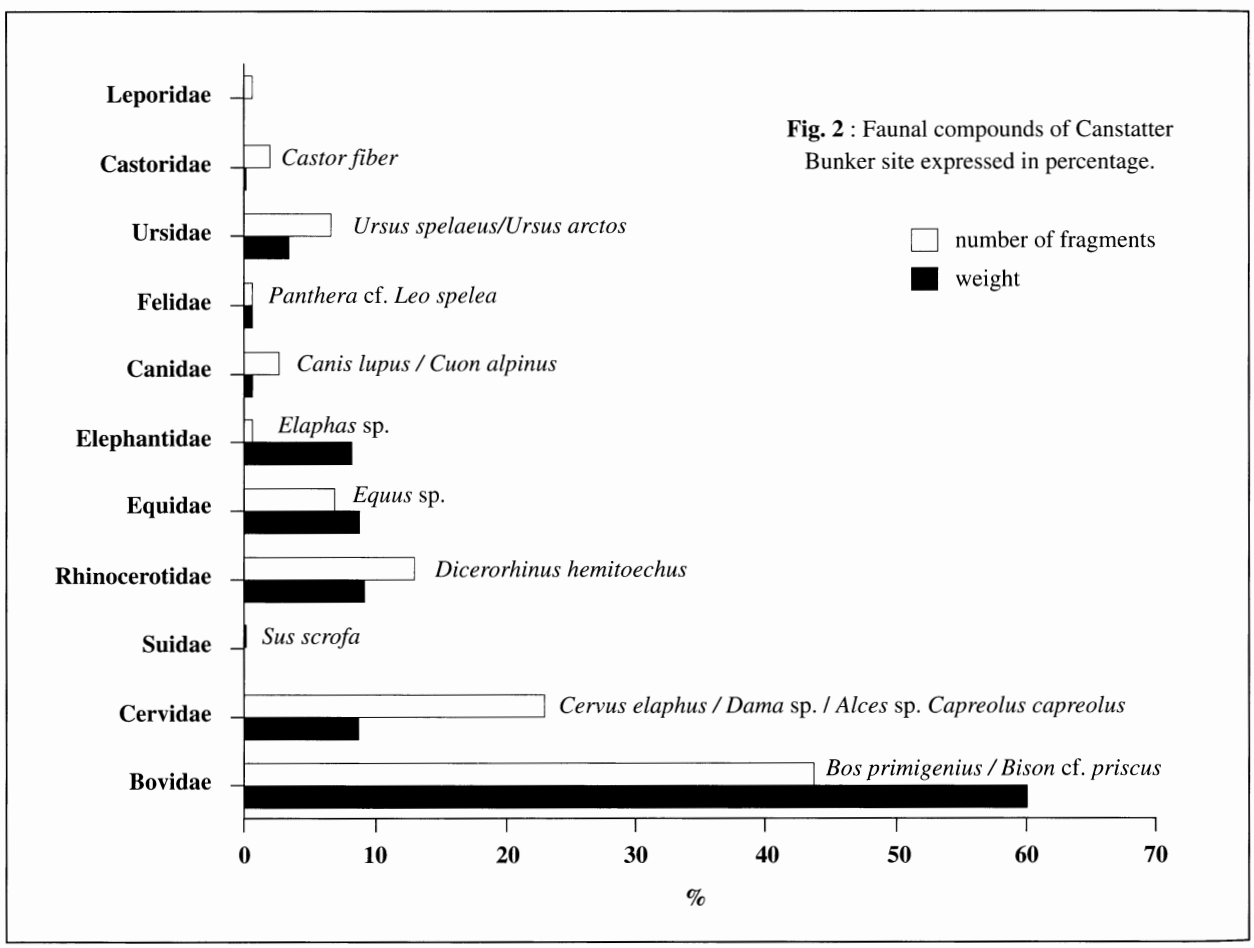
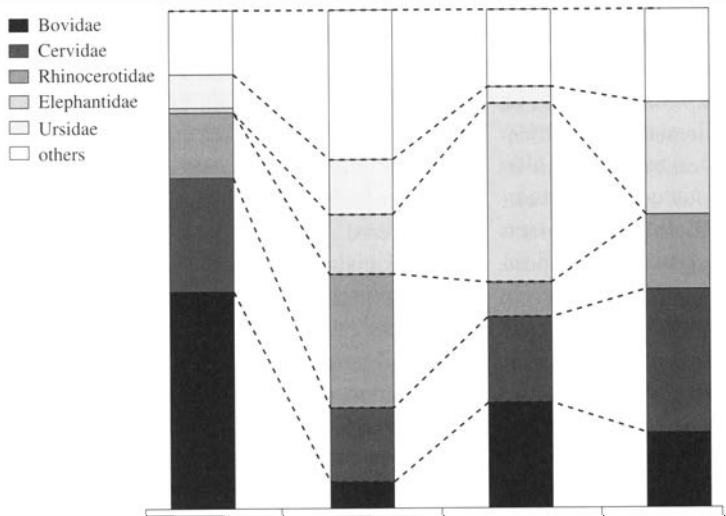


Fig. 2 : Faunal compounds of Canstatter Bunker site expressed in percentage.



	Cannstatter Bunker	Bilzingsleben	Steinheim	Heppenloch
others	12.8	30	16	19.1
Ursidae	6.7	11	3	22.4
Elephantidae	0.8	12	36	0.3
Rhinocerotidae	13	27	7	14.7
Cervidae	23	15	17	29.1
Bovidae	43.7	5	21	14.4

Fig. 3 : Comparison of the proportion of the large mammal compounds of Cannstatter Bunker, Bilzingsleben (Mania, 1990), Steinheim (Adam, 1954) and Heppenloch (Adam, 1975).

spelaeus and *Ursus arctos* are frequent members of the Bunker-fauna.

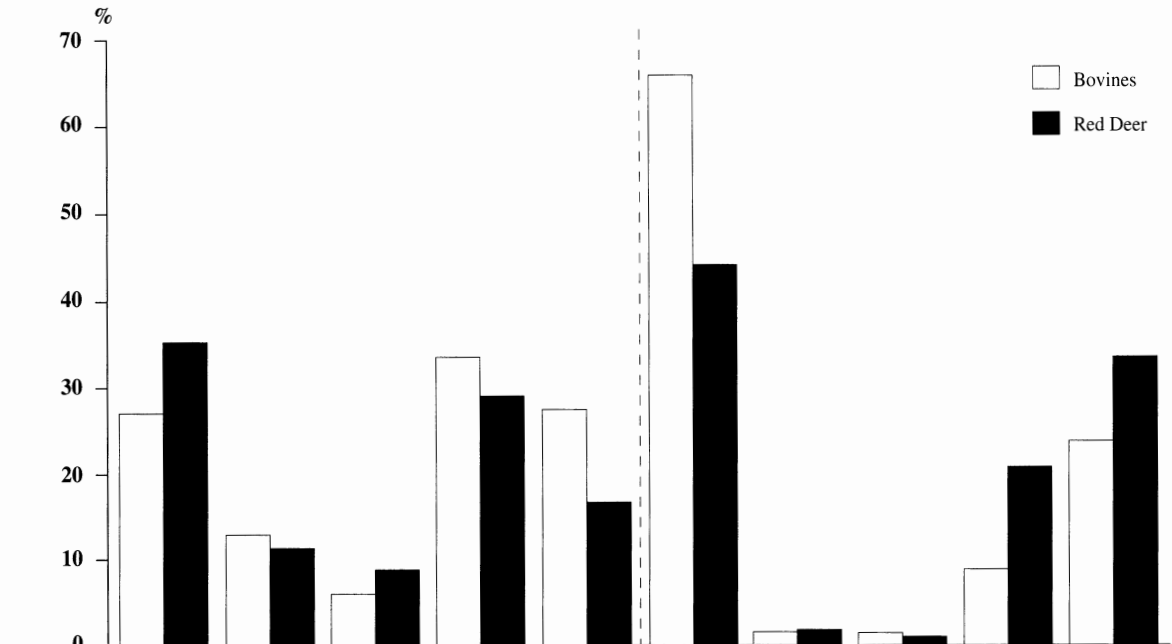
The dominating faunal elements are the bovines representing nearly half, followed by the cervids representing almost a quater of the determined bones (fig. 2). Thus these artiodactyls should be expected to be the best support to discuss human hunter activities. The bovines are represented by the urus *Bos primigenius* and the steppe bison *Bison* cf. *priscus*. In many cases a reliable distinction of postcranial skelettal bones of the two genera - especially when they are fragmented as in case of Cannstatter Bunker site - is rather difficult (see Schertz, 1936; Lehmann, 1949; Sala, 1986; Schatz, 1993). Inspite of intensive preliminary investigations, only 14% of the bovine bones could have been determined up to species level. Since both *Bos primigenius* and *Bison priscus* are supposed to have almost identical size and weight they are gathered in the further discussion. Besides, a separate analysis of the two species did not show significant differences. As for the cervids, only red deer is discussed because the remains of the other cervids are too rare to give raise for any relevant statistical argumentation.

The first questions to answer are: do the high percentages - almost 50% of all determined bones in case of the bovins and over 20% in case of red deer - reflect any artificial selection? Were these animals the prefered preys of the man who had left the pebble tools? It is rather difficult to get a satisfactory solution to these questions. Middle Pleistocene sites with comparable environmental and taphonomic conditions are rare. Besides, in most cases, the documentation of faunal remains is restricted to the description of the prooved species. So only the South German sites Steinheim and Heppenloch and the Eastgerman Bilzingsleben could be involved in comparative investigations. Both Southern German sites are nearly time equivalent to Cannstatter Bunker, Bilzingsleben represents an older stage within the Holsteinian Interglacial (Adam, 1954; Adam, 1975; Mania, 1990). Out of the three sites only Bilzingsleben provides similar taphonomic conditions. The finds are embedded within travertin sands resting on a loess horizon. The stratum is plombed by lacustrine calcareous deposits and travertines. As in Cannstatt Bunker, the site was occupied by ancient man. In contrast to Bilzingsleben

and Cannstatt, Heppenloch is a cave site. Human presence is not recorded. The term Steinheim summarizes finds out of several gravel pits. The most spectacular find of the rich remains of Steinheim is undoubtedly a completely preserved human skull performing morphological features of *Homo erectus* as well as of *Homo sapiens* (Czarnetzki, 1983). So the discussion about its systematical classification is still going on. The skull was embedded with its mandible still articulated; also numerous complete skeletons of large mammals were brought to light. These facts suggest that the bones did not undergo long transport. Unfortunately in case of Steinheim no information is given whether at least parts of the thanatocoenoses are human influenced. But the comparatively high amount of complete skeletons contradicts this.

The comparison of the frequencies of the main mammal compounds of the four sites shows very different results (fig. 3). The most conspicious point is the rather spectacular frequency of bovine bones in case of Cannstatter Bunker. Only the portion of proboscidean rests within Steinheim site can merely reach this data. But, lacking background information, further arguing this feature ends in no reliable results. In case of Cannstatter Bunker, the bovine bones claim almost half of the faunal remains, thus exceeding the frequencies in the other sites over 20%. Undoubtedly the eminent amount in Bunker site reflects selection in favour of the bovines. As mentioned before, selection due to sedimentary processes is to be excluded. So it can be lined out that the urus and steppe bison were the prefered preys of the ancient habitants of the Cannstatter Bunker site. Thus they were hunting specialists.

Comparison of the frequencies of the cervid bones gives less clear results. In case of Cannstatter Bunker the percental portion of red deer is considerable higher than in the other sites, excluded Heppenloch cave. The exceeded number of red deer remains in Heppenloch cave might be caused by other factors. Supposing Heppenloch being occupied by bear - this statement could be confirmed by the high percentage of ursid remains in this site (fig. 3)- the mid size red deer should be prefered object of the ocassion-



	Cranium	Vertebra/ Costa	Scapula/ Pelvis	Stylo/ Zygopodium	Autopodium	Cranium	Vertebra/ Costa	Scapula/ Pelvis	Stylo/ Zygopodium	Autopodium
Bovines	26.9	12.8	5.8	33.1	27.1	65.4	1.2	1.2	8.6	23.4
Red Deer	35.1	11.2	8.6	28.7	16.3	43.7	1.4	0.7	20.4	33.1
	Cannstatter Bunker					**Heppenloch**				

Fig. 4 : Comparison of the frequency of skeletal elements of bovines and red deer between Cannstatter Bunker and Heppenloch (Adam, 1975) expressed in percentage.

ally hunting or scavenging ursids. Thus reaching little less than the Heppenloch portion, the red deer frequency in Cannstatter Bunker site allows the suggestion that red deer was a minor, but important nutrition source. Reviewing the comparison of faunal compositions between the four sites, the most astonishing fact is that the faunal composition of Cannstatter Bunker differs remarkably from Bilzingsleben, though this site performs quite resembling taphonomic conditions. The ancient users of the Bilzingsleben site seem to have concentrated on the very large mammals such as rhinos and elephants. Further investigations might bring to light whether this differences are caused by slightly different ecological or perhaps by technological conditions ruling within the two sites.

Summarizing the arguments, it can be stated that the bovines and minor the cervids were the main nutrition sources in case of the Cannstatter Bunker. According to individual age analysis, adult animals were prefered.

So, the next questions to be raised is which function the site might have had. Was it a central place where the hunted prey was brought to for further processing of the carcasses? Or was the Cannstatter Bunker site a resting place where only selected parts of the gained animals were used? In that context one conspicious fact is to be pointed out. In spite of the enormous frequency of bovine bones, the Cannstatter Bunker material included not a single horn core fragment. Though horn cores might be more influenced by diagenetic loss because of their relatively less dense structures, at least some little fragments could be expected. Besides, in Bilzingsleben or for example in the Eemian travertine sites of Thuringia, bovine horn cores occur relatively frequently within the faunal remains (Flerov, 1976, 1978; Mania, 1990). The lack of horn cores is an obvious hint that the bovine carcasses were not completely exploited within the Bunker site area. Thus some more detailed information should be gained by judging the rates of frequency of all skeletal elements included in Bunker bovine material. In order to give comparative references, either the skeletal remains of the less important prey red deer and the bovine and red deer rests deriving from Heppenloch cave are involved in the investigation (fig. 4). There are two reasons to choose Heppenloch site for comparison. On the one side it could be supposed that this material is not too much selected: the bears have probably exploited all carcass portions and the less valuable - concerning flesh weight - body parts might have been transported into the cave as well. The other reason is that, until now, neither the bovine and cervid material of the Steinheim sites nor of Bilzingsleben site are published in detail. The data of the Heppenloch cave were taken from Adam's "bone catalogue" (Adam, 1975). In order to create equal conditions, every single bovine or red deer rest described in the catalogue was counted as one piece. Afterwards the number of pieces deriving from the different skeletal elements were calculated as percentages of the whole Heppenloch bovine or red deer material. The thus gained frequencies of skeletal elements show quite the same remarkable differences as the above mentioned frequencies of the mammal compounds (fig. 3; fig. 4). The most obvious aspect is the deficit of cranial rests in case of the Cannstatter Bunker bovines. Their portion is nearly 40% lower than in Heppenloch cave. Contrary to this, the valuable flesh bearing body regions such as the stylo- and zygopodium are represented over 20% more frequently in the Cannstatt bovine bone material than in Heppenloch. Only in case of the less valuable autopodial bones, both sites show quite similar features. The frequencies of skeletal elements of red deer show resembling results. Though the differences are less dramatic. In case of Cannstatter Bunker it thus can be concluded that butchering of both the bovine as well as red deer carcasses took place anywhere else. Mainly the disarticulated, fleshy body portions were brought into the Bunker site area. The comparable higher amount of cranial remains in case of red deer could be caused by other reasons. First, the skulls of red deer are weighing considerably less than bovine skulls. Thus they can be transported more easily. But lacking too valuable flesh stores, there should have been no need for collecting them. The exceeded portion of cranial remains of red deer could be interpreted as an indirect hint to other intentions than nutrition strategies. Thus, implicating the worthy mechanical properties of antlers, their exploitation as raw material for tools could be suggested. Unfortunately there is not much possibility for further consolidation of this suggestion. In fact, antler rests provide only about 3% of the cervid material. And in no case manufacturing traces could be distinguished. This might partly be caused by diagenetic loss. Compared with the bone rests the rare antler fragments show miserable preservation constitution. They tend to break off into uncountable little pieces. So a good deal of antler material might have faded away long before Bunker site was excavated. Nevertheless one remarkable find, the proximal portion of a casted antler, got preserved. It does not make much sense to introduce a deer antler lacking the rest of the animal into the site area because of nutrition purposes. Thus, most probably the antler was brought in as raw material source for tools. Anyway a deposition of the antler by hazard cannot be totally excluded.

Reviewing all discussed aspects concerning the Cannstatter Bunker site, some general conclusions might

be drawn. On the whole, the basic hypothesis given by archeological investigations could be consolidated. The site seems to have had the purpose of a central resting place. Analysing the frequencies of the skeletal elements pointed out clearly that the carcasses of the killed preys were not disarticulated within the site area. Mainly the valuable, meat carrying body regions, the stylopodium and zygopodium, were brought into the site. Moreover there are some good arguments that within the site, antler tool manufacturing took place. The ancient occupants of Cannstatter Bunker seem to have been hunting specialists. Their prefered preys were the urus and steppe bison. This fact is witnessed by the overall dominance of bovine bones within the faunal material. Besides the bovines, red deer played a minor, but important role in nutrition strategies.

So, what further needs to be done is to check out whether the site was occupied throughout the whole year or only seasonally frequented. Thus lately started cementum analysis might bring some more information.

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