Taphonomical, paleoeconomical and paleoecological investigation of the animal remains from the Abri Chesselgraben, canton of Solothurn, Swiss Jura (Late Magdalenian-Mesolithic)

Autor(en): **Rehazek, André**

Objekttyp: **Article**

Zeitschrift: **Cahiers d'archéologie romande**

Band (Jahr): **81 (2000)**

Taphonomical, paleoeconomical and paleoecological investigation of the animal remains from the Abri Chesselgraben, canton of Solothurn, Swiss Jura (Late Magdalenian-Mesolithic)

André Rehazek

Recherches taphonomiques, paléoéconomique et paléoécologiques sur les restes fauniques de l'abri Chesselgraben, canton de Soleure, Jura suisse (Magdalénien final - Mésolithique) – Résumé

Les os des grands mammifères et des oiseaux des couches magdaléniennes, épipaléolithiques (?) et mésolithiques de l'abri ont été analysés. Les résultats des recherches taphonomiques indiquent que la plupart des vestiges se sont conservés dans les couches sédimentaires à l'abri de perturbations post-dépositionnelles.

Le lièvre variable (Lepus tim./europ.), le lagopède (Lagopus lag./mutus) et le renne (Rangifer tarand.) sont les espèces dominantes pour le Magdalénien final. Des espèces typiques de l'Holocène, comme le sanglier (Sus scrofa), le cerf (Cervus elaphus) et la martre (Martes mart./foina) sont présentes dans la couche mésolithique.

Aussi bien les grands mammifères que les oiseaux montrent un changement net du Magdalénien final au Mésolithique, en raison des modifications climatiques et environnementales entre le Tardiglaciaire et le Postglaciaire.

Abstract

Large mammal and bird bones from the late magdalenian, epipaleolithic (?) and mesolithic layers of the rockshelter were analysed. The results of the taphonomical investigation suggest that most of the finds of the layers were preserved in a more or less undisturbed condition.

Hare (Lepus tim./europ.), snow grouse (Lagopus lag./mutus) and reindeer (Rangifer tarand.) are the most dominant species of the late magdalenian. Typical animal species of a holocene fauna like wild boar (Sus scrofa), red deer (Cervus elaphus) and marten (Martes mart./foina) can be identified in the mesolithic layer.

Both large mammal and bird fauna show a distinct change that took place from the late magdalenian to the mesolithic. The reason for it are climatic and environmental changes from late glacial to post glacial conditions.

Introduction

The Abri Chesselgraben is situated about 30 km south of Basle in the Swiss Jura region at an altitude of 455 m (fig. 1). It is located in a small valley near Birs valley, a region that is known for its high density of prehistoric cave and rockshelter sites (Sedlmeier 1989).

In 1985 the Abri Chesselgraben was excavated by the archaeological service of the canton of Solothurn . Jürg Sedlmeier directed the excavation (Spycher/Sedlmeier 1985).

Unfortunately, the investigation of the lithic material has not been finished yet for monetary reasons. Radiocarbon datings have not been available so far, but there are plans to date the charcoal and bone finds in the near future.

Stratigrafically, at least two, perhaps three archaeological layers can be distinguished from each other: a late magdalenian («AH III») and an almost erodet mesolithic layer («AH I») separated by a thin, possibly epipaleolithic, layer («AH II»; fig. 2).

The silex material of the magdalenian layer contains end scraper-burins, backed bladelets, shouldered points and convex backed points.

Artifacts of the probably epipaleolithic layer are short scrapers and a convex backed point.

The mesolithic layer contains too little silex in order to be able to specify it more.

All of the finds come from an area of about 12 sqm below the rockshelter. This part was preserved quite well because it was protected by a big boulder in front of the abri. It was the only part of the abri that was not heavily disturbed. It is also important to remark that most part of the forecourt was eroded by a nearby brook.

The most important archeological features are a well preserved hearth of the magdalenian layer and a structure similar to a pit containing a number of burned bone fragments. It has not been possible yet to date the pit precisely.

There is a total number of 10000 animal remains (with the exception of molluscs). The material includes more than 7000 bones of small mammals, about 2200 fragments of large mammals, 87 bird bones, 94 amphibians and 2 fish remains. Most of the fauna material comes from the late magdalenian layer.

Fig. 1. Abri Chesselgraben. Situation of the site. Scale 1:50.000.

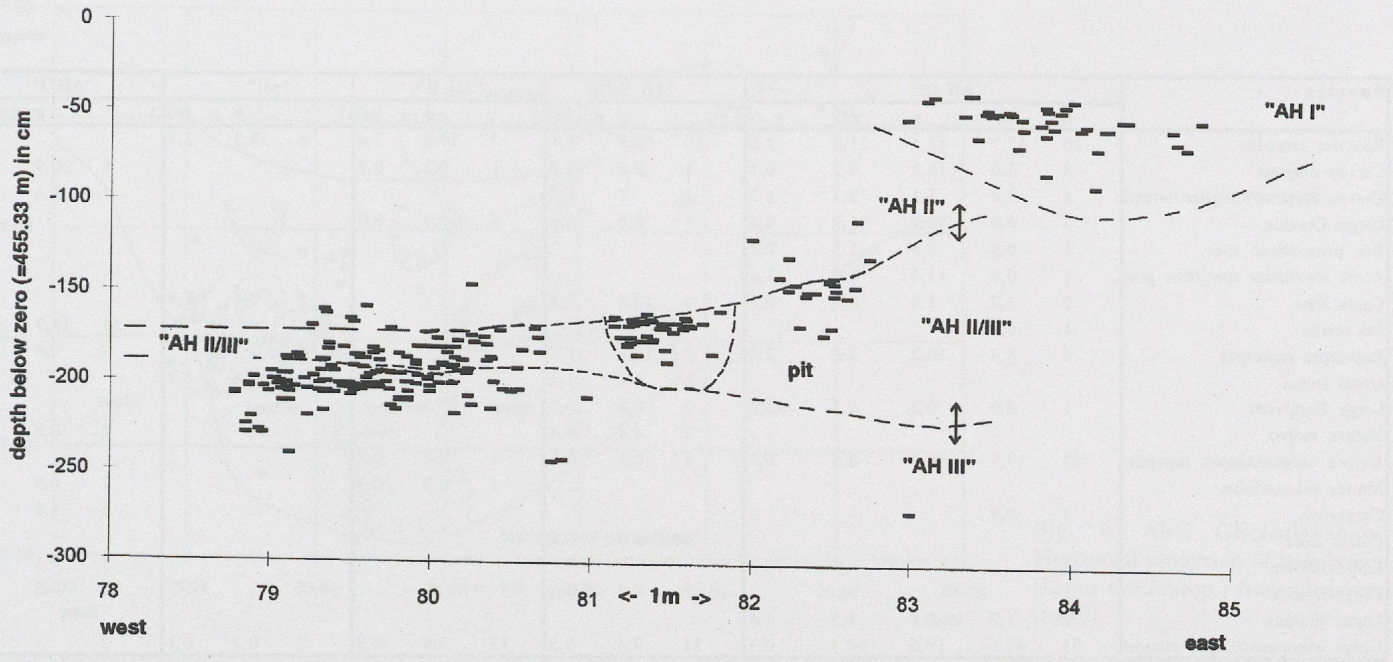

Fig. 2. Abri Chesselgraben. Vertical projection of all three-dimensional measured animal bones of the site (n=260) on a west-east profile.

The mesolithic and the probably epipaleolithic layer contain relatively few animal remains (fig. 3).
I will only discuss the results of the investigation of the large mammal and bird remains. The analysis of the small mammals, amphibians and molluscs has not been finished yet (Rehazek 1996).

Taphonomy

One important goal of the taphonomical investigation was to find out if the finds of the three layers were more or less «in situ» or not. Another aim was to check wether the animal remains had been brought into the site by prehistoric man, carnivores or predatory birds. I will get back to this issue later on.
The number of animal bone refits is quite small (14). There is a relatively short horizontal and vertical distance between the pieces, only about 20 to 30 cm. It shows us that there have only been few displacements of bones between or within the layers by people, animals or geological processes.
The orientation and inclination of main axis and cross section of the bones have had more or less the same result. For example, there is no evidence for a solifluction of the sediment.
To sum it up we can say that the results mentioned above point at a relatively undisturbed stratification of bones after their sedimentation. Exceptions however are the sediments of the back part of the rockshelter (water intrusions) and areas of intensive animal activity (digging animals like rodents, foxes or badgers).

Paleoeconomy

I am not going to make any reference to all the animals that have been identified among the faunistic material. In the following chapter, I will only mention the most frequent and economically most important animals.
The most frequent animal of the magdalenian layer is the arctic hare (*Lepus timidus*), although sometimes it is very difficult to distinguish between the arctic and brown hare (*Lepus europeus*). The typical habitat of the artic hare is an open landscape with few vegetation. Today's dispersal area in Switzerland are parts of the Alps which lie at an altidude above 1300 m.
Due to cut marks on two bones (tibia, rib) it can be assumed that the hare was brought into the site by prehistoric man. But it is very possible that some individuals were brought in as a quarry of carnivore mammals. Perhaps the cut marks are a result of skinning the animal.
In comparison to a complete hare skeleton nearly all skeletal elements of the archeological material are represented in more or less the same proportion. This means that the hole body had been brought into the site before it was butchered. Only ribs and vertebrae are underrepresented. This might have resulted from a differentional preservation of these skeleton elements.
The distribution of the bones gives us the impression that butchering and skinning took place around the hearth (fig. 4). But we should also keep in mind that most of the former activity area of the site, the forecourt, has been completely erodet by the brook. For this reason presumptions about former activity zones within the site are quite speculative.
The two most abundant species of great ruminants of the late magdalenian layer are the reindeer (*Rangifer tarandus*) and the red deer (*Cervus elaphus*). While the reindeer is an animal of the recent tundra region, the red deer is very adaptable to a lot of different types of biotopes. It prefers half-open landscapes.

Species	"AH III"					"AH II/III"			"AH II"			"pit"			"AH I"		
	n	n %	g	g %	g (av.)		g	g (av.)		g	g (av.)		g	g (av.)		g	g (av
Rangifer tarandus	16	13,7	41,1	21,8	2,6	12	72,8	6,1	7	17,0	2,4	6	22,2	3,7			
Cervus elaphus	3	2,6	18,2	9,7	6,1	1	9,6	9,6	1	0,2	0,2				8	20,9	2,6
Cervus elaphus/Rangifer tarand.	4	3,4	5,1	2,7	1,3	7	7	1,0							1	1,4	1,4
Large Cervide	7	6,0	58,7	31,2	8,4	1	6,6	6,6	2	16,0	8,0						
Bos prim./Bison spec.	1	0,9	2,9	1,5	2,9												
Alces alc./Bison spec./Bos prim.	1	0,9	11,3	6,0	11,3												
Capra ibex	2	1,7	1,4	0,7	0,7	4	15,4	3,9				1	2,4	2,4			
Sus scrofa	1	0,9													11	14,7	1,3
Rupicapra rupicapra	4	3,4	10,2	5,4	2,6	7	11,8	1,7							3	0,6	0,2
Ursus arctos						1	1,4	1,4				13	86,8	6,7			
Large Carnivore	1	0,9	0,3	0,2	0,3	2	0,6	0,3									
Vulpes vulpes						1	4,4	4,4							2	0,8	0,4
Vulpes vulpes/Alopex lagopus	23	19,7	16,7	8,9	0,7	1	0,5	0,5	4	1,5	0,4						
Martes martes/foina									1	0,3	0,3				7	0,9	0,1
Carnivore	1	0,9													5	1,8	0,4
Castor fiber						1	0,3	0,3									
Large Rodent															1	0,1	0,1
Felis silvestris						1	0,3	0,3							1	0,2	0,2
Lepus timidus	2	1,7	2,8	1,5	1,4												
Lepus europaeus/Lepus timidus	51	43,6	19,6	10,4	0,4	21	9,4	0,5	13	3,8	0,3	2	0,1	0,1	2		
Det. large mammals	**117**	**100,0**	**188,3**	**100,0**	**1,6**	**60**	**140,1**	**2,4**	**28**	**38,8**	**1,4**	**22**	**111,5**	**5,1**	**41**	**41,4**	**0,7**
indet., size> Equus/Cervus	3		23,5		7,8				1	7,3	7,3						
indet., size Equus/Cervus	9		24,8		2,8	5	21,6	4,3	1	2,9	2,9	3	9,9	3,3	5	4,1	0,8
indet., size Rangifer	88		89,4		1,0	44	40,3	0,8	33	29,1	0,9	14	17,9	1,3	17	5,8	0,3
indet., size Rupicapra	23		21,8		0,9	16	16,5	1,0	9	7,9	0,9	4	1,8	0,5	43	7,4	0,2
indet., size Lepus/Vulpes	125		17,1		0,1	42	4,1	0,1	11	2,4	0,2	1	0,2	0,2	45	2,7	0,1
indet., size< Lepus	17		1,3		0,1	4	0,5	0,1	6	0,1		6	0,2	0,0	41	0,3	
indet.	797		96,2		0,1	258	32,5	0,1	148	20,5	0,1	82	14,1	0,2	74	1,4	
Indet. large mammals	**1062**		**274,1**		**0,3**	**369**	**115,5**	**0,3**	**209**	**70,2**	**0,3**	**110**	**44,1**	**0,4**	**225**	**21,7**	
Total large mammals	**1179**		**462,4**		**0,4**	**429**	**255,6**	**0,6**	**237**	**109,0**	**0,5**	**132**	**155,6**	**1,2**	**266**	**63,1**	**0,5**
Total small mammals	**1221**		**48,8**			**153**	**6,1**		**650**	**26,0**		**4**	**0,2**		**4988**	**198**	
Percidae, indet.	1														1		
Total fishes	**1**														**1**		
Rana temporaria	3		0,2									1					
Amphibia, indet.	18		1,1			3	0,2		8	0,5		1			60	4	
Total amphibians	**21**		**1,3**			**3**	**0,2**		**8**	**0,5**		**2**			**60**	**4**	
Lagopus spec.	25		7,8		0,3	5	1,2	0,2	3	1,0	0,3	8	1,7	0,2	2	0,4	0,2
Buteo buteo															1	0,5	0,5
Otus scops															1	0,2	0,2
Asio otus						1	0,4	0,4									
Glaucidium passerinum															1	0,1	0,1
Tyto alba															1	0,2	0,2
Strix aluco															1	0,3	0,3
Rallus aquaticus															1	0,1	0,1
Perdix perdix						1	0,8	0,8									
Columba spec.						1											
Luscinia spec.															1		
Turdus viscivorus															1		
Turdus iliacus						1									1		
Turdus pilaris	1																
Pyrrhocorax pyrrhocorax/gracu	1																
Loxia spec.															2		
Certhia spec.															1		
Passeriformes, indet.												1			8	0,2	
Fringillidae, indet.	1								1						3	0,1	
Turdidae, indet.															1		
Sylviidae, indet.						1											
Emberizidae, indet.															1		
Aves, indet.	6		0,2			2									1		
Total birds	**34**		**8,1**		**0,2**	**12**	**2,4**	**0,2**	**4**	**1,0**	**0,3**	**9**	**1,7**	**0,2**	**28**	**2,1**	

Fig. 3. Abri Chesselgraben. Results of determination. «AH I»: mesolithic, «AH II»: epipaleolithic (?), «AH III»: late magdalenian. «AH II/III»: epipaleolithic (?) or late magdalenian. n: number of bone finds, g: weight in grams, g (av.): average weight in grams.

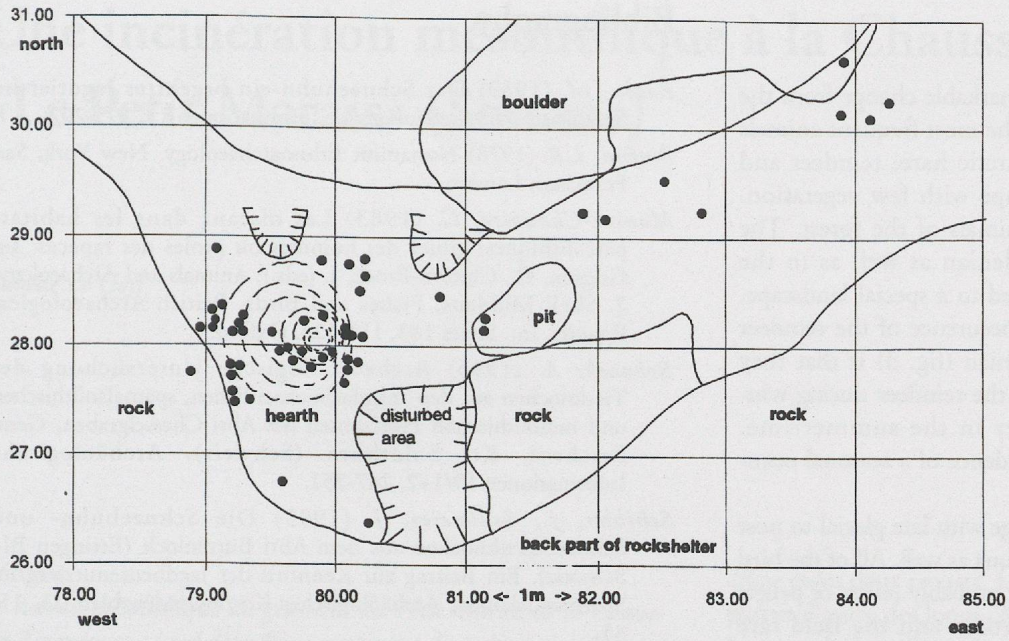

Fig. 4. Abri Chesselgraben. Horizontal projection of hare bones (Lepus tim./europ.) from all layers (n=89).

The reindeer as well as the red deer are migratory animals. In addition, the reindeer is able to cover very long distances in search of appropriate food.

Great ruminants provided most of the meat supply to the late magdalenian hunters from the Abri Chesselgraben. The distribution of their skeletal elements suggests that those parts that carry a lot of meat (for example the upper and medium parts of the extremities) were selected. The fact that parts of the trunk are underrepresented may lead to the conclusion that they were not as preservable as the other parts. But in my opinion, it is more plausible that these parts had been left at the kill side of the animals. There are reports that eskimo hunters nowadays behave the same way (Binford 1978).

The most important bird that was found in the late magdalenian and epipaleolithic layers is the snow grouse. It is impossible to decide wether the bones are remains of the willow grouse (*Lagopus lagopus*) or of the ptarmigan (*Lagopus mutus*). These two species are very similar to each other. Nowadays in contrast to the willow grouse, the ptarmigan is a common bird of the Alps. Its habitat is the mountain region below the snow line. Since the snow grouse is also an important quarrel of the snowy owl (*Nyctea scandiaca*) it is difficult to decide wether it was brought into the side by prehistoric man or owl. Two cut marks on bones of the snow grouse prove that they were brought into the side by prehistoric man. But what about the other bones?

It is known that accumulations of snow grouse bones from owl pellets are dominated by the lower parts of the extremities (carpometacarpus and tarsometatarsus; Mourer-Chauviré 1983, Baales 1989). This differs significantly from the archeozoological feature of the Abri Chesselgraben where parts of the upper and medium extremities are very frequent (humerus, radius, ulna, tibiotarsus). These are skeletal parts that carry a lot of meat. It indicates that most but perhaps not all of the snow grouse remains were brought into the site by prehistoric man.

It is very interesting that skeletal parts of the wings are overrepresented. It can be interpreted as a special utilization of wing feathers and downs. This was suggested as well for the archeozoological feature of nearby late magdalenian Abri Büttenloch (Schibler/Sedlmeier 1993).

As far as the large animal remains of the mesolithic layer are concerned, it has to be mentioned that only 41 fragments could be determined (fig. 3). All of them are quite well preserved but very fragmented. The most frequent animal of the mesolithic layer is the wild boar (*Sus scrofa*). But from the economic point of view the most important one is the red deer. A common animal is also marten (*Martes martes/foina*). But it is very difficult to decide wether or not it was brought into the site by prehistoric man.

Landscape	Late Magdalenian	Epipaleolithic (?)	Mesolithic
"Open", "half open" (low vegetation, mountain slopes)	* * *	*	* * *
"Forest"			* * * * * * *
"Wetland"			*
unspecific			*

Fig. 5. Abri Chesselgraben. Paleoecological interpretation of bird species from the late magdalenian, epipaleolithic (?) and mesolithic layers. *=one species.

Paleoecology

The large mammal fauna shows a remarkable change from the late magdalenian to the mesolithic. The most frequent animals of the late magdalenian layer like arctic hare, reindeer and snow grouse prefer an open landscape with few vegetation. Wildboar and marten are typical animals of the forest. The reddeer appears in the late magdalenian as well as in the mesolithic context but it is not limited to a special landscape. A possible explanation for the joint occurence of the reindeer and the reddeer in the late magdalenian (fig. 3) is that they were hunted in different seasons e.g. the reindeer during winter or springtime and the reddeer in the summertime. Unfortunately, there is no reliable evidence of a seasonal occupation of the rockshelter.

The climatic and environmental change with late glacial to post glacial conditions is visible in the avifauna as well. All of the bird bones except those of snow grouse are probably relicts of pellets from predatory birds. The snow grouse and the field fare (*Turdus pilaris*) of the late magdalenian layer are species of the arctic and siberian type and prefer an open landscape with low vegetation or stony mountain slopes.

The mesolithic layer shows a distinct increase of species variety. Birds like the crossbill (*Loxia spec.*), the tree keeper (*Certhia spec.*), the tawny owl *(Strix aluco)* and the nightingale (*Luscina spec.*) are typical species of a woody landscape. The water rail however prefers a humid environment with water pools or riversides (fig. 5).

Outlook

The fauna of the Abri Chesselgraben provides us with a lot of information about the paleoeconomical and paleecological conditions at the border of the late glacial and beginning post glacial period of the Swiss Jura region. The next step is now to radiocarbondate the organic material (bones and charcoal) and to examine the small mammals.

Acknowledgement
I would like to thank Sabine Rothmund for translating the manuscript.

André Rehazek
Seminar für Ur-und Frühgeschichte der Universität Basel
Archäobiologische Abteilung
Petersgraben 9-11
CH - 4051 Basel

Bibliography

Baales, M. (1989) Das Schneehuhn-ein begehrtes Jagdtier im Spätpleistozän? Archäologische Informationen 12, 195-202.

Binford, L.R. (1978) Nunamiut Ethnoarchaeology. New York, San Francisco, London.

Mourer-Chauviré, C. (1983) Les oiseaux dans les habitats paléolithiques: gibier des hommes ou proies des rapaces? In: Grigson, C., Clutton-Brock, J. (eds.): Animals and Archaeology: 2. Shell Middens, Fishes and Birds. British Archaeological Reports, Int. Series 183, 111-124. Oxford.

Rehazek, A. (1996) Archäozoologische Untersuchung der Tierknochen aus den magdalénienzeitlichen, spätpaläolithischen und mesolithischen Horizonten des Abri Chesselgraben, Gem. Erschwil, Kt. Solothurn (Schweiz). Archäologische Informationen 19/1+2, 247-251.

Schibler, J., Sedlmeier, J. (1993) Die Schneehuhn- und Schneehasenknochen aus dem Abri Büttenloch (Ettingen BL, Schweiz). Ein Beitrag zur Kenntnis der Jagdbeutenutzung im Spätmagdalénien. Archäologisches Korrespondenzblatt 23, 15-35.

Sedlmeier, J. (1989) Jungpaläolithikum und Spätpaläolithikum in der Nordwestschweiz. Ein Beitrag zur regionalen Erforschung des Paläolithikums auf Grund ausgewählter Fundinventare aus Grabungen der Jahre zwischen 1910 und 1956. Dissertation Bern.

Spycher, H., Sedlmeier, J. (1985) Steinzeitfunde bei Erschwil im Schwarzbubenland. Helvetia Archaeologica 63/64, 78-80.