Doboş A., Soficaru A. & Trinkaus E. - *The Prehistory and Paleontology of the Peştera Muierii, Romania.*
Liège, ERAUL 124, 2010, p. 29-33.

Chapter 4

THE VERTEBRATE PALEONTOLOGICAL REMAINS

The Pleistocene and Holocene deposits of the Peştera Muierii yielded an abundant faunal collection, consisting of a large number of macromammals, a modest sample of micromammals, and a few passerine birds. The current collections, in the Muzeul Oltenei and other institutions, consist of partial samples of the originally excavated remains. Many of them are unlabeled, but a significant number are labeled as to gallery (G.P., G.M., etc.) and to depth within the deposits.

The information available consists primarily of species presence in the different galleries, and to a lesser extent in levels within those galleries (Daicoviciu *et al.* 1953; Bombiţă 1954; Gheorghiu *et al.* 1954; Gheorghiu & Haas 1954; *cf.*, Păunescu 2000). Bombiţă (1954) provided some anatomical data, principally of a taxonomic nature, on faunal remains discovered and excavated in 1951. In addition, there is a modest amount of stable isotope data on cave bears and a large cat as a result of the radiocarbon dating of the depths within the Galeria Principală (Doboş *et al.* 2009; Chapter 2).

Pleistocene Species Representation

The current faunal list, based on the published sources and a minimal reassessment of a small set of the bones during the selection of samples for radiocarbon dating, is provided in tables 8 and 9. All genus and species names have been made to conform to current usage, despite ongoing disagreements at the generic level, especially for the carnivores.

Carnivores

Among the carnivores, by far the most abundant are the remains of *Ursus spelaeus*. It was estimated that in the Galeria Musterianã approximately 90% of the remains were of *U. spelaeus*, and in the adjacent, and deeper, Galeria Urşilor the excavators counted 183 variably complete crania of *U. spelaeus* on the surface. Cave bears are listed as coming from every excavated Pleistocene level of the main galleries, Gura Peşterii, Secundară, Musterianã and Principală. From the existing collections, it is apparent that all portions of the skeletons were originally present, and they most likely represent the remains of hibernation deaths within the cave system. The current collections, however, mostly contain the more complete larger elements (crania, mandibles, major long bones) plus boxes of the ubiquitous metapodials and phalanges.

From a chronological perspective, the presence of *U. spelaeus* in the Middle Paleolithic levels is unexceptional, given its presence throughout the Carpathians (and Europe from the Caucasus to the Atlantic) during this time period. Its presence in the Upper Paleolithic ("Aurignacian") levels of the Galeria Principală serves to further confirm the age of this deposit as being prior to the last glacial maximum (see Chapter 2), since *U. spelaeus* appears to have gone extinct ~24,000 ^{14}C BP (~29,000 cal BP) (Pacher & Stuart 2009).

The other identified carnivores are *Panthera (leo) spelaea*, *Panthera pardus*, *Lynx lynx*, *Felis silvestris*, *Canis lupus*, *Crocuta crocuta spelaea*, *Vulpes vulpes*, *Gulo gulo*, *Lutra lutra* and *Martes martes* (tabl. 8). The list, in fact, reads like a *Who's Who* of Late Pleistocene denning carnivores. It is not clear in what proportions these other carnivores were present in the deposits, since all of them will den in cave systems,. The only publication which lists specific skeletal elements, that of Bombiţă based only on the 1951 excavations, suggests that they were represented almost entirely by craniofacial and dental remains. Yet, it is not known to what extent this anatomical distribution represents the *in situ* distributions, reflects excavation collection and/or represents a focus on species-specific elements.

All of these carnivores except the smaller *F. silvestris*, *L. lutra* and *G. gulo* are listed as coming from the Middle Paleolithic levels of the Galeria Musterianã. Păunescu listed *G. gulo* as coming from the Mousterian, but he did not specify from which gallery (possibly the Galeria Musterianã). *C. lupus*, *V. vulpes*, *C. crocuta*, *P. spelaea* and *M. martes* came from the Galeria Secundară. Only four genera are listed as coming from the deeper (Middle Paleolithic portion) of the Galeria Principală (*Canis*, *Vulpes* and *Crocuta*, plus *Ursus*), and three similar ones (*Ursus*, *Panthera* and *Canis* are identified from the higher (Upper Paleolithic) portion of the Galeria Principală (Gheorghiu and Haas only listed *U. spelaeus* from the upper portion). Curiously, Bombiţă mentioned only *U. spelaeus* and *C. lupus* from the Middle Paleolithic of the Gura Peşterii, but he provided a long list of carnivores, all but

Taxon	Common Name	Gura Peşterii Mousterian	Gura Peşterii Aurignacian	Galeria Urşilor	Galeria Musteriană	Galeria Secundară	Galeria Principală inferior	Galeria Principală superior
Ursus spelaeus	Cave bear	X	X	X	X	X	X	X
Canis lupus	Wolf	X	X	X	X	X	X	X
Vulpes vulpes	Red fox		X		X	X	X	
Crocuta crocuta (spelaea)	Spotted hyena			X	X	X	X	
Panthera (leo) spelaea	Cave lion				X	X		X
Panthera pardus	Leopard				X			
Felis silvestris	Wild cat		X					
Lynx lynx	Lynx				X			
Martes martes	Marten		X		X	X		
Gulo gulo	Wolverine		X		X?			
Lutra lutra	European Otter		X					

Table 8 - Distribution of carnivore species presence in the galleries of the Peştera Muierii. Data pooled from Bombiţă (1954), Gheorghiu & Haas (1954:648), and Daicoviciu *et al.* (1953:203).

Taxon	Common Name	Galeria Musteriană	Galeria Secundară	Galeria Principală inferior	Galeria Principală superior
Cervus elaphus	Red deer (Wapiti)	X	X	X	
Megaloceros giganteus	Giant deer			X	
Alces alces	Moose (Elk)				X
Saiga tatarica	Saiga	X	X	X	X
Capra ibex	Ibex	X	X	X	
Bos primigenius	Aurochs	X	X	X	X
Bison priscus	Steppe wisent	X	X		X
Rupicapra rupicapra	Chamois	X	X	X	X
Equus caballus	Horse	X	X	X	
Rhinoceros tichorhinus	Wolly rhinoceros	X	X		
Mammuthus primigenius	Mammoth		X	X	

Table 9 - Distribution of herbivore species presence in the galleries of the Peştera Muierii. Data pooled from Bombiţă (1954), Gheorghiu & Haas (1954:648), Daicoviciu *et al.* (1953:203) and Doboş *et al.* (2009). The only herbivores documented from the Gura Peşterii (*Bos*, *Sus*, *Castor* and *Capra*) are from the superficial mixed terminal Pleistocene and Holocene level (Bombiţă 1954). None has been listed for the Galeria Urşilor.

hyenas and the larger cats, as being present in the Aurignacian level of the Gura Peşterii.

In addition, Bombiţă (1954) mentioned a complete wolf skeleton lying on the surface of the Galeria Ursilor, among the abundant cave bear bones of that lower gallery.

If one pools together the Middle Paleolithic carnivore representation, the only ones not present in at least one of the galleries are the smaller *F. silvestris* and *L. lutra*, and possibly wolverines. Similarly, for the two Aurignacian levels, only hyenas, leopards and lynx are not represented. The cave clearly had an abundance and a diversity of Late Pleistocene carnivores.

Herbivores

The published ungulate species in the Peştera Muierii include *Saiga tatarica*, *Capra ibex*, *Rupicapra rupicapra*, *Cervus elaphas*, *Megaloceros giganteus*, *Bison priscus*, *Bos primigenius*, and *Equus caballus*, as well as *Alces alces* identified among the radiocarbon samples (tabl. 9). To these herbivores are added *Rhinoceros tichorhinus* and *Mammuthus primigenius*. *Megaloceros* is only indicated as having derived from the deeper (Middle Paleolithic) levels of the Galeria Principală, and *Alces* is only known from a single molar from the upper levels of the Galeria Principală which was radiocarbon dated to ~30,000 ^{14}C BP (Chapter 2). *R. tichorhinus* and *M. primigenius* each come from two deposits, the Galeria Secundară and Galeria Musteriană for the former, and the Middle Paleolithic levels of the Galeria Principală and the Galeria Secundară for the latter.

Only three of these ungulate species derive from all of the excavated Pleistocene galleries and levels, *S. tatarica*, *R. rupicapra* and *B. primigenius*. The Middle Paleolithic levels of the Galeria Secundară, Musteriană and Principală yielded remains of *C. elaphus*, *C. ibex*, and *E. caballus*, and the same levels of the Galeria Musteriană and Secundară provided remains of *B. priscus* and *R. tichorhinus*. Mammoth remains are known, from similarly Middle

Paleolithic levels, in the deeper Galeria Principală and the Galeria Secundară.

Given the diversity (relative abundance is not known) of herbivorous species in the various Middle Paleolithic deposits, and especially in the Galeria Secundară, what is curious is the dearth of such species in the Upper Paleolithic levels of the Galeria Principală, being limited to saiga, aurochs, chamois and wisent. These four species, in addition to cave bears and various carnivores in both the Galeria Principală and the Gura Peşterii, are the only ones identified for the Upper Paleolithic levels. Since this is a period during which it has been proposed that humans were more effective at competing for space within cave systems than during the earlier Middle Paleolithic (Grayson & Delpech 2003), it is interesting that carnivores remain quite abundant in the earlier Upper Paleolithic levels of the Peştera Muierii and that likely human prey are present but not particularly diverse compared to the earlier levels within the cave. Yet, as with the Middle Paleolithic levels, the relative abundances of the different species are not known, and it is not known to what extent the carnivore or herbivore remains were accumulated through hibernation deaths, carnivore predation and/or human predation.

As with the carnivores, data on the anatomical distributions of the herbivore bones are rare, except for our observations of the preserved remains in different institutions. Bombiţă (1954) exclusively described cranial, mandibular and dental remains for the few herbivore species that he mentioned.

The Human "Locale"

Species representation is also available separately (Gheorghiu & Haas 1954) for the portion of the Galeria Musteriană which yielded the human remains. It is generally similar to the remainder of the Galeria Musteriană representation, in yielding *U. spelaeus*, *C. lupus*, *V. vulpes*, *M. martes*, *C. crocuta* and *P. spelaea* among the carnivores, and *C. elaphus*, *B. primigenius*, *B. priscus*, and *E. caballus* among the herbivores. However, there is no indication that there was a direct association between the human remains and the archeological and paleontological remains from the back of the Galeria Musteriană, especially since the recess at the back of the Galeria Musteriană contained mixed deposits from the Galeria Musteriană and the Galeria Principală (see Chapter 2).

Small Species

In addition to these macromammalian species, several micromammal and passerine bird species are listed as being present in the deposit.

Among the former, Păunescu (2000) listed *Chionomys nivalis* (European snow vole), *Cricetus cricetus* (European hamster), *Microtus agrestis* (field vole), *Arvicola terrestris* (European water vole) and *Ochotona pusilla* (steppe pika). However, these is no information on which galleries or levels yielded these remains. In addition Gheorghiu & Haas (1954) listed *Sorex* sp. (common shrew) as deriving from the Galeria Secundară and *Vespertilio* sp. (particolored bat) as present in the Middle Paleolithic levels of the three galleries. These various micromammals are widely present in Late Pleistocene Europe, and one, *O. pusilla*, should be indicative of cold climatic conditions.

Păunescu (2000) also listed *Aquila chrysaetos* (golden eagle), *Lyrurus tetrix* (black grouse), *Columba palumbus* (wood pigeon) and Anseriformes sp. (duck or goose) as present.

Holocene Species Representation

Since they are of less vertebrate paleontological interest, there is relatively little data on the faunal remains associated with the Holocene levels of the Peştera Muierii. There is a brief species list for the upper levels of the Gura Pesterii, provided by Bombiţa (1954) for the 1951 excavations, and a list of species for the Holocene levels of the Galeria Principală by Daicoviciu *et al.* (1953) for the 1952 excavations Together they listed domestic *Bos taurus* (cattle) *Canis familiaris* (dog), *Ovis aries* (sheep), *Sus scrofa* (pig) and various birds, plus the wild species *Sus scrofa* (boar, as opposed to pig), *Rupicapra rupicapra* (chamois), *Castor fiber* (beaver), *Capra ibex* (ibex) and bats. It is not possible to determine with which Holocene archeological culture(s) the different species were associated.

Middle Paleolithic Faunal Stable Isotopes

In the course of the radiocarbon dating of a stratigraphic sequence through the Galeria Principală (Chapter 2), carbon and nitrogen stable isotope ratios ($\delta^{13}C$ and $\delta^{15}N$) were generated for cave bear and cave lion remains. Carbon isotope ratios in Pleistocene Europe can provide some indication of general habitat or access to maritime resources if sufficiently distant from the general values found for terrestrial large-bodied mammals. In general, terrestrial consumers have $\delta^{13}C$ values close to -20 ± 2‰, depending on the region (Kelly 2000). However, of particular interest are the nitrogen isotope ratios, since they are generally 3 to 5‰ higher in herbivores than in the plants that they consume, giving herbivores values of 3 to 7‰. Moreover, $\delta^{15}N$ values are a further 3 to 5‰ higher in carnivores than in the herbivores that they consume, providing carnivores with $\delta^{15}N$ signatures in the range of 6 to 12‰ (Schoeninger & DeNiro 1984; Bocherens & Drucker 2003; Hedges & Reynard 2007).

Ideally, given possible diagenesis, one should have stable isotope profiles for a series of species from the same time horizon of a site that represent a spectrum of known dietary profiles. This is not available for the Peştera Muierii, but it is possible to assess the one pure carnivore (*P. spelaea*) and compare to it the spectrum provided by the four cave bear samples (tabl. 10). All of these samples derive from mature animals and are diagnostic as to species. The dated molar root of *Alces* also yielded stable isotopes, but the $\delta^{15}N$ value is artificially elevated since it derives from a molar root that would have formed shortly after birth and would therefore have been affected by the trophic level effects of perinatal maternal nutrition (Jenkins *et al.* 2001; Fuller *et al.* 2006).

The $\delta^{13}C$ values for the five specimens are all well within the expected range for terrestrial mammals. In addition, the $\delta^{15}N$ value of 8.2‰ for the cave lion specimen is comfortably within

Sample	Lab number	Species	Depth	$\delta^{13}C$	$\delta^{15}N$
Mui05-6	OxA-15530	*U. spelaeus*	1.20 – 1.40	−20.3‰	6.0‰
Mui05-8	OxA-16380	*P. spelaea*	1.40 – 1.60	−19.1‰	8.2‰
Mui05-9	OxA-16381	*U. spelaeus*	1.60 – 1.70	−20.3‰	3.7‰
Mui05-10	OxA-16382	*U. spelaeus*	1.70 – 1.90	−20.2‰	3.4‰
Mui-0511	OxA-16383	*U. spelaeus*	1.90 – 2.05	−20.7‰	7.3‰

Table 10 - Carbon and nitrogen stable isotope data for the cave bear (*Ursus spelaeus*) and cave lion (*Panthera (leo) spelaea*) remains from the Galeria Principală. All of the bones are isolated metapodials. See Chapter 2 for radiocarbon dating and sample details.

the range of carnivores, if not exceptionally high for as pure a carnivore as would be expected for a large felid. The cave bear values, however, provide a range for two that is well within the "herbivore" range (3.4‰ and 3.7‰) and two that are more appropriate for omnivores (6.0‰ and 7.3‰).

Since the early suggestion by Kurtén (1976) that cave bears were largely herbivorous, a series of stable isotopes studies (Vila *et al.* 1999; Fernández 1998; Bocherens *et al.* 1997, 2001; Fernández *et al.* 2001; Nelson *et al.* 1998) have provided $\delta^{15}N$ values that are securely within the "herbivore" range, if not below it, leading to the impression that they were dedicated herbivores, a view defended by some in the face of evidence to the contrary (Bocherens 1998, 2009; Grandal & Fernández 2008). This "herbivory" view was initially questioned based on a small study of museum specimens (Hilderbrand *et al.* 1996) and more thoroughly based on relevant issues of bear ecology (Hilderbrand *et al.* 1998; see also Peigné *et al.* 2009). More recently, three studies, one using stable isotopes on a large sample of cave bears from the Peştera cu Oase (Romania), a second comparing Pyrenean cave bear craniofacial functional morphology to that of extant bears, and a third using dental microwear to assess pre-dormancy diet in cave bears from Goyet (Belgium) (Richards *et al.* 2008a; Figueirido *et al.* 2009; Peigné *et al.* 2009), have all concluded that Late Pleistocene cave bears are best seen as facultative omnivores, and that their actual annual dietary profiles probably varied considerably with changing ecological parameters.

The plotting of the full sample of available cave bear isotopic data (fig. 16) shows a considerable range particularly of $\delta^{15}N$ values, with a general trend for the eastern European sample [almost entirely from the Peştera cu Oase but including two specimens from Peştera Cioclovina Uscată (Richards *et al.* 2008a)] to be the most carnivorous and the Alpine sample to have predominantly herbivorous values. The western European sample, including data from the Pyrenees, southeastern France and Belgium, is intermediate. The Muierii values are moderately high (less negative) in their $\delta^{13}C$ values, and they span the middle of the range in their $\delta^{15}N$ values.

However, Bocherens (1998) in particular (see also Richards & Trinkaus 2009) has emphasized that one should only employ high quality isotopic data, which in this case means adequate geochemical control of diagenesis, appropriate data from carnivores and herbivores from the same site (and time horizon), and data from taxonomically diagnostic remains (thereby eliminating the possibility of analyzing *U. arctos* remains, whose dietary flexibility is not in question). If one rigidly applies these criteria, only the Oase bears and part of the Scladina sample are acceptable. If one relaxes the comparative herbivore/carnivore

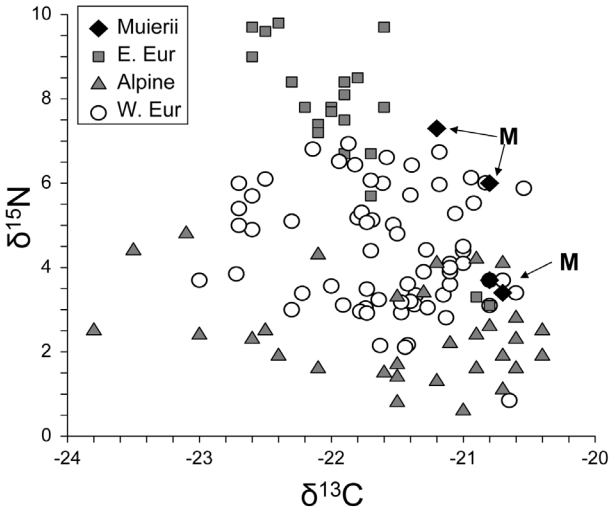

Figure 16 - Bivariate plot of available carbon and nitrogen stable isotope data for *Ursus spelaeus* remains from Peştera Muierii and other European MIS 3 sites, divided into eastern European, Alpine and western European sites. The eastern European sites include specimens from Peştera cu Oase (N = 22) and Peştera Cioclovina Uscată (N = 2). Note that all available data have been included, even though all of the Alpine and most of the western European samples, as well as the Cioclovina one, lack basic requirements for evaluating isotopic reliability (see text). M: Muierii cave bear values.

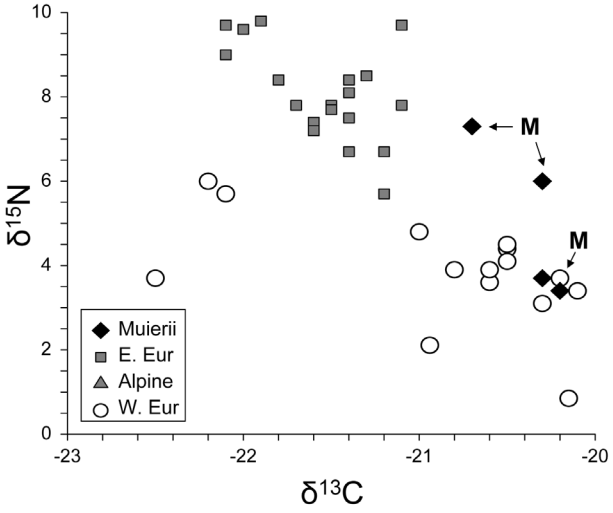

Figure 17 - Bivariate plot of available carbon and nitrogen stable isotope data for *Ursus spelaeus* remains from Peştera Muierii and other European MIS 3 sites, using only those data from sites which provide carnivore and/or herbivore comparative isotopic data, have reliable geochemistry data provided (minimally including acceptable C: N ratios), geochronological control, and derive from taxonomically diagnostic ursid remains. Note that there are no Alpine specimens included. The eastern European sample is from Peştera cu Oase, and the western European sites are Chauvet, Liñares and Scladina. M: Muierii cave bear values.

criterion to include one and/or the other of these dietary categories, the Chauvet and Liñares, and Muierii, samples can be included. None of the Alpine samples meets these criteria. The resultant samples are plotted in figure 17. The result is a species, *U. spelaeus*, whose average dietary pattern [averaged over years (Hedges *et al.* 2007)] shows considerable vegetarian to omnivory flexibility. Again, the Muierii specimens span the middle of this flexible range.

The limited cave bear stable isotope data from the Peştera Muierii, and especially the single value for a carnivore and the absence of herbivore isotopic data, cannot resolve the dietary profiles of this species. However, it is readily apparent from these few data, in the context of larger data sets from across Europe, that the Muierii cave bears span the "herbivory" and "omnivory" ranges with respect to their stable isotope profiles, reinforcing the stable isotopic data from elsewhere and analyses of cave bear craniofacial morphology and dental microwear that these were dietarily, and hence ecologically, flexible large mammals. Ultimately, the implications of this inference reside in their ecological relationships to the abundance of other carnivores documented at the Peştera Muierii, as well as to the humans who occasionally occupied the cave.

Summary

The faunal remains from the different galleries of the Peştera Muierii document a pattern that is well-known among the Carpathians in the Late Pleistocene. There is an abundance of carnivore remains, with a dominance of cave bears. There is also a variable diversity of large herbivores, although the absence of minimum number of individual (MNI) or (even better) number of identifiable skeletal parts (NISP) data for the different species in the Peştera Muierii makes it impossible to assess the extent to which the faunal collections were dominated by the carnivores as opposed to being a more balanced mix of species (*cf.*, Klein & Cruz-Uribe 1984). Moreover, there are no data on the damage patterns of the bones, so it is not possible to determine the extent to which the accumulations were due to hibernation deaths, denning, carnivore predation and/or human predation and processing.

However, the geochemical analysis of some of the faunal remains, initially for the purposes of radiocarbon dating, have provided stable isotope data on four cave bears and a cave lion, which together help to document the dietary flexibility and omnivory of *Ursus spelaeus*.