Doboş A., Soficaru A. & Trinkaus E. - *The Prehistory and Paleontology of the Peştera Muierii, Romania.*
Liège, ERAUL 124, 2010, p. 9-20.

Chapter 2

THE PEŞTERA MUIERII: GEOLOGICAL CONTEXT AND CHRONOLOGY

The Peştera Muierii

The Peştera Muierii (Cave of the Woman; also known as the Peştera Muierilor – Cave of the Women) is located in Gorj County, Oltenia near the village of Baia de Fier in southwestern Romania (fig. 1) (45° 11' 24" N, 23° 45' 19" E). The name is rumored to have come from the habit, during wartime, of women and children from the local area taking refuge in the cave.

The cave is on the southern slope of the Carpathian Mountains, in the eastern portion of a cluster of Paleolithic and human paleontological sites extending from Peştera cu Oase and Peştera Livadiţa to the southwest, through Peştera Hoţilor and Peştera Cioarei further east, and Peştera Cioclovina Uscată and Peştera Bordu Mare to the northwest on the other side of the Carpathians.

More locally, the Peştera Muierii is located in the southeastern sector of the Munţii Parâng (the Parâng Mountains) on the right bank of the Galbenu River as it passes through the Valea Galbenului (the valley of river Galbenu) just above the village of Baia de Fier (fig. 2 to 5). The cave is a complex karstic system formed in limestone bedrock of Tithonic (late Jurassic) age (Bleahu *et al.* 1976; Goran 1982).

The Peştera Muierii has four floors, with three entrances from the valley wall. The highest entrance is 45 m above the valley floor (Goran 1982), which in turn is ~615 m above sea level. The important levels from an archeological and paleontological perspective are the second one (Upper) and the third floor (Lower) (fig. 6). The other levels have only speleological and zoological relevance (Bombiţă 1954; Bleahu *et al.* 1976; Gruia 2003; Diaconu *et al.* 2008; Dragu 2009). The total length of the gallery system is 3,566 m, with a main orientation following a NNW – SSE line. The Upper floor has a total length of 1,228 m. It consists of a horizontal gallery, 573 m long, and a network of channels and/or diverticulae that sum up to 655 m.

The Lower floor comprises two sectors: a Northern one with a total length of 1,560 m and a Southern one. The access to these sectors can only be made from the Upper floor. The principal galleries on the Lower floor of interest are the Galeria Secundară towards the entrance and the Galeria Musteriană deeper in the cave and largely parallel to, if lower than, the Galeria Principală. Furthermore, from the Southern sector, one can also enter the deeper Galeria Urşilor (Bear's Gallery, that harbors over 180 cave bear skulls) (fig. 7) and Sala Perlelor (Pearl's Hall) (Bleahu *et al.* 1976:352-353).

As indicated in figures 8 and 9, the excavations by C.S. Nicolăescu–Plopşor and colleagues in 1929 and the early 1950s consisted of a series of pits and trenches in the Galeria Principală and the adjacent Gura Peşterii (the cave entrance), as well as extensive excavation through most of the Galeria Secundară and the Galeria Musteriană. They also made observations on the surface material (mostly faunal remains, including abundant cave bear remains) in the adjacent galleries of the Lower floor.

In these excavations and subsequent preliminary reports (Daicoviciu *et al.* 1953; Gheorghiu *et al.* 1954; Nicolăescu-Plopşor *et al.* 1957; see also Păunescu 2000 and Chapter 5), they noted only Middle Paleolithic archeological remains in the Galeria Secundară and the Galeria Musteriană. In contrast, the Galeria Principală yielded a succession of Middle Paleolithic, early Upper Paleolithic ("Aurignacian"), Early to Middle Neolithic to Chalcolithic (Sălcuţa Culture), Bronze Age (Coţofeni Culture), Iron Age (*cf.*, La Tène / Hallstatt), Medieval and modern levels, with some separation by sterile levels between the deeper (Pleistocene) levels (Gheorghiu *et al.* 1954; Păunescu 2000). The Gura Peşterii also produced an early Upper Paleolithic level and a deeper Middle Paleolithic one.

Human remains were encountered in the Coţofeni level of the Galeria Principală (Chapter 8), scattered Holocene human remains were found in the Galeria Principală (Chapter 8), and a now lost isolated human molar was found in the Galeria Principală, in what were probably Late Pleistocene deposits based on associated faunal remains (Nicolăescu–Plopşor 1952; Daicoviciu *et al.* 1953; Chapter 7). However, of primary concern, and long term debate, are the various human remains that were discovered in a recess at the back of the Galeria Musteriană in 1952 (Nicolăescu–Plopşor 1952; Gheorghiu & Haas 1954; Chapter 7). These remains, which consist of a cranium, a partial mandible, a temporal bone, a scapula, a fibula, plus several bones whose locations are currently unknown [a tibia (Gheor-

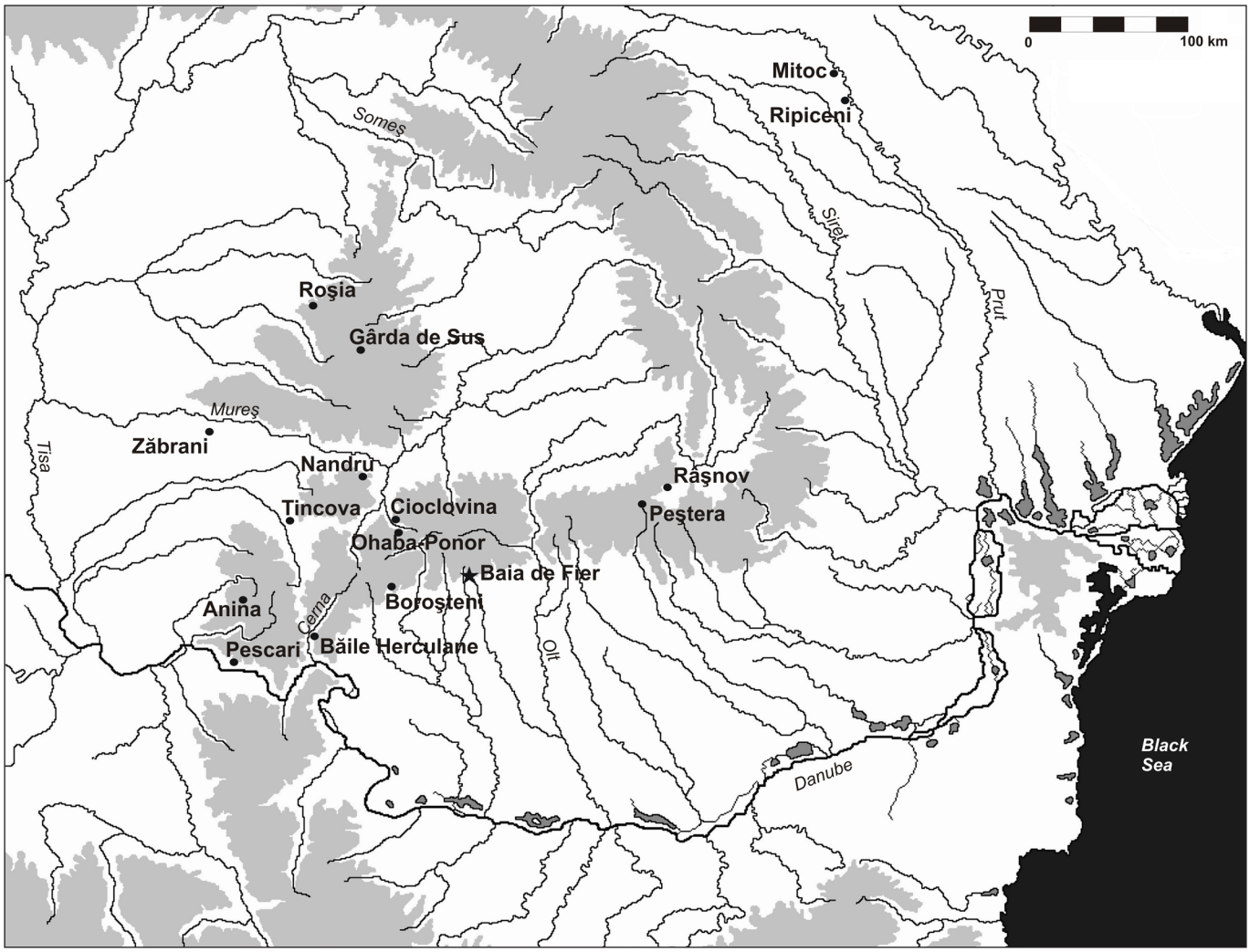

Figure 1 - Map of Romania and adjacent areas, with the locations of relevant Paleolithic and human paleontological sites. The towns adjacent to the sites are provided on the map. The Middle and Upper Paleolithic sites are: Baia de Fier (Peştera Muierii); Boroşteni (Peştera Cioarei); Ohaba-Ponor (Peştera Bordu Mare); Băile Herculane (Peştera Hoţilor); Râşnov (Peştera Gura Cheii); Peştera (Peştera Liliecilor and Peştera Valea Coacăzii); Ripiceni (Izvor); Mitoc (Valea Izvorului); and Zăbrani (Dealul Pietrei: Middle Paleolithic only). The Early Upper Paleolithic site is: Tincova (Selişte II). Human footprints are known from: Roşia (Peştera Ciurului-Izbuc) and Gârda de Sus (Peştera Gheţarul Vârtop). Two of these sites and three other sites have yielded Pleistocene human remains: Baia de Fier (Peştera Muierii); Anina (Peştera cu Oase); Cioclovina (Peştera Cioclovina Uscată); Pescari (Peştera Livadiţa); and Ohaba-Ponor (Peştera Bordu Mare).

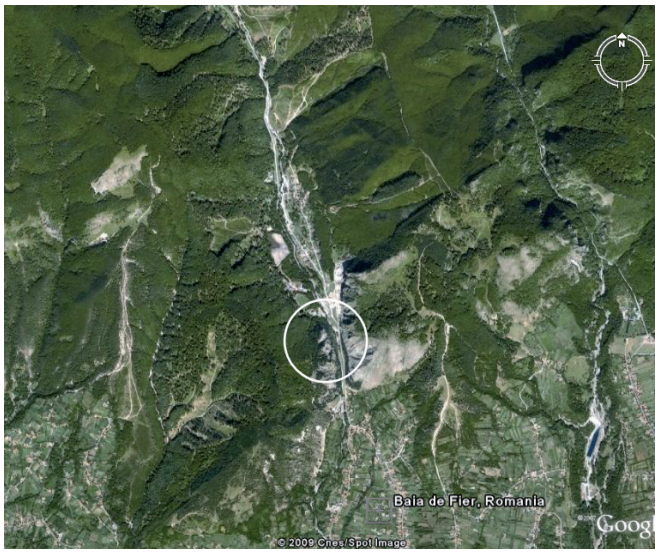

Figure 2 - Satellite view of the northern portion of Baia de Fier and the Valea Galbenului, with the location of the Peştera Muierii indicated by the white circle. Image from Google Earth and © Cnes/Spot Image.

Figure 3 - Oblique satellite view of the Valea Galbenului with the northern portion of Baia de Fier. The location of the Peştera Muierii is indicated by the white circle. Image from Google Earth and © Cnes/Spot Image.

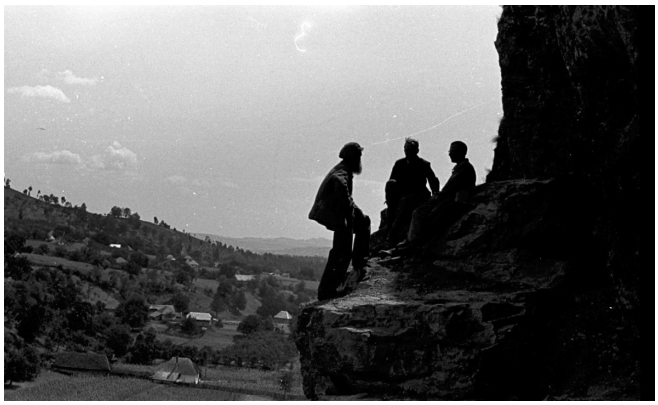

Figure 4 - View in 1952 from the upper rock face by the Peştera Muierii looking down the Valea Galbenului. The man standing on the edge is Constantin S. Nicolăescu-Plopşor. Photo: Institutul de Arheologie "Vasile Pârvan."

Figure 5 - View along the Valea Galbenului with the rock face containing the Peştera Muierii in the background, taken during excavations in 1952. Photo: Institutul de Arheologie "Vasile Pârvan."

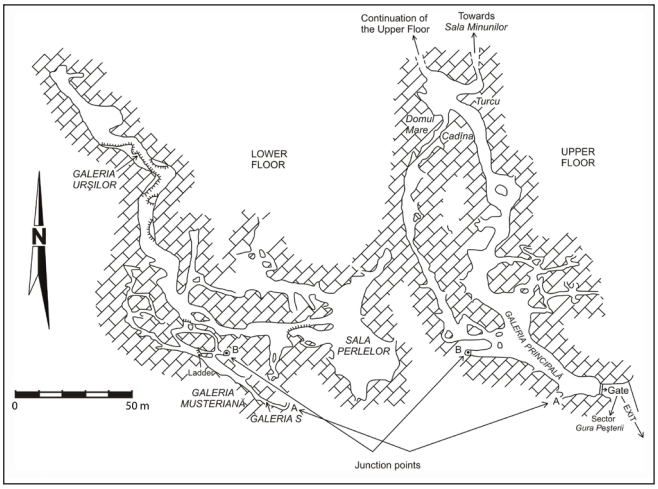

Figure 6 - Horizontal plan of the Upper and Lower galleries or passages of the Peştera Muierii, redrawn with modifications from Păunescu (2000).

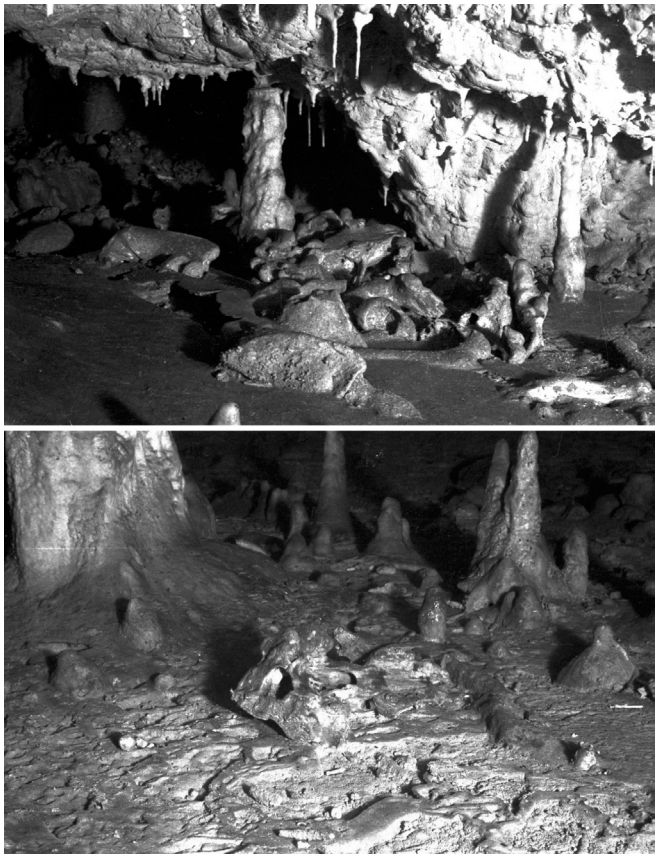

Figure 7 - Two views of the Galeria Urşilor with cave bear bones cemented into the surface of the gallery, taken during excavations in the 1950s. Photo: Institutul de Arheologie "Vasile Pârvan."

ghiu & Haas 1954) and two thoracic vertebrae (Nicolăescu–Plopşor 1952)], were recognized from the beginning as those of anatomically modern humans despite some possibly archaic human traits. However, they were found associated with a Middle Paleolithic assemblage, raising questions as to whether they were indeed Middle Paleolithic in age, intrusive from the Upper Paleolithic, or actually Holocene in age (see Chapter 3).

Chronology of the Peştera Muierii

Radiocarbon Considerations

The chronology of the stratigraphic levels in the Peştera Muierii is based on a combination of contained faunal remains, Paleolithic archeological assemblage technology, Holocene cultural affinities, and radiocarbon dating. The "absolute" ages of all of the first three categories are ultimately based on radiocarbon chronology. In addition, some of the dates for comparative materials are based on other radiometric dating techniques [especially uranium-series (U-series) and the related techniques of electron spin resonance (ESR) and optically stimulated luminescence (OSL)]. Of primary concern for the Peştera Muierii is radiocarbon dating, particularly for the Paleolithic deposits and their paleontological contents.

Since the original excavations of the site in the 1950s, there have been several attempts to provide a radiocarbon chronology for portions of the site, and especially during the past decade (see below). In the evaluation of these results, and the radiocarbon dating results from other similarly aged sites in southeastern Europe (or elsewhere), it needs to be kept in mind that both the accuracy and the precision of radiocarbon dating has changed

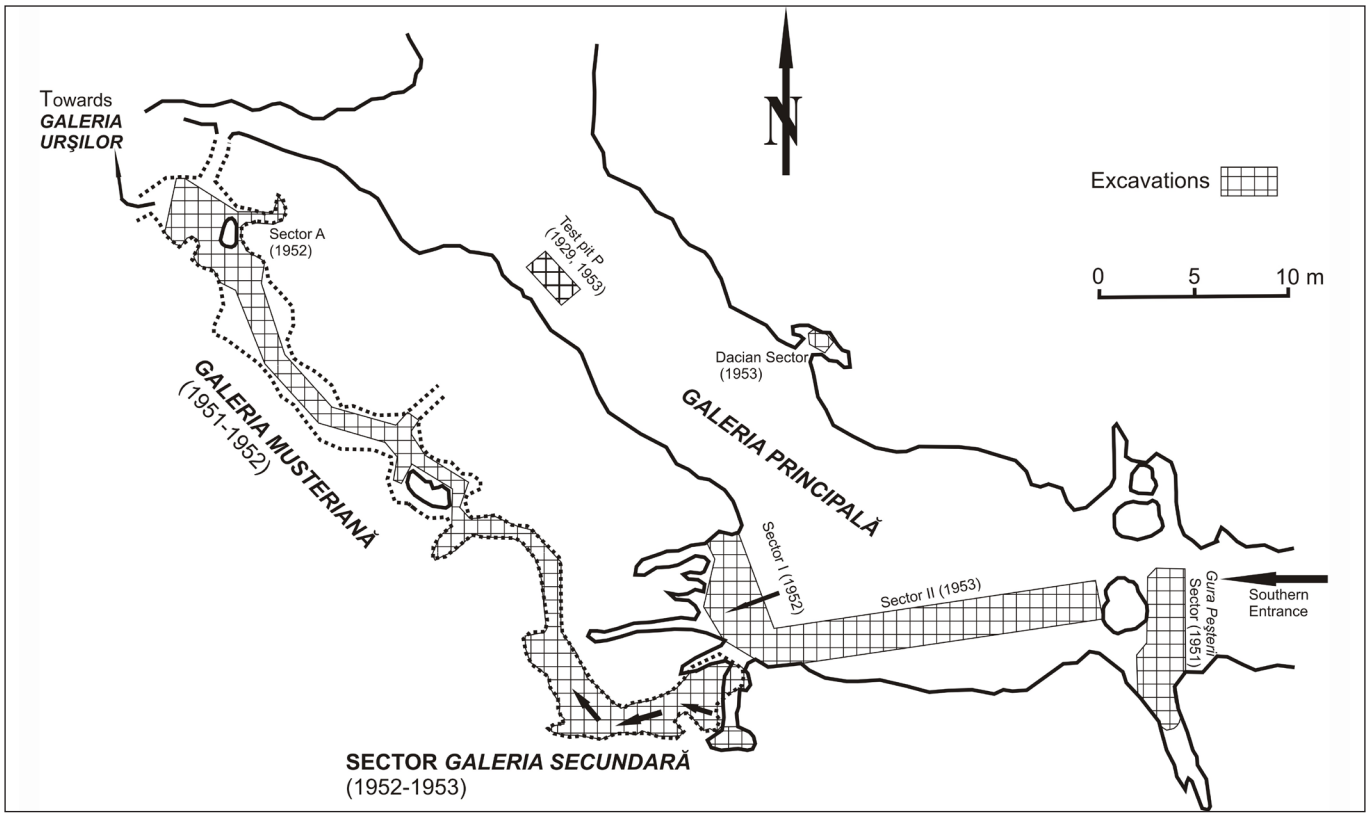

Figure 8 - Horizontal plan of the main galleries of the Peştera Muierii with the areas of the excavations in the early 1950s indicated. Note that the Galeria Principală is at a higher level than the Galeria Secundară and the Galeria Musteriană (see fig. 9), which is indicated by the dotted lines between them. Redrawn with modifications from Gheorghiu & Haas (1954).

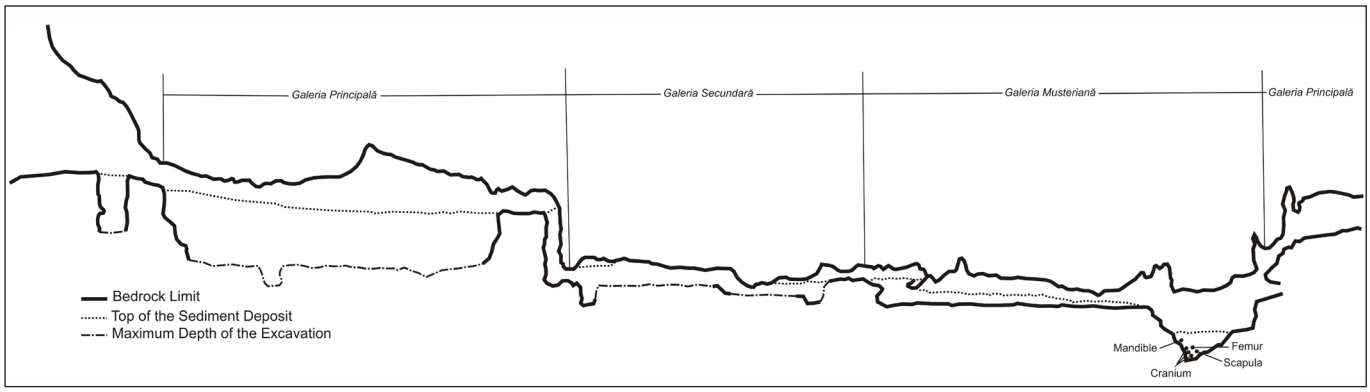

Figure 9 - Composite vertical section of the Galeria Principală, Galeria Secundară and Galeria Musteriană of the Peştera Muierii. Redrawn with modifications from Gheorghiu & Haas (1954).

significantly during the time period of these dating assays. In particular, for all radiocarbon dates greater than ~30,000 ^{14}C BP, contamination is, and remains, a serious consideration, given that little of the original ^{14}C is likely to remain. Accelerator mass spectrometry (AMS) dating has greatly increased the accuracy of dates relative to conventional (emitted radiation) dates, but primary concerns have remained including 1) the natures of the original samples (in terms of solidity, size and porousness), 2) the techniques used to decontaminate them, and 3) for archeological technocomplexes the secureness of the association between the dated sample and the assemblage of concern.

For charcoal, the solidity and size of the samples are of primary concern. For bone, in which principally the purified collagen is dated, it is critical to date only collagen from the original bone. As a result, ultrafiltration has increasingly been employed, since it filters out the collagen fragments with a molecular weight <30 kD and leaves the larger portions for dating (Higham *et al.* 2006a,b). Reassessments have shown that ultrafiltration provides older and/or more precise dates than previous (conventional or AMS) assays on the same osteological specimens. Furthermore, assessments of bone and tooth dentin dates at the Peştera cu Oase, near the limits of radiocarbon dating, have shown that dating the protected dentin collagen provides results similar to ultrafiltration (Higham *et al.* n.d.).

As a result, the earlier dates on remains from the Peştera Muierii, whether conventional or AMS, that did not use ultrafiltration or

dated dentin, need to verified. Moreover, many of the comparative sample dates, whether on human fossils (tabl. 6) or on archeological remains from southeastern Europe (tabl. 2 to 4), need to be accepted cautiously, especially if they are significantly younger than consistent dates on similar technocomplexes. This applies especially to dates on bone run prior to the 21st century.

Radiocarbon dates in this range (>25,000 ^{14}C BP) with large standard errors (≥1,000 years) should also be viewed with caution, since they are not likely to have been fully decontaminated. In addition, older conventional radiocarbon dates >40,000 ^{14}C BP are best seen as minimum dates, even if they have been published as finite dates with standard errors; this applies in particular to many of the comparative Middle Paleolithic dates (tabl. 3 and 4), none of which can be used to provide maximum ages for the levels being dated (*contra* Păunescu 1988). This is particularly relevant for conventional dates that are both >40,000 ^{14}C BP and have standard errors >1,000 years; they are probably meaningless except to document that the sample is older than the reliable range for conventional radiocarbon dating. Of the 33 Romanian Middle Paleolithic radiocarbon dates that are likely to be minimally reliable (tabl. 3), only two (6%) are both <40,000 ^{14}C BP and have standard errors <1,000 years. Moreover, twelve (36%) of them were only provided as minimum ages.

In addition, given the discordance between radiocarbon and calendar years, especially in the range of concern here (25,000 – 50,000 ^{14}C BP), both the radiocarbon dates in ^{14}C years, and "calibrated" dates in calendar years are provided. There is no universally accepted calibration curve for radiocarbon dates >20,000 BP, but for consistency we use the one provided by CalPal (quickcal2007, ver. 1.5; www.calpal.de). At least at the Peştera cu Oase, nearby in Caraş-Severin, calibration of radiocarbon dates using CalPal provides congruity with stratigraphically associated U-series dates on stalagmites (Zilhão *et al.* 2007), giving confidence in the CalPal calibration algorithms.

Stratigraphic Ages within the Peştera Muierii

The ages of the more superficial (Holocene) levels of the Galeria Principală are based on the contained archeological remains and their affiliations to the different defined prehistoric "cultures" of the region, dated at other sites. These ages are likely to be 4,500 – 3,500 BC for the Sălcuţa assemblage (Lichter 2001:30, fig. 2), 3,500 – 2,900 BC for the Coţofeni material, and 1,400 BC – 100 AD for the Iron Age remains (Petrescu-Dîmboviţa & Vulpe 2001:300, fig. 50; 464-465).

There have been a couple of attempts to radiocarbon date the Pleistocene levels in the past. The first date was a conventional one on bone from Level I of the Galeria Musteriană, Sector C at a depth of 1.4 to 1.5 m (Păunescu 2000). It produced an age of 42,560 +1,310, -1,120 ^{14}C BP (GrN-16977). Given its age (>40,000 ^{14}C BP), the large standard deviation, the absence of the sample preparation techniques currently available, and being a conventional (non-AMS) date, it is best considered as a minimum age for the deeper Middle Paleolithic level of the Galeria Musteriană.

Subsequently, a bear bone of unspecified location in the cave was given by N. Haas to the Vernadsky Institute (Moscow) for radiocarbon dating (Vinogradov *et al.* 1968). The site is described as containing "the bones of primitive man and animals with quartzite implements" (1968:454), but there is no indication how or whether the sample was associated with either human or lithic remains. The organic fraction (collagen) of the bone provided an age of >29,000 ^{14}C BP (Mo-105). Given that cave bear bones were found throughout the deposits (Bombiţă 1954; Gheorghiu & Haas 1954; Chapter 4), the location of the bone in the site is unknown. The result is only a minimum age in the latter part of marine isotope stage (MIS) 3, and therefore the date is of little use. It only establishes that cave bears were present in the Peştera Muierii sometime prior to their extinction ~24,000 ^{14}C BP (Pacher & Stuart 2009).

There is only one suggestion of a Late Upper Paleolithic deposit in the Peştera Muierii, a single blade found during the 1929 excavations in the cave entrance (Gura Peşterii) that was attributed to the Magdalenian by Nicolăescu–Plopşor (1935-36). However, a single blade with minimal retouch is not likely to be diagnostic, and there are no Late Upper Paleolithic (MIS 2) dates from the cave. Moreover, the Upper Paleolithic levels identified in the cave all yielded the remains of *U. spelaeus* (Chapter 4), which place those deposits prior to the last glacial maximum (Pacher & Stuart 2009). It therefore remains to be demonstrated whether there was a Late Upper Paleolithic occupation in the Peştera Muierii.

Subsequently, during the 1951 excavations, an Upper Paleolithic level was identified in the Gura Peşterii deposits, which was provisionally assigned to the Aurignacian (Gheorghiu *et al.* 1954). This was based on the presence of a modest number of blades, a blade nucleus and a bone point with a round cross-section. Subsequent excavations in the Galeria Principală identified an additional earlier Upper Paleolithic level, based on aspects of the lithic technology and a bone point. It was also assigned to the Aurignacian (see Păunescu 2000). However, as previously noted (Soficaru *et al.* 2006), the available illustrations of the lithic and bone implements (Gheorghiu *et al.* 1954; Păunescu 2000:322) indicate that the lithic assemblage lacked diagnostic Aurignacian types (J. Zilhão pers. comm.) and therefore could belong to either the Aurignacian or the earlier Gravettian. The bone point does fit better in an Aurignacian context. Furthermore, as noted with respect to the faunal remains (Chapter 4), the presence of *Ursus spelaeus* in these deposits indicates an age of at least ~24,000 ^{14}C years BP (~29,000 cal BP), given the apparent extinction of *U. spelaeus* at that time (Pacher & Stuart 2009).

In order to assess the ages of the levels in at least the Galeria Principală, in 2005 we collected samples of bone from a stratigraphic series in Sector I of the Galeria Principală (Doboş *et al.* 2009). It is not possible to relate these samples directly to the previously identified stratigraphic levels, but each one is labeled with the site, year and gallery (BF 52 G.P.), the excavation area (S_1 or SI = Sector I), and the depth below datum (e.g., 1.10 – 1.20 m) (see tabl. 1). By reference to the published scaled stratigraphic section of the Galeria Principală excavation and the recorded thicknesses of the levels, we were able to assign the highest specimen at 0.90 m to the "Aurignacian," and the

Sample number	Mui05-5	Mui05-6	Mui05-8	Mui05-9	Mui05-10	Mui05-11
Curating institution	Inst. Archeol.	Muzeul Olteniei	Muzeul Olteniei	Inst. Archeol.	Inst. Archeol.	Inst. Archeol.
GP SI depth (m below datum)	0.9	1.20 – 1.40	1.40 – 1.60	1.60 – 1.70	1.70 – 1.90	1.90 – 2.05
ORAU number	OxA-15554	OxA-15530	OxA-16380	OxA-16381	OxA-16382	OxA-16383
Species	*Alces alces*	*Ursus spelaeus*	*Panthera spelaea*	*Ursus spelaeus*	*Ursus spelaeus*	*Ursus spelaeus*
Bone	Molar root	Metapodial	Metapodial	Metapodial	Metapodial	Metapodial
Radiocarbon age (^{14}C BP)	30,060 ± 280	40,850 ± 450	47,500 ± 900	40,950 ± 450	42,700 ± 550	>52,400
"Calendrical" age (cal BP)	34,291 ± 216	44,372 ± 790	51,292 ± 2081	44,467 ± 783	46,182 ± 1176	--
δ^{13}C	−19.9‰	−20.3‰	−19.1‰	−20.3‰	−20.2‰	−20.7‰
C:N	3.5	3.3	3.2	3.2	3.2	3.2
Sample weight (mg)	520	640	900	800	840	800
Collagen weight (mg)[1]	13.1	52.2	77.5	51.7	60.5	12.0
Burnweight (mg)[2]	5.6	5.3	5.4	5.3	5.2	5.2
%C (% carbon on combustion)	46.9%	43.4%	48.8%	47.5%	46.9%	44.9%
%N (% nitrogen on combustion)	16.1%	15.1%	17.9%	17.5%	17.2%	16.4%

[1] Collagen weight: ultrafiltered gelatin yield.
[2] Burnweight: gelatin combusted for graphitization.

Table 1 - Radiocarbon results for faunal remains from the Peştera Muierii. All samples are from the depth below datum brackets indicated from the Galeria Principală (GP), Sector I (SI), 1952 excavations. All samples were run using ultrafiltration (Higham *et al.* 2006a,b) at the ORAU. Calendrical years based on CalPal quickcal2007 ver.1.5 (www.calpal.de).

Provenience	Method	Lab Number	Age (^{14}C years)	Age (cal years)	Material	Reference
Bacho Kiro						
Layer 6b	Conv.	GrN-7569	32,700 ± 300	37,219 ± 710	bone	Mook 1982
Layer 6a/7	Conv.	Ly-1102	29,150 ± 950	33,417 ± 819	bone	Mook 1982
Bistricioara-Lutărie						
–1.95 to –2.20 m	Conv.	GrN-10529	27,350 ± 1300	31,989 ± 1204	charcoal	Honea 1984
–1.95 to –2.20 m	Conv.	GrN-11586	28,010 ± 170	32,490 ± 303	bone	Honea 1984
–2.00 to –2.15 m	Conv.	GX-8844	27,350 +2100 −1500	31,838 +1959/−1368	charcoal	Honea 1984
Bordu Mare						
4b, Cas 3A –0.2 to –0.5m	Conv.	GrN-14627	28,780 ± 290	33,264 ± 444	bone	Păunescu 2001
Mitoc-Malu Galben						
Level 8b inf	AMS	GrA-27261	27,700 ± 180	32,267 ± 276	charcoal	Damblon & Haesaerts 2007
Level 8b inf	AMS	GrA-27268	27,750 ± 160	32,301 ± 277	charcoal	Damblon & Haesaerts 2007
Level 9b inf	AMS	GrA-1355	25,380 ± 120	30,211 ± 277	charcoal	Damblon & Haesaerts 2007
Level 10b inf	AMS	GrA-1648	31,000 ± 330	35,076 ± 401	charcoal	Damblon & Haesaerts 2007
Level 11 sup	Conv.	GrN-20443	30,240 +470/−440	34,482 +409/−368	charcoal	Damblon & Haesaerts 2007
Level 11 sup	Conv.	GrN-20770	31,160 +570/−530	35,294 +586/−550	charcoal	Damblon & Haesaerts 2007
Level 11 inf	Conv.	GrN-20442	30,920 ± 390	35,042 ± 428	charcoal	Damblon & Haesaerts 2007
Level 12a	Conv.	GrN-20444	31,160 +550/−510	35,281 ± 568/−533	charcoal	Damblon & Haesaerts 2007
Level 12b	AMS	GrA-1357	32,730 ± 220	37,251 ± 669	charcoal	Damblon & Haesaerts 2007
Ripiceni-Izvor						
-3.00 m	Conv.	Bln-809	28,420 ± 400	32,891 ± 504	charcoal	Honea 1984

Table 2 - Aurignacian radiocarbon dates from Romanian and neighboring Bulgarian sites. The Mitoc-Malu Galben dates are all from the 1992-2004 excavations (see discussion in Damblon & Haesaerts 2007). Results listed as questionable by Honea (1984) are not included. Calendrical years based on CalPal quickcal2007 ver.1.5 (www.calpal.de).

subsequently deeper specimens to either the Middle Paleolithic or the even deeper archeologically sterile levels. In this, since the horizontal positions of the specimens are unknown and the levels within the excavation, especially for the deeper portions, were not horizontal, the associations with the identified stratigraphic levels are approximate.

Provenience	Method	Lab Number	Age (^{14}C years)	Age (cal years)	Material	Reference
Bordu Mare						
Layer 3a, -1.91 to -2.00 m (hearth)	AMS	GrA-6036	>40,000	--	charcoal, bone, sediment	Păunescu 2001
Layer 3a, -1.70 to -1.80 m (hearth)	Conv.	GrN-11618	39,200 +4500/−2900	43,251 +4528/−2486	charcoal	Honea 1984
Layer 3b, -1.48 to -1.55 m (hearth)	Conv.	GrN-12676	43,600 +2800/−2100	47,686 +3013/−2395	charcoal, bone, sediment	Păunescu 1989
Layer 3c, -1.32 to -1.47 m (hearth)	Conv.	GrN-14626	45,500 +3500/−2400	50,111 +4223/−3074	burnt bone	Păunescu 2001
Layer 3b, -1.48 to -1.52	Conv.	GrN-11617	>41,000	--	charcoal	Honea 1984
Cioarei						
Layer G, -2.75 to -2.95 m	Conv.	GrN-13002	49,500 +3200/−1100	55,213 +5211/−2572	unburnt bone	Honea 1986
Layer F, -3.25 to -3.50 m	Conv.	GrN-13003	>50,000	--	unburnt bone	Honea 1986
Layer E, -3.70 to -3.90 m	Conv.	GrN-13004	>45,000	--	unburnt bone	Honea 1986
Layer E, -4.10 to -4.15 m	Conv.	GrN-15046	50,900 +4400/−2800	--	unburnt bone	Honea 1993
Layer E, -4.20 to -4.30 m	Conv.	GrN-15047	>47,000	--	charcoal	Honea 1993
-2.05 to -2.15 m	Conv.	GrN-13000	>46,000	--	unburnt bone	Honea 1986
Layer J, -2.15 to -2.25 m	Conv.	GrN-13001	43,000 +1300/−1100	46,746 +1889/−1796	unburnt bone	Honea 1986
Layer E, -4.25 to -4.35	Conv.	GrN-15048	51,900 +5300/−3200	--	unburnt bone	Honea 1993
Layer K, -2.15 to -2.25 m	Conv.	GrN-15052	47,200 +2900/−2100	51,678 +4066/−3197	unburnt bone	Honea 1993
Layer J, -2.45 to -2.55 m	Conv.	GrN-15053	48,900 +2100/−1700	53,723 +3550/−3008	?	Honea 1993
Layer H, -2.75 to -2.85 m	Conv.	GrN-15054	48,000 +1800/−1500	52,174 +2936/−2599	unburnt bone	Honea 1993
Layer F, -3.35 to -3.45 m	Conv.	GrN-15055	>54,000	--	unburnt femur and vertebra of *Ursus*	Honea 1993
Layer E, -4.05 to -4.15 m	Conv.	GrN-15056	>49,000	--	?	Honea 1993
-1.60 to -1.70 m	Conv.	GrN-13005	37,750 ± 950	42,412 ± 737	unburnt bone	Honea 1986
Curată						
Layer 2a, -3.00 to -3.15 m	Conv.	GrN-24221	44,600 +1900/−1500	48,247 +2390/−2073	bone	Păunescu 2001
Layer 1b, -4.38 to -4.50 m (hearth)	Conv.	GrN-24223	>36,300	--	bone (collagen)	Păunescu 2001
1 b, S 3, -4.15 to -4.25 m (hearth)	Conv.	GrN-24222	45,200 +4200/−2700	50,172 +4895/−3298	bone (collagen)	Păunescu 2001
Layer 2c, -1.90 to -2.15 m	AMS	GrA-13948	40,800 +1050/−930	44,388 +1054/−992	bone	Păunescu 2001
Layer 2a, -2,90 to -3.00 m	Conv.	GrN-23407	>45,000	--	bone	Păunescu 2001
Layer 2b, -2.50 to -2.70 m	Conv.	GrN-23406	>47,800	--	charcoal, bone	Păunescu 2001
Layer 1a, -5.08 to -5.17 m (hearth)	Conv.	GrN-24224	>39,600	--	bone (collagen)	Păunescu 2001
Gura Cheii						
Sterile layer below Moust. Level 1, -1.90 m	Conv.	GrN-13010	44,900 +1800/−1500	48,510 +2371/−2128	unburnt bone	Păunescu 2001
Mare/Liliecilor						
unknown depth	Conv.	GrN-14618	38,700 ± 850	43,088 ± 756	bone	Păunescu 2001
Ripiceni-Izvor						
-6.6 to -6.68 m	Conv.	GrN-9210	40,200 +1100/−1000	43,976 +965/−912	charcoal, burnt bone	Honea 1984
-7.3 m	Conv.	GrN-9209	42,500 +1300/−1100	46,250 +1613/−1461	charcoal, burnt bone	Honea 1984
-7.3 m	Conv.	GrN-9207	43,800 +1100/−1000	47,345 +1795/−1752	charcoal, burnt bone	Honea 1984
-7.3 m	Conv.	GrN-9208	44,800 +1300/−1100	48,230 +1967/−1842	charcoal, burnt bone	Honea 1984
-8.0 m	Conv.	GrN-11230	46,400 +4700/−2900	51,639 +5634/−3827	burnt bone	Honea 1984

Table 3 - Romanian Middle Paleolithic radiocarbon dates. Dates <20,000 ^{14}C BP not included. Questionable dates are listed in table 4. Calendrical years based on CalPal quickcal2007 ver.1.5 (www.calpal.de); minimum ages are not calibrated.

Given these limitations, the stratigraphically highest specimen, a molar of *Alces alces* (moose, or European elk) provided an ultrafiltered AMS radiocarbon date of ~30,100 ^{14}C BP (~34,300 cal BP) (tabl. 1). This result is well within current estimates for the Aurignacian, especially in the region of the Carpathians (Mook 1982; Haesaerts 2007; Damblon & Haesaerts 2007; Dobrescu 2008), but also in neighboring regions (Teyssandier 2008; Svoboda *et al.* 2009) (see tabl. 2). It is also older than most of the dates available for the Gravettian in the region and neighboring areas of Europe (Honea 1986; Păunescu 1989, 2001; Conard & Moreau 2004; Cârciumaru *et al.* 2006; Damblon & Haesaerts 2007; Svoboda *et al.* 2009).

The deeper samples (tabl. 1) provide a range of ~41,000 ^{14}C BP to >52,000 ^{14}C BP for these levels, or ~44,000 cal BP to

Provenience	Method	Lab Number	Age (^{14}C years)	Comments	Material	Reference
Curată						
Layer 1a, -5.08 to -5.17 m (hearth)	AMS	GrA-13250	28,250 +350/−530	same sample as GrN-24224: >39.6 ka	charcoal	Păunescu 2001
Layer 1b, -4.15 to -4.25 m (hearth)	Conv.	GrN-24326	> 31,700	same sample as GrN-24222: 45.2 ± ka	charcoal	Păunescu 2001
Layer 1b, -4.38 to -4.50 m (hearth)	AMS	GrA-13249	29,940 +420/−400	same sample as GrN-24223: >36.3 ka	charcoal	Păunescu 2001
Gura Cheii						
Layer 2a, -1.52 to -1.62 m (hearth)	Conv.	GrN-13009	33,300 ± 900		charcoal and bone collagen	Păunescu 1989
Layer 2a + 2b, -1.40 to -1.60 m	Conv.	GrN-13008	30,450 ±300		bone	Păunescu 1987
Layer 2b, -1.20 to -1.27 m (hearth)	Conv.	GrN-14620	28,900 +2400/−1800	top of Mousterian	charcoal, bone and sediment	Păunescu 1989
Layer 2b, -1.20 to -1.27 m (hearth)	Conv.	GrN-11619	29,700 +1700/−1400	small carbon yield, top of Mousterian	bone	Honea 1984
Spurcată						
Cas B, -1.30 m	Conv.	GrN-14622	30,000 +1900/−1500	fragments	bone	Păunescu 2001:264
Valea Coacăzii						
-1.0 to -1.1 m	Conv.	GrN-16141	34,400 ± 500	all carnivores, esp. bear	bone collagen	Păunescu 2001:334

Table 4 - Radiocarbon dates for Middle Paleolithic levels in the literature which are questionable for various reasons.

Bone	Scapula and Tibia	Zygomatic	Temporal[3]	Temporal[3]
Lab number	LuA-5228	OxA-15529	OxA-15435	OxA-16252
Radiocarbon age (^{14}C years BP)	30,150 ± 800	29,930 ± 170	29,750 ± 800	29,110 ± 190
"Calendrical" age (cal years BP)	34,403 ± 805	34,227 ± 175	33,933 ± 707	33,585 ± 329
δ^{13}C	−20.0‰	−19.3‰	−19.1‰	−19.3‰
C:N	--	3.4	3.4	3.3
Sample weight (mg)	437	420	240	240
Collagen weight (mg)[1]	--	56.0	26.8	26.8
Burnweight (mg)[2]	--	6.0	5.9	5.4
%C (% carbon on combustion)	--	41.5%	43.7%	41.7%
%N (% nitrogen on combustion)	--	13.3%	15.3%	14.9%

[1] Collagen weight: ultrafiltered gelatin yield.
[2] Burnweight: gelatin combusted for graphitization.
[3] The Muierii 2 temporal bone originally yielded an age of 29,750 ± 190 ^{14}C BP (34,068 ± 240 cal BP), but subsequent realization at the ORAU that there had been venting of the ion source during the run meant that all of the older (>20,000 BP) ages were given higher (± 800 year) errors, to provide the age of 29,750 ± 800 ^{14}C BP (T. Higham pers. comm. 2006). The sample was then re-run, and OxA-16252 is the result of the second dating attempt.

Table 5 - Direct AMS radiocarbon ages for the Peştera Muierii human remains. The LuA-5228 data are from Olariu *et al.* (2005) and A. Olariu (pers. comm. 2005). The Oxford Radiocarbon Accelerator Unit (ORAU) samples (OxA-##) were run using ultrafiltration (Higham *et al.* 2006a,b). Calendrical years are based on CalPal quickcal2007 ver.1.5 (www.calpal.de). Complete chemistry is not available for LuA-5228.

>~55,000 cal BP (the older date being too old to calibrate). Even though the youngest of these dates (OxA-15530 and OxA-16381) overlap the range of dates for the Initial Upper Paleolithic, such as the Bachokirian and similar assemblages in neighboring Bulgaria, they are substantially older, even at 2 sigma, than the earliest manifestations of the Aurignacian in Europe and the region (Haesaerts 2007; Dobrescu 2008; Teyssandier 2008). The older dates, although not in strict stratigraphic order, push the limits of radiocarbon dating and mostly serve to place the deeper levels of the Galeria Principală in the older phases of MIS 3 (or possibly MIS 4).

These dates for the Middle Paleolithic levels of the Galeria Principală raise the issue of the "Late Mousterian" in the Carpathians, since the Middle Paleolithic levels of the Peştera Muierii were assigned to a "Late Mousterian" by Nicolăescu-Plopşor (1935-36, 1957) on the basis of techno-typological comparisons to other assemblages in Romania (see Chapter 5).

The origins of this concept of a "Late Mousterian" are connected with the research of F. Mogoşanu in sites from Banat (Mogoşanu 1978). He defined a *Quartzite Paleolithic* for Tincova (a second site, 200 m south from the Early Upper Paleolithic site of Tincova–Selişte), the lower layer of Românești–Dumbrăviţa I, and a quartzite workshop (or knapping floor) at Românești–Dumbrăviţa II. Subsequent discoveries at the sites of Băile Herculane–Peştera Hoţilor and Climente I were also assigned to this particular facies. In brief, the Quartzite Paleolitic could be described from a typological point of view as having few types (the most numerous were side scrapers on naturally

backed flakes – hence the so-called Charentian aspect). In terms of technology, Pontinian knapping was frequently employed, whereas the Levallois index was very low or zero.

In terms of chronology, the Quartzite Paleolithic allegedly evolved from the Würm II (MIS 3) to the Holocene. What is of interest here is the Old Quartzite Paleolithic; this entity was linked, through the Middle Paleoliothic layer of Peştera Hoţilor, to the Quartzite Mousterian, encountered in the cave sites of southern Carpathians. Given that, at the time, the human fossils of Baia de Fier, Ohaba Ponor, Cioclovina and Peştera Mică were all assigned to *Homo sapiens fossilis*, another feature of the Quartzite Mousterian emerged; it was a relatively young technocomplex.

Some chronological landmarks were added to the picture by Cârciumaru's (1980) pollen analyses, through which he attempted a correlation between the depositional sequences from Paleolithic sites in Romania and the traditional Alpine (Würm) framework [now completely replaced by marine isotope stages (MIS)]. To these correlations were added conventional radiocarbon dates for some important sites (see tabl. 3 and 4). Both of these frameworks are subject to criticism. Pollen analyses are poor markers for developing a reliable scheme for Pleistocene (Djindjian 2000; Honea 1986, 1991), and the Middle Paleolithic ages that are younger than 30,000 ^{14}C BP, obtained through conventional radiocarbon, are in most cases likely to be incorrect or merely minimum ages (see above; *cf*., van der Plicht 1999; Auguste 2009).

Subsequently, two different stages were identified within the Quartzite Mousterian, roughly separated by a 35,000 ^{14}C BP chronological boundary. The older one comprised the lower layers of Ohaba-Ponor, the lower layer of Râşnov–Gura Cheii, all of the Mousterian layers of Boroşteni, and the lower layer of Nandru–Peştera Curată. The more recent stage comprised the single Mousterian layers of Nandru–Peştera Spurcată and Peştera Hoţilor, and the upper Mousterian layers of Nandru–Peştera Curată and Ohaba-Ponor (Cârciumaru 1999; Cârciumaru & Anghelinu 2000). The older sequence was assigned to the Charentian Mousterian, whereas the younger one was interpreted as a transitional technocomplex, called "The Carpathian Facies" (Cârciumaru 1999). Given the lack of significant differences between the two sequences from a techno-typological point of view, the "transitional" character of the "Carpathian Facies" has yet to be demonstrated (Popescu 2009).

Another issue to be assessed is the notion of a "Late Mousterian" itself. This concept was applied for the Mousterian throughout Romania. A key site in understanding the Middle Paleolithic is Ripiceni-Izvor, on the left bank of river Prut. The Middle Paleolithic sequence here comprises six layers; the oldest had an alleged age of ~70,000 BP, and the younger one of ~38,000 BP [ages estimated both by conventional radiocarbon and pollen analyses (Cârciumaru *et al*. 2007; Honea 1981; Păunescu 1984)]. Layers 4 and 5, which appear to be Micoquian, were paralleled by the Middle Paleolithic industry of Mitoc–Valea Izvorului (also on the left bank of river Prut). For this level, recently acquired OSL dates indicate a much older age, of ~167,000 cal BP (Tuffreau *et al*. 2009a). A similar situation is encountered for the site of Zăbrani (in western Romania, Arad County). The quartzite industries found there now date from the early Late Pleistocene (MIS 5d-5a) (Tuffreau *et al*. 2007, 2009b). Therefore these Mousterian layers should not be labeled as "Late."

In the context of this ongoing re-evaluation of the chronology of the Carpathian Middle Paleolithic, the radiocarbon dates for the Galeria Principală Middle Paleolithic levels are all consistent with the expected chronology for the Middle Paleolithic in Romania (tabl. 3). The deepest date for the Galeria Principală Middle Paleolithic (OxA-16383) is nonetheless a minimum age, and a couple of the other dates are close to the reliable limits for finite radiocarbon dates. They all, nonetheless, support a moderately recent, but still >40,000 ^{14}C BP, age for at least some of the Peştera Muierii Middle Paleolithic.

Ideally, it would be helpful to have a series of similar dates for the other galleries of the Peştera Muierii, as well as dates using other techniques that extend beyond the current range of radiocarbon dates (e.g., U-series and OSL). However, such additional chronological control would require additional excavations in the cave, and it would always remain difficult to relate the materials from the 1950s excavations to any new results.

The Age of the Human Remains

In this context, the age of the human remains discovered in 1952 in a recess at the back of the Galeria Musteriană has remained a persistent issue until recently. From the beginning (Daicoviciu *et al*. 1953), it was recognized that at least some of the remains were those of anatomically modern humans, yet they were discovered in a stratigraphic context that contained only Middle Paleolithic artifacts. There were nonetheless suggestions that the associated sediments may have been a mix of Middle Paleolithic materials from the Galeria Musteriană and more recent sediments from the Galeria Principală (Gheorghiu & Haas 1954; see Cosac 2006-07). As a result, a discussion has ensued as to whether they were indeed Middle Paleolithic in age, whether they were intrusive from Upper Paleolithic or even Holocene levels, and (more recently) what implications they might have for the identity of the manufacturers of the purportedly late Middle Paleolithic assemblages in the Carpathians (see below and Chapter 3).

Direct Radiocarbon Dates

At some point a portion of the left posterior parietal bone was removed from the Muierii human cranium (see fig. 30 and 47). According to the curators of the Muzeul Olteniei it was done by someone from St. Petersburg (Leningrad) for analysis, but no results were ever obtained. Similarly, a portion of the inferior human mandibular corpus, below the premolars, was removed (fig. 57 and 58), but it is not known when it occurred or whether the sample was analyzed. However, Cosac (2006-07) quoted Roşu (1987) as saying that a radiocarbon date of ~29,000 ^{14}C BP had been obtained for the human remains from Baia de Fier, without further information. It is not known whether this was based on the section of parietal bone, or the currently absent mandibular corpus, or where it might have been run. It is also

unknown whether this might be a confusion with the minimum age on a cave bear bone run in Moscow.

These issues were partially resolved when, in 2001, the first direct radiocarbon determination for which we have documentation was made on the Galeria Musteriană human remains. In 2001 Olariu and colleagues obtained a combined sample of bone from the scapula and the now absent tibia. They submitted the sample to the radiocarbon laboratory at Lund and obtained a direct AMS radiocarbon date on these human remains. First announced on the web by Olariu *et al.* (2001) and in print by Păunescu (2001) (see also Olariu *et al.* 2003, 2005; Alexandrescu *et al.* 2010), the result was 30,150 ± 800 ^{14}C BP (LuA-5228) (34,403 ± 805 cal BP) (tab. 5). The resultant date from the scapula and tibia served to place these Muierii human remains securely within the time period of earlier phases of the Upper Paleolithic, especially of the Aurignacian. However, it did not resolve the issues of their association with the Middle Paleolithic of the Galeria Musteriană.

To further assess the ages of the Muierii Pleistocene human remains, in 2005 we obtained a dating sample from the orbital portion of the left zygomatic bone, which attaches to the neurocranium and the left maxilla, but belongs to the Institutul de Speologie "Emil Racoviţă" in Bucharest whereas the other portions of the cranium are curated in the Muzeul Olteniei. Additional samples were taken from the medial surface of the anterior mandibular corpus, the squamous portion of the temporal bone and the distal diaphysis of the fibula, all in the Institutul de Speologie "Emil Racoviţă." The samples were submitted to the Oxford Radiocarbon Accelerator Unit (ORAU) for dating, given their experience with dating Pleistocene remains, their experience with dating collagen from bone, and especially their use of ultrafiltration.

The mandibular and fibular samples were failed due to insufficient collagen (the pieces removed were small so as to minimize damage to the specimens), but the zygomatic and temporal samples produced reliable ages (tabl. 5). The mean resultant ages are slightly less than the value provided by the earlier Lund (LuA) date, but they are well within 2 sigma of it. The initial date on the Muierii 2 temporal bone was essentially the same as that of the zygomatic bone (and hence of the Muierii 1 cranium and mandible), but a rerun of the sample provided a slightly younger age. The resultant ages are all between ~29,000 and ~30,000 ^{14}C years BP.

Implications and Issues

The direct radiocarbon ages for the Muierii human remains place them in the middle of a growing sample of directly dated early modern human remains across the Old World (tabl. 6). They are younger than the ages available for Hofmeyr 1 and Nazlet Khater 2 in Africa, Tianyuan 1 in east Asia, and Oase 1 in neighboring Romania. They are slightly younger than the Aurignacian-associated Mladeč and La Crouzade remains and slightly older than the Cioclovina and Paviland remains, but at 2σ many of these ages overlap. The Cioclovina neurocranium lacks an archeological association (Soficaru *et al.* 2007), despite original claims (Rainer & Simonescu 1942; see also Dobrescu 2008) that it was associated with Aurignacian in the cave (the few lithic remains are probably undiagnostic, and their association with the cranium is unknown and unknowable). The Paviland skeleton, the oldest of the known Gravettian "red ochre" burials, appears to be securely Gravettian (Mid Upper Paleolithic) in association, despite its early direct radiocarbon dates (Jacobi & Higham 2008); its age is nonetheless matched by other very early Gravettian dates (Conard & Moreau 2004). The remainder of the directly dated early modern humans, all from Europe, are Mid Upper Paleolithic (or later) in age (tabl. 6). Yet, as with the archeological assemblages, it is possible that some of the older direct dates, done without ultrafiltration, may well be too young within the Gravettian, especially given the need to minimize sample size (and hence damage) to original human fossils.

All of these dates for the Muierii human remains from the back of the Galeria Musteriană are also consistent in placing them securely in the time period of the Early Upper Paleolithic, generally Aurignacian in age. Indeed, although there are few reliable dates for the Aurignacian *sensu stricto* in the Carpathians and still only a modest number of dates if sites across the Danube in Bulgaria or in northeastern Romania are taken into consideration (tabl. 2; see Djindjian *et al.* 2003; Teyssandier 2008), the dates for the Muierii human remains place them most comfortably within the Aurignacian of southeastern Europe.

These direct dates on the Muierii human remains, however, raise the question of their stratigraphic association with the Middle versus the Upper Paleolithic. There are two possible interpretations. The third hypothesis, of a Holocene age for them, is rejected by the direct dates.

The first interpretation, most recently proposed by Cârciumaru *et al.* (2007; see also Cârciumaru 1999), is that the Muierii human remains are associated with a late Mousterian, given the purportely late age of the terminal Middle Paleolithic in the Carpathians (Păunescu 1988; Moncel *et al.* 2002; Cârciumaru *et al.* 2007, 2008; see discussion above). 29,000 to 30,000 ^{14}C BP is younger than any of the Middle Paleolithic radiocarbon dates for the Peştera Muierii, including Level I of the Galeria Musteriană (see above). Yet, as noted above, there are radiocarbon dates for the Middle Paleolithic in Romania that overlap the age of the Muierii human remains (tabl. 4), even though current reassessments of the absolute dating of Middle Paleolithic sites in the Carpathians (Tuffreau *et al.* 2009a; Balescu *et al.* 2010), as well as Upper Paleolithic ones in the same region (Haesaerts 2007), have placed into question many of the older radiocarbon determinations for these sites. This is particularly relevant for older convential (non-AMS) radiocarbon dates run prior to the 1990s, especially on bone and particularly for levels that may well be close to or beyond the limits of radiocarbon dating (Honea 1984; Mertens 1996; van der Plicht 1999; Djindjian 2000; Djindjian *et al.* 2003; Damblon & Haesaerts 2007). The comments of Honea (1984:29) with respect to one of the late radiocarbon dates from Peştera Gura Cheii (GrN-11619) are especially pertinent here.

"The large sample of unburnt bone, along with a small quantity of charcoal ... produces a date of 29,700 +1700/-1400. ... The

Specimen	Technocomplex	Dating Technique[1]	Lab Number	Age (^{14}C years)	Age (Cal years)[2]	Reference
Nazlet Khater 2, Egypt	IUP	ESR	ANU	--	38,000 ± 6,000	Crevecoeur 2008
Hofmeyr 1, South Africa[3]	--	OSL, U-series	--	--	36,200 ± 3,200	Grine *et al.* 2006
Tianyuan 1, China	--	^{14}C	BA-03222	34,430 ± 510	39,713 ± 882	Shang *et al.* 2007
Oase 1, Romania	--	^{14}C UF	OxA-11711, GrA-22810	34,950 +990/−890	39,848 +1152/−1077	Trinkaus *et al.* 2003a
Oase 2, Romania[4]	--	^{14}C	GrA-24398	28,890, +∞/−170	33,408 +∞/−347	Rougier *et al.* 2007
La Crouzade 6, France	Aurignacian	^{14}C	ERL-9415	30,640 ± 640	34,905 ± 583	Henry-Gambier & Sacchi 2008
Mladeč 1, Czech Rep.	Aurignacian	^{14}C tooth	VERA-3073	31,190 +400/−390	35,225 +457/−450	Wild *et al.* 2005
Mladeč 2, Czech Rep.	Aurignacian	^{14}C tooth	VERA-3074	31,320 +410/−390	35,333 +495/−481	Wild *et al.* 2005
Mladeč 8, Czech Rep.	Aurignacian	^{14}C tooth	VERA-3075	30,680 +380/−360	34,892 +427/−418	Wild *et al.* 2005
Mladeč 9, Czech Rep.	Aurignacian	^{14}C tooth	VERA-3076A	31,500 +420/−400	35,490 +552/−537	Wild *et al.* 2005
Cioclovina 1, Romania	--	^{14}C UF	LuA-5229, OxA-15527	29,000 ± 700, 28,510 ± 170	33,332 ± 671, 32,915 ± 359	Olariu *et al.* 2005; Soficaru *et al.* 2007
Paviland 1, U.K.[5]	Gravettian	^{14}C UF	OxA-16412, OxA-16413	28,870 ± 180, 29,490 ± 210	33,387 ± 355, 33,841 ± 316	Jacobi & Higham 2008
Sunghir 2, Russia[6]	Gravettian	^{14}C	AA-36474, AA-36475	27,210 ± 710, 26,200 ± 640	31,874 ± 705, 31,016 ± 555	Kuzmin *et al.* 2004
Sunghir 3, Russia[6]	Gravettian	^{14}C	AA-36476	26,190 ± 640	31,010 ± 556	Kuzmin *et al.* 2004
Eel Point 1, U.K.	--	^{14}C UF	OxA-14164	24,470 ± 110	29,250 ± 444	Schulting *et al.* 2005
Willendorf 1, Austria	Gravettian	^{14}C	ETH-20690	24,250 ± 180	29,014 ± 428	Teschler-Nicola & Trinkaus 2001
Brno-Francouzská, Czech Rep.	Gravettian	^{14}C	OxA-8293	23,680 ± 200	28,627 ± 424	Pettitt & Trinkaus 2000
La Rochette, France	--	^{14}C	OxA-11053	23,630 ± 130	28,563 ± 390	Orschiedt 2002
Arene Candide IP, Italy	Gravettian	^{14}C	OxA-10700	23,440 ± 190	28,304 ± 308	Pettitt *et al.* 2003
Dolní Věstonice 35	--	^{14}C	OxA-8292	22,840 ± 200	27,477 ± 430	Trinkaus *et al.* 1999a

[1] For the radiocarbon dates, "^{14}C UF" indicates a date run using ultrafiltration (see Higham *et al.* 2006a,b). The Mladeč dates were run on teeth ("^{14}C tooth"), which experience has shown provides results which closely approximate ultrafiltration dates on bone collagen. When there are multiple, consistent dates on the specimen, they are all provided. All of them are AMS dates.

[2] The ESR and OSL dates are in calendar years. The radiocarbon dates are calibrated using CalPal quickcal2007 ver.1.5 (www.calpal.de) based largely on the Hulu curve, converted in November 2009.

[3] Since the date refers to the sediment filling the endocranium, it only dates the human skull if the infilling occurred shortly after death of the individual.

[4] The sample for the direct date on Oase 2 was not fully decontaminated, and hence the date is a minimum age (Rougier *et al.* 2007).

[5] There is a long history of directly dating the Paviland 1 remains, given their proximity to the Oxford radiocarbon lab (see Jacobi & Higham 2008). Only the most recent dates, the only ones using ultrafiltration, and incidentally the oldest dates, are provided here.

[6] There has been a series of attempts to directly the date the Sunghir human remains (Sulerzhitski *et al.* 2000; Kuzmin *et al.* 2004), many of which have provided results significantly younger than the cultural layers with which the burials are associated. The most recent dates on the Sunghir 2 and 3 double burial (Kuzmin *et al.* 2004.) provide results compatible with the archeological context.

Table 6 - Direct radiocarbon (^{14}C), Uranium-series (U-series), electron spin resonance (ESR) and optically stimulated luminescence (OSL) dates for MIS 3 early modern human remains.

sample stems from a hearth at the base of a culturally sterile sedimentary unit situated directly at the interface of a Carpathian Mousterian level. The sample contained little carbon and thus the date is best considered minimal. The hearth is believed to be associated with the Mousterian level below. *Alternative interpretations are, of course, possible.*" (Emphasis added)

In this context, a few further comments on the purportedly young (<37,000 ^{14}C BP) Middle Paleolikthic dates from Romania (tabl. 4) are warranted. The later dates from the Peştera Curată (GrA-13250, GrA-13249 and GrN-24326) are all based on the charcoal portions of mixed bone and charcoal samples, the osteological portions of which provided dates in excess of 36,000 ^{14}C BP. Given contamination issues which almost always make contaminated dates younger, the older of these dates should invariably be accepted. Two of the Gura Cheii dates (GrN-13008 and GrN-11619) derive from on top of the upper Mousterian level, may represent mixing from above, and the latter is the questionable sample discussed by Honea (see above). The Peştera Spurcată sample is described as bone fragments, of unknown size and integrity (Păunescu 2001:264). The sample from the Peştera Valea Coacăzii is from bone collagen (species unspecified) from a level containing a 29 lithic pieces and the remains of denning carnivores (*Ursus*, *Canis* and *Vulpes*);

it is not known if it dates the lithic assemblage or only the carnivores. The last two of these late Middle Paleolithic dates, GrN-13008 and GrN-13009, are on bone but cannot be further evaluated given available information. None of the bone dates is, of course, an ultrafiltration date. This caution with these older bone dates is reinforced by the substantial number of such dates from Carpathian sites that have been previously rejected as too recent (see Honea 1984; Păunescu 2000, 2001). As noted (Mertens 1996; see also Djindjian 2000), none of these younger Middle Paleolithic dates is sufficiently reliable to argue strongly for the late survival of the Middle Paleolithic in the Carpathians, and especially not into the time period of the Peştera Muierii human remains.

Moreover, paleoclimatic correlations based largely on palynology (see Cârciumaru *et al.* 2006, 2007, and references therein) have suggested that some of these Middle Paleolithic levels are relatively late within the Interpleniglacial (MIS 3). As noted above, paleoclimatic correlations based on the palynology of deposits within karstic systems are difficult to maintain at the level of resolution needed here (see Auguste 2009; Djindjian 2000). This is particularly relevant for the Carpathians, given the multitude of climatic fluctuations of MIS 3, the topographic and ecological diversity of the Carpathians, areas of Transylvania and adjacent river drainages, and the difficulties in inferring broader climatic patterns from the pollen which happened to have accumulated in caves. These palynological data may be invaluable for assessing the degrees to which Middle and Upper Paleolithic humans were able (or willing) to occupy various portions of the Carpathians during phases of MIS 3, but they tell us little about chronology on a millennium scale.

The second interpretation is that the Muierii human remains were indeed associated with the Early Upper Paleolithic but were intrusive into the Middle Paleolithic of the Galeria Musteriană (Chirica *et al.* 1996; Soficaru *et al.* 2006; Cosac 2006-07). The longitudinal profile published by the excavation team (Gheorghiu & Haas 1954: fig. 14; see fig. 9) indicates that the human remains and their associated sediment (including faunal remains and lithics) were in a depression at the back of the Galeria Musteriană. They were below and separated from the other excavated levels of the Galeria Musteriană, which apparently thinned out as they approached the depression. In addition, the depression was adjacent to the higher levels of the back of the Galeria Principală (fig. 8).

It was observed by the excavators (Daicoviciu *et al.* 1953; Gheorghiu & Haas 1954) that there were accumulations of deposits from both the Galeria Musteriană and the Galeria Principală at the north, or deepest, end of the Galeria Musteriană where the human remains were discovered (fig. 9). As presented by Daicoviciu *et al.* (1953:199; translation ours):

"Sector A is situated at the north end of the M gallery (Galeria Musteriană); the geological deposits of Sector A result from the M gallery and the main gallery (Galeria Principală); from the main gallery water flowed down into the north side of Sector A, including pebbles, gravel, complete or broken bones; over this cone of sediment deposition there was an overlap of material from the M gallery;" and "The inferior cultural level (associated with animal bones and tools) (contained) a skull with the maxillae, a fragment of the right half of a mandible, a tibia, and a scapula (0.30 m below), all human."

If we interpret these statements correctly, the lower level in the recess contained the human bones along with sediments from both galleries, and it was subsequently overlain by sediments from the Galeria Musteriană containing Middle Paleolithic implements, neither level representing its original deposition context.

It therefore appears that the most likely scenario is one in which the human remains, either placed in the depression or washed down from higher surface levels of either gallery, became mixed with sediment eroding down from the deeper portions of the Galeria Musteriană and the Galeria Principală, the former of which contained Middle Paleolithic implements. Given the absence of erosion on the human bones from water transport or rolling, it may be more likely that the Muierii human remains were on the surface of the depression and then secondarily covered by sediment from the two galleries. It is therefore ultimately not possible to determine from the available evidence and published interpretations of the excavators whether the human remains were originally derived from deposits within the Galeria Musteriană versus the Galeria Principală. However, given the radiocarbon age of the human remains, the presence of the Aurignacian at that age in the region and probably in both the Galeria Principală and the Gura Peşterii, the absence of reliable Middle Paleolithic dates in the same time range, and the evidence for erosion or slumping of sediments from the Galeria Principală into the Galeria Musteriană, the simplest solution is to associate the human remains from the Galeria Musteriană with the Early Upper Paleolithic in the cave system.

This second interpretation need not imply anything about the competence of the excavators in 1952. There is a substantial list of anatomically modern human remains from sites across Eurasia, found in association with Late Pleistocene levels, which are now known to be either more recent within the Upper Paleolithic or Holocene in age. These remains include those from Balla, Hahnöfersand, Kostenki-Markina Gora, Krems-Hundssteig, Mikkabi, Salawusu, Svitávka, Velika Pećina, Vogelherd, and Zlatý Kůň (Smith *et al.* 1999; Trinkaus & Pettitt 2000; Matsu'ura & Kondo 2001; Terberger *et al.* 2001; Svoboda *et al.* 2002; Conard *et al.* 2004; Sinitsyn 2004; Shang *et al.* 2006; Tillier *et al.* 2009). Yet, at the same time, the direct dating of specimens has served to confirm or refine the ages of a number of earlier Upper Paleolithic human fossils (tabl. 6), including the Romanian ones from Peştera Cioclovina Uscată, Peştera cu Oase, and (of course) Peştera Muierii. It should therefore not be surprising, or deemed exceptional, to view the Muierii human remains as more recent than their implied archeological context, on the basis of (now four) consistent direct radiocarbon determinations.

For these reasons, we will consider the human remains from the Galeria Musteriană of the Peştera Muierii to be Early Upper Paleolithic ("Aurignacian") in age and probable archeological association.