AMBIGUITIES OF AURIGNACIAN-GRAVETTIAN SURFACES AT MITOC-MALU GALBEN, BOTOŞANI COUNTY, MIDDLE PRUT VALLEY: 39 ^{14}C AND AMS RADIOCARBON VALUES

by Kenneth Honea

The Upper Paleolithic geological surfaces at Mitoc-Malu Galben (48°07'N, 27°10'E) should be understood in terms of proglacial morphostructural processes that once operated in Western Moldavia during the late middle Pleniglacial times. At that time, the periglacial permafrost zone in South-eastern Europe embraced the regions located between 53° to 45°N latitude. The margins of the late Fenno-Scandinavian (Eurasian) glacial ice sheet, about 20,000 years BP, were placed a little to the North of Minsk, or about 800 km from Mitoc (Soffer 1985, fig. 3.3; Grosswald 1980, fig. 7). This fact had a considerable influence upon the weather of Moldavia, between 32,000 to 20,000 periods.

The excavations at Mitoc were initially done by Moroşanu (1938), Nicolăescu-Plopşor, Zaharia (1959) and later by Chirica (1980). According to these sources, lower Middle Paleolithic levels were overlain by upper Paleolithic ones. The exact location of test-trenching by the first two is unknown, so the new stratigraphic conclusions later reached by Chirica are different. The geology of the site has not been recently studied by specialists.

The nature of Middle Paleolithic surfaces is now unknown, since they have been covered by rising floodwaters from nearby Lake Stânca-Costeşti on the Prut River in 1987. Mogoşanu (1983, 41), Bitiri (1987, 220) and Chirica (1989, 145) have noted that Middle Prut Paleolithic stations have been heavily eroded during late glacial times. The present system of technocomplexes, Aurignacian and Gravettian, have been determined by Chirica (1980, 1984, 1987, 1988, 1989).

Radiometric Values

The interpretational complexities of chronostratigraphic sequences at Mitoc are based on a total of 39 infiltrated field samples collected in Upper Paleolithic surfaces by the author and Chirica, between 1982-1986. The depth sequences of radiocarbon samples, according to the author's view, have little bearing on associated cultural and

fauna remains in the deposits. They may be enmeshed with ancient, local, cold-weather geoturbational phenomena (Taylor 1987, 110; Harris 1989, 18; Mook, Waterbolk 1985, 57). Eleven Gravettian radiocarbon values were published by the author in 1984, and three others in 1986a. Two of the latter were Aurignacian. Twenty-three other Gravettian and two Aurignacian ones are here published (1991). The field depths were established by Chirica. The numerical ordering of the samples into climatic groups is found in table 1. A horizontal concordance plan is attached, table 2. Figure 1, primary datelist, follows. Others shall be available from Groningen in 1992.

Table 1. Local Mitoc Climatic marker horizons. Most values at 1 SD, few at 2 SD (samples 9, 11, 15, 34), fig. 1. Plus-minus coefficients not listed

Samples	Correlative	Means BP	Oscillations
		Gravettian	
3	4-6	20,325	Valdai Maximum (early)
9	10-14	23,430	Tursac
15	17-20	24,575	Dunsevo = Briansk 4
21	22-25	25,570	Dunsevo = Briansk 3
26	27-30	26,595	Dunsevo = Briansk 2
31	32-35	27,330	Dunsevo = Briansk 1
		Aurignacian	
36	37	29,160	Kesselt-Denekamp 2
38	39	31,475	Arcy-Denekamp 1

Geomorphological Considerations

The surfaces (even buried ones) in the site are inclined along two transepts: north-south and west-eastward. The former slants to nearby Ghireni Creek and the latter to the Prut River valleys. Samples are referenced to the datum point in square A8, 0 m (table 2). The deviation in degrees may be measured in relation to this spot. The depth of specimens is deeper in the South half of the site, due to ancient slopewash.

Aurignacian Variability

Four separate hearth lots have Aurignacian associations. They represent the earliest suite of age-determinations available in an open-site context in Romania (Honea 1991).

All (charcoal) stem from *different* depths. Their basic age places them in the late part of the Kesselt-Denekamp 2 and early Arcy-Denekamp 1 phases, table 1 and fig. 1.

36	GrN-12636	28, 910±480	Square E4	7.85 m
37	GrN-15454	29, 410±310	Square I3	9.45 m

38	OxA-1646	31, 100±900	Square E5	10.65 m
39	GrN-12637	31, 850±800	Square G4	8.70 m

Clues for the values of samples 37 and 38 became available between 1988 and 1990. The mean ages of samples 36 and 37 are 29, 160±395; 38 and 39, 31, 475±850 BP, table 1. However, all have been subjected to processes of local geoturbation.

The first (36), 28, 910±480, GrN-12636 (Honea 1986a) has been identified by the *third* Aurignacian level by Chirica (1987). By 1989, an early Gravettian level was named. There is no mention of sample 37 in his reports.

Table 2. Mitoc-Malu Galben. Primary excavation unit. Horizontal concordance plan of 39 radiocarbon samples, using northwestern square A8, 0.00 m, as datum point. Coordinates and depths indicated for 1991, fig. 1

I	H	G	F	E	D	C	B	A	
							13 B8, 5.05	18 A8, 5.40	8
30 I7, 8.75	25 H7, 10.10	17 G7, 5.00					7, 20 B7, 5.60	4 A7, 3.10 24 A7, 7.00	7
		34 G6, 5.00 15 G6, 8.60	2, 8 F6, 6.60					5 A6, 3.60 9 A6, 5.75	6
		28 G5, 7.10	31 F5, 8.70	16, 38 E5, 10.65		11 C5, 6.40	29 B5, 6.80	14 A5, 5.75 26 A5, 6.80	5
	1 H4, 6.80	33, 39 G4, 8.70	22 F4, 8.15	36 E4, 7.85			21, 23 B4, 7.00	12 A3-4, 6.15	4
27, 37 I3, 9.45	10 H3, 8.15			3 E3, 6.10					3
	19, 35 H2, 8.15		6 F2, 7.00						2
							32 B1, 6.35		1
3	5	6	5	4	0	1	7	8	

An Aurignacian sample (39) from Chirica's (1987) *second* level was published by the author (Honea 1986a). Its relations with sample 38 are pointed out below. The depths between them are nearly 2.00 m apart.

A sensitive Oxford AMS value from a hearth, of the reputed *first* Aurignacian level at 10.65 m, was finally obtained: sample 38 (86 A) (Honea in Hedges et al. 1990, 213).

OxA-1646 31, 100±900 BP

A second sparse carbon sample 16 (86 B), from the same location and depth (10.65 m), was also independently analyzed at Groningen in 1988, fig. 1. It has an anomalous date of

GrN-15457 24, 400±2200/-1700 BP at 1 SD

According to W.G. Mook, the sample has a *terminus ante quem*, late age and is not dependable (July 15, 1988, personal communication). The disturbance can be attributed to either cryoturbational or antropogenic agencies. The first two samples are, then, discordant.

A third and fourth field samples, 87-88, from the same location, were also analyzed at Oxford by the same technique and found to have *nil* carbon content (R. Housley, private communication, August 5, 1988).

A fifth and sixth field samples, 85A-85B, same location, sparse carbon, could not be processed (the author's visual observations). All were collected from this surface in 1986 by Chirica alone.

Therefore, only sample 38, out of six obtained from this 10.65 surface, is correct.

In 1989 Chirica misidentifies sample 16 as paralleling the "Gravettian", level III (Herculane II = Lascaux, Tardiglacial phase). The observation proved to be unfortunate.

The "secret" of these geoturbated samples at 7.85, 8.70, 9.45 and 10.65 m surfaces (36-39, Fig. 1) is openly visible. They cannot be used, it seems to the author, as building-blocks for local cultural developments.

Fig. 1. Mitoc-Malu Galben, Botoşani County, Romania. Primary date list. Published: *(1984), **(1986), *(1991). Depths by Chirica from a datum point in the northwest corner of square A8, 0.00 m**

Sample	Laboratory and Field Number	Results BP	Range ±	Material	Techno-complex (?)	Square and Depth below Datum (m)
1*	GX-9423 (20 A-B)	17,300 +2100 -1670	19,400-15,630	C	Gravettian (v. 2-5)	H4, 6.80
2*	GX-9429 (16)	19,900 +1050 -950	20,950 18,950	B	Gravettian (v. 9; 1, 3-5)	F6, 6.60
3*	GX-8724 (5)	19,910 ±990	20,900 18,920	C	Gravettian (v. 1-2, 4-5)	E3, 6.10
4***	GrN-13765 (8)	20,150 ±210	20,360 19,940	B	Alluvium (non-cultural; mid-alluvium; v. 5; 1-3)	A7, 3.10

Sample	Laboratory and Field Number	Results BP	Range ±	Material	Techno-complex (?)	Square and Depth below Datum (m)
5***	GrN-14031 (60)	20,300 ±700	21,000 19,600	C	Gravettian (directly under alluvium; v. 4; 1-3)	A6, 3.60
6*	GX-8503 (2)	20,945 ±850	21,795 20,095	C	Gravettian (v. 5; 7)	F2, 7.00
7*	GX-9424 (22)	>21,000	(1 SD)	B	Gravettian (v. 20;13, 17-19)	B7, 5.60
8*	GX-9420 (12 A-B)	22,050 ±1250	23,300-20,800	C	Gravettian (v. 2)	F6, 6.60
9***	GrN-15448 (69)	<23,000	(2SD) (1SD 28,500 + 5900/-3400)	C	Gravettian (v. 14; 10-11, 19)	A6, 5.75
10***	GrN-13006 (45)	23,700 ±180	23,250 22,890	B	Gravettian (v. 35; 9, 11, 19)	H3, 8.15
11*	GX-8725 (6)	<23,100	(2 SD) (1 SD>28,750)	C	Gravettian (v. 9-10)	C5, 6.40
12***	GrN-15805 (68)	23,490 ±280	23,770 23,210	B	Gravettian (v. 13-14)	A 3-4, 6.15
13***	OxA-1779 (64)	23,650 ±400	24,050 23,250	B	Gravettian (above mammuth hut; v. 14; 12-13, 17-19)	B8, 5.05
14***	GrN-14034 (70)	23,850 ±330	24,160 23,500	C	Gravettian (floor mammuth hut; pit or crevise; v. 9, 13)	A5, 5.75
15**	GrN-13007 (48)	<24,000	(2 SD) (1 SD 30,000+6500/-4300)	B	Gravettian (isolate; v. 31, 33, 39)	G6, 8.60
16***	GrN-15457 (86 B)	24,000 ±2200 -1700	26,600-22,700	C (sparce)	Aurignacian (anomalus, v. 38)	E5, 10.65
17*	GX-9422 (17 A-C)	24,620 ±810	25,430 23,810	C	Gravettian (v. 15-16; 18-20)	G7, 5.00
18***	OxA-1780 (67)	24,650 ±450	25,100 24,200	B	Gravettian (floor mammuth hut; v. 7, 20; 15, 17, 19)	A8, 5.40
19***	OxA-2033 (44)	24,800 ±430	25,230-24,770	B	Gravettian (isolate; v. 35; 7, 10, 18, 20)	H2, 8.15
20*	GX-9425 (23)	24,820 ±850	25,670-23,970	C	Gravettian (v. 7; 10, 18-19)	B7, 5.60

Sample	Laboratory and Field Number	Results BP	Range ±	Material	Techno-complex (?)	Square and Depth below Datum (m)
21***	GrN-14036 (74 A-D)	25,140 ±210	25,350-24,930	C	Gravettian (v. 23, 26; 22-25)	B4, 7.00
22***	GrN-14913 (47)	25,330 ±420	25,750-24,910	C	Gravettian (isolate; v. 21; 23-25)	F4; 8.15
23***	GrN-15450 (75 A-C)	25,610 ±220	25,830-25,390	C	Gravettian (v. 21-22; 24-26)	B4, 7.00
24***	GrN-15808 (71)	25,840 ±90	25,930-25,750	B	Gravettian (v. 21-23, 25)	A7, 7.00
25***	GrN-15456 (83)	25,930 ±450	26,380-25,480	C	Gravettian (v. 21-24)	H7, 10.10
26***	GrN-15449 (72)	26,100 ±800	26,900-25,300	C	Gravettian (under mammuth hut; v. 27-30)	A5, 6.80
27***	GrN-15451 (79)	26,530 ±400	26,930-26,130	C	Gravettian (v. 37; 28-30)	I3, 9.45
28*	GX-9418 (9 A)	26,700 ±1040	27,740-25,660	C	Gravettian (pendant; v. 29; 26-27, 29-30)	G5, 7.10
29***	GrN-14035 (73)	26,750 ±600	27,350-26,150	C	Gravettian (figurine; v. 28; 26-27, 30)	B5, 6.80
30***	GrN-14037 (78)	26,910 ±450	27,360-26,460	C	Gravettian (v. 26-29)	I7, 8.75
31***	GrN-15453 (52-53)	27,100 ±1500	28,600-25,600	C	Gravettian (v. 32)	F5, 8.70
32***	GrN-12635 (32-35)	17,150 ±750	27,900-26,400	C	Gravettian (v. 31)	B1, 6.35
33***	GrN-14914 (50)	27,410 ±430	27,840-26,980	C	Gravettian (v. 39)	G4, 8.70
34*	GX-8723 (3)	<27,500	(2 SD) (1 SD>33,000)	C	Gravettian (v. 35; 33)	G6, 5.00
35***	OxA-1778 (43)	27,500 ±600	28,100-26,900	B	Gravettian (isolate; v. 19; 33-34)	H2, 8.15
36**	GrN-12636 (41-42)	28,910 ±480	29,390-28,430	C	Aurignacian (isolate; v. 37)	E4, 7.85
37***	GrN-15454 (80)	29,410 ±310	29,720-29,100	C	Aurignacian (v. 27; 36)	I3, 9.45
38***	OXA-1646 (86 A)	31,100 ±900	32,000-30,200	C	Aurignacian (v. 16)	E5, 10.65
39**	GrN-12637 (49)	31,850 ±800	32,650-31,050	C	Aurignacian (large, rich hearth; v. 33)	G4, 8.70

Gravettian Variability

Ten other soliflucted ones from the 8.15-10.10 m surfaces pertain to various phases

of the Mitoc Gravettian sequences (Tursac to Dunsevo = Briansk), fig. 1, tables 1 and 2. The depth, therefore, may not represent any age criteria, given the incidence of erosiv disturbances:

Samples	Depth m	Time
10	8.15	23, 070±180
19	8.15	24, 800±430
22	8.15	25, 330±420
35	8.15	27, 500±600
15	8.60	< 24, 000
31	8.70	27, 100±1500
33	8.70	27, 410±430
30	8 75	26, 910±450
27	9.45	26, 530±400
25	10.10	25, 930±450

The above depth differences (8.15-10.10 **m**) argue against their being Aurignacian, as Chirica claims (1987, 27).

Time differences, *not* depth, are an obvious clue to their polarities. These and twenty-five others pertain to the Gravettian, but different depths and ages, fig. 1. Time patterns may exist between them (below).

The samples (Gravettian, above, and 37 Aurignacian) both charcoal, are from a single hearth. They stem from identical place and depth in square 13, 9.45 m (table 2). Results: 27, 530±400, GrN-15451 versus 29, 410±310, GrN-15454 (fig. 1). They are incongruent with differences of 1880±90 years between the two of them. As a consequence, they probably do not date the same archaeological, geological or other events. This could be due to geoturbational changes. Others also occur: eg. 17, 34; 19, 35; 33, 39 etc. (table 2 and fig. 1).

Fig. 1a. OxA AMS

Carbon Content			Age		
19	7 mg/g	B	13	23, 650±400	B
13	10 mg/g	B	18	24, 650±450	B
35	10 mg/g	B	19	24, 800±430	B
38	20 mg/g	C	35	27, 500±600	B
18	21 mg/g	B	38	31, 100±900	C

Compatible double-dates occur with some frequency at the site (table 2). They may stem from the same (or adjacent) locations and depth or nearly so. It is hoped that cognate clusters can be mathematically determined in the future. They are indicated by *vide* (v.) in columns 5-6 in fig. 1. This problem will be thoroughly disscussed in a forthcoming report.

Fig. 1b. Clusters Coherent AMS-GrN-GX Values (1 SD)

(A)	13: 23, 650±400	(B)	AMS	(B)	18: 24, 650±450	(B)	19: 24, 800±430	(B) AMS
	12: 23, 490±280	(B)	GrN		17: 24, 620±810	(C)	GX	
	14: 23, 850±330	(C)	GrN		20: 24, 820±850	(C)	GX	
(C)	35: 27, 500±600	(B)	AMS	(D)	38: 31, 100±900	(C)	AMS	
	32: 27, 150±750	(C)			39: 31, 850±800	(C)	GrN	
	33: 27, 410±430	(C)	GrN					

Fig. 1c. Coherent 2 SD-1 SD Sequences

Samples	2 SD	Samples	1 SD
			Mean
9, 11	< 23, 050	12, 13, 14	23, 650±335
15	< 24, 000	17, 18, 19, 20	24, 720±635
34	< 27, 500	31, 32, 33, 35	27, 300±820

SUMMARY

The local *Aurignacian Technocomplex* in Western Moldavia and Middle Prut Valley at Mitoc appears to be constituted by 32,000 and 29,000 BP (samples 39 to 36) (fig. 1, table 1). The equivalent climatic marker horizon seems to be early and late Arcy-Denekamp 1-2 oscillations.

The transition to the following *Gravettian Technocomplex* may be securely placed at about 27,330 BP (samples 31-35, table 1). The chronoclimatic correlates are the early and middle parts of the local Dunsevo = Briansk oscillation (Allsworth-Jones 1986, table 1). Continuing Gravettian surfaces (samples 30 to 9), 26, 595-25, 570-24, 575, perhaps the main one is dated to both the later part of the Dunsevo = Briansk and throughout the Tursac oscillations at 23,430 BP (table 1). The glaciofluvial alluvium mantling the top of the site has a mean of 20,325 BP (samples 3-6, table 1). It is equivalent to the end of the Tursac phase and the beginning of the Valdai Maximum (Soffer 1985).

In sum, the author believes the total Aurignacian-Gravettian sequences at Mitoc had a period of about 12,000 years BP to develop. They are without precedent in southeastern parts of Europe.

Transition of Upper-Middle Paleolithic in Romania

The lowest Aurignacian dated surfaces at Mitoc have a mean of 31,475±850 BP, early Arcy-Denekamp 1 climatic phase (table 1). The topmost Micoquian-Mousterian and the somewhat lower Typical Mousterian surfaces at Ripiceni, 40, 200+1100/-1000, GrN-9210 and 36,950, Bln-811, are joined by the topmost Cioarei cave Charentian-Mousterian surface, 37, 750±950 BP, GrN-13005 (Honea 1986b). Together,

the three give an age-determination, as it is here speculated, for the local Hengelo interstade in Romania during late interpleniglacial period. This time-span, 32-40 Kyrs, may have witnessed the transition of the Upper and Middle Paleolithic populations in the Middle Prut Valley and Southwest Carpathian Mountains. Therefore, a flint (Prut) and quartzitic (Cioarei) working technocomplexes may have been contemporaneous.

This period was recently characterized by Montet-White (1989) as beset by local intensive erosion in Southeast and Central Europe, at the onset of second Pleniglacial times. Stratigraphic gaps were produced between early Upper and late Middle Paleolithic surfaces. This seems to be the case at both Ripiceni and Cioarei (Păunescu 1984; Cârciumaru 1980). Effects at Mitoc led to disruption between upper Aurignacian and lower-gravettian surfaces (samples 35 and 36, fig. 1, table 2).

Other Stratigraphic Successions

Two Aurignacian cultural levels were apparent to Chirica in 1987. As part of his conclusions, a third and earlier level was hypothesized which bracket the temporal position of the dawning Upper Paleolithic horizon. The period chosen was an unproved Nandru 4b = Hengelo (38-40 Kyr) age. It was not borne out.

Sample 38 from the 10.65 m, the lowest Upper Paleolithic surface, at 31,100±900, OxA-1646 (fig. 1) became available in 1988 to answer his quest. The affiliated climatic phase was Ohaba A = Arcy-Denekamp 1 and *not* Hengelo as he thought. The earlier retrieved sample 39, 31, 850±800, GrN-12637 is cognate with a mean of 31,475±850, or 32,000 BP. Both samples, together, seem to be candidates for the early dating of the site's early Upper Paleolithic surfaces. Upper Mousterian surfaces at Mitoc, however, were not excavated because they have been submerged.

Chirica's account of Mitoc Gravettian cultural levels appeared in 1984 (8), 1986 (6), 1987 (6) and, below, 1989 (4). Artifact counts and archaeological features have not yet been published. Chirica (1989, 50-56) calculates that the settings of 34 Mitoc radiocarbon samples are equatable with the following four Gravettian cultural levels and climatic phases:

I (Ohaba B = Stillfried B-Kesselt), 28, 910+450-27, 100±1500; II (Herculane I = Tursac), 26, 900±450-25, 140±210; III (Herculane II = Laugerie), 24, 820±850-22, 050±1250; IV (Romăneşti = Lascaux), 20, 945±850-19, 900±1050 BP. The latter two levels, it is claimed, are early Tardiglacial. Geological disturbances are not mentioned.

An entirely new schedule is presented by him (pages 141 -- 146) which contradicts the conclusions drawn from the above first version. The sample tables, stratigraphic succession of specimens and text are confusing.

Climatic oscillations are based on earlier precepts developed by both Cârciumaru (1980) and Nicolăescu-Plopşor et al. (1966) works before local radiocarbon measurements were available in Romania. This hastily translated work, in English, is unsound in far-reaching conclusions. They are strongly at odds with values presented in this report's attached table 1.

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