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Mousterian Cultures in European Russia

The Mousterian of European Russia comprised a series of cultures in a variety of environments.

Richard G. Klein

The term "Mousterian" refers to a complex of cultures which existed in Europe, in parts of central and western Asia, and in North Africa during the Last (or Eem) Interglacial and the first two-thirds of the Last (or Würm) Glacial. All Mousterian cultures were characterized by the manufacture of stone tools on flakes, including especially tool-types called sidescrapers, points, and denticulates.

In European Russia, the vast area of the Soviet Union west of the Urals and north of the Caucasus, Mousterian sites constitute the earliest well-documented evidence of human occupation. It is not yet clear whether the lack of undoubted pre-Mousterian sites means that Mousterian peoples were the first to settle the area or whether it reflects inadequacy of investigation (*1*). In any case, the available data suggest that the Mousterians succeeded in settling a large part of European Russia, including all the major river valleys up to at least the latitude of Bryansk (53.15°N) and quite possibly beyond.

Altogether, at least 33 Mousterian occupation sites have been uncovered in European Russia (Fig. 1), comprising ten open-air stations [Kasperovtsy (*2*; *3*, pp. 105–106), Molodova I and V (*3*, *4*), Khotylevo (*5*), Kodak (*6*, p. 22; *7*), Rozhok I and II (*8*), Nosovo I (*8*), Volgograd (*9*), and Il'skaya (*10*)], and 23 cave sites [in the Prut Basin, Buteshty and Starye Duruitory (*11*); in the Dnestr Basin, Vykhvatintsy (*12*); on the Northern Black Sea Littoral, Il'inka (?) (*6*, pp. 19–20; *13*); in the Crimea, Kiik-Koba (*14*), Starosel'e (*15*), Shajtan-Koba (*16*), Chokurcha (*17*), Kabazi (*18*), Volchij Grot (*19*), Adzhi-Koba (*20*), Kholodnaya balka (*21*), Bakhchisarajskaya (*22*), Chargorak-Koba (*23*), and Kosh-Koba (*24*); in the Northern-Caucasus Foreland, Dakhovskaya Cave (*25*) and Gubs Cave and Shelter No. 1 (*26*); on the Eastern Black Sea Littoral, Akhshtyr' Cave (*27*), Navalishino Cave (*28*), Vorontsovo Cave (*29*), Khosta Caves I and II (*30*), Ats Cave (*29*)].

Geological Age of the Sites

Only the open-air sites may be placed in time on the basis of stratigraphic evidence alone. A provisional chronological ordering of them is presented in Fig. 2 (last column). The single candidate for a Last Interglacial site is Khotylevo, near Bryansk, where the lone occupation horizon occurs more than 20 meters from the surface in what is probably Last Interglacial alluvium. Khotylevo is located considerably farther north than any of the other known Mousterian sites—a fact which may well be linked with its Last Interglacial age. The next youngest sites are probably Il'skaya (lower level) and Volgograd. In each case, occupational debris was found on the surface of a thick fossil soil believed to have developed during the Last Interglacial. The preservation of cultural materials undisturbed on the surface of the soil indicates that they were sealed in soon after the site was abandoned. The colluviation which accomplished this probably began at, or shortly after, the onset of the Last Glacial. Thus, in both cases, the cultural horizons can be no older than the terminal part of the Last Interglacial and may well be of earliest Last Glacial age.

The remaining open-air stations, like the majority of Mousterian sites elsewhere, date rather clearly from the earlier part of the Last Glacial. At Nosovo I and Il'skaya (upper level), the occupation horizons occur only a short distance above deposits believed to be of Last Interglacial age. An early-to-middle Last Glacial age for the five Mousterian levels of Molodova I and

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the eight levels of Molodova V is suggested not only by their stratigraphic situations but also by radiocarbon determinations [> 44,000 years ago for horizon 4 of Molodova I and > 45,600 years ago for horizon 11 of Molodova V (*31*)]. A somewhat later mid-Last Glacial age for the six horizons of Rozhok I is suggested by their occurrence only a short way below a fossil soil believed to have formed during the Mologo-Sheksna (or Paudorf) Interstadial of the Last Glacial. Finally, the occurrence of the three horizons of Rozhok II and of the single level of Kasperovtsy within soils of probable Mologo-Sheksna age indicates that they are probably the latest Mousterian sites so far discovered in European Russia.

Circumstantial evidence—or, perhaps better, the absence of contradictory facts—allows us to place the various Mousterian cave sites, like most of the open-air sites, within the first two-thirds of the Last Glacial time span.

Environment of Mousterian Man in Russia

Detailed reconstruction of the environment during the long interval when Mousterians inhabited European Russia has been hampered by a scarcity of data. What evidence there is has come mostly from the Mousterian sites themselves. For the open-air sites, the absence of strong traces of soil formation in Mousterian-bearing sediments or the presence of frost phenomena and of remains of cold-loving organisms frequently document the view that Mousterian peoples lived under cold climatic conditions. (Only Khotylevo—the single site that is probably of Last Interglacial age—presents relatively solid evidence of warmer climate. This evidence consists of an assemblage of warmth-loving mollusks found in the alluvium that contains the cultural debris.) Remains of cold-loving creatures or the presence of angular rubble in Mousterian beds, or both, suggest severe climatic conditions during the occupation of many of the caves.

In addition to the evidence that the Mousterians of European Russia lived, for the most part, under climatic conditions colder than those of today, we have data suggesting that they lived in

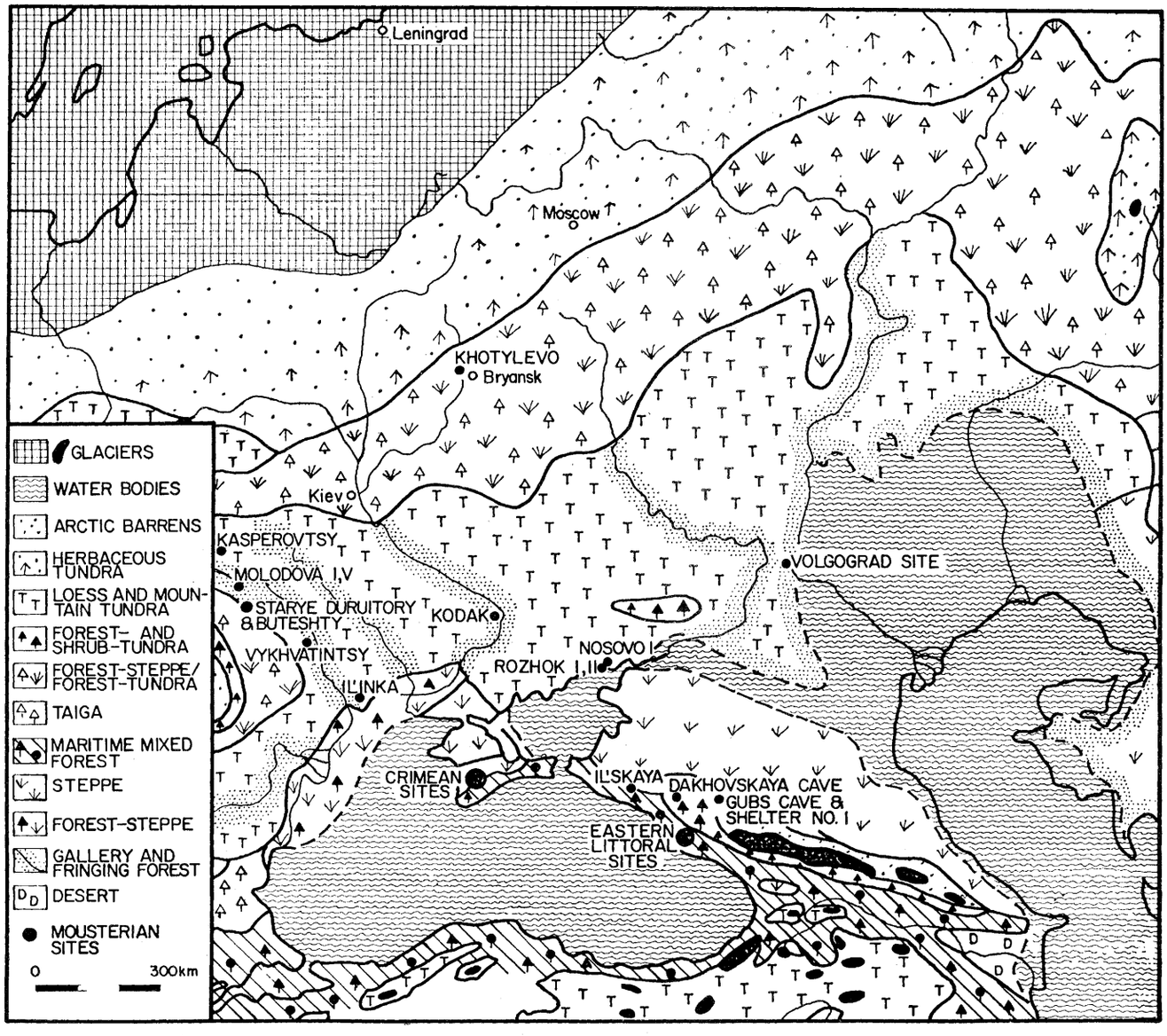

Fig. 1. Vegetation zones of European Russia at the maximum of the Last Glacial, with Mousterian sites superimposed. [After Frenzel (*36*)]

a variety of environmental situations. These data are derived from a comparison of faunal assemblages from sites located in different areas. From Fig. 3 it may be seen that the Molodova sites on the Dnestr contain mostly mammoth remains, whereas the south Russian stations and Volgograd are characterized by a predominance of bison. The Crimean sites, on the other hand, contain a wide variety of species. Where one form predominates heavily in a Crimean site, it is wild ass. The Eastern Littoral sites are characterized by the predominance of cave bear. These differences in faunal assemblages cannot be explained by suggesting that the different groups of sites were occupied at different times. In the first place, it is highly probable that some of the sites in each group were contemporaneous. In the second place, the differences appear to have continued for a long time, even into the later part of the Last Glacial, when Mousterian cultures had been supplanted by cultures referred to as Upper Paleolithic. This last fact strongly suggests that the differences reflect actual past variation in the proportions of different species in different areas. It argues against the notion that the differences are due simply to regional diversity in hunting preferences.

Unfortunately the faunal information is not sufficient to allow us to construct a detailed map showing the various environmental zones of European Russia at any time during the earlier Last Glacial. However, in combination with limited paleobotanical information, the faunal data suggest that these zones were not strikingly different from those tentatively proposed for the time of the maximum cold of the Last Glacial (about 22,000 to 17,000 years ago), the time represented in Fig. 1. There it may be seen that, at the height of the Last Glacial, nearly all of south-central and southern Russia was covered by herbaceous vegetation. The prominence of bones of large herbivorous mammals in the Mousterian horizons of the Dnestr and south Russian sites implies that herbaceous countryside was also characteristic of southern Russia during the earlier part of the Last Glacial. Such an environment is the only one which could have supported large gregarious mammals in sizable numbers. Figure 1 also shows that, at the maximum of the Last Glacial, forests were most prominent in the southern part of the Crimea and in the Transcaucasus. If we assume that this was also the case in the earlier Last Glacial, we may find an explanation for the faunal assemblages from the Crimean and Eastern Littoral sites.

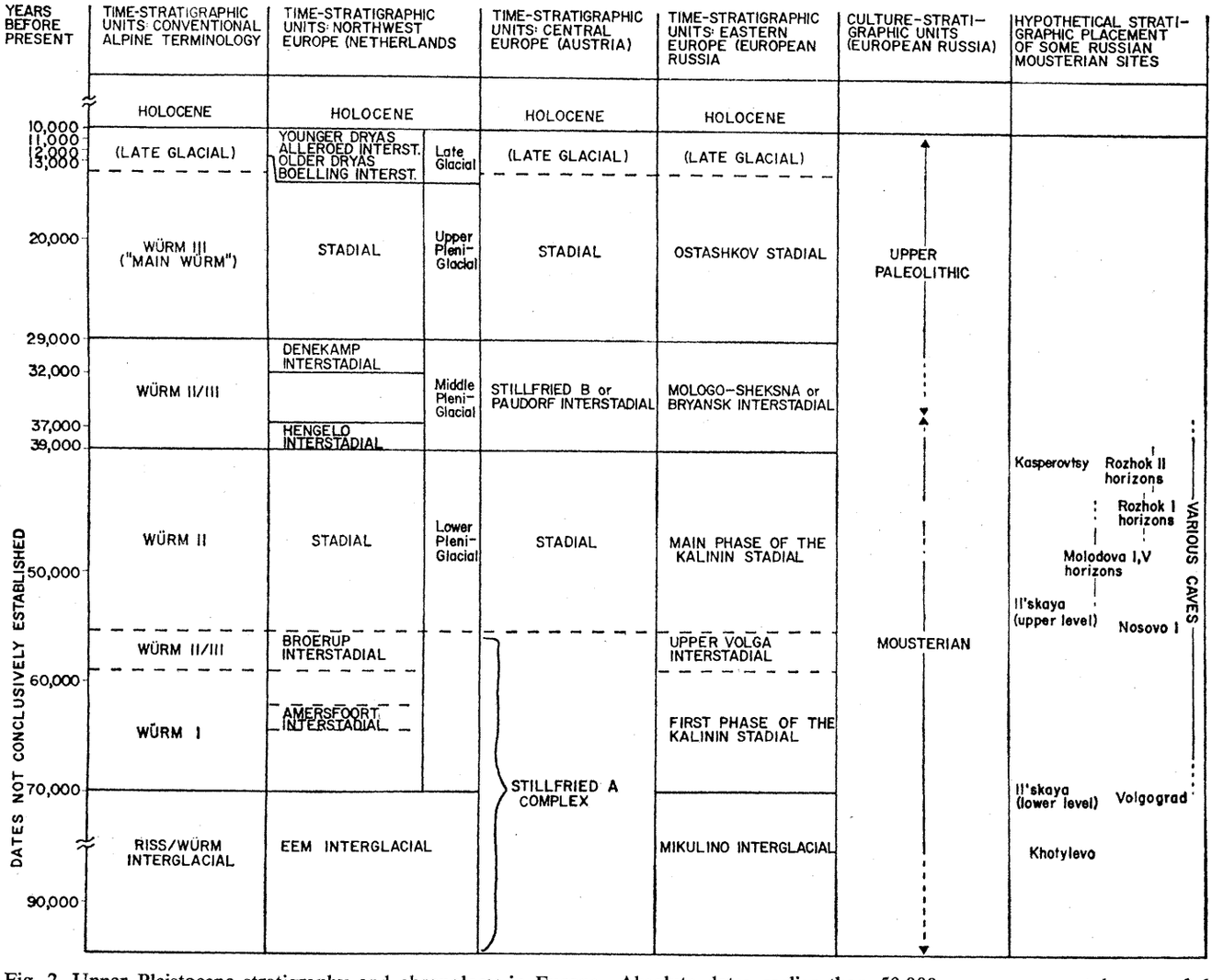

Fig. 2. Upper Pleistocene stratigraphy and chronology in Europe. Absolute dates earlier than 50,000 years ago must be regarded as hypothetical. [Based on data in T. van der Hammen *et al.*, *Geol. Mijnbouw* **46**, 3 (1967); J. Fink, *Mitt. Geol. Ges. Wien* **54(1961)**, 1 (1962); I. K. Ivanova, in *Verkhnij Pleistotsen* (Nauka, Moscow, 1966), pp. 32–66; A. I. Moskvitin, *ibid.*, pp. 74–92]

	DNESTR AND PRUT BASIN SITES													DNEPR BASIN SITES		SOUTH RUSSIAN SITES						CRIMEAN SITES														EASTERN LITTORAL SITES		
	KASPEROVTSY	MOLODOVA I					MOLODOVA V				VYKHVATINTSY	STARYE DIURTORY		KHOTYLEVO	KODAK	ROZHOK I	ROZHOK II	ILSKAYA	DAKHOVSKAYA CAVE	RUBS CAVE	VOLGOGRAD	KIIK-KOBA		STAROSELE	SHAITAN-KOBA	CHOKURCHA	KABAZI	VOLCHIJ GROT		BAKHCHISARAJSKAYA	KHOLODNAYA BALKA	CHAGORAK-KOBA	KOSH-KOBA	ADZHI-KOBA	AKMSHTYR' CAVE	NAVALISHINO CAVE	VORONTSOVKA AND KOSTA ATS CAVES I AND II
		HORIZONS					HORIZONS					HORIZONS										HORIZONS					HORIZONS										
		1	2	3	4	5	XIb	XI	XIIa	XII		3	4									V-VI	III-IV				7	6									
MAMMUTHUS PRIMIGENIUS, WOOLLY MAMMOTH	x	xx	xx	xx	xx	xx	x	xx	xx	xx	239/8	x		x	102/7		1/1	x	14/1		51/?		43/3	88/8	1/1	/>20		38/4	61/6	x		x	5/1				
COELODONTA ANTIQUITATIS, WOOLLY RHINOCEROS	x				x			x			78/5	x			67/5								5/1	19/4		+		?	?			x	19/3	6/2			
EQUUS CABALLUS, WILD HORSE	x		x		x	x					298/11	x	x		44/5	x	x	x		x	x	5/1	103/6	134/16	11/1	x	x	12/2	9/1	?	x	x	86/6	1/1			
EQUUS ASINUS, WILD ASS																x		x				1/1	3/2	58909 /287	50/5		x	17/4	4/1	x	xx	x	37/3	1/1			
BISON PRISCUS, STEPPE BISON	x										141/9				184/8	xx	xx	xx	19/3		366/?															
BOS OR BISON, WILD CATTLE		x	?		x							x	x	?		x				x		2/1	12/1	138/9	2/1	x	x	2/1	2/1	x	x		2/1	2/1	x		x
OVIS SP., WILD SHEEP											x												1/1					2/1						10/3			
CAPRA CAUCASICA, CAUCASIAN IBEX																			4/1	SP?															x		
SAIGA TATARICA, SAIGA ANTELOPE																		x	5/2		36/?	18/1	144/5	350/4	177/5	xx	x	2/1	22/9	x	x		116/5	130/4			
CERVUS ELAPHUS, RED DEER (ELK)	x	x				x					45/9	x			32/4						15/?	1/1	16/1	67/7	7/1	x	x	3/1					26/8	6/1	x		
CERVUS SP, DEER			x		x	x		?									x																			x
CAPREOLUS CAPREOLUS, ROE DEER																							3/1														
MEGACEROS EURYCEROS, GIANT DEER											12/3	x			27/6	x		x	5/2			11/2	232/8	6/2	170/8	x			6/2				8/2				
ALCES ALCES, MOOSE (ELK)					x																																
RANGIFER TARANDUS, REINDEER		x			x			?			15/3	x			31/5								5/1	35/5				?	?				6/2				
SUS SCROFA, WILD BOAR																		+						1/1				?	?				13/4		x		
URSUS ARCTOS, BROWN BEAR					x			x							1/1								2/1									SP?		2/1			
URSUS SPELAEUS, CAVE BEAR											63/12	x	x					+	3/1					1/1		+							2/1	19/2	xx	xx	xx
CROCUTA SPELAEA, CAVE HYENA											69/9	x			1/1			x	1/1			1/1	10/1	25/5	2/1	x		3/1	6/1			x	68/4	1/1			
CANIS LUPUS, WOLF	x				x						18/4				3/1	x	x	x	10/2		1/1	1/1	3/1	32/6	1/1			2/1	2/1			x	1/1	3/1	x	x	
VULPES VULPES, RED FOX											7/2				1/1				7/4				13/2	8/5	3/1				1/1				4/2	1/1	x		
VULPES CORSAC, STEPPE FOX																							27/5		5/1									1/1			
ALOPEX LAGOPUS, ARCTIC FOX																						1/1	13/3	5/3				2/1	2/1			x	6/2	2/1			
PANTHERA SPELAEA, CAVE LION							x	x			9/2	x			5/2				4/1						2/1							x					
FELIS SYLVESTRIS, WILD CAT																			2/1																		
LYNX LYNX, LYNX																																		1/1			
MELES MELES, BADGER																			7/2													x					
GULO GULO, GLUTTON (WOLVERINE)																												?	?								
LEPUS EUROPAEUS, BROWN HARE					SP?	SP?									SP?			+	3/1			SP?	SP?	9/4							SP?	x	x			
MARMOTA BOBAC, STEPPE MARMOT															2/1								1/1			x							x	x			

MAJOR MAMMALIAN SPECIES REPRESENTED IN THE PRINCIPAL MOUSTERIAN OCCUPATION SITES OF EUROPEAN RUSSIA. + = rare; X = present; XX = frequent; −/− = no. of bones/no. of individuals (Shadow figures after Thenius 1962)

TYPES OF BORDES (1961)	MOLODOVA I-4	MOLODOVA I-5	MOLODOVA V-XII	MOLODOVA V-XI	KIIK-KOBA-III/IV	STAROSELE	VOLCHJ GROT	VOLGOGRAD
1. TYPICAL LEVALLOIS FLAKE	2+	—	3	3	—	1	—	—
2. ATYPICAL LEVALLOIS FLAKE	9+	1	22	16	1	4	—	—
3. LEVALLOIS POINT	4	—	1	3	—	1	—	—
4. RETOUCHED LEVALLOIS POINT	3	—	—	—	—	—	—	—
5. PSEUDO-LEVALLOIS POINT	—	—	1	4	—	—	—	—
6. MOUSTERIAN POINT	—	—	—	1	11	13	1	5
7. ELONGATED MOUSTERIAN POINT	—	—	—	—	1	—	—	—
8. LIMACE	—	—	—	—	—	8	—	—
9. SIMPLE, STRAIGHT SIDE-SCRAPER	9	1	3	4	36	98	12	19
10. SIMPLE, CONVEX SIDE-SCRAPER	29	6	14	20	26	248	13	63
11. SIMPLE, CONCAVE SIDE-SCRAPER	4	—	1	2	9	51	4	17
12. DOUBLE, STRAIGHT SIDE-SCRAPER	—	—	—	—	5	6	1	—
13. DOUBLE, STRAIGHT-CONVEX SIDE-SCRAPER	3	—	—	3	4	20	1	5
14. DOUBLE, STRAIGHT-CONCAVE SIDE-SCRAPER	—	—	—	—	4	7	1	—
15. DOUBLE, BICONVEX SIDE-SCRAPER	1	1	—	3	3	45	2	8
16. DOUBLE, BICONCAVE SIDE-SCRAPER	—	—	—	—	—	3	—	—
17. DOUBLE, CONVEX-CONCAVE SIDE-SCRAPER	—	—	—	—	2	19	1	3
18. STRAIGHT, CONVERGENT SIDE-SCRAPER	—	—	—	—	8	24	2	4
19. CONVEX, CONVERGENT SIDE-SCRAPER	—	2	—	2	6	35	2	4
20. CONCAVE, CONVERGENT SIDE-SCRAPER	—	—	—	—	3	10	—	—
21. CANTED SIDE-SCRAPER	1	—	—	—	124	112	4	41
22. STRAIGHT, TRANSVERSE SIDE-SCRAPER	—	—	—	—	14	26	1	4
23. CONVEX, TRANVERSE SIDE-SCRAPER	—	1	—	—	9	47	1	15
24. CONCAVE, TRANSVERSE SIDE-SCRAPER	—	—	—	—	1	6	—	2
25. SIDE-SCRAPER ON THE VENTRAL SURFACE	3	1	3	—	3	9	—	10
26. SIDE-SCRAPER WITH ABRUPT RETOUCH	3	—	—	3	2	11	1	—
27. SIDE-SCRAPER WITH THINNED BACK	—	—	—	—	3	4	1	3
28. SIDE-SCRAPER WITH BIFACIAL RETOUCH	—	—	—	—	3	10	1	3
29. SIDE-SCRAPER WITH ALTERNATE RETOUCH	—	—	—	—	3	8	1	1
30. TYPICAL END-SCRAPER	—	—	—	—	—	—	1	—
31. ATYPICAL END-SCRAPER	1	—	—	1	1	16	2	0
32. TYPICAL BURIN	—	—	—	—	1	—	—	—
33. ATYPICAL BURIN	3	—	1	2	2	14	—	—

TYPES OF BORDES (1961)	MOLODOVA I-4	MOLODOVA I-5	MOLODOVA V-XII	MOLODOVA V-XI	KIIK-KOBA-III/IV	STAROSELE	VOLCHJ GROT	VOLGOGRAD
34. TYPICAL BORER	—	—	—	—	1	3	—	—
35. ATYPICAL BORER	—	—	—	1	7	7	—	1
36. TYPICAL BACKED KNIFE	—	—	—	—	—	1	—	2
37. ATYPICAL BACKED KNIFE	—	—	—	—	4	13	—	1
38. NATURALLY BACKED KNIFE	5+	3	11	17	—	—	—	—
39. RACLETTE	8	—	—	—	2	6	—	—
40. TRUNCATED FLAKE OR BLADE	2	—	—	—	3	4	—	—
41. MOUSTERIAN TRANCHET	—	—	—	—	—	6	—	—
42. NOTCHED TOOL	9	2	2	—	37	37	—	15
43. DENTICULATE TOOL	21	2	2	10	59	60	—	29
44. ALTERNATE BURINATING BEC	—	—	—	—	1	—	—	3
45. PIECE WITH VENTRAL RETOUCH	1	—	—	—	2	3	—	2
46- PIECE WITH COARSE, 47. ABRUPT OR ALTERNATE RETOUCH	—	—	—	—	21	25	—	2
48- PIECE WITH FINE, 49. ABRUPT OR ALTERNATE RETOUCH	180+	33	59	22+	60	258	2	30
50. PIECE WITH BIFACIAL RETOUCH	2	—	—	—	1	1	2	1
51. TAYAC POINT	—	—	—	—	9	1	—	2
52. NOTCHED TRIANGLE	—	—	—	—	—	—	—	—
53. PSEUDO-MICROBURIN	—	—	—	—	—	—	—	—
54. END-NOTCHED TOOLS	—	—	—	—	4	2	—	—
55. HACHOIR	—	—	—	—	—	—	—	—
56. PUSHPLANE (RABOT)	—	—	—	—	—	—	—	1
57. STEMMED POINT	—	—	—	—	—	—	—	—
58. STEMMED TOOL	—	—	—	—	—	—	—	—
59. CHOPPER	—	—	—	—	—	—	—	—
60. INVERSE CHOPPER	—	—	—	—	—	—	—	—
61. CHOPPING-TOOL	—	—	—	—	—	—	—	2
62. MISCELLANEOUS TOOLS	—	—	—	1	4	10	1	3
63. FOLIATE PIECE	—	—	—	—	—	—	—	—
TOTALS	303	53	123	118	502	1255	58	301

Fig. 3 (facing page). Major mammalian species represented in the principal Mousterian occupation sites of European Russia: +, rare; ×, present; ××, frequent; —/—, (number of bones)/(number of individuals). No data are available on the faunal remains from Buteshty and Gubs Shelter No. 1. No identifiable remains were preserved at Nosovo I. Il'inka is not included because it seems certain that the overwhelming majority of the bones there accumulated naturally. [Drawings after Thenius, *Z. Säugetierkunde* **27**, 65 (1962)] Fig. 4 (above). Frequencies of occurrence of artifact types in some Mousterian sites of European Russia. [Counts by R. G. Klein]

The Crimean sites would have been situated on the boundary of two major zones—the forested mountains to the south and the herbaceous steppes to the north. The wide variety of species in the sites may reflect consistent and repeated exploitation of both zones. And the narrow valleys of the Crimean Mountains may have provided an ideal situation for the hunting of such fleet-footed animals as wild ass. On the Eastern Black Sea Littoral, the forest zone would have been the only zone present. As a consequence, the numbers of large herbivores would have been restricted and the human population would also have been relatively small. Most of the Eastern Littoral sites seem to have housed cave bears more often than men.

Artifacts

Through the kindness of P. I. Boriskovskij, A. P. Chernysh, E. E. Fradkin, and M. D. Gvozdover, I am able to supplement the published information on Russian Mousterian artifact assemblages with my own observations made during two study trips to the Soviet Union. A major portion of the results of these observations, based chiefly on the well-known stone-artifact typology of Bordes (*32*), is summarized in Fig. 4 and Table 1. It is apparent from these data that artifact assemblages from various sites show marked differences. The Molodova stations provided mainly simple sidescrapers and virtually no bifacially worked tools. Volgograd, Kiik-Koba III/IV, and Starosel'e, on the other hand, contained a large number of canted sidescrapers and a significant quantity of bifacial pieces. In these cases, however, as the data of Table 1 indicate, the bifacial pieces were quite different and sharply distinguished the assemblages from one another.

Not represented in Fig. 4 and Table 1 are collections that were too small for meaningful analysis and collections that were either no longer intact or were not available during my trips to the Soviet Union. Published information on these latter collections suggests, however, that if they had been represented in Fig. 4 and Table 1 the apparent variability would have been even greater.

Since the various Russian Mousterian

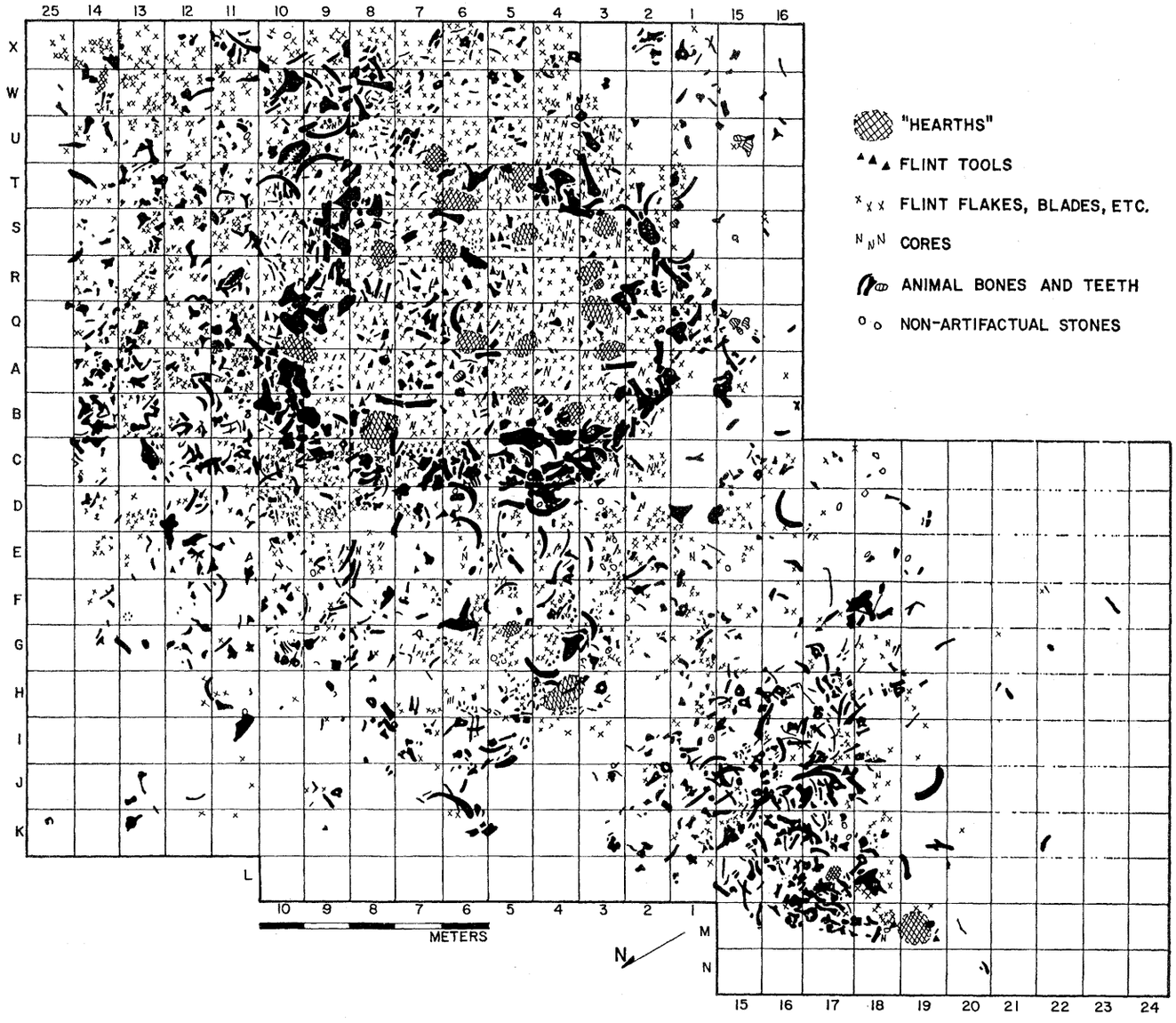

Fig. 5. Horizontal distribution of materials in Mousterian horizon 4 of Molodova I. [After Chernysh (*3*)]

sites are often separated by great distances and, in many cases, also by many thousands of years, it seems likely that much of the observable artifactual variation among them reflects cultural differences among their ancient occupants. In other words, the Mousterian of European Russia was not a single undifferentiated culture but a complex of cultures sharing such features as the manufacture of tools chiefly on flakes and a general preference for sidescrapers of various kinds. A likelihood that there were several Mousterian cultures is completely in accord with the likelihood that the Russian Mousterians lived in a variety of environments. It is also in accord with what we know of other areas in which several Mousterian cultures (generally distinct from those in Russia) have been found. At the same time that I emphasize the probable occurrence of several Russian Mousterian cultures, however, I should point out that some of the variation among artifact assemblages may simply reflect differences in the kinds of activities people of a single culture engaged in at different sites. This is particularly likely in the case of assemblages coming from sites that are close in space and time—for example, some of the Crimean sites.

Table 1. Bifacial artifacts from the sites listed in Fig. 4.

Artifact	Number of pieces
Molodova sites	
Crude bifacially worked hunk	1
Kiik-Koba III/IV	
Plano-convex Mousterian points	3
Plano-convex simple convex sidescrapers	2
Plano-convex double sidescrapers	1
Plano-convex convergent sidescrapers	32
Plano-convex notches	6
Plano-convex denticulates	2
Plano-convex Tayac points	1
Indeterminate plano-convex pieces	5
"Hand axes"	10
Starosel'e	
Bifacial limaces	5
Partially bifacial limaces	5
Biface scrapers	5
Quasi-foliate pieces	1
"Hand axes"	23
Partially bifacial "hand axes"	2
Fragments of bifacial artifacts	14
Miscellanea (bifacially worked hunks)	5
Volgograd	
Leaf-shaped points, biface scrapers, and "hand axes"	22
Volchij Grot	
Bifacial pieces	None

Features

No less interesting than the faunal remains and the artifacts are the irremovable cultural items ("features") uncovered at Russian Mousterian sites. In Russia, as in other parts of Europe, almost every site has one or more distinctly bounded accumulations of ash and charcoal which are clearly interpretable as hearths. Even where hearths are not apparent, bits of charred bone and ash scattered through a cultural horizon indicate the use of fire.

In addition, at least some Mousterian peoples in Russia were modifying their sites in other ways. At Nosovo I, the cultural level contained a number of tabular fragments of limestone; since limestone does not occur naturally in the deposits, these fragments were apparently brought to the site by its ancient inhabitants for an as yet unknown purpose. At Molodova I, excavations of horizon 4 uncovered an extremely interesting oval arrangement of large bones of mammoth (Fig. 5). The inner dimensions of the oval were 8 by 5 meters; the outer dimensions, 10 by 7 meters. The distance between the inner and outer edges varied from 0.6 meter to 1.6 meters. The area enclosed by the oval contained a great quantity of cultural debris, including roughly 29,000 pieces of flint, hundreds of fragments of animal bones ("kitchen debris"), 15 hearths, and a spot of red, ochreous pigment. Chernysh, whose excavations uncovered the oval, believes that it marks the location of an ancient structure. In his opinion the large bones were probably weights holding down skins stretched over the wooden (?) framework of this structure. If Chernysh's interpretation is correct, the ring of bones would constitute the first "ruins" discovered at any Mousterian site. Even if he is wrong, the ring remains the clearest evidence to date of any kind of modification of an open-air site by Mousterian peoples. A similar, but less spectacular and less convincing, pattern of mammoth bones has been found in horizon 11 of Molodova V.

Finally, I should mention some very interesting features found in the Crimean cave site of Kiik-Koba: five cache(?)-pits dug by the ancient inhabitants of the upper cultural horizon (3/4) and a grave dug by the inhabitants of the lower horizon (5/6). The grave was approximately 2 meters long and 1 meter wide and was hollowed out from the bedrock floor of the cave. Its contents had been greatly disturbed by the intrusion of one of the cache(?)-pits from the upper horizon. However, in one end where the grave was clearly not disturbed, it contained, in anatomical order, the bones of the right leg and of both feet of an adult human being. A series of hand bones and a tooth, presumably belonging to the same individual, were found in the fill of the pit intruding upon the grave from above. This discovery of an intentional burial in Kiik-Koba supplements data already available on Mousterian burial practices in other regions.

Human Remains

It is widely agreed today that the bearers of the Mousterian complex of cultures belonged to the variety of fossil men known as Neanderthals (*Homo sapiens neanderthalensis*). However, it is also recognized that Neanderthals were not morphologically the same everywhere, and considerable discussion has centered on the question of whether just a few or virtually all Neanderthal populations are likely to have given rise to populations of anatomically modern men (*Homo sapiens sapiens*) (*33*). Because of their scarcity, human remains from Mousterian sites in European Russia have not figured prominently in such discussions. To date, only four sites—Rozhok I, Akhshtyr' Cave, Kiik-Koba, and Starosel'e—have provided human bones. Those from Rozhok I and Akhshtyr' Cave consist, respectively, of an upper left permanent molar, and of an upper left permanent molar and three foot bones (metatarsals). These pieces are inadequate for distinguishing between Neanderthal and anatomically modern man. Kiik-Koba contained the headless skeleton of an infant (in unclear context) and relatively complete remains of the feet and hands of an adult (from the grave, as described above). The infant's bones were too poorly preserved for scientific analysis. Studies of the adult bones (*34*) have indicated that their owner had extraordinarily short, broad, massive, and well-muscled hands and feet, probably closely resembling those of such western European contemporaries as the "classic" Neanderthals from La Chapelle-aux-Saints and La Ferrassie.

Starosel'e contained some scraps of adult human bones which were useless

for diagnostic purposes, and (of considerably greater interest) the relatively complete skeleton of a child of about 18 or 19 months. The child's skull is remarkably modern-looking (*35*), with a high, steeply rising, well-rounded forehead, a relatively short face, a clearly outlined chin, and a high, rounded occiput. Its appearance has encouraged speculation that anatomically modern man may have become established in eastern Europe while Neanderthals were still living in western Europe (no such modern-looking remains have been found in a Mousterian context in western Europe). However, the use of the Starosel'e infant to support such a conclusion is questionable because of some uncertainty concerning its provenience. Chemical tests have failed to confirm a contemporaneity of the child's bones with animal bones found in the surrounding deposits. The tests indicate that the child's skeleton may be considerably more recent. A. A. Formozov, the excavator of Starosel'e, has insisted that the skeleton was found *in situ* and was not intrusive from above, but, until convincing arguments are put forth to explain away the results of the chemical analyses, the significance of the Starosel'e infant cannot be conclusively assessed. The Mousterian sites of European Russia have yet to contribute any clearly significant data on the "Neanderthal question."

Conclusions

Much of the information from the Russian Mousterian stations has not so much revised our ideas of what the Mousterian was like as substantiated notions obtained earlier in other geographic regions. Thus, we have additional evidence from European Russia that Mousterian peoples camped both in the open air and in the mouths of caves. The Russian sites indicate that the Mousterians were competent hunters who sometimes concentrated heavily on a single species. They made stone tools of many kinds, which probably means that they engaged in a variety of specialized activities. They could control fire, and evidence of its ubiquity in their sites suggests that they could make fires at will. At least on occasion, they buried their dead. And they were fully capable of modifying their sites to make them more livable. Molodova I–4 presents the clearest instance, to date, of modification of an open-air site by a Mousterian group.

Unfortunately there are many questions about the Mousterian way of life that we cannot yet answer. For example, how large was the social group in different areas. What was the duration of settlement? Just how efficient were the Mousterians as hunters? To what extent did they rely on the collection of wild vegetable foods? And—perhaps most intriguing of all—what happened to them?

As in neighboring regions, the Mousterian in European Russia was supplanted by a "culture" or complex of cultures known collectively as the Upper Paleolithic. Unlike the Mousterians, Upper Paleolithic peoples tended to make most of their tools on blades (that is, flakes which are at least twice as long as they are wide). They made even more kinds of stone tools than the Mousterians did, and emphasized various types of end scrapers and burins as opposed to sidescrapers. It seems that they sometimes transported or imported high-quality raw materials over distances of hundreds of kilometers; there is no evidence in the Mousterian for such a practice. In contrast to the Mousterians, who worked bone only on occasion, Upper Paleolithic peoples worked it in profusion, making bone artifacts of many different kinds. Often they used bone, ivory, and other materials for working clearly recognizable art objects; art objects and ornaments are entirely lacking in the Mousterian. Also, Upper Paleolithic people seem to have been much more numerous than their Mousterian predecessors. This is shown by the fact that their sites are many times more abundant than Mousterian sites, while there is no evidence to suggest that, on the average, individual Upper Paleolithic sites were occupied for shorter periods than Mousterian sites. If anything, Upper Paleolithic peoples were less nomadic than the Mousterians. (Upper Paleolithic sites very frequently contain remains of what seem to have been semi-permanent structures.) In the long view of culture history, the Upper Paleolithic appears to constitute a kind of revolution from the Mousterian.

As astonishing as the contrast between the two cultures is the rapidity with which the Upper Paleolithic replaced the Mousterian. Everywhere in Europe this replacement seems to have happened between 40,000 and 30,000 years ago and to have taken no more than a very few thousand years. Also interesting is the fact that, whereas Mousterian cultures seem to have been produced by Neanderthal man, Upper Paleolithic cultures were produced by men of the modern subspecies. What we would like to know, of course, is whether the various early manifestations of the Upper Paleolithic were directly derived from various local Mousterian cultures or whether the Upper Paleolithic originated in a fairly limited area, perhaps even outside Europe, and spread from there. Similarly, did modern man evolve over a broad front in many related Neanderthal populations, or did he too originate in a relatively restricted area? Those who favor widespread, multiple origins of the Upper Paleolithic (and of modern man) are faced with the problem of explaining the total absence of undoubted transitional Mousterian/Upper Paleolithic sites and also the abruptness of the replacement. Those who favor a single, limited area of origin would like to demonstrate, at the very least, that the Upper Paleolithic (and that modern man) is clearly earlier in some places than in others. So far they have not been able to do so. Future excavations in European Russia, which comprises 42 percent of the European land mass and contains abundant Last Glacial deposits, may one day provide the data needed to deal conclusively with this problem.

References and Notes

(Abbreviations used in references: *BKICP, Byulleten' Komissii po izucheniyu chetvertichnogo perioda; KSIA, Kratkie soobshcheniya Instituta arkheologii; KSIIMK, Kratkie soobshcheniya Instituta istorii material'noj kul'tury; MIA, Materialy i issledovaniya po arkheologii SSSR; SA, Sovetskaya arkheologiya; SPPVTE, Stratigrafiya i periodizatsiya paleolita Vostochnoj i tsentral'noj Evropy* (Nauka, Moscow, 1965); *TINQUA II, Trudy mezhdunarodnoj konferentsii Assotsiatsii po izucheniyu chetvertichnogo perioda II; TKICP, Trudy Komissii po izucheniyu chetvertichnogo perioda*).

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NEWS AND COMMENT

Houston MSC: Community with a Space Complex

Houston, Texas. The moment an Apollo spacecraft lifts off from Cape Kennedy, Florida, a futuristic room in a windowless building hundreds of miles away outside Houston becomes the brain and nerve center for America's mission to the moon. The handful of engineers and scientists who sit in the mission control room of NASA's Manned Spaceflight Center (MSC) live with tensions produced by knowing that they are making decisions which will affect not only the lives of the astronauts and the success of the Apollo program but, quite probably, the future of the American space effort. These unique pressures, shared in some measure by the 4600 NASA people at MSC as well as the 9000 employees of 125 private firms working on NASA business in the area, helped to shape this space-age community.

In the early 1960's, when the space program was young and NASA needed friends, officials made glowing prophecies of the "fallout" benefits of the space effort and predicted that NASA space establishments like MSC would precipitate major economic and social change around them. After 4 years of running at top speed, it can be reported that MSC's presence has not transformed Houston into a "science city." The Houston area, after all, was and is the biggest petrochemical-industry center in the country and is going its own booming way. The injection of $140 million a year in NASA money and the impact on the life of the area of NASA workers—some 2500 of them R & D scientists and engineers—and of the 9000 employees of the 125 private high-technology firms serving MSC has so far had surprisingly little measurable effect. But meanwhile the space community has developed its own special character with its own style of life and its own special goals.

That the space community would become something less than a well-integrated part of the area seemed a logical consequence of the decision to locate the center 23 miles southeast of Houston. The original 1000-acre site was part of the estate of the late J. M. West, a Texas oilman who donated the land to Rice University (which then offered it free to NASA as an inducement to set up shop in the area). Later NASA purchased 600 acres from the Humble Oil Company, which still owns much of the area's land. The cost of clearing the 1600-acre site and of relocating a few cows was negligible, and construction started promptly in 1962—thanks in part to the efforts of then Vice President Lyndon Johnson and the Houston congressman Albert Thomas (who happened to be chairman of the House committee assigned responsibility for NASA appropriations). By mid-1965 the $245-million center was finished, and so was narrow, twisting Farm Road 528, which was widened, straightened out, and renamed NASA Road 1.

NASA has rightly pointed out that there were other motivations behind the choice of the Clear Lake site, as it is called, in addition to the low cost of the land and the political influence of some politicians who wanted the benefits of the space program to fall on Texas. For example, said NASA, nearby Houston provides a major source of manpower. The nearby ship canal offers access to the third largest deep-sea port in the country, at Galveston. Nearby universities such as Rice and the University of Houston provide educational opportunities for employees. And, finally, the choice of Houston fit neatly into the so-called "Big Crescent" constellation of space centers in the South, including Cape Kennedy and the Eglin Air Force Base in Florida; the Marshall Spaceflight Center at Huntsville, Alabama; and the huge Michoud Saturn and Nova rocket assembly plant near New Orleans. At these latter places, incidentally, NASA's social and economic impact seems much greater than at Houston.

Physically, MSC today looks like a college version of the Astrodome, Houston's major civic monument. The 50 MSC buildings are more uniformly modernistic and imposing than anything else in the area, and not even the inevitable mod motels and hamburger stands along NASA Road 1—the space community's main street—prepare one for the cluster of gleaming, imported NASA buildings set down on the humid Gulf Coast flatlands.

Most of the NASA workers who came to MSC couldn't have cared less how the center looked, why it was where it was, or why NASA said it