# Mesolithic Europe

*Edited by*

Geoff Bailey
University of York

Penny Spikins
University of York

CAMBRIDGE
UNIVERSITY PRESS

# Chapter 10

# The Mesolithic of the Iron Gates

Clive Bonsall*

## Introduction

The Iron Gates region may be defined as the 230-km-long section of the Danube valley that forms the border between Romania and Serbia. Marking the beginning of the 'lower Danube', it comprises two distinct physiographic zones with contrasting geology and relief.

The first corresponds with the Iron Gates 'gorge' where the Danube breaks through the Carpathian–Balkan mountain chain. Also known as Djerdap (Serbia) and Clisura (Romania) it is really a system of gorges, some narrow and canyon-like, separated by small basins, which extends for over 130 km. The gorge is developed in rocks of mainly Palaeozoic and Mesozoic age, which include limestone formations in which caves and rockshelters occur. The terrain on either side of the gorge is mountainous, rising to over 700 m above the river on the Serbian side. The average gradient of the river within the gorge is much steeper than elsewhere along the middle or lower Danube. Before it was impounded, strong currents, turbulent flow, rapids and rock reefs characterized this section of the river, impeding navigation; current velocity varied between 3.5 and 18 km per hour.

Downstream from the gorge, the Danube valley broadens out as the river enters a landscape of more moderate relief, underlain by mainly Quaternary sediments, at the western edge of the Wallachian Plain. Here the river is flanked by a broad alluvial plain consisting of several terraces varying in age from mid-Holocene to pre-Last Glacial maximum. The river gradient in this lowland zone is much shallower, current velocity being less than 4 km per hour.

The Iron Gates is the 'jewel in the crown' of the Southeast European Mesolithic, renowned for its exceptional record of human occupation during the Late Glacial and the earlier part of the Holocene between approximately 13,000 and 5500 cal BC – a time segment that encompasses the whole of the Mesolithic and the beginning of the Neolithic[1].

* School of Arts, Culture and Environment, University of Edinburgh, UK.





Elsewhere in Southeast Europe, the Mesolithic has proved difficult to find. There are some notable cave and rockshelter sites scattered through the Balkans, such as Franchthi and Theopetra (Greece), Crvena Stijena, Medena Stijena, and Odmut (Montenegro), Pupičina and Vela Spila (Croatia), and Mala Triglavca (Slovenia). But open-air sites are mostly surface sites on which only stone artefacts have survived.

The existence of Mesolithic sites in the Iron Gates was recognized only in the 1960s. This was a consequence of the decision by the Romanian and Yugoslav governments to build two dams across the Danube for power generation. The first dam, which became operational in 1971, was built where the Danube leaves the Iron Gates gorge, and was designed in part to improve navigation through the gorge. The second dam (operational in 1984) is located 80 km downriver at the island of Ostrovu Mare.

Archaeological surveys and rescue excavations were undertaken prior to construction of the dams. However, these were quite limited in their extent, focusing on valley floor areas on both sides of the river that would eventually be submerged beneath the reservoirs created by the dams, and very little archaeological exploration took place in areas farther from the river.

More than thirty sites with traces of Mesolithic and/or Early Neolithic occupation were identified (Figure 10.1). The majority are situated in the gorge sector. They include several cave and rockshelter sites, all on the Romanian side of the river, and a larger number of open-air sites. Open-air sites also have been found downriver, in the more open section of the Danube valley between the Iron Gates I and II dams. The open-air sites are on low terraces along the Danube or small islands in the river. In spite of the contrast in physical setting between the gorge and the downstream sector, the archaeological records of the two zones show many similarities. Although small in number, the range and quality of the information from the Iron Gates sites bearing on Mesolithic architecture, art, burial practices, bone and stone technology, and subsistence, is superior to that from most other areas of Europe.

## 'Mesolithic' and 'Epipalaeolithic' in the Iron Gates

Because of its relative archaeological 'isolation' – surrounded by vast areas where evidence of Late Glacial and early Holocene settlement is sparse – the Iron Gates Mesolithic is often viewed in its own terms, without close reference to events in other regions of Europe. Hence, its subdivisions and terminology tend not to conform to the conventions and criteria adopted elsewhere. In many parts of Europe changes in stone technology provide the basis for subdividing the Mesolithic, but these play little or no role in subdividing the period in the Iron Gates.

Opinion is divided over when the Mesolithic of the Iron Gates begins and ends, but almost no one places its beginning at the onset of the Holocene, as is the convention elsewhere. Some authors prefer the term 'Epipalaeolithic' to Mesolithic, arguing for continuity with the local Upper Palaeolithic. Others make a clear distinction between Epipalaeolithic and Mesolithic and use the terms accordingly. Because of the generally microlithic character of the lithic assemblages, some authors regard the whole of the period from the beginning of the Late Glacial to the adoption of farming in the Middle Holocene as 'Mesolithic' (e.g., Jovanović 1969a) or 'Epipalaeolithic' (e.g., Boroneanț 1973). Boroneanț (1989) divided the period into two cultures – 'Clisurean' dating to the Late Glacial, and 'Schela Cladovei' dating to the Holocene. The latter he equated with the Lepenski Vir culture identified by Srejović on the Serbian bank of the Danube. Interestingly, in his earlier work, Srejović did not describe the Lepenski Vir culture as Mesolithic, but as 'Epipalaeolithic' in

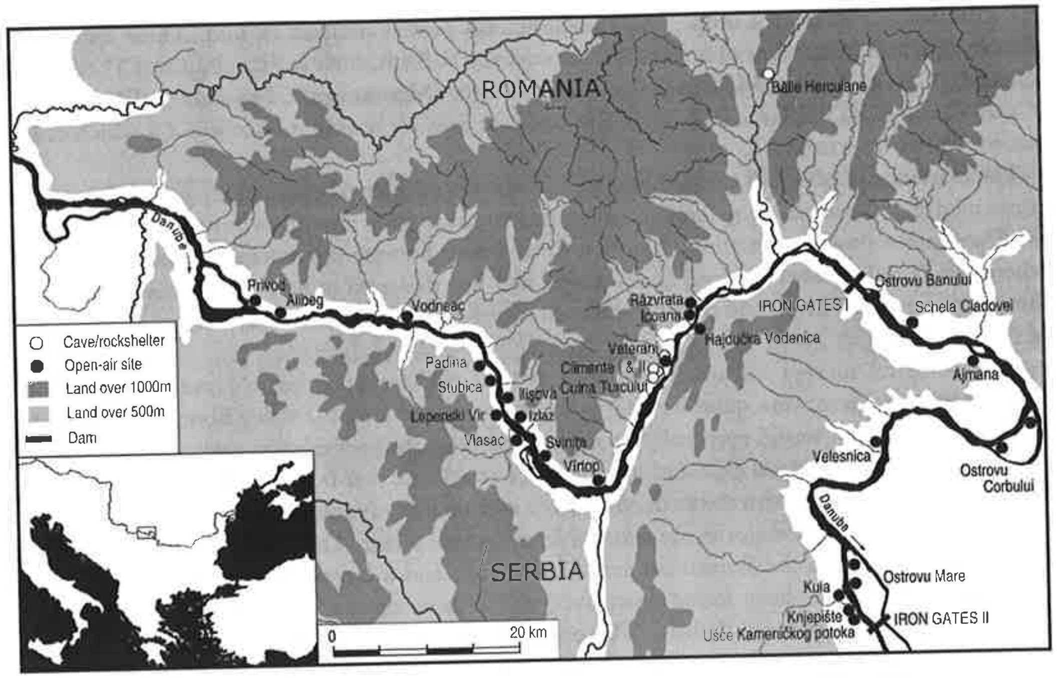



Figure 10.1. Principal Mesolithic and Early Neolithic sites in the Iron Gates.

its early phase, and 'Proto-Neolithic' in its later phase, reflecting his belief in an indigenous origin of farming and pottery manufacture in the region (Srejović 1969).

As research progressed, it became the conventional view that the hunter-gatherer sites of the Late Glacial–Holocene show evidence of increasing social complexity and sedentism with time, and that an important shift in residential mobility patterns and subsistence practices occurred in the early Holocene approximately 7600 cal BC – when, supposedly, people abandoned the caves and rockshelters they had used as residential sites during the Late Glacial and initial Holocene, and began to establish permanent or semipermanent settlements on the banks of the Danube based on intensive exploitation of riverine resources. Many researchers have argued that the establishment of open-air settlements on the Danube approximately 7600 cal BC should be regarded as the beginning of the 'Mesolithic' in the region, and that what came before is 'Epipalaeolithic' (e.g., Voytek and Tringham 1989).

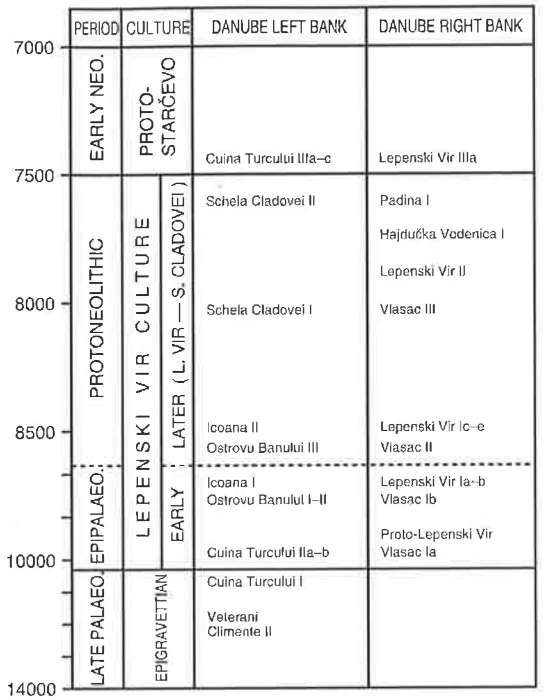
The Iron Gates sites contain some of the largest concentrations of Mesolithic burials in Europe. Burials have been recorded from at least eleven sites[2], and four of these, Lepenski Vir, Padina, Schela Cladovei and Vlasac, each contained very large numbers of graves. Ivana Radovanović has attempted to redefine the Iron Gates Mesolithic in terms of changes in burial practice, arguing that the Mesolithic can be distinguished from the preceding Epipalaeolithic by the appearance of 'formal disposal areas' for burial of the dead. These she defines as 'areas of continuous, ceremonial, mortuary disposal' (Radovanović 1996: 14).

## Chronology

Field investigations in the Iron Gates took place mainly between 1965 and 1984. Many were short campaigns, conducted under rescue conditions, often with very limited resources. Comparatively








Srejović (1969) (a)

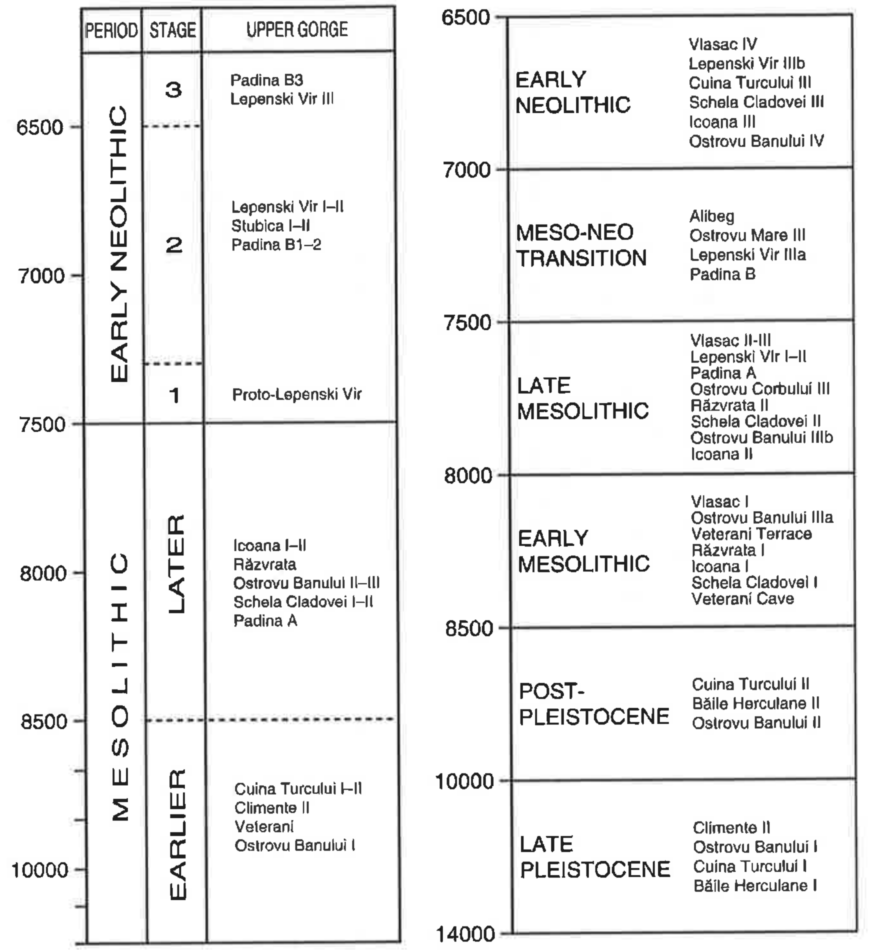
Figure 10.2. Chronology and 'periodisation' of the Iron Gates sites according to different authors: (a) Srejović 1969; (b) Jovanović 1969; (c) Voytek and Tringham 1989; (d) Radovanović 1996; (e) Boroneanţ 2000. Dates are uncalibrated radiocarbon years BP.

few radiocarbon measurements were carried out at the time. Excavators relied mainly on stratigraphy and artefact typology to date their sites, often proposing quite complex relative chronologies. In many sites, more than one Mesolithic occupation layer was recognized, sometimes stratified below one or more Early Neolithic layers.

Various attempts were made to correlate the individual site sequences, using the small number of $^{14}C$ dates available and type comparisons of artefacts (especially architectural features) to produce an integrated chronology for the Iron Gates region as a whole (Figure 10.2).

There are many differences of detail between the various schemes, but the major point of controversy has been the dating of Lepenski Vir and Padina. Srejović (1969, Srejović and Letica 1978) interpreted Lepenski Vir I–II and Padina A and B as Mesolithic, antedating 7500 BP (6400 cal BC). Jovanović (1969a) assigned Padina A to the Mesolithic, and Padina B and the whole of the Lepenski Vir sequence to the Early Neolithic after c. 6400 cal BC. The debate turned on the validity of the $^{14}C$ ages for Lepenski Vir I–II, and the cultural/chronological significance of the presence of pottery in the buildings of Lepenski Vir I–II and Padina B.

The inherent weakness of all of these chronologies is that they rely heavily on the original stratigraphic interpretations of individual sites proposed by their excavators. In very few cases, however, have the individual site stratigraphies been adequately tested against independent dating methods. Two exceptions are Lepenski Vir and Vlasac, both of which have large series of




Jovanović (1969a) (b) Voytek & Tringham (1989) (c)

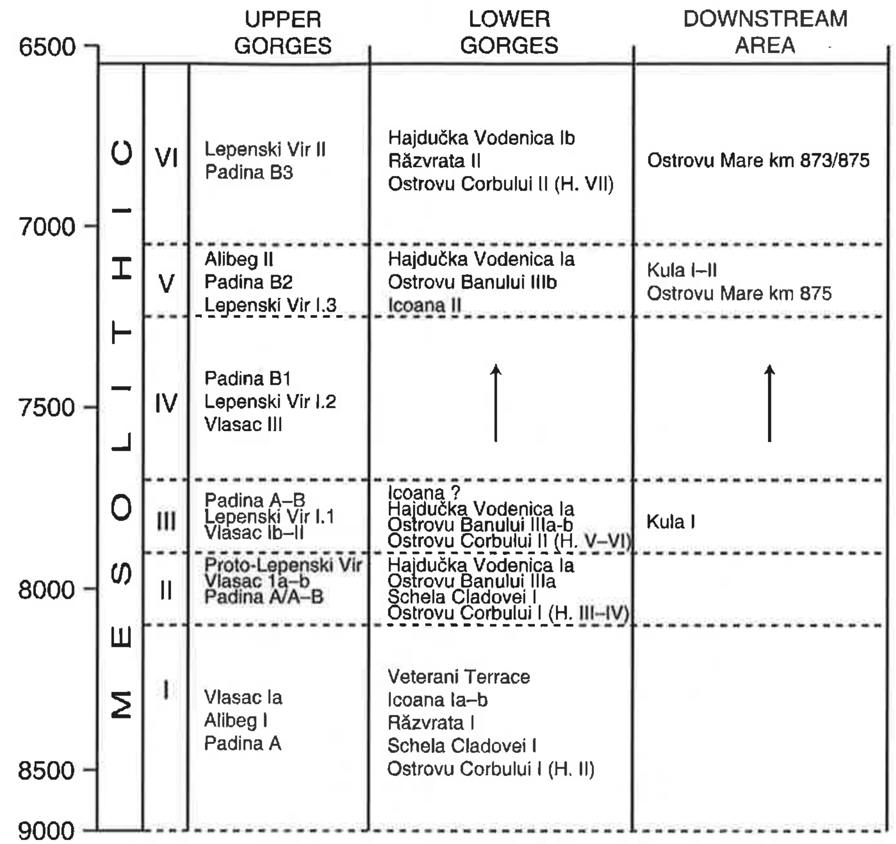
Figure 10.2 (*continued*).

radiocarbon ages. At both sites the results of $^{14}C$ dating were inconsistent with the stratigraphic interpretations.

At Lepenski Vir, Srejović (1972) identified a stratigraphic sequence of five occupation phases: Proto-Lepenski Vir (Early Mesolithic), Lepenski Vir I and II (Late Mesolithic), and Lepenski Vir IIIa and IIIb (Early Neolithic). A series of charcoal samples from contexts associated with LV I–II buildings gave $^{14}C$ ages between c. 7430 and 6560 BP (6300 to 5500 cal BC) (Quitta 1972), but no dates were obtained at that time for the earlier (Proto-LV) or later (LV IIIa–b) phases. Subsequent AMS dating of human remains assigned to LV III gave ages, which, after reservoir correction, were indistinguishable from the charcoal dates for LVI–II (Bonsall et al. 1997, 2000, Cook et al. 2002). Thus, unless phases LV I–IIIb occupy a very short time-span, the radiocarbon evidence is in conflict with Srejović's stratigraphic dating of the burials and architectural remains.








Radovanović (1996) (d)

Figure 10.2 (*continued*).

The occupation at Vlasac was divided into four phases: Vlasac I (Early Mesolithic), Vlasac II–III (Late Mesolithic) and Vlasac IV (Early Neolithic) (Srejović and Letica 1978). Again, the radiocarbon evidence is in conflict with the relative chronology based on stratigraphy. Radiocarbon ages of the majority of charcoal samples from phase I lie within a range from c. 7010 to 6865 BP (5900 to 5750 cal BC) and are significantly *younger* than the age range of c. 7930 to 7440 BP (6800 to 6300 cal BC) for the charcoal samples from phases II and III (Srejović and Letica 1978). Subsequent AMS dating of five human skeletons assigned to phases I and III yielded (reservoir corrected) $^{14}C$ ages that are generally older than the charcoal ages for phase I (Bonsall et al. 1997, 2000).

Similar problems have since emerged at Schela Cladovei, where Boroneanţ identified a stratigraphic sequence of two Mesolithic phases, which he assigned to stages II and III of his Schela Cladovei culture, followed by two Early Neolithic phases, dubbed 'proto-Sesklo' and Criş (Boroneanţ 1989). The Romanian–British excavations at Schela Cladovei between 1992 and 1996 (Boroneanţ et al. 1999; Bonsall et al. 2002) confirmed the presence of Mesolithic and Early Neolithic (Criş) occupations, but found no stratigraphic or radiocarbon evidence to support the subdivision of either occupation.

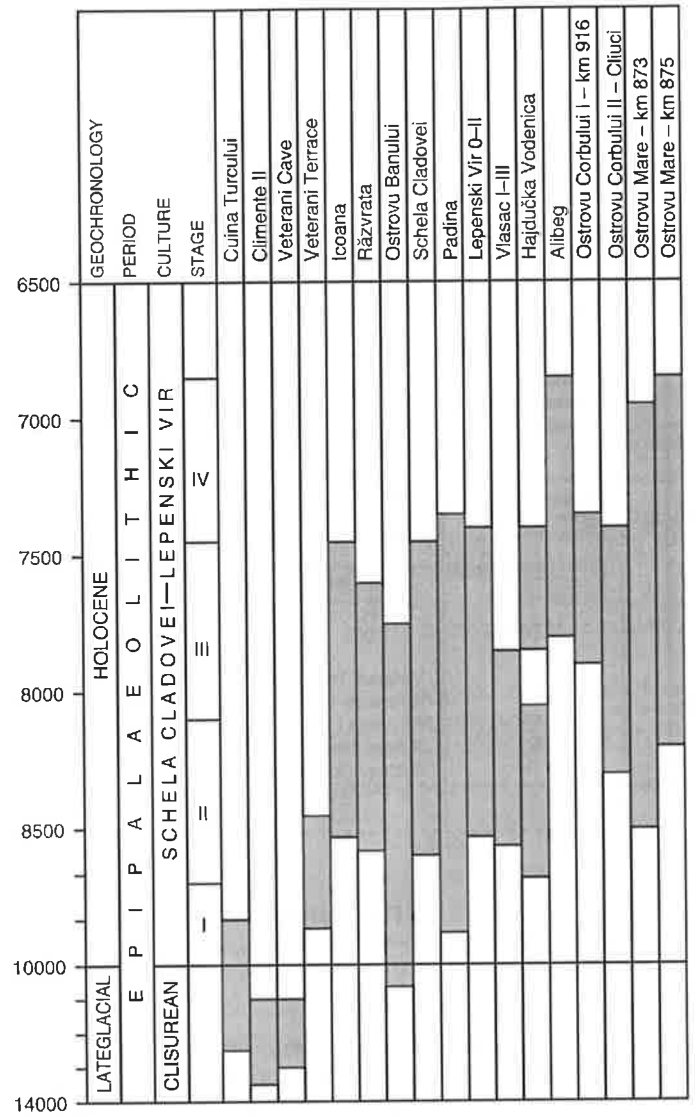



Figure 10.2 (*continued*).





In an effort to explain away the discrepancies between stratigraphic and radiocarbon dating at Lepenski Vir and Vlasac, Srejović, and Letica (1978) suggested that the charcoal samples from the lower levels of both sites had been contaminated owing to groundwater penetration, resulting in erroneous $^{14}C$ ages. However, as noted earlier, new AMS measurements on human bone are equally at variance with the stratigraphic interpretations of Lepenski Vir and Vlasac, as well as Schela Cladovei, which suggests it is the stratigraphic interpretations that are in error. This in turn raises concerns about the validity of the stratigraphic sequences proposed for other sites in the Iron Gates and, by extension, all of the regional chronologies illustrated in Figure 10.2.

The alternative to a chronology based on dubious interpretations of 'stratigraphy' is one based on radiocarbon dating. Although the vast majority of the sites are no longer available for investigation owing to impounding of the Danube by the Iron Gates dams, large collections of animal and human bones are preserved in museums and are suitable for direct dating by AMS. Detailed $^{14}C$ dating programmes using these materials have the potential to: (i) establish the period or periods of occupation of individual sites; and (ii) suggest chronological subdivisions of the Mesolithic based on changes in bone technology and burial practices. This work is at a very early stage. Currently, AMS dates on human bones and/or bone artefacts are available only for Hajdučka Vodenica, Lepenski Vir, Padina, Schela Cladovei and Vlasac (Table 10.1). From these data, coupled with critical use of previous radiometric $^{14}C$ measurements, a provisional radiocarbon-based chronology may be proposed (Tables 10.2 and 10.3).

## Early Mesolithic, 13,000–7200 cal BC

The early stages of the Iron Gates Mesolithic are poorly documented. Use of caves and rockshelters on the Romanian bank of the Danube can be traced back to the Late Glacial period. The most extensively excavated site, and the most securely dated, is Cuina Turcului – a rockshelter situated close to the Danube, approximately 12 m above the pre-dam river level. In excavations undertaken between 1964 and 1969, two 'Epipalaeolithic' layers (Cuina Turcului I and II) were identified, separated by a thick stony layer containing no archaeological materials.

The artefact assemblages from both layers – described as 'Romanello-Azilian' by Păunescu (1970) and 'Clisurean' by Boroneanț (1989) – have been regarded as Late Glacial in age, based on the presence among the chipped stone tools of convex-backed blades and bladelets and 'unguiforme' end-scrapers. Similar tool-making traditions characterized other regions of Europe at the end of the Pleistocene, for example, the Azilian in southwest France and northern Spain, the Romanellian in Italy, and the 'Federmesser' technocomplex of the North European Plain.

Radiocarbon dating of bulk samples of pine charcoal from the Cuina Turcului I layer gave ages of 12,600 ± 120 BP (Bln-803) and 12,050 ± 120 (Bln-804) BP, suggesting use of the rockshelter at a time equivalent to the first half of the Late Glacial Interstadial of northwestern Europe. The presence of woodland species (e.g., red deer, wild pig) among the mammalian remains from this layer is consistent with this interpretation (Bolomey 1970, 1973).

Dating of the Cuina Turcului II layer is less secure, being based on a single $^{14}C$ measurement with a large error – 10,125 ± 200 BP (Bln-802) – also on pine charcoal. This could indicate use of the site either towards the end of the Late Glacial or early in the Holocene. Proxy environmental indicators from this layer present a confusing picture. The avifauna and pollen spectra suggest temperate conditions, consistent with a Holocene age (Pop et al. 1970, Păunescu 1970), whereas the mammalian remains are a mixture of temperate woodland (e.g., red deer, wild pig) and more open hilly habitat (e.g., chamois, ibex) species. These data can be explained in several ways. The

Table 10.1. List of radiocarbon dates for Mesolithic and Early Neolithic sites in the Iron Gates

| Site | Context | Material | Lab. No. | BP | cal BC (2σ) |
|---|---|---|---|---|---|
| Cuina Turcului | Hearth, layer I, 5.90–5.95 m | C | Bln-803 | 12,600 ± 120 | 13221–12275 |
| | Hearth, layer I, 6.20–6.40 m | C | Bln-804 | 12,050 ± 120 | 12232–11711 |
| | Hearth, layer I, 5.70–5.85 m | C | GrN-12665 | 11,960 ± 60 | 12023–11754 |
| | Hearth, layer II, 3.68–3.85 m | C + B | Bln-802 | 10,125 ± 200 | 10639–9251 |
| Hajdučka Vodenica | Burial 8 | H | OxA-11128 | ***8165 ± 90*** | 7477–6833 |
| | Burial 15 ('younger') | H | OxA-11126 | ***7524 ± 77*** | 6503–6227 |
| | Burial 12 | H | OxA-11127 | ***7522 ± 82*** | 6561–6222 |
| | Burial 20 | H | OxA-11109 | ***7389 ± 84*** | 6419–6078 |
| Icoana | Trench IV, 2.10 m, horizon Ib | C | Bln-1078 | 8605 ± 250 | 8287–7075 |
| | Trench IV, 0.50 m, horizon Ia | C | Bln-1077 | 8265 ± 100 | 7518–7070 |
| | Trench II, 1.60 m, horizon Ia | C | Bonn no. 2 | 8070 ± 130 | 7448–6647 |
| | Trench II, 1.20 m, horizon 1b | C | Bonn no. 3 | 8010 ± 120 | 7306–6610 |
| | Trench II, 2.00 m, horizon Ib | C | Bonn no. 4 | 7660 ± 110 | 6750–6247 |
| | Trench III, 1.00 m, horizon II | C | Bonn no. 1 | 5830 ± 120 | 4993–4402 |
| Lepenski Vir | Burial 60 ('LV Ic') | H | OxA-11715 | ***9020 ± 80*** | 8445–7953 |
| | Burial 69 ('Proto-LV') | H | OxA-11703 | ***8784 ± 72*** | 8202–7609 |
| | Under house 23 | B | OxA-8610 | 8770 ± 60 | 8180–7605 |
| | House 62 ('LV Ib') | C | KN-405 | 7430 ± 160 | 6592–6006 |
| | Burial 61 ('LV Ic') | H | OxA-11698 | ***7374 ± 80*** | 6406–6071 |
| | Burial 14 ('LV I–II') | H | OxA-11704 | ***7368 ± 75*** | 6396–6072 |
| | House 36 ('LV Ia') | C | Bln-740b | 7360 ± 100 | 6425–6049 |
| | Burial 54d ('LV Ib') | H | OxA-11700 | ***7353 ± 72*** | 6385–6067 |
| | Burial 54c ('LV Ib') | H | OxA-11696 | ***7346 ± 57*** | 6365–6074 |
| | Burial 45b ('LV I') | H | OxA-11701 | ***7337 ± 79*** | 6388–6053 |
| | House 36 ('LV Ia') | C | Bln-740a | 7310 ± 100 | 6392–6010 |
| | Burial 31a ('LV III') | H | OxA-5827 | ***7308 ± 108*** | 6401–5997 |
| | Burial 79a | H | OxA-11705 | ***7312 ± 79*** | 6366–6029 |
| | House 54 ('LV Ib–c') | C | Z-143 | 7300 ± 124 | 6426–5928 |
| | Burial 26 ('LV I') | H | OxA-11693 | ***7284 ± 47*** | 6233–6056 |
| | House 54 ('LV Ib–c') | C | KN-407 | 7280 ± 160 | 6445–5845 |
| | Burial 54e ('LV Ib') | H | OxA-11697 | ***7250 ± 59*** | 6227–6017 |
| | House 54 ('LV Ib–c') | C | Bln-738 | 7225 ± 100 | 6354–5896 |
| | Burial 7/I ('LV I') | H | OxA-11692 | ***7218 ± 81*** | 6243–5917 |
| | House 27 ('LV Id–e') | C | KN-406 | 7210 ± 200 | 6445–5720 |
| | Rear of house 51, under level of house XLIV | B | OxA-8618 | 7200 ± 60 | 6217–5986 |
| | Burial 7/I ('LV I') [repeat] | H | OxA-12979 | ***7157 ± 77*** | 6215–5892 |
| | Burial 44 ('LV III') | H | OxA-5830 | ***7152 ± 106*** | 6233–5797 |
| | Burial 89a ('LV II') | H | OxA-11702 | ***7133 ± 75*** | 6208–5845 |
| | Between houses 20 and 33 ('LV Ia–b') | F | OxA-8725 | ***7060 ± 114*** | 6207–5721 |
| | House 54 ('LV Ib–c') | C | Bln-653 | 7040 ± 100 | 6081–5719 |
| | Burial 32a ('LV III') | H | OxA-5828 | ***7036 ± 95*** | 6066–5728 |
| | House 54 ('LV Ib–c') | C | Z-115 | 6984 ± 94 | 6028–5676 |
| | Burial 9 ('LV IIIb') | H | OxA-11695 | ***6982 ± 50*** | 5983–5747 |
| | Burial 88 ('LV III') | H | OxA-5831 | ***6980 ± 92*** | 6023–5677 |
| | House 47 ('LV Id–e') | C | UCLA-1407 | 6970 ± 60 | 5983–5735 |
| | Burial 8 ('LV III') | H | OxA-11694 | ***6942 ± 47*** | 5972–5729 |
| | House 37 ('LV Id') | C | BM-379 | 6900 ± 150 | 6055–5544 |
| | House 37 ('LV Id') | C | Bln-678 | 6900 ± 100 | 5984–5636 |
| | House 1 ('LV Id') | C | Bln-575 | 6860 ± 100 | 5982–5572 |
| | House 9 ('LV Id') | C | Bln-647 | 6845 ± 100 | 5978–5565 |
| | House 16 ('LV Ie') | C | Bln-576 | 6820 ± 100 | 5972–5554 |
| | House 34/43 ('LV I?') | C | Bln-650 | 6820 ± 100 | 5972–5554 |
| | House 32 ('LV Ie') | C | P-1598 | 6814 ± 69 | 5867–5571 |

*(continued)*

Table 10.1. *(continued)*

| Site | Context | Material | Lab. No. | BP | cal BC (2σ) |
|---|---|---|---|---|---|
| | House 37 ('LV Id') | C | Bln-649 | 6800 ± 100 | 5899–5526 |
| | Burial 35 ('LV III') | H | OxA-5829 | ***6718 ± 93*** | 5777–5480 |
| | House IX ('LV II') | C | Bln-654 | 6630 ± 100 | 5723–5378 |
| | House 51 ('LV Ie') | C | Bln-652 | 6620 ± 100 | 5718–5376 |
| | House XXXII ('LV II') | C | Bln-655 | 6560 ± 100 | 5657–5324 |
| Ostrovu Banului | Trench IV, horizon III, hearth 2 | C | Bln-1080 | 8040 ± 160 | 7455–6593 |
| | Trench I, horizon III, hearth 1 | C | Bln-1079 | 7565 ± 100 | 6606–6227 |
| Ostrovu Corbului | Hearth, level I, 4.50–4.53 m | C | SMU-587 | 8093 ± 237 | 7567–6503 |
| | Hearth, level II, 4.02–4.12 m | C | SMU-588 | 7827 ± 237 | 7350–6228 |
| | Hearth, level I, 4.20–4.38 m | C | Bln-2135 | 7710 ± 80 | 6692–6423 |
| | Hearth, level I, 4.20–4.38 m | C | Bln-2135a | 7695 ± 80 | 6681–6421 |
| | Level I, 4.23 m | C | GrN-12675 | 7640 ± 80 | 6647–6368 |
| Padina | Under house 14 | B | OxA-11102 | 9990 ± 55 | 9760–9307 |
| | Burial 21 | H | OxA-11106 | ***9729 ± 73*** | 9314–8839 |
| | Burial 11 | H | OxA-11104 | ***9700 ± 72*** | 9292–8835 |
| | Burial 15 | H | OxA-11105 | ***9138 ± 71*** | 8547–8247 |
| | Midden – profile 3, segment 1, excavation level 3 | B | OxA-9055 | 8445 ± 60 | 7590–7357 |
| | Bear (*Ursus arctos*) bone | B | BM-1403 | 8138 ± 121 | 7477–6710 |
| | Burial 1a (antler artefact) | B | OxA-11108 | 7750 ± 50 | 6654–6471 |
| | Burial 1a | H | OxA-11107 | ***7525 ± 77*** | 6504–6227 |
| | House 17, hearth (bone artefact) | B | OxA-11103 | 7315 ± 55 | 6353–6053 |
| | 'Occupation layer' (?) ('Padina B2') | C | GrN-8230 | 7100 ± 80 | 6203–5778 |
| | Trapezoidal building (?) ('Padina B3') | C | GrN-7981 | 7075 ± 50 | 6047–5845 |
| | Padina B1 | C | GrN-???? | 7065 ± 110 | 6206–5725 |
| | House 18, floor | B | OxA-9052 | 6965 ± 60 | 5983–5732 |
| | Under floor of house 15 (bone artefact) | B | OxA-9054 | 6790 ± 55 | 5784–5574 |
| | Hearth (in trapezoidal building?) ('Padina B1') | C | GrN-8229 | 6570 ± 55 | 5625–5390 |
| Răzvrata II | 'Hut' | C | Bln-1057 | 7690 ± 70 | 6645–6434 |
| Schela Cladovei | Bone artefact, Area VI | B | OxA-9140 | 8105 ± 60 | 7312–6830 |
| | Bone artefact, Area VI | B | OxA-9135 | 8085 ± 60 | 7302–6818 |
| | Burial, Area III | H | OxA-4385 | ***8090 ± 118*** | 7448–6681 |
| | Bone artefact, Area VI | B | OxA-9139 | 8075 ± 60 | 7293–6775 |
| | Burial, Area III | H | OxA-4379 | ***8070 ± 122*** | 7442–6649 |
| | Burial, Area VI | H | OxA-9007 | ***8055 ± 86*** | 7296–6690 |
| | Burial, Area III | H | OxA-4380 | ***8046 ± 122*** | 7338–6644 |
| | Burial, Area III | H | OxA-4382 | ***8046 ± 124*** | 7345–6642 |
| | Bone artefact, Area VI | B | OxA-9138 | 8040 ± 60 | 7162–6701 |
| | Bone artefact, Area VI | B | OxA-9137 | 8010 ± 60 | 7072–6699 |
| | Bone artefact | B | OxA-9207 | 8000 ± 80 | 7128–6654 |
| | Burial | H | OxA-8502 | ***7988 ± 72*** | 7072–6665 |
| | Bone artefact | B | OxA-9374 | 7980 ± 60 | 7055–6696 |
| | Burial, Area III | H | OxA-4378 | ***7971 ± 115*** | 7282–6536 |
| | Burial, Area VI | H | OxA-8583 | ***7960 ± 97*** | 7126–6601 |
| | Bone artefact, Area VI | B | OxA-9132 | 7950 ± 55 | 7044–6687 |
| | Burial, Area III | H | OxA-4381 | ***7932 ± 130*** | 7173–6499 |
| | Bone artefact, Area V | B | OxA-9131 | 7925 ± 60 | 7033–6656 |
| | Bone artefact, Area III | B | OxA-8582 | 7880 ± 290 | 7515–6227 |
| | Bone artefact, Area VI | B | OxA-8584 | 7915 ± 85 | 7050–6608 |
| | Burial, Area III | H | OxA-8581 | ***7904 ± 93*** | 7060–6573 |
| | Bone artefact, Area VI | B | OxA-8549 | 7905 ± 60 | 7032–6644 |
| | Burial | H | OxA-8547 | ***7886 ± 92*** | 7051–6532 |
| | Bone artefact, Area VI | B | OxA-9136 | 7895 ± 55 | 7030–6641 |
| | Burial, Area III | H | OxA-4383 | ***7834 ± 120*** | 7041–6472 |

*(continued)*

Table 10.1. *(continued)*

| Site | Context | Material | Lab. No. | BP | cal BC (2σ) |
|---|---|---|---|---|---|
| | Bone artefact | B | OxA-8580 | 7770 ± 240 | 7314–6106 |
| | Bone artefact, Area VI | B | OxA-9143 | 7825 ± 60 | 7020–6485 |
| | Bone artefact | B | OxA-8579 | 7790 ± 100 | 7028–6451 |
| | Bone artefact, Area VI | B | OxA-8550 | 7805 ± 70 | 7016–6468 |
| | Bone artefact, Area VI | B | OxA-8585 | 7780 ± 75 | 6905–6454 |
| | Burial, Area VI | H | OxA-8548 | ***7762 ± 90*** | 7002–6432 |
| | Bone artefact, Area VI | B | OxA-9142 | 7745 ± 60 | 6679–6464 |
| | Bone artefact, Area VI | B | OxA-9209 | 7720 ± 70 | 6678–6441 |
| | Bone artefact, Area VI | B | OxA-9141 | 7700 ± 60 | 6642–6451 |
| | Bone artefact, Area VI | B | OxA-9205 | 7570 ± 90 | 6593–6243 |
| | Bone artefact, Area VI | B | OxA-9208 | 7530 ± 70 | 6492–6235 |
| | Bone artefact, Area VI | B | OxA-9206 | 7460 ± 75 | 6461–6110 |
| | Bone artefact, Area VI | B | OxA-9355 | 7100 ± 50 | 6064–5886 |
| | Bone artefact, Area VI | B | OxA-9210 | 7010 ± 80 | 6019–573 |
| | Bone artefact, Area VI | B | OxA-9356 | 6900 ± 50 | 5895–5674 |
| | Bone artefact, Area VI | B | OxA-9357 | 6890 ± 60 | 5964–5661 |
| | Bone artefact, Area VI | B | OxA-9597 | 6880 ± 50 | 5878–5667 |
| | Bone artefact | B | OxA-9134 | 6865 ± 55 | 5876–5645 |
| | Bone artefact, Area VI | B | OxA-9385 | 6770 ± 50 | 5740–5571 |
| | Bone artefact | B | OxA-9133 | 6715 ± 55 | 5720–5539 |
| | Bone artefact | B | OxA-9358 | 6695 ± 55 | 5713–5523 |
| Vlasac | Burial 72 ('Vlasac I') | H | OxA-5824 | ***9850 ± 130*** | 9861–8838 |
| | Burial 72 ('Vlasac I') [repeat] | H | OxA-5825 | ***9750 ± 168*** | 9799–8647 |
| | Burial 51a ('Vlasac I') | H | OxA-5822 | ***8376 ± 121*** | 7594–7083 |
| | Square C/III, layer 15 ('Vlasac II') | C | Bln-1050 | 7935 ± 60 | 7041–6659 |
| | Square A/II, layer 14 ('Vlasac II – beginning') | C | Lj-2047b | 7930 ± 77 | 7048–6645 |
| | Square C/III, layer 22 ('Vlasac II') | C | Lj-2047a | 7925 ± 77 | 7049–6643 |
| | Dwelling 5 – square BC/V, layer 18 ('Vlasac Ib') | C | Bln-1170 | 7840 ± 100 | 7034–6486 |
| | Square d/5, layer 9 ('Vlasac Ib – end') | C | Bln-1171 | 7830 ± 100 | 7030–6478 |
| | Burial 83 ('Vlasac III') | H | OxA-5826 | ***7804 ± 104*** | 7028–6461 |
| | Burial 54 ('Vlasac I') | H | OxA-5823 | ***7756 ± 113*** | 7028–6421 |
| | Square c/9, layer 14 ('Vlasac II') | C | Bln-1169 | 7665 ± 60 | 6632–6429 |
| | Square b/18, layer 13 ('Vlasac II') | C | Bln-1052 | 7610 ± 60 | 6594–6379 |
| | Burial 24 ('Vlasac III') | H | OxA-5825 | ***7598 ± 113*** | 6653–6227 |
| | Square b/9, beneath hearth 16 ('Vlasac II') | C | Z-267 | 7559 ± 93 | 6591–6236 |
| | Square b/9, layer 6 ('Vlasac II – end') | C | Bln-1168 | 7475 ± 60 | 6439–6233 |
| | Square A/II, Layer 13 ('Vlasac III') | C | Bln-1954 | 7440 ± 60 | 6438–6125 |
| | Dwelling 1 – square C/III, layer 26 ('Vlasac Ib') | C | Z-262 | 7000 ± 90 | 6032–5718 |
| | Dwelling 1 – square C/III, layer 26 ('Vlasac Ib') | C | Bln-1951 | 6905 ± 100 | 5984–5638 |
| | Dwelling 2 – square a/18, layer 18 ('Vlasac Ib') | C | Bln-1053 | 6865 ± 100 | 5983–5617 |
| | Dwelling 2 – square a/18, layer 18 ('Vlasac Ib') | C | Bln-1014 | 6805 ± 100 | 5964–5532 |
| | Dwelling 1 – square C/III, layer 26 ('Vlasac Ib') | C | Bln-1051a | 6790 ± 100 | 5891–5522 |

Dated material: B = terrestrial mammal bone; C = charcoal; F = fish bone; H = human bone. Calibration was performed with CALIB 5.0.2 (Stuiver and Reimer 1993, Stuiver et al. 2005) using the IntCal04 curve (Reimer et al. 2004). The $^{14}C$ ages of human bones have been corrected for the Danube freshwater reservoir effect using Method 1 of Cook et al. (2002). A 100 percent reservoir correction was applied to the $^{14}C$ age of a fish bone from Lepenski Vir. Reservoir corrected $^{14}C$ ages are shown in ***bold italics***. The reservoir age corrections were applied prior to calibration using the terrestrial calibration curve. Data from: Bonsall et al. (1997, in press, unpublished), Borić and Miracle (2004), Boroneanţ (2000), Burleigh and Živanović (1980), Quitta (1975), Radovanović (1996), Srejović and Letica (1978), Whittle et al. (2002).

Table 10.2. Provisional chronology for the Iron Gates based on radiocarbon dating

| Time-range (cal BC) | Notional Period | Representative Sites |
|---|---|---|
| 13,000–7200 | Early Mesolithic | Cuina Turcului, Lepenski Vir, Padina, Vlasac |
| 7200–6300 | Late Mesolithic | Hajdučka Vodenica, Icoana, Ostrovu Banului, Ostrovu Corbului, Schela Cladovei, Vlasac |
| 6300–6000 | Final Mesolithic | Lepenski Vir |
| 6000–5500 | Early Neolithic | Cuina Turcului, Lepenski Vir, Padina, Schela Cladovei, Vlasac |

Cuina Turcului II layer may relate to a short-lived occupation at the beginning of the Holocene when the surrounding landscape consisted of a mosaic of habitats. Alternatively, the archaeological remains may derive from a series of occupations over a longer period, which began in the Late Glacial and continued into the Holocene.

Bone tools, including a number of decorated items, were found in the Cuina Turcului I and II layers. According to Srejović (1969: 14) there are important differences in the decorative motifs that characterize the two layers. In the earlier layer a distinctive motif is a zig-zag pattern of parallel incised lines; whereas in the Cuina Turcului II layer cross-hatched and net-like motifs occur, which are characteristic of later Mesolithic sites in the Iron Gates including Lepenski Vir, Schela Cladovei, and Vlasac. The time-ranges of the various decorative motifs applied to antler and bone (and sometimes stone) artefacts from sites in the Iron Gates have yet to be established through direct AMS radiocarbon dating of the artefacts themselves, but the presence of cross-hatched and net-like designs on some of the pieces from Cuina Turcului II raises the possibility that this layer includes material from later Mesolithic occupations.

A final Late Glacial age has been inferred from typological evidence for the earliest occupation at an open-air site on Ostrovu Banului, an island in the Danube just below the Iron Gates I dam (Boroneanț 2000, Păunescu 2000). However, there is no independent dating evidence to support this interpretation, and both the geological context and the character of the lithic assemblage are quite consistent with an early Holocene age.

Indications of cave use in the Late Glacial and the lack of contemporaneous open-air sites are usually interpreted as evidence of a mobile population that relied on hunting large land mammals. According to some authors, this lifestyle continued into the early Holocene until c. 7600 cal BC, when open-air settlements, based on intensive exploitation of aquatic resources, were established along the Danube. However, there is no doubt that the aquatic resources of the Danube were already being exploited during the Late Glacial period. Fish bones were recovered from the Cuina Turcului I and II layers, although they were much more abundant in the later horizon.

The notion of cave dwelling during the Late Glacial and very early Holocene is overly simplistic. It is unlikely that any society has ever lived exclusively in caves, and prehistoric peoples often made use of caves for economic or ritual purposes whilst living in open-air settlements (Tolan-Smith and Bonsall 1997). In the Iron Gates cave use continued until quite late in the Holocene; although Cuina Turcului is noted especially for its Late Glacial occupation remains, the rockshelter was used at various times during the Holocene when open-air sites are also known to exist.





Table 10.3. Radiocarbon date calibration table for the period 6500–10,000 BP

| Age in $^{14}$C Years BP | Approximate Calibrated Calendar Age |
|---|---|
| 6500 | 5500 BC |
| 6600 | 5550 BC |
| 6700 | 5600 BC |
| 6800 | 5700 BC |
| 6900 | 5800 BC |
| 7000 | 5900 BC |
| 7100 | 6000 BC |
| 7200 | 6050 BC |
| 7300 | 6150 BC |
| 7400 | 6300 BC |
| 7500 | 6400 BC |
| 7600 | 6450 BC |
| 7700 | 6500 BC |
| 7800 | 6600 BC |
| 7900 | 6700 BC |
| 8000 | 6900 BC |
| 8100 | 7100 BC |
| 8200 | 7200 BC |
| 8300 | 7400 BC |
| 8400 | 7500 BC |
| 8500 | 7600 BC |
| 9000 | 8200 BC |
| 9500 | 8800 BC |
| 10,000 | 9500 BC |
| 10,500 | 10,600 BC |
| 11,000 | 11,000 BC |
| 11,500 | 11,400 BC |
| 12,000 | 11,900 BC |
| 12,500 | 12,700 BC |
| 13,000 | 13,400 BC |

Radiocarbon ages have been converted into approximate calendar ages using the CALIB (rev. 5.0.2) calibration program (see Table 10.1 for details).

The lack of open-air settlements along the Danube older than 9500 cal BC is perhaps better explained in terms of the Late Glacial river environment. During the Younger Dryas, in particular, higher seasonal discharges associated with snowmelt and glacial meltwater are likely to have been a deterrent to settlement of the riverbank. People probably lived on higher ground, such as older river terraces, above the level of flooding – areas that were not surveyed archaeologically in the 1960s to 1980s! Occupation of the riverbank would have been possible during periods of low discharge, for example, in midsummer and midwinter, but such sites are likely to be underrepresented in the archaeological record. Repeated, seasonal flooding and high rates of flow during the Younger Dryas would tend to result in deep burial or erosion of any riverbank sites occupied during this phase or earlier in the Late Glacial.

For much of the Holocene, the Danube was characterized by smaller annual variations in discharge, which allowed settlements to be established closer to the river. That people occupied sites along the riverbank very early in the Holocene is demonstrated by $^{14}$C dating of human remains from several sites. One burial from Vlasac has a $^{14}$C age of c. 9850 BP (9300 cal BC) (Bonsall et al. 1997, 2000, Cook et al. 2002) and there are burials from Lepenski Vir, Padina and Vlasac with $^{14}$C ages ranging between c. 8400 and 9750 BP (7500 to 9250 cal BC) (Burleigh and Živanovic 1980, Bonsall et al. 1997, 2004, Borić and Miracle 2004).

A variety of body positions is represented among these Early Mesolithic burials. They include individuals who were buried (i) lying on their back, extended, with legs and arms straight, (ii) lying on one side with the legs slightly flexed, (iii) lying on their back with the legs flexed and splayed and the soles of the feet together (the famous burial 69 from Lepenski Vir: Srejović 1972: fig. 56), and (iv) in a 'sitting' position with the legs splayed and crossed. What social or religious significance these different burial positions may have had is a matter for speculation.

The character and duration of the Early Mesolithic occupations at Lepenski Vir, Padina, and Vlasac is unclear. None of the architectural remains at these sites is securely dated to this period; in fact the vast majority of the surviving structural features appear to belong to later Mesolithic and/or Early Neolithic occupations[3]. There are a few AMS $^{14}$C dates on animal bones which show that they derive from early occupations (Table 10.1), but as yet there are no direct age measurements for antler/bone artefacts or art objects that would allow any of them to be assigned to the Early Mesolithic.

In the absence of well-dated faunal and archaeobotanical assemblages, the economic basis of these early riverside settlements must be inferred from stable isotope analysis of dated human remains. Skeletons from Lepenski Vir, Padina and Vlasac dated between c. 9850 and 8400 BP (9300 to 7500 cal BC) all exhibit very high bone collagen C- and N-isotope values, reflecting a diet in which a large proportion of the protein must have been obtained from freshwater fish or animals that consumed freshwater fish (Figure 10.3). These data suggest that already by the beginning of the Holocene the inhabitants of the Iron Gates gorge were heavily reliant on the Danube for their subsistence needs. It is interesting that the averages of the $\delta^{13}$C and $\delta^{15}$N values are lower than the Late Mesolithic averages. Average $\delta^{15}$N for 7 Early Mesolithic burials is 14.3‰, while the average for 21 Late Mesolithic burials is 15.2‰. A Student's *t*-test shows the difference between the two groups to be statistically significant at the $p \leq 0.05$ level of probability. The lower average $\delta^{15}$N value of the Early Mesolithic skeletons may indicate that riverine resources were marginally less important in the period before 7200 cal BC than later on in the Mesolithic.

Given that the C- and N-isotope composition of bone collagen in adults reflects average diet over a period of years to decades (for discussion, see Ambrose 1993: 110–11), the results from Lepenski Vir and Vlasac imply that consumption of fish was not just a seasonal activity for the Early Mesolithic inhabitants of these sites. Regardless of whether fishing was carried out year round or undertaken intensively at a particular time, or times, of year and the surplus stored for later consumption, the stable isotope evidence implies that these foraging communities were in some degree sedentary.





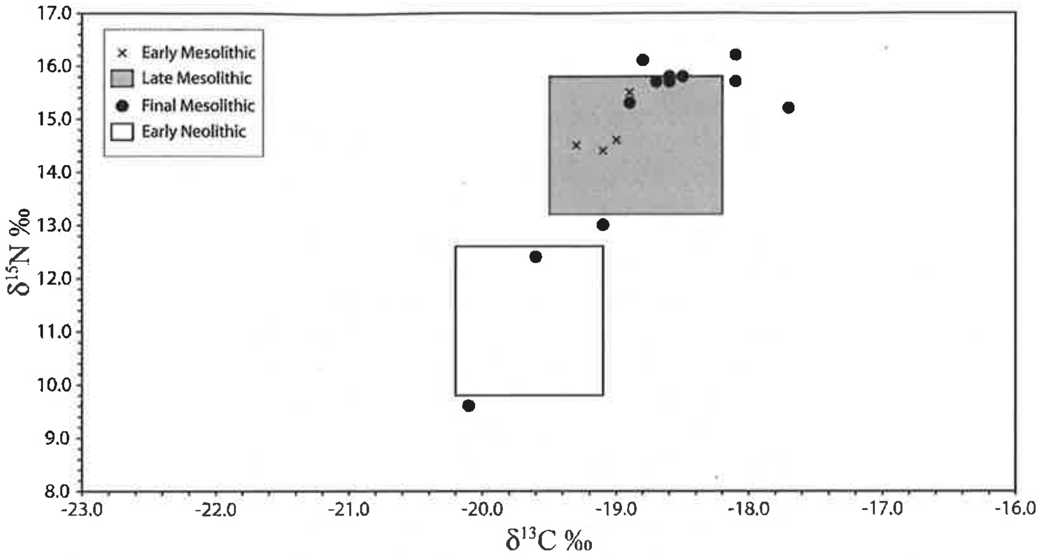



Figure 10.3. Stable isotope ($\delta^{13}$C and $\delta^{15}$N) values for Early and Final Mesolithic skeletons from Lepenski Vir and Vlasac plotted against the Late Mesolithic and Early Neolithic ranges. The Late Mesolithic range is based on data from Schela Cladovei and Vlasac. The Early Neolithic range is based on data from Lepenski Vir.

## Late Mesolithic, 7200–6300 cal BC

Eight sites have radiocarbon dates in this time range: Hajdučka Vodenica, Icoana, Padina, Razvrata, and Vlasac in the gorge, and Schela Cladovei, Ostrovu Banului, and Ostrovu Mare in the downstream section (Table 10.1, Figures 10.1–10.2). But only Schela Cladovei and Vlasac have large series of dates more or less spanning the period.

The Romanian–British project at Schela Cladovei (Bonsall et al. 1997, Bonsall et al. 2002, Boroneanţ et al. 1999) has so far produced 45 AMS $^{14}$C dates, all from secure contexts. Thirty-six dates span the period from c. 8100 to 7450 BP (7100 to 6300 cal BC), and no evidence of earlier Mesolithic occupation was found.

The situation at Vlasac is less satisfactory. As noted previously, the relative chronology proposed by Srejović and Letica (1978) is suspect and should be disregarded. Of a total of 18 radiocarbon dates, 11 cluster between c. 7950–7450 BP (6900–6300 cal BC), suggesting an important Late Mesolithic component in the site. However, not all of the $^{14}$C ages are from well-defined contexts. Moreover, other dates show there was also earlier Mesolithic occupation at Vlasac and suggest that some features regarded by the excavators as 'Mesolithic' are, in fact, of Early Neolithic age. Hence, isolating the Late Mesolithic component at Vlasac is problematic.

Nevertheless, Schela Cladovei and Vlasac together provide the clearest indication of the character of settlement in the Iron Gates region between 7200 and 6300 cal BC.

The Late Mesolithic societies of the Iron Gates are often described as complex hunter-gatherers, characterized by sedentism, construction of substantial houses, intensive use of local resources for food and tools, food storage, exchange, and social ranking (e.g., Voytek and Tringham 1989, Radovanović and Voytek 1997). However, several aspects of this interpretation are open to question.

## Architecture

A variety of structural remains were recorded at Schela Cladovei and Vlasac. The most conspicuous were those described by the excavators as 'hearths' and 'houses'.

The majority of the hearths were rectangular features, up to a metre long, with a border of large tabular stones set on edge. There were also a few simple hearths lacking stone borders. Some of the stone-bordered hearths were associated with traces of house floors. Others were isolated features and may have been constructed in the open, unless the original house floors have not survived or were simply not recognized.

The better-preserved houses had a trapezoidal ground plan, and it is generally supposed that the entrance was at the broader end. They appear to have been semisubterranean structures ('pit houses') in which the sides of the pit formed the walls (or the lower part of the walls) of the house. The house pits varied in depth and diameter. One example at Schela Cladovei was excavated at least 0.30 m below the contemporaneous Mesolithic ground surface (Bonsall, unpublished data); while Srejović and Letica (1978) report house pits at Vlasac up to 0.82 m deep. Following abandonment of the houses, the pits were often infilled with refuse from domestic and industrial activities.

All the houses at Schela Cladovei and Vlasac appear to have been small, single-room structures; the largest house pit at Vlasac (house 2) measured approximately 5 m from front to back, although the habitable space was probably less. Some houses contained a stone-bordered hearth set into the floor; others apparently lacked hearths. The form of the roof and the means of access to the houses are unknown. Postholes were identified in house 2 at Vlasac and presumably held posts that formed part of the superstructure. The excavators of Vlasac conjectured that the houses there had pitched roofs and were entered by means of a stair or ramp, but could present no strong supporting evidence (Srejović and Letica 1978: 146–7).

The remains of an estimated forty-three houses were excavated at Vlasac (Srejović and Letica 1978: 146)[4]. Not all of these, it seems, relate to Late Mesolithic occupation of the site. To judge from the radiocarbon evidence, some of the structures are of Early Neolithic date. Conventional $^{14}C$ ages on charcoal were obtained for three houses (Table 10.1). Only one – house 5 (Srejović and Letica 1978: fig. 13) – gave an age consistent with a Late Mesolithic dating. The other two structures – houses 1 and 2 (Srejović and Letica 1978: figs. 7–8) – have much younger $^{14}C$ ages suggesting they belong to the Early Neolithic[5]. These last-mentioned structures were the largest recorded at Vlasac and had their broader ends facing toward the river like the trapezoidal buildings of Lepenski Vir and Padina B, which are also predominantly of Early Neolithic date.

## Burials

Large numbers of burials were recorded at both Schela Cladovei and Vlasac. Eighty-five graves containing the remains of more than one hundred individuals were found at Vlasac, and more than sixty graves have been excavated at Schela Cladovei. Direct AMS $^{14}C$ dating suggests that the majority belong to the Late Mesolithic, although some of the burials at Vlasac undoubtedly belong to the earlier Mesolithic (Bonsall et al. 1997, 2000, 2002, Boroneanţ et al. 1999, Cook et al. 2002).

Single inhumation was the norm; the dead were placed in simple earthen graves, often lying extended on their backs, but sometimes lying on one side with the legs and arms flexed. There is persuasive evidence for the deliberate disposal of individual human bones, groups of disarticulated bones, and body parts still held together by soft tissue. In some cases, they may represent bones





Figure 10.4. A typical Late Mesolithic extended inhumation burial uncovered during the Romanian-British excavations at Schela Cladovei (Romania). Other human bones, possibly resulting from the practice of excarnation, have been carefully placed in the grave along the left side of the primary burial (© Clive Bonsall).

from a previous burial that were uncovered when a new grave was dug and reburied with the corpse (e.g., Figure 10.4). Other instances suggest the practice of excarnation – removal of the flesh from a corpse leaving only the bones. It is unclear what method of excarnation was used. The corpse may have been exposed, perhaps on a specially constructed platform, to allow the flesh to either rot away or be removed by scavengers. However, removal of flesh by mammalian and some avian scavengers would be expected to leave marks on the bones. To the author's knowledge, such evidence has not been reported from either Vlasac or Schela Cladovei. Excarnation can also be achieved by 'burying' the corpse (i.e., covering it with earth or stones) until the soft tissue has decayed completely, and then exhuming the bones. Whatever the method practised, excarnated bones were sometimes buried separately and sometimes added to graves containing an intact body.

Special treatment appears to have been given to the skull. Some, otherwise intact, adult skeletons from both Schela Cladovei and Vlasac were lacking the skull or cranium and there is evidence of separate burial of crania either individually or in small clusters (e.g., Boroneanţ et al. 1999). At

Schela Cladovei, the absence of cut-marks associated with skull removal suggests burials were revisited and the skulls removed after the flesh had decayed. Skull removal and skull caching are known from late Epipalaeolithic (Natufian) sites in the Levant and were especially characteristic of the ensuing PPNA phase (c. 9500–8800 cal BC), where they have been linked with the veneration of ancestors and the creation of social memory (Kuijt 2000, 2001). When such practices first appeared in the Iron Gates is unclear; at Schela Cladovei the context is clearly Late Mesolithic, but at Vlasac and elsewhere the evidence remains largely undated.

The presence of cemeteries (formal burial areas) is thought by archaeologists to indicate full or partial sedentism. There has been some debate as to whether cemeteries existed in the Late Mesolithic of the Iron Gates (Radovanović 1996). At both Schela Cladovei and Vlasac people were buried within the confines of the settlement. At first sight, it seems the burials are scattered across the settlement area, with a tendency to occur near houses. This has created the impression that graves were deliberately placed around or adjacent to the houses (Srejović and Letica 1978). But the relationship may be fortuitous. The Late Mesolithic occupations at Schela Cladovei and Vlasac span several centuries, and there is evidence from Schela Cladovei that the same areas were not used simultaneously for burial and habitation. Rather houses were built on ground that had previously been used for burial, and vice versa (Bonsall, unpublished data). The excavations at Schela Cladovei exposed several small areas with particular concentrations of burials. One area of just approximately 4 × 4 m contained eight more or less intact extended inhumations with approximately the same orientation, parallel to the Danube (Boroneanţ et al. 1999). This could be interpreted as a small formal burial area that remained in use for a limited period, before it was abandoned and a new burial plot established in another part of the site. Periodic relocation of burial and habitation areas is to be expected during the five-hundred- to seven-hundred-year lifespan of the Late Mesolithic settlements at Schela Cladovei and Vlasac, especially if the sites were not occupied continuously during their respective lifespans.

Convincing evidence for the existence of cemeteries in the Late Mesolithic of the Iron Gates comes from the site of Hajducka Vodenica. An area approximately 4 × 2.5 m at the rear of the site, lying partly within a recess in the bedrock (the so-called chamber tomb), contained the remains of at least twenty-two individuals (Jovanović 1967, 1969b, 1984, Radovanović 1996, Borić and Miracle 2004). They comprised articulated skeletons, lying in the extended supine position and orientated parallel to the Danube, and groups of disarticulated bones. The arrangement of the burials suggests careful and deliberate placement within a cemetery. Two burials from the cemetery have (reservoir corrected) AMS $^{14}$C ages of c. 7400–7500 BP (6300–6400 cal BC) (Table 10.1, Borić and Miracle 2004: fig. 11, table 3).

Cemeteries, it seems, did not just appear in the Late Mesolithic. At Padina, at least twelve burials were found in an area of approximately 12 × 1.75 m in sector III in the downstream part of the site. Large stones had been heaped up over the burials forming an elongated cairn, known as the 'stone construction of the necropolis' (Jovanović 1969a, Radovanović 1996, Borić and Miracle 2004). Radiocarbon dating of three skeletons (Table 10.1; Borić and Miracle 2004: tables 1 and 3) indicates an Early Mesolithic age for the cemetery. Differences in the $^{14}$C ages suggest the cemetery was in use over a long period. In fact the cairn may be a composite feature resulting from the piling up of stones over individual burials emplaced at different times. The construction of stone heaps over corpses or graves appears to have been a common practice throughout the Mesolithic in the upper gorge. At Lepenski Vir, there are instances of stones heaped up over bodies or redeposited bones dating to the Early Mesolithic and the Final Mesolithic (see Radovanović 1996: figs. 4.2 and 4.6). Cairns may have served as markers or memorials and, as such, may have been maintained over many generations.





Some archaeologists (e.g., Chapman 1993, Radovanović 1996, Zvelebil 2004) have looked for evidence of status differences among the Late Mesolithic burials of the Iron Gates, but with inconclusive results. Ethnographic studies show there is often a connection between the treatment of the body and the status of that person in life. Accordingly, Radovanović (1996) suggested that excarnation was reserved for individuals of higher status. However, apart from the presence of red ochre in many graves, burial goods are few and provide no clear evidence of social distinctions within the communities. Distinctions according to sex or age are difficult to discern. Ochre was associated with the burials of men, women, and children, and the practice of excarnation seems to have applied to adults and children alike. A few of the burials at Schela Cladovei and Vlasac were accompanied by cyprinid pharyngeal teeth and/or marine shell beads, but again there are no clear associations according to sex or age. Arguably the 'richest' burial at Vlasac is that of a young child (Burial 21) with cyprinid teeth in the stomach area and approximately fifty perforated shells of the marine mollusc, *Cyclope nerita*, on the chest – the shells were perhaps originally strung as a necklace (Srejović and Letica 1978: 58, pl. CVI). Archaeologists working on hunter-gatherer sites in other parts of the world, such as the Pacific Northwest Coast of North America, have sometimes taken the presence of shell beads in graves as an indicator of high social status (cf. Ames and Maschner 1999: 181). However, this is perhaps overstating the evidence. Ethnographically, shell beads are known to fulfil a variety of purposes. Often they serve as tokens of social relationships (Binford 1983) or simply as personal ornaments, rather than as symbols of wealth and social rank. In the Iron Gates shell beads appear to have been used throughout the Mesolithic, and in Europe as a whole their manufacture dates back to the early Upper Palaeolithic at least.

Some interesting examples of mortuary ritual have been recorded from the Iron Gates sites. Bones of dogs, the only domestic animal of this period, were found in association with human remains at Vlasac, and there is one possible example of the separate burial of a dog (Radovanović 1999). The ritual burial of dogs appears to have been widespread among Postglacial hunter-gatherers. The practice is well documented in the Late Mesolithic of the circum-Baltic region (Larsson 1989c, Larsson 1990a), and examples are known from Germany (Street 2003) and Israel (Davis and Valla 1978) as early as c. 12,000 cal BC.

## Subsistence

The Late Mesolithic economy appears to have been relatively diverse. Faunal remains show that the inhabitants of Schela Cladovei and Vlasac harvested a broad spectrum of animal resources. Large herbivores (red deer, roe deer, wild pig, and aurochs) were exploited for meat and raw materials. Fur-bearing mammals such as brown bear, wolf, otter, and badger were taken, as were several species of birds including eagles (probably sought for their feathers). Fish and shellfish (especially freshwater mussels, *Unio* sp.) also figure very prominently in the faunal inventories of both sites, and shells of edible land snails (notably *Helix pomatia*) occur (Pickard and Bonsall in preparation).

In the Romanian–British excavations at Schela Cladovei, where wet sieving was employed, fish bones far outnumbered those of other animals in Late Mesolithic contexts. Carp, sturgeon, and catfish (*Siluris glanis*) dominate the assemblage, although several other species are represented (Bartosiewicz et al. 1995). Many of the fish caught were of very large size; Bartosiewicz et al. (forthcoming) estimate individual specimens of sturgeon to have weighed as much as 150 kilograms.

Curiously, there is no mention of sturgeon in the Vlasac excavation report (Bökönyi 1978), but probably they were present[6]. Acipenserid bones have been reported from other sites upstream of

Schela Cladovei, including several sites within the Iron Gates gorge. Sterlet and great sturgeon (beluga) were reported from 'Mesolithic' contexts at Ostrovu Banului and Icoana, and bones of sterlet and Russian sturgeon were identified in layer II at Cuina Turcului (Nalbant 1970, Păunescu 2000). Sturgeon remains are also reported from Early Neolithic contexts at Padina (Clason 1980).

The role of plant foods in Late Mesolithic subsistence in the Iron Gates is debatable. Among ethnographically known hunter-gatherers in temperate environments, plants usually made some contribution to diet though often more in terms of weight than calories, as most plants are poor sources of food energy compared to animals (Bonsall 1981, Kelly 1995). Moreover, the costs of processing plant food in terms of time and specialized equipment are often high. Late Mesolithic people would have had access to a broad array of plant foods in the early Holocene woodlands of the Iron Gates region (Mišic et al. 1972). It is likely that wild plants were collected for dietary and other (e.g., medicinal and manufacturing) purposes, but there is no evidence that they made a major contribution to subsistence. There are no artefacts from Mesolithic contexts that can be related specifically to plant collecting or processing, and even when fine sieving and flotation have been used, as in the Romanian–British excavations at Schela Cladovei, plant remains have been recovered only in very small quantities (Mason et al. 1996). The prevalence of oak in pollen assemblages from several sites led Prinz (1987) to suggest that acorns could have been a dietary staple in the Iron Gates Mesolithic, as they were for some North American aboriginal groups (Driver 1961), but the apparent absence from the Iron Gates sites of the technology necessary for intensive processing of acorns argues against this idea.

Stable isotope analysis of human remains from Vlasac and Schela Cladovei provides a good indication of the relative importance of terrestrial and freshwater resources. Bonsall et al. (1997, 2000, 2004) examined a number of skeletons dating between c. 7100 and 6600 cal BC. All showed elevated C- and N-isotope values, suggesting diets in which the greater part (approximately 60–85 percent) of the protein was derived directly or indirectly from freshwater food sources. The averages of the $\delta^{13}C$ and $\delta^{15}N$ values are slightly heavier than those of skeletons dating to the earlier Mesolithic.

The stable isotope data are thought to reflect mainly protein consumption rather than the whole diet (Bonsall et al. 1997), but they do not reveal the exact source of the protein. Fish are likely to have been considerably more important than either shellfish or aquatic mammals such as otters, although eating the meat of any animal that regularly consumed fish could have contributed to the 'aquatic' signal (see later).

In theory, food sources high in carbohydrate or fat but low in protein (e.g., certain plant foods) could have contributed significantly to diet without affecting bone collagen stable isotope values. Other evidence is against this. Bonsall et al. (1997) noted a lack of caries and the presence of heavy calculus on the teeth of Late Mesolithic individuals buried at Schela Cladovei, suggesting diets low in carbohydrate and high in protein. The oil in sturgeon and other fatty fish, and caviar from sturgeon which is especially rich in fat, may have compensated for the lack of carbohydrate in the diet.

## *Was Food Storage Practised in the Iron Gates Mesolithic?*

The role of storage in the Late Mesolithic of the Iron Gates is an important issue. Food storage is generally seen as crucial to the development of complex hunter-gatherer societies, and some archaeologists (e.g., Voytek and Tringham 1989) have argued that it was central to the Late Mesolithic economy of the Iron Gates.





As Ames and Maschner (1999: 127) have observed, basic techniques for preserving fish and shellfish – sun and wind drying and smoking – have probably been known since at least the Late Pleistocene, and it is reasonable to suppose that they were also familiar to the Mesolithic foragers of the Iron Gates. The sunny, dry summers that characterize this part of Europe would have provided ideal conditions for drying (at least small) fish on outdoor racks, and it is likely that some food storage occurred. But was storage practised on a large scale?

The most obvious reason for storing food is to be able to survive periods when fresh food is in short supply. Although the Iron Gates was a rich environment especially in terms of aquatic resources, it was not a constant source of plenty; there were undoubtedly times of scarcity, especially during the winter. Fishing along the Danube is considerably more productive during the warmer months of the year (March/April to September/October). The main food fish are either not available during the winter or are difficult to capture. Catfish become less active as water temperature decreases and may cease to feed, carp tend to move into (comparatively warmer) deeper waters where they are less accessible, while sterlet also congregate in bottom holes and show little activity. Before dam construction effectively cut off their migration route, anadromous sturgeon were common in the Iron Gates reach of the Danube, but could only be taken in significant numbers during spring/early summer and autumn on their way to and from their spawning grounds (Bartosiewicz et al. forthcoming).

The problems of catching fish during the winter months would have been exacerbated in some years by freezing of the Danube. In recent times, freezing of the river across its entire width has been rare, but freezing at the margins is more frequent. Regardless, the presence of surface ice would have made fishing and the use of boats, if not impossible, certainly more hazardous. Historical records suggest that winter freezing of the Danube occurred more often during the 'Little Ice Age' c. AD 1500–1850 than in the period since then. Similar cooling phases occurred during the time-range of the Iron Gates Mesolithic c. 7300 cal BC and c. 6200 cal BC, each lasting several hundred years. A reduction of 2 degrees C in mean summer and annual temperatures across mid-latitude Europe characterised the second of these episodes, known as the '8200 cal BP cold event' (Magny et al. 2003). The more rigorous climatic conditions of these cooling phases may have had the effect of reducing the numbers of carp and catfish available in the Danube, as these species require a water temperature of at least 18 degrees C to reproduce (Bartosiewicz and Bonsall 2004: 268, table 7). The timing of sturgeon migrations along the Danube also may have been affected.

Thus Mesolithic communities in the Iron Gates may not have been able to survive some (i.e., very long or severe) winters without food storage methods. Yet there are no structural remains from the Iron Gates sites that would indicate large-scale preservation and storage of fish or other food items. This in itself is not conclusive, as certain kinds of storage facilities may leave few or no traces in archaeological record. Containers made of basketry, bark, wood, or animal skin/tissue are highly unlikely to have survived in the free-draining, calcareous soils of the Iron Gates sites, while small pits and the postholes of fish-drying racks or raised caches could have been erased by pedogenetic alteration of the sediments since the Mesolithic, or simply overlooked during excavations that for the most part were conducted rapidly under rescue conditions. Voytek and Tringham (1989) suggested that some of the rectangular stone-bordered pits, widely interpreted as hearths, could have been used for storage, and there is some evidence to support this interpretation. The soil infilling one such feature at Schela Cladovei contained large numbers of small fish bones. None of these were obviously fire-damaged and magnetic susceptibility readings on soil samples from the stone-bordered pit failed to identify it as a hearth (Bonsall et al. 1992).

Although it is likely that some food storage occurred, people may have been able to survive most winters without heavy reliance on stored foods. Even in winter, the Danube is still a source of food in the form of freshwater mussels[7] and waterfowl[8]. Certain species of fish, including barbel, pike, and pikeperch, also can be taken quite readily during the winter[9], and opportunistic fishing for carp, catfish, and sturgeon cannot be ruled out, especially in milder weather. There are historical records of winter catches of sturgeon in the Hungarian section of the Danube (Bartosiewicz et al. forthcoming: table 8) and sturgeon will occasionally over-winter in the *accessible* reaches of the Danube today, that is, between the Black Sea and the Iron Gates II dam. Hunting of wild herbivores may have made some contribution to winter food supply, but the stable isotope data (discussed earlier) would appear to rule this out as a major source of food.

Dogs were the only domesticated animals kept by Late Mesolithic communities in the Iron Gates, and would have been a very convenient source of food during the winter months when other resources were scarce. Dog bones were particularly numerous at Vlasac. Among the 9,831 bone fragments of the three most important mammals consumed at the site dog accounted for 20 percent and was second in importance to red deer (68 percent) and more numerous than wild pig (12 percent) (Bökönyi 1975: table 1)[10]. The fact that the dog bones were often disarticulated and fragmented, like those of deer and wild pig, suggests that dogs were regarded as a food source; and the breakage patterns exhibited by long bones and skulls indicated to Bökönyi (1975: 168) that dogs were eaten. Clason (1980) drew similar conclusions from the large numbers of dog bones found at Padina and the state of fragmentation and charring of the bones.

Use of dogs as food would not be inconsistent with the stable isotope evidence of human diet from the Iron Gates Mesolithic. Dogs are omnivores and a large proportion of their diet may consist of left-over human food. Bone collagen stable isotope values of (probably) Mesolithic dogs from Vlasac (Grupe et al. 2003) suggest they ate significant amounts of fish, and regular consumption of dog meat may have contributed to the even higher levels of $^{13}$C and $^{15}$N present in the bones of Mesolithic humans.

Consumption of dog meat is widely reported among ethnographically-known hunter-gatherers, and also has been demonstrated from several Mesolithic sites in Europe (Benecke and Hanik 2002). The evidence for human consumption of dog flesh at some sites in the Iron Gates is sufficiently strong as to suggest that dogs were reared primarily for eating – a practice that has occasionally been documented among recent hunter-gatherers (e.g., Powers 1877) and was widespread among farming societies in ancient and historical times, especially those who, like the Aztecs and Polynesians, lacked large domesticated animals (Diamond 1997)[11].

In general terms, the larger the dog the greater its food value and it is interesting that the Vlasac dogs were larger on average than those from Early Neolithic (Starčevo-Körös-Criş culture) contexts in the Iron Gates and surrounding regions (Bökönyi 1975: 175–6). This size difference may reflect a change in the uses to which dogs were put between the Mesolithic and the Neolithic when domesticated livestock became available, and lends support to the suggestion that dogs were reared for eating during the Mesolithic. The keeping of dogs for human consumption may have been part of a deliberate strategy for coping with seasonal (especially winter) food shortages, and as such could be regarded as a form of indirect storage.

Ethnographic studies suggest that winter scarcity is not the only, nor necessarily the primary, reason for large-scale food storage by hunter-gatherers. Storage can be an important component of exchange systems; surplus food may be traded and dried foods, especially, which weigh less and preserve longer, can be transported over large distances. People also stored food for 'social' reasons – storage facilitated social gatherings and the allocation of time to nonsubsistence activities. For





example, many aboriginal peoples of the Northwest Coast of North America regarded winter as a 'ceremonial season, when people should not have to search for food' (Suttles 1968: 64). Among Northwest Coast society generally food surpluses ultimately were converted into prestige.

To what degree these were also factors in the Iron Gates Mesolithic, thousands of years before the emergence of complex hunter-gatherer societies on the Northwest Coast, is difficult to gauge from the archaeological record and remains a source of debate.

If sites such as Vlasac and Schela Cladovei represent permanent or semi-permanent base camps, then individual Mesolithic communities were probably relatively small, numbering tens rather than hundreds of people – especially within the gorge where settlement space adjacent to the river was limited. Such small communities would not be reproductively or socially viable, and their survival would depend on participation in wider social networks (cf. Chapman 1989, Bonsall et al. 1997). People from different communities may have gathered together periodically for purposes of social intercourse, finding mates, sharing information, trade, ceremonial, and worship. Such gatherings would have required a food supply but may not have necessitated heavy reliance on storage, especially if they were timed to coincide with seasonal concentrations of migrating sturgeon.

## *Technology*

The lithic technology of the Late Mesolithic is hard to characterize. At Vlasac concerns over the reliability of the stratigraphic interpretation of the site make it difficult to distinguish 'Late Mesolithic' from earlier or later material. At Schela Cladovei, Late Mesolithic features excavated between 1992 and 1996 produced only small assemblages of lithic artefacts, in spite of the use of wet sieving. The raw materials used were flint, radiolarite, and quartz, all apparently obtained locally mainly in the form of river pebbles. Bipolar débitage is much in evidence. Retouched pieces are few, comprising mainly scrapers and truncated bladelets.

In contrast, both sites produced an array of tools made from bone, red deer antler, and boars' tusks. Those that can be assigned to the Late Mesolithic with a fair degree of confidence include heavy duty 'hoes' or 'mattocks' made from red deer antler, boar tusk scrapers, awls, and distinctive bone arrowheads with a double-bevelled base.

A few decorated items were recovered from Schela Cladovei, and a much larger number from Vlasac. They consist mainly of bone, antler and stone objects engraved with geometric motifs, typically bands or areas filled with oblique hatching or cross-hatching. The chevron motif, which is well represented in layer I at Cuina Turcului, also occurs at Vlasac. However, it remains to be established through direct AMS $^{14}$C dating how much of the artwork from Vlasac belongs to the Late Mesolithic.

## *External Relations*

Evidence that the inhabitants of Vlasac and Schela Cladovei engaged in trade or other forms of exchange with neighbouring groups is the presence in some of the graves of the shells of marine molluscs (Srejović and Letica 1978, Boroneanţ et al. 1999), which probably originated in the Adriatic or Aegean. These almost certainly were acquired through exchange rather than procured directly from the source. The shells were made into 'beads' using various techniques.

There is evidence that relations with other groups were not always peaceful. A significant proportion of the adults buried at Schela Cladovei (nearly 15 percent of those examined) died violently, shot by arrows equipped with bone points (Figure 10.5). Others suffered broken bones, including skull fractures, which also may have been the result of violence (Boroneanţ and Nicolaescu-Plopşor 1990, McSweeney et al. in preparation). The high incidence of arrow wounds at Schela Cladovei is unusual, but such evidence is not unique in the Iron Gates. One instance of a bone arrowhead embedded in the pelvis of a juvenile male has been reported from Vlasac (Roksandić 2000), although the burial in question (Burial 4a) is undated and so cannot be assigned with confidence to the Late Mesolithic.

Bone arrowheads were also common as individual finds at both sites. At Schela Cladovei they were nearly always found with burials, in positions suggesting they were originally embedded in the soft tissue surrounding the skeleton and could have been the cause of death. At Vlasac, the pattern of occurrence is less clear. Bone arrowheads were found with at least four burials – Burials 9, 11a, 40, and 63 (Srejović and Letica 1978). In most cases, more than one arrowhead was present, and from their positions in relation to the skeletons they are likely to have been associated with arrow injuries. Also, because fine sieving was not employed in the Vlasac excavations, such small items could have been overlooked in other burials. Judging from published illustrations (Srejović and Letica 1978: pl. CI), some of the bone arrowheads from Vlasac show fractures which may have resulted from impacts against bone. Similar evidence was found at Schela Cladovei.

We can only speculate on the causes of the violence at Schela Cladovei and whether it reflects conflict within the community or between communities. Both are likely, although the frequent use of the bow and arrow is suggestive of intergroup conflict ('warfare'). Ethnographic studies suggest that hunter-gatherers engage in raiding and warfare primarily for reasons of revenge or material benefit[12], and warfare to protect or acquire important resource areas is widely reported (e.g., Heizer 1978, Suttles 1990). In the Iron Gates, ownership of, or access to, prime fishing spots may have been a frequent source of conflict. Schela Cladovei lies just a few kilometres downriver from the rapids that once marked the exit of the Danube from the Iron Gates gorge but that ceased to exist when the river was impounded by the Iron Gates I dam (Bartosiewicz and Bonsall 2004: fig. 8). The rapids created a bottle-neck in the upriver migration of sturgeon, leading to a seasonal concentration of these fish below the rapids. It is tempting to link the signs of warfare at Schela Cladovei to competition with neighbouring groups for control of this valuable resource.

Does the level of violence at Schela Cladovei tell us anything about mobility patterns in the Iron Gates Mesolithic? Among recent hunter-gatherers warfare appears to have been more frequent and more intense among sedentary peoples, presumably because they had more possessions to defend, but it was by no means unknown among non-sedentary foragers (cf. Divale 1972: table 2). In both cases, casualties caused by warfare could account for a significant proportion of all adult male deaths.

## Final Mesolithic, 6300–6000 cal BC

There is a conspicuous gap in the radiocarbon dates for both Schela Cladovei and Vlasac between c. 7450 and 7100 BP (6300 and 6000 cal BC), and very few other sites in the Iron Gates have $^{14}C$ dates in this time-range (Figure 10.6a–c). This implies a significant decrease in activity at the sites or a change in the nature of that activity.

Proxy climate records show this to have been a period of cooler and wetter climate affecting much of western and central Europe, when the Danube and other river systems experienced more frequent and more extreme flooding (Bonsall et al. 2002, Magny et al. 2003).





Figure 10.5. Part of a human pelvis from Schela Cladovei with an embedded bone arrowhead. On the x-ray the hole made by a second arrow is also visible. Around 15 percent of Late Mesolithic adults buried at Schela Cladovei had arrow injuries and probably died from their wounds (© Clive Bonsall).

Sites on the banks of the Danube would have been vulnerable to big floods, and it is possible that people chose to relocate their settlements, or at least their houses and living areas, onto higher ground further away from the river. Any sites located on higher terraces or on the plateau above the valley are likely to have escaped detection during the archaeological surveys of the 1960s to 1980s, as those areas were not surveyed systematically. It is unlikely that activity ceased altogether at the riverbank sites. Probably they continued to be used as places from which to conduct fishing activities and at which to land boats.

The only site that can be shown to have remained in regular use during this period is Lepenski Vir. Occupying a unique position facing the imposing Treskavac Mountain on the opposite bank of the Danube (Figure 10.7), Lepenski Vir has a number of features that set it apart from other Iron Gates sites. These only become apparent in the archaeological record after c. 6300 cal BC and include: buildings with lime plaster floors, the apparently deliberate placement of burials within or beneath some of the buildings, an unusually high frequency of decorated objects including the famous sculptured boulders which were often placed on the floors of buildings, and the deposition of parts of animal carcasses inside some of the buildings which suggest symbolic, and in some cases sacrificial, acts (Bökönyi 1972, Dimitrijević 2000, forthcoming).

These distinctive features of Lepenski Vir suggest that it was a 'sacred site' used primarily as a centre for burial and ritual, and some archaeologists have speculated that the plaster-floored structures served as temples or shrines, rather than houses (e.g., Srejović 1972, Gimbutas 1991). The religious character of Lepenski Vir may explain why this site remained in use throughout the period from 6300 to 6000 cal BC when other riverbank sites in the Iron Gates ceased to be occupied on a regular basis. It was perhaps regarded as hallowed ground inhabited by the spirits

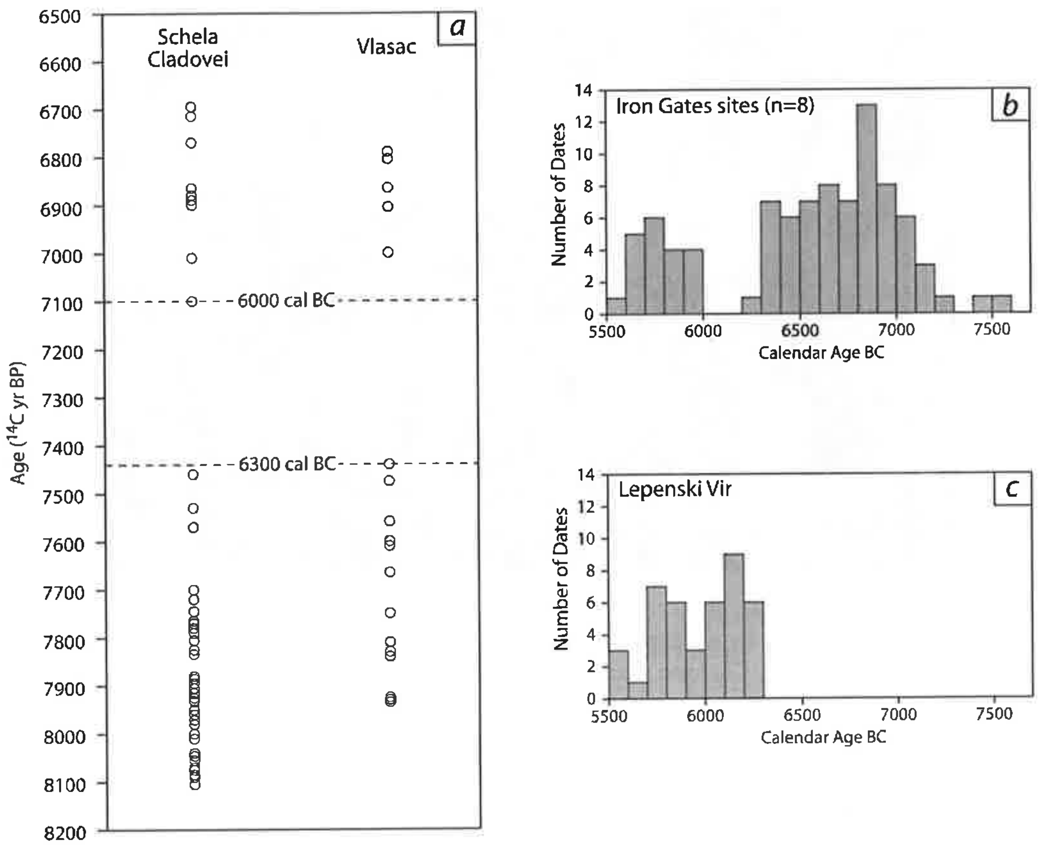



Figure 10.6. The radiocarbon 'gap' in the Iron Gates: *a.* $^{14}C$ mean ages for Schela Cladovei and Vlasac; *b.* Calibrated (median probability) ages per 100-year period between 5500 and 7700 BC from Hajducka Vodenica, Icoana, Ostrovu Banului, Ostrovu Corbului, Padina, Razvrata, Schela Cladovei, and Vlasac; *c.* Calibrated (median probability) ages per 100-year period between 5500 and 7700 BC from Lepenski Vir. The radiocarbon dates listed in Table 10.4 have been excluded.

of the ancestors, and by continuing to use it as a burial place the group could maintain rights of ownership and inheritance of the land, the river and resources (Bonsall et al. 2002).

Although Lepenski Vir between 6300 to 6000 cal BC shows some novel features compared to the preceding period, the underlying cultural tradition is still clearly 'Mesolithic'. Burial practices remain essentially the same, with extended supine inhumation as the norm (Figure 10.8). Bone chemistry analyses reveal that the majority of individuals who were buried at Lepenski Vir between 6300 and 6000 cal BC placed the same heavy emphasis on aquatic food sources as their Late Mesolithic predecessors at Schela Cladovei and Vlasac. In fact, median human bone collagen $\delta^{13}C$ and $\delta^{15}N$ values are even heavier, which may indicate that dependence on the aquatic food web increased still further during this final phase of the Mesolithic (Figure 10.3, Bonsall et al. 2004).





Table 10.4. List of 'unsatisfactory' radiocarbon dates from Mesolithic and Early Neolithic sites in the Iron Gates

| Site | Context | Material | Lab. No. | BP |
|---|---|---|---|---|
| Alibeg | Trench II, horizon II | C | Bln-1193 | 7195 ± 100 |
| Ogradena-Icoana | 'Criş hut', horizon III (?) | C | Bln-1056 | 7445 ± 80 |
| Padina | Burial 12 | H | BM-1146 | 9331 ± 58 |
| | Burial 39 (?) | H | BM-1404 | 9292 ± 148 |
| | Burial 14 | H | BM-1147 | 9198 ± 103 |
| | Burial 7 | H | BM-1144 | 8797 ± 83 |
| | Above house 12 | D | OxA-9034 | 7755 ± 65 |
| | Burial 2 | H | BM-1143 | 7738 ± 51 |
| | House 18, floor | D | OxA-9053 | 7685 ± 60 |
| | House 9 | D | OxA-9056 | 7625 ± 55 |
| Schela Cladovei | Burial, Area III | H | OxA-4384 | 8570 ± 105 |
| | Bone artefact, Area VI | B | OxA-9211 | 6250 ± 450 |
| Vlasac | Grave 54 | C | Z-264 | 6335 ± 92 |
| | Grave 11 | C | Z-268 | 6713 ± 90 |

Dated material: B = terrestrial mammal bone; C = charcoal; D = dog bone; H = human bone. The dates from Alibeg and Ogradena-Icoana are single measurements from dubious contexts. The dates on bones of dogs and humans from Padina most likely require correction for the freshwater reservoir effect; however, for the humans, there are no associated $\delta^{15}N$ measurements, which would allow a correction to be applied (the same applies to OxA-4384 from Schela Cladovei), and for the dogs there is insufficient information on the dietary end members to perform a reservoir correction. OxA-9211 from Schela Cladovei has a very large error. Z-268 and Z-264 from Vlasac appear to be from grave fills; hence the charcoal may be redeposited and comprise material of differing ages. Data from: Bonsall et al. (1997, unpublished), Borić and Miracle (2004), Boroneanţ (2000), Burleigh and Živanović (1980), Srejović and Letica (1978), Whittle et al. (2002).

## When Did the Neolithic Transition Occur in the Iron Gates?

### *The Downstream Area*

According to the radiocarbon evidence the Late Mesolithic occupation at Schela Cladovei came to an end c. 6300 cal BC. The site was reoccupied c. 6000 cal BC and, from the outset, a change in cultural patterns is apparent. Livestock keeping is indicated by abundant remains of domestic cattle, pigs and sheep/goats, although hunting and fishing still contributed to the economy. There were clear changes in material culture and technology, reflected in the appearance of pottery, ground stone artefacts, and new forms of bone tools (Figure 10.9). There are traces of buildings with a rectangular ground plan in contrast to the trapezoidal structures of the Late Mesolithic, as well as evidence for trade or exchange in exotic materials such as obsidian and high-quality 'Balkan' flint (Figure 10.10). No burials dating to this period have been identified at Schela Cladovei, but evidence from other sites in the downstream area such as Velesnica (Vasić forthcoming) suggests a change in funerary practices around this time with the appearance of burials in which the body is almost invariably placed in the crouched position.

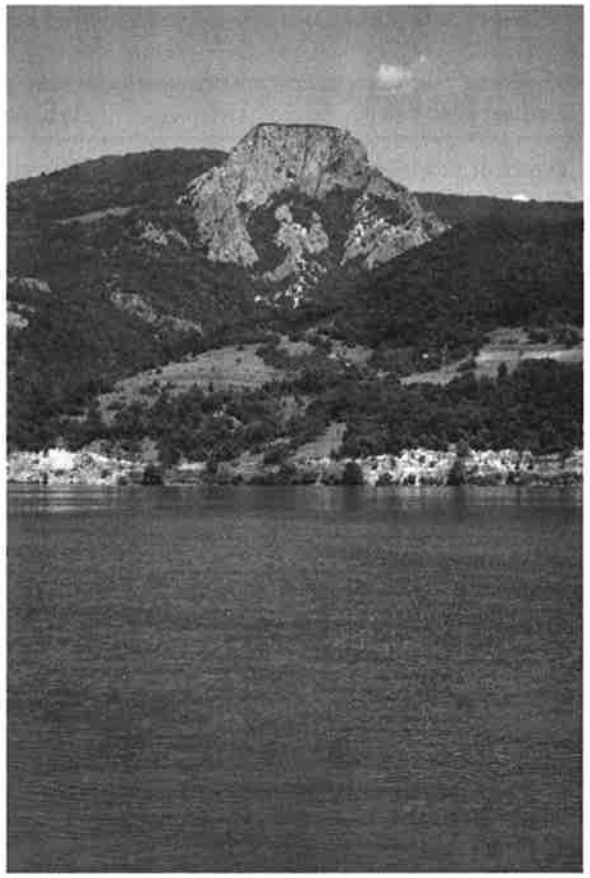


Figure 10.7. The distinctive trapezoidal mountain of Treskavac on the Romanian bank of the Danube, opposite Lepenski Vir (© Clive Bonsall).

These new elements can all be paralleled in early farming settlements of the Starčevo-Körös-Criş complex, which by 6000 cal BC occupied a large area of southeast and central Europe surrounding the Iron Gates. Thus, there seems little doubt that the part of the Danube valley that lies immediately downstream of the Iron Gates gorge had been assimilated into the Starčevo-Körös-Criş complex by 6000 cal BC.

But when was agriculture introduced to downstream area? Whittle et al. (2002) have shown that Neolithic farmers were already present in the Morava catchment, approximately150 km to the southwest, by 6200 cal BC. However, farming settlements are not recorded along the Danube or in its catchment area beyond for a further 150–200 years. The earliest $^{14}C$ dates for Early Neolithic (Körös) settlements on the Pannonian Plain (Whittle et al. 2002) are no older than the date of the appearance of agriculture at Schela Cladovei. The same applies to the first Neolithic settlements in Romania north of the Danube. Sites attributed to the earliest phase of the Cris culture ('Pre-Criş' [Paul 1995] or 'Criş I' [Lazarovici 1993]) on the Banat plain and in Transylvania have $^{14}C$ ages clustering around 7100 BP (6000 cal BC) (Biagi et al. 2005), which are statistically indistinguishable from the earliest $^{14}C$ dates for Neolithic activity on the Pannonian Plain and at Schela Cladovei.





Figure 10.8. Final Mesolithic burial inserted through the floor of House 21 at Lepenski Vir (© Archaeological Institute, Beograd).

One interpretation of the radiocarbon evidence is that the spread of agriculture through the Balkan Peninsula came to a standstill c. 6200 cal BC to the south of the Danube, and a new phase of expansion began c. 6000 cal BC when agriculture spread rapidly along the Danube and its tributaries in northeast Serbia, Hungary, and Romania. The apparent delay in the appearance of Early Neolithic settlements on the floodplains and lower terraces of the Danube and its northern tributaries has been attributed to severe flooding associated with the distinct global cooling phase between 6300 and 6000 cal BC (Bonsall et al. 2002). Frequent, large-scale, and unpredictable floods would have been a deterrent to farming of valley bottoms and may have excluded large areas from the possibility of cultivation and stockraising.

## *The Iron Gates Gorge*

The Iron Gates gorge offered a very different environment from the fertile alluvial plains on either side of the Carpathian Mountains, and the timing of the Neolithic transition within the gorge has been the subject of intense debate. Central to this debate is the site of Lepenski Vir, which shows evidence of frequent, perhaps continuous, use between c. 6300 and 5500 cal BC. Arguably, this is the only site in the entire Iron Gates region where the events of that time range can be studied as a more or less uninterrupted process.

Fragments of pottery, and occasionally whole pots, were found lying on the floors of some of the trapezoidal buildings at Lepenski Vir (Srejović 1969, 1972, Borić 1999, 2002, Radovanović 2000, Garašanin and Radovanović 2001). The buildings with pottery seem to be among the latest in

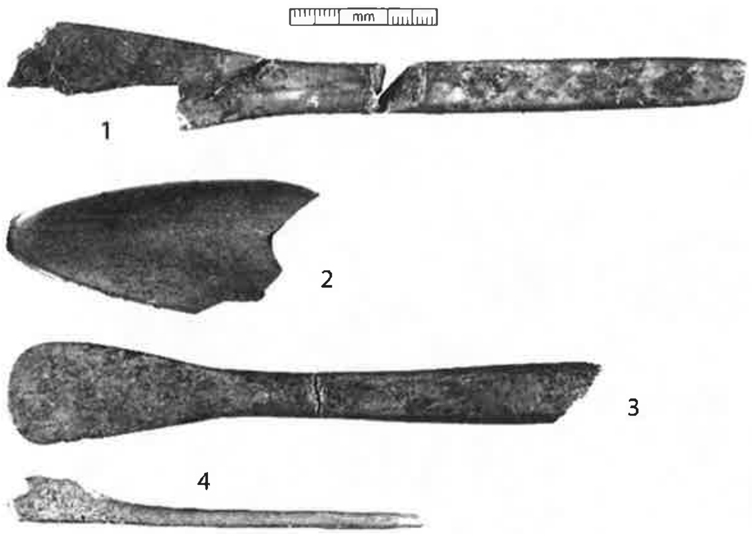



Figure 10.9. New forms of bone tools appeared in the Iron Gates from approximately 6000 cal BC. These examples from Schela Cladovei (Romania), comprising fragments of spoons (1–3) and an awl with a distinctive worked base (4), can be paralleled in sites of the Early Neolithic Starčevo-Körös-Criş complex throughout the central and northern Balkans (© Clive Bonsall).

the sequence with $^{14}$C ages ranging between 7083 ± 73 and 6814 ± 69 BP (c. 5950 to 5700 cal BC) (Figure 10.11, Bonsall et al. 2002: fig. 6, Bonsall 2005).

A new form of burial also appeared. The traditional Mesolithic burial rite of extended supine inhumation was replaced by crouched inhumation characteristic of the Starčevo-Körös-Criş complex. The latest example of a burial in the Mesolithic tradition has a reservoir-corrected $^{14}$C age of 7133 ± 75 BP (c. 6000 cal BC), and the earliest dated instance of a Neolithic-type burial is 7036 ± 95 BP (c. 5950 cal BC) (Bonsall et al. 2004, Bonsall et al. in preparation, Bonsall 2005).

This evidence implies that two key Neolithic traits – pottery manufacture and crouched inhumation – became firmly established at Lepenski Vir at about the same time as they did at sites in the lowland plains on either side of the Iron Gates gorge. It does not prove that they were introduced simultaneously, nor does it preclude the possibility of Starcevo culture elements, especially portable items such as pottery, ground stone tools and artefacts made from Balkan flint, infiltrating the gorge during the Final Mesolithic as a result of initial contacts with farmers[13].

By contrast, it is clear that *some* 'Mesolithic' traditions survived at Lepenski Vir and other sites within the gorge into the period after 6000 cal BC. For example, buildings with a trapezoidal ground plan continued to be erected at Lepenski Vir, Padina, and Vlasac, and carved boulders continued to be deposited inside buildings at Lepenski Vir implying continuity of religious traditions.

Bones of domestic livestock (cattle, pig and sheep/goat) were found at Lepenski Vir and other sites in the gorge in contexts that also produced Starčevo ceramics ('Lepenski Vir III', 'Padina B', 'Hajdučka Vodenica II'), which suggests the livestock remains and the pottery are contemporaneous. In all cases, however, it seems the bones of livestock are far outnumbered by the remains of wild animals and fish (e.g., Bökönyi 1972, Clason 1980, Greenfield forthcoming).

The dating of the livestock remains at Lepenski Vir is especially problematic. Neither Bökönyi (1972), nor Dimitrijević (2000, forthcoming) have reported bones of domestic animals other than





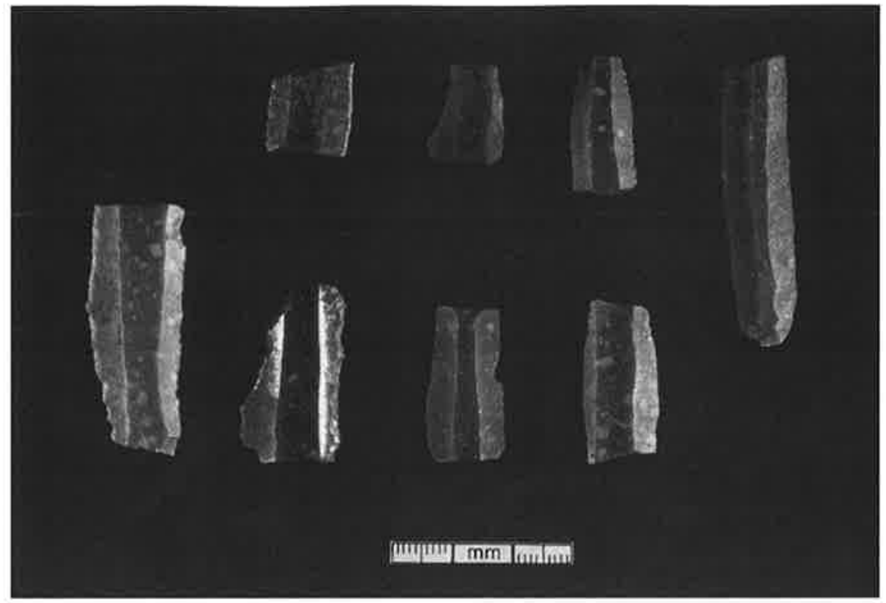



Figure 10.10. Blades made from high-quality Balkan flint, sometimes known as 'honey flint' or 'yellow-spotted flint', from the Romanian-British excavations at Schela Cladovei. This type of flint is common in Early Neolithic Starčevo-Körös-Criş culture contexts in the central and northern Balkans, often in the form of complete blades. Thought to originate from sources on the Pre-Balkan Platform, it is one of several 'exotic' materials that enter the Iron Gates through exchange c. 6000 cal BC (© Clive Bonsall).

dogs from the trapezoidal buildings, and because Garašanin and Radovanović (2001) and Borić (2002) have effectively reassigned the features originally attributed to 'Lepenski Vir III' to the same period as the trapezoidal buildings ('LV I–II'), it is not clear how the livestock remains relate to the architectural features on the site. It is possible to suggest a 'ritual' explanation for the absence of the bones of livestock from the later ('ceramic') buildings at Lepenski Vir (Bonsall 2005), but the chronological context of the livestock remains will only be reliably established by direct $^{14}$C age measurements on the bones.

The persistence of Mesolithic traditions and the preponderance of wild over domestic animal remains in the period after 6000 cal BC have led some authors to propose that the inhabitants of the Iron Gates gorge remained hunter-gatherers for centuries after a Neolithic economy based on cereal cultivation and stockraising had been established in the surrounding areas (e.g., Clason 1980, Voytek and Tringham 1989, Radovanović 1996, Radovanović and Voytek 1997, Zvelebil and Lillie 2000). According to this theory, the presence of pottery and bones of livestock is the result of trade or exchange with neighbouring farmers.

Other evidence contradicts this interpretation. The appearance of new burial practices around this time implies more than mere trade contacts, and can only be explained in terms of either acculturation or immigration. Moreover, bone collagen stable isotope analysis suggests that the people buried at Lepenski Vir after 6000 cal BC did not subsist mainly on fish and other aquatic foods like their Mesolithic predecessors, but derived a large proportion of their dietary protein from terrestrial sources (Figure 10.3). It is difficult to see how such a major change in diet

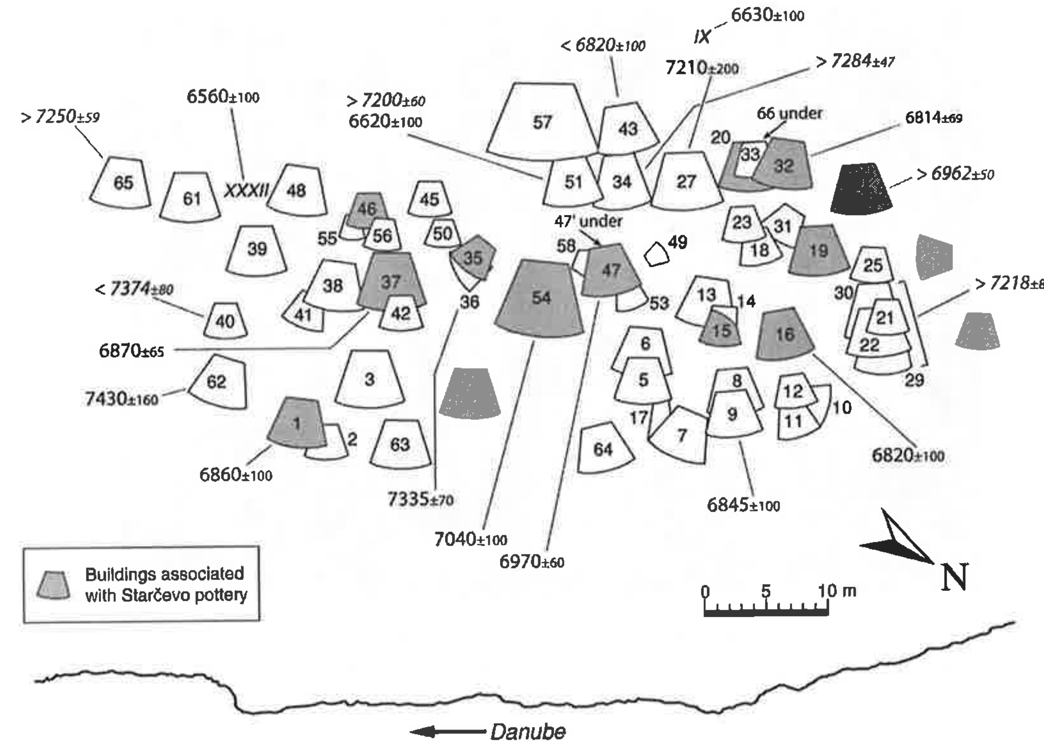



Figure 10.11. The occurrence of Starčevo pottery within the trapezoidal buildings of Lepenski Vir. Dates shown are in $^{14}$C years BP – the dates assigned to individual buildings are either the $^{14}$C ages of associated charcoal samples, or based on the stratigraphic relationship of a building to another radiocarbon dated feature (animal bone, building, or burial).

could have been accomplished without an economy in which agriculture played a significant role (cf. Bonsall et al. 1997, 2000, Bonsall 2003).

From these lines of evidence, it can be argued that the later Stone Age people of the Iron Gates gorge made the transition to agriculture and adopted other facets of Early Neolithic culture at roughly the same time as their neighbours on the Pannonian and Wallachian plains. However, in all three areas to varying degrees fishing and hunting continued to be part of the Early Neolithic economy (cf. Clason 1980, Bonsall et al. 1997, Bartosiewicz et al. 2001, Whittle et al. 2002).

The riparian sites within the gorge seem unlikely places from which to have conducted farming activities, and the possibility exists that after 6000 cal BC they were used not as primary residential sites, but as seasonal fishing camps, perhaps maintained in order to take advantage of the sturgeon migrations in late spring/early summer and autumn. This would explain the much smaller numbers of Early Neolithic (vs. Mesolithic) burials and the low frequencies of bones of domestic livestock in the sites.

As suggested earlier, the spread of farming may have come to a temporary standstill c. 6200 cal BC to the south of the Iron Gates. By that time a farming settlement had been established at Blagotin in the catchment area of the West Morava river (Whittle et al. 2002). However, the agricultural frontier may have extended further north along the Morava and other southern tributaries of the Danube. This raises the possibility that the hunter-gatherers of the Iron Gates were in contact with





Figure 10.12. Trapezoidal buildings with carefully laid plaster floors, stone-bordered 'hearths', and other stone fixtures are a conspicuous feature of Lepenski Vir. In this example so-called altars – large tabular stones with artificially ground hollows in the upper surface – can be seen set into the floor behind the hearth and adjacent to the near side of the building. Such buildings began to be erected on the site during the Final Mesolithic around 6300 cal BC, but their construction continued throughout the Early Neolithic between 6000 and 5500 cal BC when pottery and farming were introduced to the region (© Archaeological Institute, Beograd).

farmers to the south for a time before the eventual establishment of farming in the Iron Gates region. Some authors have argued that there was contact between the two populations by 6300 cal BC if not earlier (e.g., Radovanović 1996, Tringham 2000, Whittle et al. 2002, Borić and Miracle 2004) although these claims are often based on 'data', such as the supposed early appearance of pottery at Lepenski Vir and Padina, which have yet to be verified.

For reasons already discussed, Lepenski Vir is the site most likely to furnish evidence of forager–farmer contacts.

The appearance of lime plaster floors (Figure 10.12) at Lepenski Vir c. 6300 cal BC might be interpreted as evidence of contact with farmers, since the technique is otherwise unknown in the European Mesolithic. The earliest evidence of lime plaster pyrotechnology is from the Late Epipalaeolithic (Natufian) period in the Levant. Buildings with plaster floors proliferate in the Near East during the PPNB phase (8800–6900 cal BC) (Gourdin and Kingery 1975, Kingery et al. 1988, Thomas 2005) and are first encountered in Europe in the Greek Early Neolithic (Perlès 2001). However, the earliest Greek examples are no older than those at Lepenski Vir. Moreover, to date, plaster floors have not been found on Early Neolithic sites in the region between Greece and the Danube – an area in which limestone abounds – and this raises doubts that the use of the technique at Lepenski Vir was inspired by contact with farmers. An equally plausible case could be made for an independent invention of lime plaster pyrotechnology in the northern Balkans, or its transmission from the Near East to southeast Europe before the Neolithic (Bonsall 2005).

An unusual feature of Lepenski Vir highlighted by Borić and Stefanović (2004) is the occurrence of burials of neonates beneath the floors of some of the trapezoidal buildings. Because this practice is not clearly represented in earlier Mesolithic contexts at neighbouring Vlasac, but is known from Epipalaeolithic and Neolithic sites in the East Mediterranean, Borić and Stefanović have implied that it spread with farming from the Near East to southeast Europe, and thus reflects contact between the inhabitants of Lepenski Vir and nearby farmers in the period between c. 6300 and 6000 cal BC. However, none of the infant burials from Lepenski Vir has been $^{14}C$ dated and so it is not certain that they all belong to the time-range from 6300 to 6000 cal BC. Moreover the lack of Mesolithic house remains in southeast Europe outside the Iron Gates means we cannot be sure that the practice of burying infants under house floors was not practised by indigenous hunter-gatherers before the arrival of farming. As with the lime plaster floors, it may be that the presence of sub-floor burials at Lepenski Vir and their (apparent) absence from Late Mesolithic Vlasac and Early Neolithic Padina is simply a reflection of the special significance of Lepenski Vir for the Final Mesolithic inhabitants of the region, and not a marker of culture change.

The evidence of symbolic behaviour at Lepenski Vir has also been linked to contact with farmers. According to Radovanović and Voytek (1997) trade relations with neighbouring farmers led to the intensification of an already complex social and ideological system within Iron Gates gorge, which enabled the inhabitants to resist assimilation and preserve their cultural identity and hunter-gatherer lifestyle longer than was the case in the area downstream of the gorge.

Bonsall et al. (2002) have offered an alternative explanation which links the proliferation of stone sculptures at Lepenski Vir after c. 6300 cal BC with climate change and a concomitant increase in flood frequency, magnitude and unpredictability along the Danube. Accepting Srejović's (1972) interpretation of the figural sculptures as apotropaic representations of mythical ancestors or 'fish-gods', Bonsall et al. (2002) suggested they were intended to protect against the growing threat from flooding by the Danube, rather than the advancing tide of agriculture.

Arguably, the strongest evidence for the presence of farmers close to the Iron Gates in the centuries before 6000 cal BC is provided by bone chemistry analyses. Stable isotope data indicate that the people buried at Lepenski Vir during the Final Mesolithic (6300–6000 cal BC) generally had diets that were very high in aquatic protein, higher even than during earlier phases of the Mesolithic (Figure 10.3). However, three adults from this period show diets that were unusually high in terrestrial protein, similar to those of the Early Neolithic after 6000 cal BC. All three had been accorded the traditional Mesolithic burial rite of extended supine inhumation. One explanation is that these three individuals had spent a significant portion of their lives among a farming population (Bonsall et al. 2004). They may have originated from that population and married into the Lepenski Vir group. Alternatively, they could have been indigenous people who moved to live with farmers and on death were returned to the ancestral home for burial.

Other interpretations of the stable isotope data may be suggested, based on either the imprecision of radiocarbon dates or the possibility of earlier 'false' starts to agriculture in the Iron Gates region (for discussion, see Bonsall et al. 2004). Whichever of the hypotheses discussed by Bonsall et al. (2004) is preferred, they all suggest that the Lepenski Vir population had at least *knowledge* of agriculture and, by implication, contacts with farmers for a time before 6000 cal BC.

Other questions follow on from this. What was the nature of the forager–farmer interactions? If intermarriage did occur, does this indicate that external relations with farmers were generally peaceful? Ruth Tringham (2000), drawing on the work of Chapman (1993) and Zvelebil and Lillie (2000), painted a compelling picture of contacts across the agricultural frontier as a two-way process





that involved exchanges of goods and personnel, leading to population increase and intensification of production among foragers and farmers alike, then to social competition and status differentiation among the hunter-gatherers and their eventual adoption of farming. She went on to argue that interactions with the foragers of the Iron Gates gorge stimulated a perceived change in subsistence practices in the later stages of the Starčevo-Körös-Criş culture (*viz.* greater emphasis on local animal and plant resources) and were an important factor in the formation of the Middle Neolithic Vinca culture. These last-mentioned aspects of Tringham's hypothesis, however, are difficult to accept in the light of reappraisal of the chronology of the Iron Gates Mesolithic, especially the dating of Lepenski Vir (see earlier), and Bartosiewicz's demonstration that 'local' animal resources (wild ungulates and domesticated cattle and pigs) were of secondary importance to sheep/goat herding throughout the Early Neolithic of the Carpathian Basin (Bartosiewicz 2005).

## Summary and Conclusions

The Iron Gates is a key area within southeast Europe for studying the Mesolithic and the transition to farming. Yet after more than four decades of research the archaeological evidence continues to generate intense debate and disagreement among scholars.

The prevailing view of the Iron Gates Mesolithic, based on excavations conducted in the 1960s, is of a foraging society, which, in the course of its long development from the Late Glacial to the mid-Holocene, exhibited an increasing degree of social complexity and sedentism. In this scenario, there was an initial period of cave occupation when people followed a nomadic lifestyle based on hunting terrestrial herbivores. Then, around 7600 cal BC, the foragers began to intensify their exploitation of aquatic resources, which made possible a reduction in residential mobility leading to the establishment of semipermanent or permanent settlements on the banks of the Danube. According to some archaeologists, so successful was this foraging adaptation that the Mesolithic inhabitants of the Iron Gates were able to resist the adoption of agriculture for centuries after it became established in the surrounding regions, even though they traded with neighbouring farmers for pottery and other goods.

A new phase of research began in the 1990s with the Romanian-British excavations at Schela Cladovei and the systematic application of AMS $^{14}C$ dating and stable isotope analysis to bone remains from the Iron Gates sites. AMS dating of animal and human bones and bone artefacts from Lepenski Vir, Schela Cladovei, and elsewhere has exposed flaws in the traditional chronological framework of the Iron Gates Mesolithic and has laid the foundations of a more secure radiocarbon-based chronology. Stable isotope analysis of human remains has provided a new perspective on the economic basis of the Mesolithic and the transition to farming in the Iron Gates region, which in key respects is at variance with previous ideas drawn from osteoarchaeological data.

The degree of 'social complexity' exhibited by the Mesolithic inhabitants of the Iron Gates and whether they became more socially complex with time remain contentious issues.

*Sedentism* and *storage* feature prominently in ethnographic descriptions of hunter-gatherer complexity. A case can be made for sedentism or substantially restricted residential mobility in the Iron Gates Mesolithic. The Danube provided an important concentration of food resources and bone chemistry studies suggest there was focal exploitation of these resources from at least the beginning of the Holocene. Formal burial areas also were in existence by that time. Some food storage is likely in the Iron Gates Mesolithic, but there is no evidence that direct storage was practised on any significant scale. On the other hand, there is good evidence that dogs were eaten and that they were fed surplus food including fish; in effect, dogs may have served as food-storing repositories.

Based on a study of seventy-four ethnographically known societies, Kent (1990) found a close correlation between social complexity and the internal partitioning of houses. Judged on this criterion, the Mesolithic people of the Iron Gates rank fairly low on the scale of complexity. From the limited data available, their houses appear to have been relatively small – on average they were larger than those of nomadic societies such as the San (cf. Yellen 1977) but substantially smaller than the houses of the sedentary hunter-gatherers of the Northwest Coast (cf. Maschner 1991) – and lacking clear internal partitions.

Most ethnographic studies of complex hunter-gatherers rely on data from the Northwest Coast of North America. In documenting the emergence of cultural complexity on the northern Northwest Coast, Maschner (1991, Ames and Maschner 1999) identified a number of archaeologically observable trends, including: (i) economic intensification, (ii) growth in population and settlement size, (iii) intensification of warfare, and (iv) the emergence of hereditary social ranking and craft specialization. There are few signs of similar processes taking place over the time-range of the Iron Gates Mesolithic.

Average stable C- and N-isotope ratios in human bone collagen can be seen to increase during the Mesolithic. This may indicate an increase in the importance of aquatic *versus* terrestrial resources with time, which could be interpreted as economic intensification. Equally, however, it could reflect other factors such as changes in the food web.

Tringham (2000) argued for a population explosion among the hunter-gatherers of the Iron Gates after c. 6500 cal BC as a result of contact with farmers. In reality, however, there are too few data on which to base estimates of group size or overall population density for any stage of the Iron Gates Mesolithic.

Warfare certainly occurred during the Iron Gates Mesolithic, on the evidence of arrow injuries from Schela Cladovei and Vlasac. But there is no evidence of increasing levels of conflict through time. The unusually high percentage of arrow injuries at Schela Cladovei possibly relates to a very restricted phase within the Late Mesolithic, while a recent study by Roksandić (2000) of the many Final Mesolithic and Early Neolithic burials at Lepenski Vir apparently revealed no individuals with arrow injuries. Moreover, there is no direct evidence of perimeter defence and the construction of fortifications in the Iron Gates at any stage of the Mesolithic or Early Neolithic.

The stone sculptures from Lepenski Vir may be the work of craftsmen, but the fact that they are virtually confined to that site argues against the idea that craft specialisation was a general feature of the Iron Gates before the introduction of pottery manufacturing.

Also, it is difficult to argue for the existence of social ranking in the Iron Gates Mesolithic using the standard' archaeological indicators of burial goods or house size variability. Almost the only items from graves which can be termed 'prestige goods' (luxury items or items of special value) are marine shell beads and necklaces. Archaeologically, shell beads are widely distributed in time and space (back to the early Upper Palaeolithic in Europe) and ethnographically they are known to have served a variety of purposes. So it would be naïve to assume that their occurrence in Mesolithic burials in the Iron Gates is proof of inherited status.

Rather than exhibiting increasing complexity, in many respects the Iron Gates Mesolithic shows remarkable stability. Between c. 9500 and 6300 cal BC, there appears to have been little change in subsistence patterns or the complexity of material culture. Mortuary practices are fairly consistent throughout the period. The trapezoidal house form is not clearly documented before the Late Mesolithic; although such structures may have been built earlier, and they continued to be erected at sites in the Iron Gates gorge with no major change in form or size until the end of the Early Neolithic c. 5500 cal BC.





New features appear at Lepenski Vir in the gorge between 6300 and 6000 cal BC, which contrast sharply with what had gone before. They include figural stone sculptures, the placement of burials beneath house floors, and new architectural elements such as lime plaster floors and stone-built façades. The challenge for archaeologists is to determine to what extent these features reflect real culture change perhaps stimulated by contact with farmers or by environmental stress, and to what extent the special character of Lepenski Vir has created a 'false' impression of change.

The florescence of Lepenski Vir during the last few centuries of the Iron Gates Mesolithic occurred at a time when many sites along the banks of the Danube were either abandoned or ceased to be occupied on a regular basis. This event coincided with a period of distinctly cooler and wetter climate across middle Europe, which was accompanied by a marked increase in riverine floods. It is possible that, faced with an increased threat from flooding, people chose to relocate their settlements onto higher ground away from the river.

The climatic downturn and increased flooding in the Danube catchment may have forced a temporary halt in the advance of agriculture through the Balkans. Between 6200 and 6000 cal BC, the agricultural 'frontier' probably lay to the south but within 100 km of the Iron Gates. It is likely that contacts between the foragers within the Iron Gates region and farmers to south were established sometime during this period, and stable isotope data from Lepenski Vir suggest there may have been movement of personnel (and by implication goods and ideas) between the two populations.

The view that the hunter-gatherers of the Iron Gates gorge resisted the adoption of agriculture for many centuries is not supported by the available evidence. Paired $^{14}C$ and stable isotope analyses of human remains from Lepenski Vir show a marked reduction in average $\delta^{15}N$ and $\delta^{13}C$ values c. 6000 cal BC suggesting a shift to a diet that included a much higher proportion of protein from terrestrial food sources than the average Mesolithic diet. The fact that this dietary shift broadly coincided with the appearance of pottery (and, probably, ground stone tools and 'exotic' raw materials such as Balkan flint and obsidian) and new burial practices all with clear parallels in the Starčevo-Körös-Criş complex, strongly implies that farming had begun to play an important role in the subsistence economy of the Iron Gates region, and that the 'neolithization' of the gorge occurred at more or less the same time as in the surrounding regions. Fishing continued to be practised during the Early Neolithic throughout the Iron Gates, and sites that were 'abandoned' around 6300 cal BC were reoccupied c. 6000 cal BC. In some respects, the changes within the gorge appear less dramatic than those in the downstream area, in that 'Mesolithic' traditions of architecture and religion continued for a time at sites in the gorge, although not, it seems, elsewhere.

It is difficult to imagine the sites located on narrow alluvial benches at the foot of the gorge acting as bases from which farming activities were conducted – farmers normally must remain close to their crops and livestock. This raises the question of whether sites such as Hajducka Vodenica, Padina, and Vlasac continued to be occupied on a permanent or semipermanent basis after 6000 cal BC or whether they became seasonal fishing camps. This latter hypothesis may explain the scarcity of Early Neolithic burials and bones of livestock at these sites.

This is one of many questions about the Mesolithic-Neolithic transition in the Iron Gates that remain unresolved. Other questions that readily come to mind are: Did more severe winters or territorial pressure from farmers during the 'Little Ice Age event' of 6300–6000 cal BC lead to a greater reliance on stored foods? And did this contribute to the heavier $\delta^{15}N$ values seen in the bones of many Final Mesolithic people buried at Lepenski Vir? Did pressure on natural resources linked to climate change and/or competition from farmers encourage the hunter-gatherers to adopt agriculture?

Although many of the sites excavated in the 1960s and 1980s are now under water as a result of the impounding of the Danube by the Iron Gates I and II dams, there is still considerable scope for further research in the region, which may help to resolve these and other issues discussed in this chapter. Some sites in the downstream area, such as Schela Cladovei and Ostrovu Banului, are still accessible and would repay more extensive excavation. Archaeological investigation of older (higher) terraces along the Danube may lead to the discovery of new sites, including sites belonging to the crucial period between 6300 and 6000 cal BC. In addition, finds from previous excavations now in museum collections remain a potentially rich source of new data. Using this material there is scope for seasonality studies of mammalian, fish, and shellfish remains bearing on questions of residential mobility and site function. The application of AMS $^{14}C$ dating to human and animal bones, bone artefacts, and organic temper and residues from pottery sherds would provide valuable information on the development of art, burial practices, technology, and the timing of the introduction of animal domesticates and ceramic technology. DNA and stable isotope analyses of human remains could be used to address questions relating to the movement of people into the Iron Gates region and between communities within the region, an aspect of the Iron Gates Mesolithic that remains poorly understood.

For archaeologists involved in this research the Iron Gates remains an immensely rich repository of information about the Mesolithic and the transition to farming, and one of the most remarkable cultural landscapes of European prehistory.

## Acknowledgments

The author would like to thank Paolo Biagi, Joni Manson, Ivana Radovanović and Barbara Voytek for information about Early Neolithic sites in Southeast Europe, Gordon Thomas for information on lime plaster pyrotechnology, and Geoff Bailey, Gordon Cook, Mark Macklin, Robert Payton, Catriona Pickard, Penny Spikins, László Bartosiewicz, and two anonymous referees for their comments on a preliminary draft of the paper.

## Notes

1. In this chapter, original $^{14}C$ measurements are quoted in years 'BP'; calibrated calendar ages are given as 'cal BC'. Calibrations were carried out using the CALIB (rev. 5.0.2) radiocarbon calibration program (Stuiver and Reimer 1993; Stuiver et al. 2005) – see Table 10.1 for further details. A basic calibration table is provided in Table 10.3. Human bone $^{14}C$ ages quoted in the text have been corrected for the freshwater reservoir effect that characterizes the Iron Gates reach of the Danube (Cook et al. 2001, Cook et al. 2002).
2. Burials dated, or presumed to date, to the Mesolithic and/or Neolithic have been found at a number of sites in the Iron Gates: Ajmana, Climente II, Cuina Turcului, Hajdučka Vodenica, Kula, Lepenski Vir, Padina, Schela Cladovei, Ušće Kamenickog potoka, Velesnica, and Vlasac (see Figure 10.1).
3. Srejović believed that the earliest architectural remains at Lepenski Vir were a series of stone bordered hearths found in the lowest part of the site adjacent to the Danube (Srejović 1972: 45–46). These structures were the main evidence for his 'Proto-Lepenski Vir' settlement, which he assigned to the beginning of the Holocene ('Preboreal period') despite the lack of supporting radiocarbon evidence. This interpretation was disputed by Bonsall et al. (2002), who suggested the hearths were remains of buildings that were contemporaneous with the trapezoidal buildings upslope but had been destroyed during extreme flood events. This may explain the (apparent) absence of charcoal from the 'Proto-Lepenski Vir' hearths; such buoyant materials could easily be washed away by flood waters. Srejović assigned at least one grave – burial 69 (Srejović 1969, plate 64) – to his 'Proto-Lepenski Vir' phase, and this was subsequently dated to c. 8800 BP (7900 cal BC) (Bonsall et al. 2004), but contemporaneity with the hearths near the river was never demonstrated.
4. It is not clear how Srejović and Letica (1978) arrived at the total of forty-three houses. For the 'Mesolithic levels' of Vlasac (I–III), they describe fourteen 'dwellings', twenty-six built 'hearths' (some of which were inside the dwellings, others 'in the open'), two simple hearths, and at least fifteen other structures some of which were interpreted as remains of tented structures.
5. In spite of the 'late' $^{14}C$ dates for Houses 1 and 2, the excavators attributed them to the earliest occupation phase at Vlasac (phase Ia), partly because they lacked hearths and thus could "be regarded as representing the beginning of the Vlasac architecture" (Srejović and Letica 1978: 146).
6. Bökönyi, who was a mammalian specialist, may have overlooked the presence of sturgeon in the samples he analyzed from both Vlasac and Lepenski Vir. More recent work by Vesna Dimitrijević (cited in Borić 2002: 1030) has identified sturgeon (mainly beluga) bones from the floors of some of the trapezoidal buildings at Lepenski Vir.
7. Native Americans living along the Missouri and other major rivers relied heavily on mussel meat during the winter months when other food was scarce.
8. The Iron Gates reach of the Danube today is an important wintering area for wildfowl, especially ducks.
9. The remains of these species are not abundant in the Iron Gates sites. All three were recovered from Mesolithic contexts in the Romanian–British excavations at Schela Cladovei (Bartosiewicz et al. 1995, Bartosiewicz 2001, Bartosiewicz unpublished data), but the season of capture was not determined.
10. Antler was included among the red deer remains in the faunal report for Vlasac, but is unlikely to have changed the overall ranking of the three species discussed here.
11. Consumption of dog meat was not uncommon in Europe in historical times. The slaughter of dogs for human food was only finally prohibited in Germany in 1986 (Geppert 1992) and dogs are still eaten as a delicacy in parts of Austria, former Czechoslovakia, Moravia, and Switzerland today.
12. Under these broad headings many specific causes of conflict between hunter-gatherer communities have been reported: previous attacks, murder, suspected witchcraft, jealousy over women, theft/poaching, abduction of women and children, rape, insult, trespass, infringement of territorial rights, access to resource areas or high priority goods, nonpayment of bride price, capture of slaves, and so on.
13. Ground stone implements and Balkan flint artefacts have been reported from trapezoidal buildings at Lepenski Vir (Kozłowski and Kozłowski 1983, Borić 2002). Both are characteristic of Early Neolithic Starčevo-Körös-Criş culture contexts in the central and northern Balkans. However, at the time of writing, there is no published information on which buildings at Lepenski Vir contained these items, and so the date of their first appearance at the site is uncertain.