Out in the cold

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Humans are very adaptable: during the last ice age, they apparently lived within the Arctic Circle. The discovery suggests that, although cold, the region was probably not covered in ice at the time.

Archaeological finds described by Pavlov and colleagues on page 64 of this issue 1 show for the first time that humans were present north of the Arctic Circle almost 40,000 years ago, in the last ice age. The idea of people living in a land gripped by an ice age goes back to nineteenth-century France, but the new finds extend both the geographic and the temporal range of the phenomenon. The results should also rekindle debate about the effects of the climate on the movements of early human populations.

Pavlov et al. carried out fieldwork at a site in the Russian Arctic known as Mamontovaya Kurya, which dates to Middle to Upper Palaeolithic times, some 35,000–40,000 years ago. Their finds comprise various stone tools and over a hundred mammalian bones, as well as a mammoth tusk bearing cut marks that were apparently made by tools. The age of the tusk was determined by a radiocarbon-dating technique known as accelerator mass spectrometry, illustrating the power of this technique for dating artefacts directly rather than by the age of the sediments in which they are found.

It is not possible from these finds to determine whether they were left by Neanderthals or by some of the first modern humans in Europe, but this is equally true of most contemporary artefacts further south. In the broader scheme of things, knowing who made the tools is less important than simply knowing that someone was adapted to the cold conditions. This is significant because all evidence from recent foragers (such as Inuit or Siberian Yukaghirs) suggests that adaptation to northern climates requires high levels of technological and social organization.

That said, it would be interesting to know whether these people were Neanderthals or early ‘anatomically modern’ humans. If they were Neanderthals, this provides further support — along with their anatomical adaptations and the height and remoteness of many of the sites at which Neanderthal artefacts have been found — of the Neanderthals’ rugged durability and extensive capabilities. Their high degree of meat-eating, indicated by recent studies of stable carbon and nitrogen isotopes in bone, also suggests a specialized socioeconomic adaptation, perhaps developed over a long period in environments rich in animals but limited in plant resources.

If, on the other hand, these ice-age people were modern humans, then this is evidence of a remarkably rapid advance to the north — modern humans had only just set foot in the southeast of Europe. Pavlov et al. incline towards this view — the nearest archaeological finds to the south, along the Pechora River near the Urals, are allied more closely with those Upper Palaeolithic traditions associated with modern humans than with the Middle Palaeolithic toolkits more commonly associated with Neanderthals.

The bones and artefacts found at Mamontovaya Kurya suggest that the northeast must have been relatively dry and ice-free in this period of the ice age. These finds are one of outcome of a major interdisciplinary study that has also shown, for most of the time, the ice sheets of the last glaciation were far more restricted on their eastern flank than is sometimes suggested. Support for the existence of ice-free areas also comes from Finland, where direct radiocarbon dating of key evidence — this time a series of mammoth teeth — establishes the presence of large animals between 22,000 and about 40,000 years ago. The existence of large animals implies that the environment was steppe-like, consisting of open grassland.

Icy cold, however, it was. Temperature estimates derived from variations in the 18O content of Greenland ice cores such as GRIP2 (at a latitude of about 72° north) show that the climate in the middle of the last glaciation (Fig. 1), but it was always at least 10 °C colder than today. The dominant feature of the time from 60,000 to 30,000 years ago was a series of saw-toothed temperature fluctuations of up to 15 °C. Similar temperatures were found in intensive research across north-central Europe, using indicators such as beetle remains and pollen as proxy evidence. These indicate an average annual temperature of −1 °C in the Netherlands from 50,000 to 41,000 years ago, with the coldest month being at least 10 °C below this.

Yet, despite this newly detailed backdrop, recent archaeology-based discussion about the Neanderthals has not — with certain exceptions — been concerned primarily with climate. The emphasis has been on chronology, population movements, and the nature of cultural contact (if indeed there was any) between Neanderthals and incoming modern humans (Box 1, overleaf). There has been good reason to focus on the cultural changes that occurred in the past 40,000 years, as this time period includes the more rapid developments of the Upper Palaeo-
Box 1 Neanderthal prehistory

Neanderthals are the best known group of early hominids; they lived in Europe and parts of Asia, and survived until about 30,000 years ago. Hominid specimens from about 300,000 years ago already had some characteristics of Neanderthals, but it is not known how much further back their roots go. Some early humans entered Europe at least 800,000 years ago, but later technological innovations shared with other regions suggest that new populations may have entered the continent.

Better known are the later, ‘classic Neanderthal’ specimens from the last glaciation. The features of these Neanderthals, who were around from about 100,000 to 30,000 years ago, are more uniform than those of earlier populations, suggesting that there may have been a population crash (with a subsequent ‘bottleneck’) around the start of this period11. All Neanderthals were strongly built, with long, low crania and large faces. Damage to their skeletons attests to the fact that their lives were hard. If they were as carnivorous as seems likely, they would have had many encounters with dangerous prey.

After 150 years of debate, and despite a steady flow of new knowledge, the Neanderthals’ position alongside anatomically modern humans remains uncertain11. The means by which Neanderthals were eventually replaced by modern humans is fiercely contested, as is the degree of genetic separation. Many specialists see Neanderthals as a distinct species, contributing little to either the gene pool or the culture of later populations.

But modern human and Neanderthal remains, genetics and tool traditions all show intriguing continuities11. Less controversial is the new willingness to admit that Neanderthals had qualities that showed their ‘humanity’. For example, Neanderthals are contenders for the first display of caring behaviour: a crippled individual at Shanidar in Iraq was clearly sustained by the support of others. But it is not easy to pick out behavioural patterns that were distinctive of Neanderthals — burials, bone-based tools and symbolism are all found earlier in populations of anatomically modern humans. The continued debate over the relationship between Neanderthals and modern humans is stimulating, but should not mask enormous advances in dating, genetics and other forms of analysis.

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The dramatically spiky record from ice cores in the interval from 60,000 to 40,000 years ago, together with pollen evidence, implies that steppe environments moved up and down rapidly from southeast Europe to the far north, and suggests that climate change could have been crucial in promoting population movement and cultural change. In ‘warmer’ parts of the ice age, as Pavlov et al.12 show, fauna-rich steppe environments and humans apparently reached the Arctic. In the Last Glacial Maximum, 20,000 years ago, conditions were so fiercely cold that even modern humans were driven down towards the south of France13. Indirectly, such responses may help to explain the southward expansion of Neanderthals into the Middle East around 60,000 years ago, and (perhaps) the similar spread of Upper Palaeolithic Aurignacian human populations around 30,000 years ago.

The new finds12 show that humans had a hold on the north, if only for a short time. Although there are questions to be answered, the artefacts illustrate both the capacity of early humans to do the unexpected, and the value of archaeologists researching in unlikely areas.

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References