

G08: From Frigid to Freezing

The Last Glacial Maximum

WC 2825

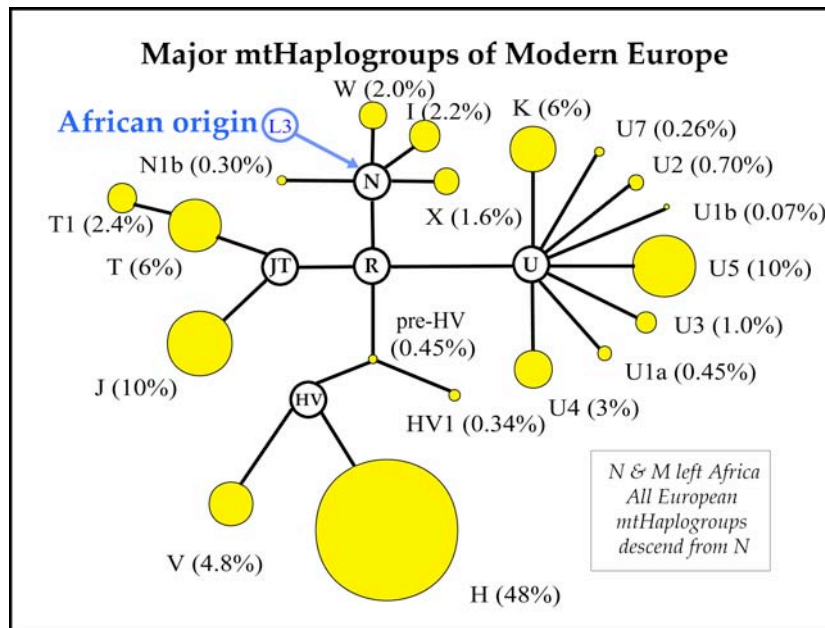
There has been a theory put about for some time now that round about the time the Aurignacians first moved into Europe — that is, about 45-40 KYA — there was a genetic change in *Homo sapiens* which gave him the abilities he needed to make the big cultural and technological changes he and his descendants demonstrated in Europe. The supreme vindication of this view, it was generally said, was the great flowering of creativity from about 30 KYA to the height of the LGM. The magnificent paintings in the caves of Perigord and Cantabria, if nothing else, showed that *H. sapiens* had indeed made a great leap forward.

However, although these cave paintings were undoubtedly a great achievement, they were less of a leap forward than earlier European-oriented researchers had fondly believed. For example, cave paintings of comparable beauty and skill were being produced in Australia ~30,000 years earlier, stone tools of equal sophistication were made in Africa long before *H. sapiens* came out of Africa.... If there was a great leap forward then it happened much further back in human history than the advent of *H. sapiens* into Europe, back — most scientists now agree — when a genetic mutation split *H. helmei* from *H. heidelbergensis* about 250 KYA. From then on, *helmei*'s descendents, if not *neanderthalensis* then certainly *sapiens* had the brain power to paint bison, even "Guernica" and "Mona Lisa" or to put men on the moon. Such talents in our remote ancestors required the challenge of adaptation and the opportunity to exchange ideas and learned skills, not a new genetic mutation, before they could flourish. The challenge came with the deteriorating climate and eventual plunge into full glacial conditions during the LGM while the crowding of survivors into small "refugia" from the Ice brought more opportunity to meet other people and thus to exchange ideas. And perhaps, after the LGM, when humans began to expand out of the refugia and to re-populate their part of the world, the relatively stable, warm and moist conditions of the new epoch, the Holocene or *Interstadial Marine Isotopic Stage 1* of the present Ice Age¹, before the full potential of the mutation which occurred to make *H. helmei* could begin to be achieved.

We will shortly go on to take a brief look at the achievements of humans in the millennia immediately before the LGM and during their sojourn in the refugia of Europe. Meanwhile, we must first look at the migrations of human beings in Europe from about 30 KYA down to ~22 KYA, the time when the climate became so glacial most of the continent was uninhabitable.

¹ MIS 1 is the present interstadial; the next stadial has yet to occur.

Europe in the Late Upper Pleistocene



As we have already seen, by ~28 KYA, Neanderthals had become extinct and modern humans had the terrain to themselves. The Aurignacian culture was gradually replaced by Gravettian technologies which had been brought in from the east, probably through the Ukraine, carried by people whose genetic hall-marks was mtHaplogroup HV and y-Haplogroup I. HV

eventually split into separate Haplogroups, H and V of which H became the more successful providing almost half the maternal lines throughout western and northern Europe. Hg V did not expand much until later in the south-west after their sojourn in the Franco-Iberian refugia. These two mtHgs are what Sykes calls "*Clan Helena*" and "*Clan Velda*". Their male equivalent was y-Haplogroup I, or as Sykes called it, *Wodan* and Oppenheimer, *Inos*.

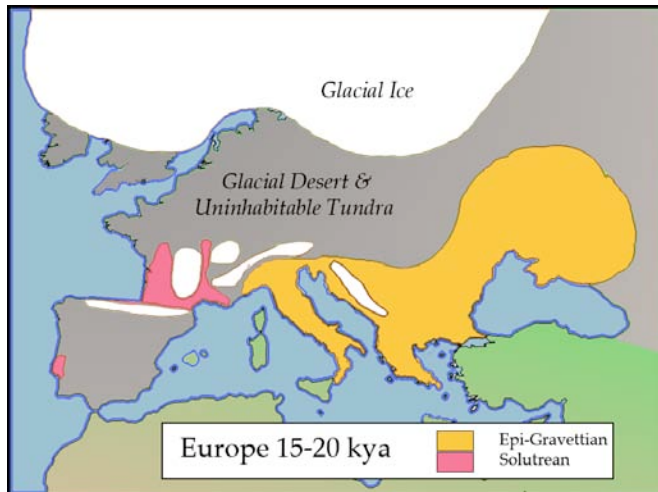
The maternal HV haplogroup — I am HV9a — is believed to have expanded into Europe about 33,500 years ago, which is about 15,000 years after U5, the earliest known mtHg to enter Europe and the one associated with the Aurignacian culture. It is interesting that mitochondrial HV seems to be much younger in the Near East, dating there from only about 26,500 years ago. This suggests that there might have been a back-migration from Europe! The present theory is that HV had her origins in the region between the Caspian and Black Seas, in what is known as the Trans-Caucasus while the y-Haplogroup I appears to be almost exclusively a European clade with a preponderance in the Balkans and Ukraine.

However, how these people came there is still open to debate. Two possible routes have been raised: (a) the one which Oppenheimer seems to prefer starts with the super-haplogroup N which came out of Africa and whose descendents travelled up the Indus River into Kashmir and thence to the steppes of Central Asia where they developed sophisticated mammoth-hunting and other techniques. Westward migration then took them across the Urals into European Russia and from there down into the Czech Republic and Germany. The alternative view (b) is that the trans-Caucasus route is the one which took them into Europe given, as one of the

most respected research teams led by Ornella Semino² has shown, the highest frequencies of Hg I are in the Balkans and Ukraine.

From 25 KYA, the climate became colder and dryer until by 21 KYA most of Europe was uninhabitable. Ice kilometres thick covered Scandinavia and most of what we call the British Isles (although they were not islands in that time), while there was also an ice cap on the Alps, thus creating a divide down the middle of Europe, not only destroying the unity which prevailed in remote time but which remains noticeable to this day. A smaller ice cap also topped the Pyrenees between Iberia and France.

We will never know how many people perished as the Ice advanced. Some perhaps were never born because, as food supplies dwindled, so too the birth-rate would have declined, in parts to vanishing point as malnutrition (especially insufficient Vitamin C) made women effectively sterile. Furthermore, some people perhaps waited too long, others underestimated the danger (how could they know it would be more severe than the Big Freezes to which they had always adapted in the past?) and some possibly found themselves cut off, even killed not only by the effects of the Ice but by desperate fellow-refugees. However, some, but probably only relatively few, found refuge in warmer, more protected places where they and their descendants waited out the Glacial Maximum which ruled Europe for the next ten thousand years.



Just as their distant ancestors had found their way into Europe by following river valleys, so too the refugees from the ice probably followed the dwindling food supplies down the major river valleys until either they found refuge or they could go no further. Three major rivers led the way to safer havens: the

Garonne/Dordogne system in the southwest of France, the Danube

and its tributaries in the East, and further north, the Dnieper/Don system. Of these, the Garonne/Dordogne river valley led to the Franco-Cantabrian Refugia which virtually circled the Pyrenees, despite their ice-cap. The Danube led the refugees east, back beyond the ice-cap on the Alps to the river's source in the Black Sea. There, in the northern Balkans people found refuge for the next 10–12, 000 years. And finally, the huge Dnieper/Don system — and possibly the Volga, although I have not seen mention of it — led to refugia north of the Black Sea. The Dnieper

² Semino, O et al.: The Genetic Legacy of Paleolithic Homo sapiens sapiens in Extant Europeans: A Y-Chromosome Perspective, *Science*, Volume 290, Issue 5494, pp. 1155-1159, 25 September 2000.

drains into the Black Sea itself while the Don finds its mouth in the Sea of Azov a little to the north. If the Volga did help lead refugees to safety then it ended in the Caspian Sea to the East, but the valleys of the Don and Volga at one point are very close and verge on the region which provided the refugia.

The Last Glacial Maximum — The "Ice Age"

Writing in the journal *Current Anthropology* back in 1991, anthropologist Lawrence Guy Straus³ described the period we know colloquially as "The Ice Age" in the following fact and figures:

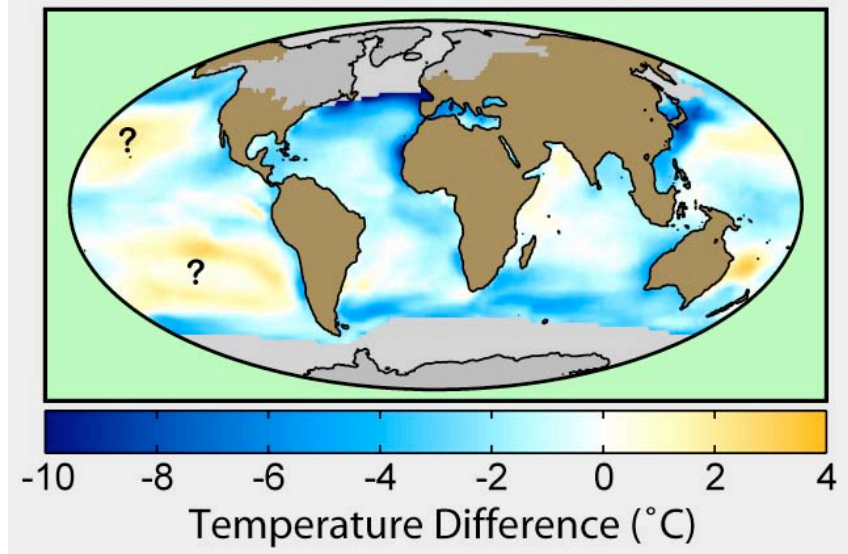
The height of the Last Glacial was reached around 18,000 bp — near the beginning of the traditional French "Würm IV" and within the more broadly defined Upper Pleniglacial (ca. 29,000—13,000 b.p.). The Last Glacial Maximum was the period of the maximum southward extension of the Scandinavian glacier (the Brandenburg Advance) and corresponded closely to the time of the span of Solutrean industry of France and Spain: 20,500 – 16,500 b.p.....

We have not touched on the Solutrean culture yet, but essentially they, and the Magdalenian who followed them were very similar to the Gravettian but effectively a cultural update from the east. The Solutrean culture first came into Europe at about 25 KYA and so they had little time in which to expand and establish themselves and their ways before the Ice Age descended. The Magdalenian culture arrived at the height of the LGM, in about 18 KYA. Straus continued:

The western European zone between 44° and 37° north latitude had some of the steepest temperature anomalies known in the Last Glacial Maximum of the world.... According to evidence from deep-sea cores throughout the North Atlantic, at ca. 18,000 b.p. the Gulf Stream ran almost directly east from Cape Hatteras in Portugal instead of turning northward and flowing into the Bay of Biscay and on to the British Isles as it does today. The polar front was located at about 43° north, while pack ice occurred about 50° north and icebergs drifted into the Bay of Biscay. Of course, at this period continental glaciation covered all but the southern fifth of Britain — and that ice-free area, like the Lowlands and most of the unglaciated parts of Germany, was at best open tundra.... The Alpine icecap covered Switzerland, the Austrian and Italian Alps, and large areas of southeastern France, while ice tongues reached almost to the Mediterranean littoral. Sea-level regression of 100-130 m exposed large areas of continental shelf off southeastern and southwestern France (up to 50 km out from the present

³ Lawrence Gay Straus: Southwestern Europe at the Last Glacial Maximum, *Current Anthropology* Vol 32, No. 2, 1991, pp 189-199

CLIMAP: The Last Glacial Maximum



shore in both areas) and all the unglaciated parts of the North Sea, as well as narrower strips (usually ca. 6-12 km) all around the Iberian Peninsula (while not closing the Straits of Gibraltar).

CLIMAP research has shown February ocean surface temperatures off Galicia to have been 2°C — a difference of

about 12° from average temperature today. For August at ca. 18,000 b.p. the temperature was about 10° — giving a temperature anomaly of about 10°. Würm Upper Pleniglacial temperature depression on the order of 10-12° is also suggested by traditional terrestrial paleoenvironmental data.....

Although we would regard the conditions in the refugia as appalling, our ancient forebears were at least able to find food and shelter and carry on what seem to have been quite active lives. South-facing caves and rock shelters might have provided some relief at the worst of times, but generally speaking these people did not abandon their nomadic, hunting and foraging life-styles. They built small, temporary shelters from the biting cold, dust-laden winds which were almost a constant companion in their daily lives. Game of course would have been limited, but already they were proficient in trapping small animals and there have been suggestions that one of the hall-marks of the Solutrian culture was beach-combing

and sea fishing. By sewing skins together and stretching them across circular frameworks they made *currachs*⁴, extraordinarily strong and sea-worthy boats capable of holding several people and withstanding very heavy seas.



Genetic effects of the LGM

Genetically, two major changes happened at this time of the

⁴ This is the Irish term for such vessels. See Panshin, C: The Paleolithic Indo-Europeans <http://www.enter.net/~torve/trogholm/wonder/indoeuropean/indoeuropean3.html>

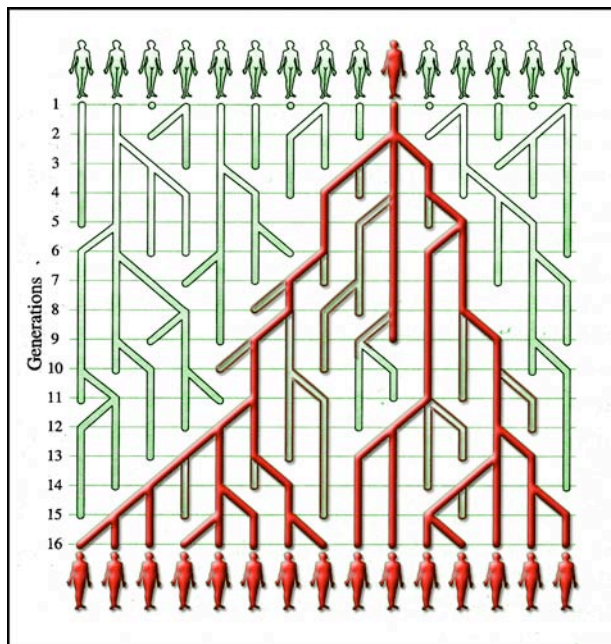
LGM and the seclusion of our remote ancestors in the various refugia. In the first instance, there was a *bottleneck* — we saw this in the case of the Toba eruption and the drastic reduction in genetic diversity. An event which destroys large numbers of people effectively reduces the genetic diversity, and this is what happened during the lead-up to the LGM and the flight into the refugia.

The second change is what geneticists call *genetic drift*. Along with *natural selection*, genetic drift is one of the two most important mechanisms of evolution. Interestingly, most of us have some knowledge of natural selection but have probably never heard of genetic drift — and neither had Darwin, for that matter! This knowledge was not available in Darwin's time so that modern evolutionary biologists are no longer "Darwinists" in the strict sense of the term.

Laurence Moran, writing in the *TalkOrigins Archive* in 1993⁵ explained genetic drift as involving a *binomial sampling error* which is what you get if —

..... a pair of diploid sexually reproducing parents (such as humans) have only a small number of offspring then not all of the parent's alleles will be passed on to their progeny due to chance assortment of chromosomes at meiosis. In a large population this will not have much effect in each generation because the random nature of the process will tend to average out. But in a small population the effect could be rapid and significant.

Let's look at this in a slightly more familiar way:



Demonstration of "genetic drift"⁶

All dogs *Canis lupus familiaris* belong to a sub-species of the grey wolf *Canis lupus*. Domesticated maybe ~40 KYA on the steppes of Central Asia, they proved such good companions and help-meets that they spread all over the world wherever humans took them. Living with their human groups often for long periods in isolation, dogs inter-bred and produced the amazing variety of *breeds* we see today, ranging from the Chihuahua to the Great Dane

or St Bernard. In other words, because the gene pool is limited in the isolated breeding group, some characteristics are perpetuated and others, once lost are lost

⁵ <http://www.talkorigins.org/faqs/genetic-drift.html>

⁶ Oppenheimer, *Out of Eden*, p. 65 (colored by BH).

forever. This process is best known to most of us as "inbreeding", although we generally associate this with negative outcomes such as "chinless wonders" or haemophilia in the Royal houses of Europe.

So, after the *bottleneck* during the centuries of retreat to the refugia, there followed a long period during which people were isolated from other human groups thousands of kilometres away in the other refugia. In that time genetic drift produced the great genetic diversity which we see today and which we will be analysing in later sessions. There, in the refugia in southern France or Northern Spain, in the Balkans and in the Ukraine, new sub-clades of the old haplogroups emerged. The initial mutation, when it occurred, is known in the trade as a *founder effect*..... This is just a special example of genetic drift.

Moran⁷ quotes Suzuki

"The founder effect is probably responsible for the virtually complete lack of blood group B in American Indians, whose ancestors arrived in very small numbers across the Bering Strait during the end of the last Ice Age, about 10,000⁸ years ago. More recent examples are seen in religious isolates like the Dunkers and Old Order Amish of North America. These sects were founded by small numbers of migrants from their much larger congregations in central Europe. They have since remained nearly completely closed to immigration from the surrounding American population. As a result, their blood group gene frequencies are quite different from those in the surrounding populations, both in Europe and in North America.

In following sessions we will be exploring some of the more common of the sub-clades which emerged during our ancestors' sojourns in their respective refugia or which entered Europe after the LGM ended. One of these, and now the most prolific, is R-M269 and its sub-clades — of which there are already a dozen or so known to geneticists and more probably yet to be discovered. Until late 2008 (and still in many quarters) this y-Haplogroup was believed to have wintered in the Franco-Iberian refugia and, when the climate improved, to have been responsible for much of the population of the Atlantic seaboard of France, the western and northernmost parts of Britain, of Ireland, Portugal, Galicia and the Basque country. Now we know they did not enter Europe until the Neolithic and so were not the progenitors of the present majority of people living in those Atlantic regions. So there remain two big questions everyone is asking in genetic genealogy these days:

(1) if it was not R-M269 in the Franco-Cantabrian refugia, who were the people living there throughout the LGM? We know y-Haplogroup I was in Europe in time

⁷ Moran, Op cit.

⁸ This was written in 1989. Amerind migrations were much earlier than this.

to suffer the LGM but the evidence we have is that these people back-tracked down the Danube and Dnieper River system and found refuge in the Balkans and areas around the Black Sea.

(2) And, most importantly, if R-M269 did not arrive in Europe until after the LGM ended and the arrival of the Holocene, how did R-M269 spread so rapidly and achieve such dominance? Various explanations have been offered, including lactose tolerance and the introduction of the horse and wheeled wagons but the mystery remains.

But before we get too far ahead of ourselves, let's indulge ourselves and take a look at what was heralded as the flowering of the late Pleistocene, the remarkable art of the early Europeans.
