

BORN AGAIN
Are we forgetting how to give birth?

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OLD WORLD NEW PEOPLE

The mysterious tribes
that founded Western
civilization



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Perhaps the rumours of strange newcomers were true after all. Certainly the slender stone blade in front of the young Neanderthal had been fashioned by someone with skills that surpassed any he had seen before. The snap of a twig broke his reverie. He spun round, and found himself face to face with two men every bit as strange and exotic as the tool they had evidently returned to claim. Their skins were unusually dark, their eyes the colour of the sky.

IT WAS possibly curiosity or wonder that the young Neanderthal felt during his first encounter with our species. Arguably, it should have been fear: a chance meeting like this could easily have happened about 45,000 years ago in a forest somewhere between Poland and England. When it did, it would have marked the dawn of a new human conquest.

Until that point, Europe had been the exclusive playground of Neanderthals. *Homo sapiens*, meanwhile, had left Africa, marched

across Arabia into East and South-East Asia, sailed to Australia. One group was on its way to Siberia, the Bering Strait and the promise of a New World. But what of Europe?

Not too long ago, that story appeared beguilingly simple. Our species arrived 45,000 years ago from the Middle East, outcompeted the Neanderthals, and that was that. Now, an explosion of studies is using fragments of DNA pulled out of ancient bones to probe Europe's genetic make-up. Together they tell a more detailed, colourful tale: that forest encounter marked just the first of three waves of *Homo sapiens* that shaped the continent. Each came with its own skills and traits. Together they would lay the foundations for a new civilisation.

Our distant ancestors first settled in Europe at least 1.2 million years ago. By 200,000 years ago, they had become Neanderthals. We know from their DNA that at least some of them had pale skin and red hair. They lived in caves, had basic stone tools, and hunted and fished along European shorelines. Some probably wore forms of decoration: shell necklaces and maybe even face paint. The last surviving ➤

Dawn of a continent

It took 40,000 years and three mystery tribes to lay the foundations for Europe. Colin Barras went to meet the forebears of Western civilisation







Neanderthal tribes might even have etched and painted simple signs on to the rocks of the Iberian peninsula.

All told, they were a relatively sophisticated bunch but no match for a group of dark-skinned hunter-gatherers who arrived from the Middle East around 45,000 years ago. The jury is still out on whether the newcomers killed, outwitted or simply outnumbered the Neanderthals, but by 39,000 years ago, our cousin species was history.

The newcomers flourished in Europe's forests, hunting the woolly rhinoceros, bison and the like that lived there. Long before farmers tamed cows and sheep, these early Europeans made friends with wolves. Like the Neanderthals, some of them lived at the mouths of caves – sometimes the very same caves – which they lit and heated with roaring fires. Like them, they ate berries, nuts, fish and game.

We are all too willing to dismiss the hunter-gatherers as “short, brutish and nasty”, says Vincent Gaffney at the University of Bradford, UK. “We are fundamentally farmers, and so we tend to think of farming as an amazing step forward,” he says. In fact, there was something subtly different going on in the minds of early hunter-gatherers: they had

artistic sensibilities, expressed in vast murals and using musical instruments like bone flutes and bullroarers. Surviving murals tell us about the large game they hunted. Perhaps most significantly, they show that the people were keen observers of the world they lived in, and capable of abstract thought.

Nor were they all, strictly-speaking, “cavemen”. Some hunter-gatherers erected rudimentary buildings. Archaeologists are

“The monument may have been used to predict when salmon would return”

studying a vast site at Star Carr in northern England, where there is evidence of a house-like structure and timber platforms on the marshy lakeside that date back to around 8500 years ago. And in 2013, in a field in north-east Scotland, Gaffney and his colleagues found a 10,000-year-old hunter-gatherer monument: an arc of 12 pits facing the point on the horizon where the sun rises on the winter solstice. Residues inside one pit suggest it held a wooden pole.

The monument was some early form of

Hunter-gatherers were drawing more than 30,000 years ago

“time reckoner” that tracked the lunar months, says Gaffney. He stops short of calling it a proto-scientific instrument, but it does seem to have been used to observe and measure the natural world, perhaps even to predict when migratory animals like salmon would return. Gaffney suspects the knowledge of how the monument worked was carefully controlled, perhaps by a ruling elite. “Then, as now,” he says, “knowledge was power.” It is thought that a similar monument existed at Stonehenge, millennia before the stones were erected.

The new wave

If this fresh archaeological evidence shows that hunter-gatherers were more modern than we once thought, new genetic research restates just how different they looked: for example, one hunter-gatherer who lived in Spain 7000 years ago – a good 35,000 years after their kind first arrived in Europe – had dark skin and pale blue eyes (*Nature*, vol 507, p 225). A group unearthed near Motala in Sweden had pale skin, blue eyes and possibly even blonde hair, but they seem to have been an exception: 8000-year-old hunter-gatherers unearthed in Luxembourg and in Hungary shared the same traits as the Spanish male. “They probably had similar [skin] tones to current North Africans,” says Carles Lalueza-Fox at Pompeu Fabra University in Barcelona, Spain, who sequenced the DNA of the Spanish individual.

The dark skin is surprising given that humans living at higher latitudes typically evolve pale skins so they can absorb more UV rays and make vitamin D. But on the whole, pale skin does not appear to have swept through Europe until much later, with the arrival of a new wave of conquerors.

Last year, a genetic study revealed that modern Europeans still carry traces of the early hunter-gatherers in their DNA. It also found signs of other long-lost ancestors. By comparing DNA from 7000- and 8000-year-old bones from Germany, Luxembourg and Sweden with the genomes of 2345 modern Europeans, Iosif Lazaridis of Harvard Medical School and his colleagues found that most living Europeans can trace their ancestry to not one but three ancestral populations (*Nature*, vol 513, p 409). The second group was strikingly different to the first.

Europe's ghosts

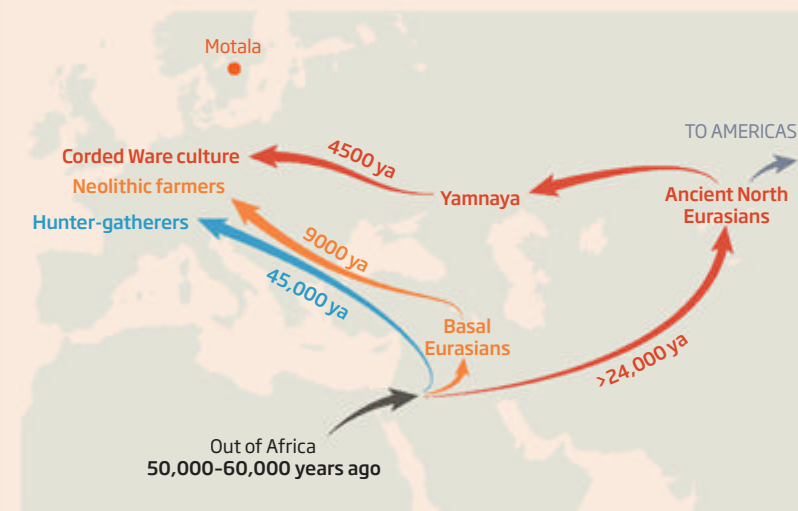
All modern Europeans carry the genetic signatures of three distinct groups that migrated into Europe between 45,000 and 4500 years ago: the hunter-gatherers, Neolithic farmers and Yamnaya (see main story). But studies of modern and ancient DNA have also kicked up evidence for two poorly understood "ghost" populations.

Genetic markers from the first ghost population, the Ancient North Eurasians, are peppered around the globe. They pop up in the Yamnaya,

in an unusual group of blue-eyed farmers discovered at Motala in Sweden, and in the earliest North Americans. At the genetic and geographical cross-roads of these groups is a boy who died 24,000 years ago near Lake Baikal in Siberia.

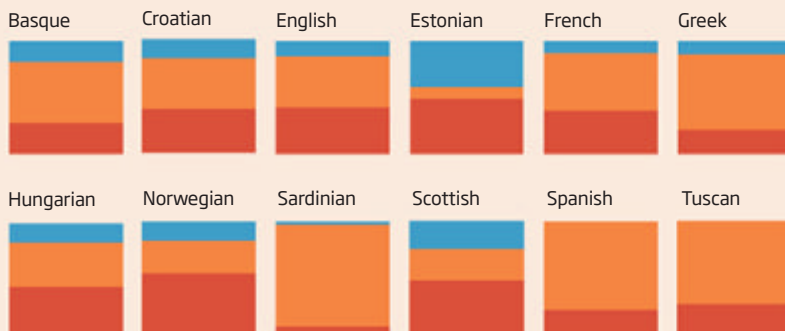
All this tells us that an intrepid group of *Homo sapiens* must have left the Middle East early on, making it to Siberia more than 24,000 years ago. From there, they split east and west, to the Americas and to Europe.

The second ghost population, the Basal Eurasians, is ancestral to the early farmers. Bizarrely, these have very different genetic markers from everyone else who descends from the out-of-Africa migrants. The best explanation is that the ancestors of European hunter-gatherers somehow set up camp on their own in the Middle East and lived apart for millennia – long enough to evolve their own genetic markers. No one knows why and how this happened.



How much of a caveman are you?

Modern Europeans have DNA from cave-dwelling **hunter-gatherers**, **Neolithic farmers** and the **Yamnaya**



SOURCE: DOI.ORG/290

What had been thick forest just a few months earlier was now open ground. From his hiding place, the young hunter-gatherer looked on with a furrowed brow, trying to understand why the pale newcomers were so diligently removing every last plant from the clearing.

For 30,000 years, the hunter-gatherers had Europe largely to themselves. Then about 9000 years ago, Neolithic farmers arrived from the Middle East and began spreading through south and central Europe. They brought their understanding of how to collect and sow seeds, as well as the staples of modern European diets. "The basic livestock of Europe today, with the exception of things like chicken, arrive then," says Peter Bogucki of Princeton University. He had long suspected that early farmers consumed dairy products too, and was proven right in 2012 when he discovered that 7500-year-old ceramic sieves from Poland bear the chemical residues of cheese-making.

With farming came a more sedentary and recognisably modern lifestyle. Villages became a much more common fixture. Some archaeological sites have distinct rows of houses. "In Central Europe, folks lived in settlements based around longhouses," says Bogucki. "Those were the largest buildings in the world in the sixth millennium BC." It was around this time that the artisan was born. "From the distribution of buildings in Neolithic villages, it's evident you are getting some forms of craft specialisation, although not necessarily full-time professionals," says James Mallory at Queen's University Belfast, UK.

Changing skin colour

Early farmers looked more like modern Europeans too. DNA pulled from the bones of a 7000-year-old early farmer unearthed in Germany shows she had pale skin, dark hair and brown eyes. More recently, Lazaridis and his colleague Iain Mathieson led an analysis of DNA from 83 people who lived in Europe within the last 8000 years. It shows that one of the two genes responsible for the ancient farmer's pale skin swept through Europe very soon after farmers arrived in the region. Today, many northern Europeans carry a mix of DNA from hunter-gatherers and early farmers (see "How much of a caveman are you?", left), which suggests that at some point ➤

TALKING 'BOUT A REVOLUTION

Languages, like bones and DNA, can offer clues to who our ancestors were. In the same way as biologists look at the genes or physical traits that two species share in order to reconstruct what their common ancestor might have looked like, so do linguists build family trees of languages. The word "name", for instance, derives from the Latin "*nomen*", which also gives us the French "*nom*" and the Spanish "*nombre*".

Doing this with modern European languages shows that most of them, and some non-European languages, share a common origin: a now-extinct language dubbed Proto-Indo-European. It was probably spoken somewhere in the west of central Eurasia, and brought to Europe by an incoming population. Don Ringe at the University of Pennsylvania in Philadelphia says it makes sense that this was the Yamnaya (see main story).

The original vocabulary reconstructed by linguists contains five words relating to the wheel. Two literally mean "wheel", one means "axle", one refers to a pole used to harness animals to a cart, and one is a verb for the action of transporting in a vehicle. Talking about the wheel implies it was an important technology for speakers of the language.

These words make it possible to date Proto-Indo-European to about 5500 years ago. That is when full-size wheels, miniature models and images and carvings of wheeled wagons start to appear across western Eurasia, from the Russian steppes to Poland and all the way down into Mesopotamia.

the two groups began interbreeding. As farming took over, a way of life that had existed in Europe for tens of thousands of years slowly faded and the continent took a giant step towards its modern identity.

Genetic analyses show that farming brought a population boom and, undoubtedly, conflict. Violence wasn't absent from Europe before the farmers showed up, of course, but there is disturbing evidence of organised killing on a massive scale once they arrived on the scene. The Talheim Death Pit in Germany is a particularly grisly example. It contains the 7000-year-old remains of 34 early farmers – men, women and children – all apparently hastily buried in a chaotic fashion. "There are holes in the skulls with the same lozenge shape as Neolithic axes," says Bogucki. "It was farmer-on-farmer violence."

"The amount of stress any group would experience probably went through the roof," he says. "The Neolithic is really predicated on a sense of property rights and ownership. This triggers all sorts of other things." A settled lifestyle made it harder to relocate if conflicts arose between neighbouring tribes, so they would often be resolved with mass violence. But, fundamentally, life in early Neolithic Europe was still relatively insular. The final, missing ingredient, the one that would truly lay the flagstones for a European civilisation, was still a few thousand years off.

In Europe, the Yamnaya formed the Corded Ware pottery culture



DEA / G. DAGLI ORTI / GETTY

Life was tough for the young farmer. Working the land had always been hard – but now his harvest could be taken by the tall horse riders.

Archaeologists have long debated the existence of another great prehistoric migration into Europe – one that brought in a mysterious group from the Eurasian steppe. The Yamnaya, so the argument went, founded some of the late Neolithic and Copper Age cultures, including the vast Corded Ware culture – named after its distinctive style of pottery (see picture below) – that stretched from the Netherlands to central Russia. "The weight of archaeological opinion has been against the idea," says David Anthony at Hartwick College in Oneonta, New York.

That might be about to change. Lazaridis's 2014 study of ancient DNA offered the first compelling evidence that a third ancient population did shape the modern European gene pool, and that it originated in northern Eurasia. With the curious exception of the blond hunter-gatherers from Sweden, Lazaridis found no signs of this population in the genes of early farmers or hunter-gatherers. So the people carrying the genes must have become common in Europe some time after most farmers arrived.

Now, two separate studies – one led by Lazaridis and Wolfgang Haak of the Australian Centre for Ancient DNA in Adelaide, the other by Eske Willerslev of the University of Copenhagen in Denmark – link the arrival of these genes to a massive Yamnaya migration into Europe about 4500 years ago. Haak and Lazaridis found that 75 per cent of the genetic markers of skeletons associated with Corded Ware artefacts unearthed in Germany could be traced to Yamnaya bones previously unearthed in Russia (*Nature*, vol 522, p 207).

"That changes things dramatically," says Anthony, who also contributed to the paper. The genetic evidence provides tantalising evidence that there really was a massive influx of Yamnaya people into Europe around 4500 years ago – just as Anthony and a few archaeologists have long argued.

In appearance, the Yamnaya might not have been too different from the early farmers – light-skinned and probably with dark eyes – although there is evidence to suggest they may have been taller. It is the social and cultural traits they brought to Europe that are most significant.



**The “ladies of Téviec”
were victims of
Neolithic violence**

The Yamnaya were cattle herders. Up until about 5500 years ago, their settlements clung to the river valleys of the Eurasian steppe – the only place where they had easy access to the water they and their livestock needed. The invention of a single, revolutionary technology changed everything. We know from linguistic studies (see “Talking ‘bout a revolution”, page 32) that the Yamnaya rode horses and, crucially, had fully embraced the freedom that came with the wheel.

With wagons, they could take water and food wherever they wanted, and the archaeological record shows they began to occupy vast territories. Natalia Shishlina at the State Historical Museum in Moscow, Russia, has also found evidence for this increasingly nomadic existence. Her archaeological research shows that Yamnaya groups moved their large herds from season to season so they always had fresh pastures to feed on.

Anthony suspects that the change led to fundamental shifts in how Yamnaya society was structured, before they left the steppes. Groups roamed into each other’s territories, so a political framework emerged that obliged tribal leaders to offer wanderers safe passage and protection.

There is, of course, no archaeological evidence for this new political framework, especially given that the Yamnaya didn’t keep written records. “It’s quite difficult to tell much about developments in social

organisation from the archaeological point of view,” says Shishlina. Anthony finds supports for his idea in the work of linguist Don Ringe of the University of Pennsylvania in Philadelphia, who has shown that Yamnaya vocabulary contains words for “hospitality”, “feast” and “patron”.

If Anthony is correct, then it’s easy to imagine that the Yamnaya brought this new political framework with them as they ventured west, although why the European farmers and remaining pockets of hunter-gatherers adopted it is a puzzle. Anthony speculates that it would have brought them under the legal protection of the powerful newcomers: “like a protection racket”, he says.

“Like Romulus and Remus, Yamnaya youth cults are associated with wolves”

Scholars will no doubt continue to speculate about how Yamnaya and early European cultures clashed and interacted. But in one respect at least, the arrival of the Yamnaya had a clear and profound effect on Europe. The language they spoke, Proto-Indo-European is the common ancestor of all modern European languages.

Some say the genetic evidence still needs to be backed up. “Invariably you’re working with very small population samples, and you can have no idea how the picture will look in the long run,” says Mallory. Martin Furholt at the University of Kiel, Germany, agrees. He says

there is so much regional variation in Corded Ware artefacts that it’s clear the culture was not a homogeneous entity with a single origin. “It is not very helpful to produce these stereotypic, oversimplified narratives of mass migrations or invasions,” says Furholt.

If Corded Ware skeletons further west do show the same genetic pattern as those so far analysed in Germany, the case for a mass migration that brought in new languages and new ideas becomes stronger. We might not have to wait long to find out. Mallory is aware of several studies in the pipeline that explore the genetics of the western Corded Ware people.

When it comes to understanding the origin of European culture, there’s another reason for looking at the Yamnaya. The very foundation of Rome may be steeped in their traditions. According to studies of Indo-European mythology, young Yamnaya men would go off in warlike groups, raping and pillaging for a few years, then return to their village and settle down into respectability as adults. Those cults were mythologically associated with wolves and dogs, like youths forming wild hunting packs, and the youths are said to have worn dog or wolf skins during their initiation.

Anthony has found a site in Russia where the Yamnaya killed wolves and dogs in midwinter. He says it’s easy to imagine groups sacrificing and consuming the animals as a way to symbolically become wolves or dogs themselves. Bodies in Yamnaya graves on the western steppes frequently have pendants of dog canine teeth around their necks. Anthony says that all this offers solid archaeological evidence for the youthful “wolf packs” of Indo-European legends – and sees a link to the myth of the foundation of Rome.

“You’ve got two boys, Romulus and Remus and a wolf that more or less gives birth to them,” he says. “And the earliest legends of the foundation of Rome are connected with a large group of homeless young men who were given shelter by Romulus. But they then wanted wives, so they invited in a neighbouring tribe and stole all their women. You can see that whole set of early legends as being connected possibly with the foundation of Rome by youthful war bands.”

It’s a seductive idea, and if true a very satisfying conclusion to the series of dots linking Europe’s remote prehistory to the early days of modern Western civilisation. ■

Colin Barras is a writer based near Ann Arbor in Michigan, US