# Unearthed tools rewrite saga of human migration

July 7 2010, by Marlowe Hood

Palaeontologist Simon Parfitt shows a newly discovered fossil of hyena droppings found in a United Kingdom river deposit, during a press conference to reveal the findings at the Royal Institution in London, Wednesday, July 7, 2010. The finds, revealed in this week's Nature magazine, indicate that early humans were living in northern Europe more than 780,000 years ago and tell us more about the dispersal of early humans out of Africa and will likely prompt a re-evaluation of the adaptations and capabilities of early humans. (AP Photo/Sang Tan)

Early humans migrating out of Africa adapted to freezing climes more than 800,000 years ago, far sooner than previously thought possible, according to a landmark study released Wednesday.

A trove of flint tools found near Happisburgh in the eastern English county of Norfolk marks Homo sapiens' earliest known settlement in a

location where winter temperatures fell below zero degrees Celsius (32 degrees Fahrenheit).

The discovery implies our ancestors some 26,000 generations ago survived climates like those of southern Sweden today, perhaps without the comforting benefit of fire or clothes, the study says.

Until now, almost every archeological site testifying to habitation across Eurasia during the Early Pleistocene period, 1.8 million to 780,000 years ago, has been below the 45th parallel, suggesting a natural temperature barrier to further northward expansion.

All these sites were either tropical, savannah or Mediterranean in character.

The climate boundary cut across southern France and northern Italy, Romania, southern Kazakhstan and Mongolia, as well as northeastern China and the northern tip of Hokkaido Island in Japan.

The only known exception -- a site at Pakefield in Suffolk, southern England -- was occupied by humans during a balmy interlude.

But the new research, led by Nick Ashton of the British Museum, has thrown down a challenge to the 45th-parallel rule.

It has shown for the first time that our hardy forebears, armed with a few stone tools or weapons, could survive in a challenging, frigid environment.

"The new flint artefacts are incredibly important," said Ashton.

"Not only are they much earlier than other finds, but they are associated with a unique array of environmental data that gives a clear picture of

the vegetation and climate."

Piecing that information together required several strains of complex detective work.

To date the tools, the researchers examined the magnetic data locked in different layers and types of sediment, comparing them to known changes in the direction and intensity of Earth's magnetic fields.

The materials, however, did not lend themselves easily to such analysis, both because of the lack of magnetic minerals, and because of "noise" created by the presence of an iron-rich rock called greigite.

Ashton and colleagues also used a technique called biostratigraphy, which analyses the remnant traces of plants and animals.

By cross-referencing species known to be already extinct or not yet present, they succeeded in narrowing down the timeframe.

Together, the magnetic and biological evidence "indicate a date toward the end of the Early Pleistocene," concludes the study, published in the British journal *Nature*.

Reconstructing the climate and environment -- near an estuary of the River Thames, which has since changed course -- also called for identifying long-dead flora and fauna, including several types of pollen, seeds, pinecones, barnacles and beetles.

Summers probably averaged 16 to 18 C (61 to 64 F), and winters a frosty zero to - 3.0 C (32 to 26 F).

During the harsh winters, the area's two-legged predators almost certainly relied on hunting animals, as edible plants would have been in

very short supply, the study says.

Still, they would have also benefited from the warming impact of the ocean, as well as species-rich freshwater pools, salt marshes and a large tidal flood plain with a large range of grass-eating creatures and their predators.

Further excavation is already under way to resolve other mysteries.

"It remains unclear whether expansion into northern latitudes with lower winder temperatures required human physical adaptation, seasonal migration or developments in technology such as hunting, clothes, the use of shelters or control of fire," the researchers said.

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