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Neanderthal man's last stand

Our distant relatives may have survived on Gibraltar as recently as 24,000 years ago, writes **Deborah Smith.**

IT WAS prime real estate – spacious, with high ceilings, lots of light and water views. And for thousands of years, Gorham's Cave was a popular haven from the weather for the Neanderthals who lived on the Rock of Gibraltar. Now it appears the site provided a final refuge for this species of human. New research shows the cave was the home of the last known Neanderthals on Earth.

As our ancestors, modern humans, strode across the breadth of Europe from the Middle East, claiming their territory, groups of the squat, thick-browed Neanderthals clung on in this isolated spot at the south-western tip of the continent, while their relatives elsewhere died out.

A study published today by the journal *Nature* shows they survived at Gorham's Cave until 28,000 years ago, and perhaps as recently as 24,000.

Modern humans arrived in Europe about 45,000 years ago and some recent studies have suggested they quickly ousted the less technologically advanced people they came across.

Professor Clive Finlayson, the director of the Gibraltar Museum, however, says his team's new findings show that pioneer groups of one species and remnants of the other shared Gibraltar for several thousand years. "For a long time populations of both Neanderthals and modern humans were thinly scattered across the region," he says.

The last Neanderthals, wherever they lived, were participants in one of the most dramatic events in human evolution, as they watched our ancestors finally establish themselves as the inheritors of Europe, says Professor Eric Delson, of the American Museum of Natural History in New York. "Did they meet? Did they compete? If so, in what ways? Did they interbreed? If they did, did the Neanderthals become assimilated into the modern human gene pool, or was theirs a union without issue?"

While archaeological digs can help answer these questions, in Adelaide, Professor Alan Cooper, an expert on ancient DNA, is tackling them with modern technology. Cooper, a Federation Fellow, is working on bones and teeth from two Neanderthals who lived in Spain and Italy. The ancient material in his laboratory is rare and precious.

"Samples [from Neanderthals] are very hard to come by," he says. The material from Spain is particularly valuable because it has not been handled much by modern humans.

Other scientists extracting and studying Neanderthal DNA destroy the sample in the experiments, but Cooper is pioneering a radical way of growing or amplifying the DNA so it becomes an inexhaustible resource. This "library" of DNA would then be available to different researchers wanting to study different Neanderthal genes.

Cooper says genetic studies so far suggest there was no sustained interbreeding between modern humans and Neanderthals. "You can never rule out some random coupling in some dark forest in Europe in the past," he says. "But it doesn't seem to have generated any offspring that contributed to the modern population of humans."

The tentative 24,000-year-old date for occupation of Gorham's Cave, however, does throw light on the recent discovery in Portugal of remains known as the Lagar Velho child. Researchers claimed the 24,500-year-old skeleton of a four-year-old boy was a hybrid, with features of both Neanderthals and modern humans.

One of the main objections to this interpretation was that Neanderthals were thought to have been extinct by then, say Delson and Dr Katerina Harvati, of the Max Planck Institute for Evolutionary Anthropology in Germany, in a commentary for *Nature*. This criticism would no longer hold if the Gibraltar date is confirmed, they say.

Sea levels were much lower 30,000 years ago. Today Gorham's Cave, discovered in 1907 and first excavated in the 1950s, is close to the water. In a 60-metre-high cliff, the cave is one of eight sites on the six-kilometre-long Rock of Gibraltar that were inhabited by Neanderthals, and well-preserved skulls have been found in two of these caves.

Gorham's Cave was popular among cavemen, says Finlayson. "It's situation, where natural light penetrates deep into the cave and where high ceilings permit ventilation of smoke, is unique within the cave system, and hearths were made in the same location many times."

For the latest study, archaeologists

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dug into a large area of floor at the back of the cave. More than 100 stone tools of the style made by Neanderthals were discovered, as well as the bones of butchered animals. The inhabitants would have had access to a wide range of plants and animals on the sandy plains, open woodlands, wetlands, cliffs and coast that surrounded their paradise home, says Finlayson. "Such ecological diversity might have facilitated their long survival."

But they also had to contend with predators such as hyenas, leopards, lions and wolves.

Then came the modern humans. A study published in February which reviewed the dates of archaeological sites in Europe concluded that modern humans moved across Europe faster than had been thought, and co-existence with most Neanderthals may have been as short as 2000 years in places. This would suggest Neanderthal extinction was rapid and modern humans had a big competitive advantage, Delson says.

"That edge came perhaps from cultural practices such as improved clothing and more effective social networks." However, the Gibraltar finds add another dimension to the story. "At least one group of Neanderthals was able to survive the deteriorating climate and competition from modern humans."

Neanderthals were not the last human species to become extinct. That distinction belongs to the hobbit-sized people whose remains were found in another spacious cave, Liang Bua, on the other side of the world, on the Indonesian island of Flores. They survived until about 12,000 years ago.

Cooper is also searching for DNA from this species, known as *Homo floresiensis*. He went to Jakarta, where the remains are kept, and drilled the contents from teeth from two hobbits which were about 18,000 and 15,000 years old. "They were in surprisingly good nick, but we have been unable to get any DNA out of them."

He remains hopeful, having been able to extract DNA from a tooth from an 8000-year-old pig excavated from the same cave. If younger hobbit bones are found they may still contain genetic material that would resolve a scientific controversy about the bones. "DNA will definitely show whether these specimens were simply unusual modern humans or a completely separate species," he says.

His recently opened laboratory, the Australian Centre for Ancient DNA, has also been contracted to study ancient human DNA as part of National Geographic's Genographic Project, which aims to trace, genetically, the history of human migration around the globe.

Cooper is also studying DNA from prehistoric animals, including lions, bison, horses and giant beavers. "What I'm really interested in is the impact of climate change on the distribution and diversity of species over time – why they move where, and when."

The Neanderthals of Gorham's Cave eventually succumbed to the cold and dwindling resources. Their cave was taken over by modern humans who made well-crafted arrowheads, wore deer teeth for necklaces and began to decorate their new home with drawings of animals on the walls.

Man of science … Alan Cooper, far left, is tackling questions about Neanderthal man, left, with DNA technology.

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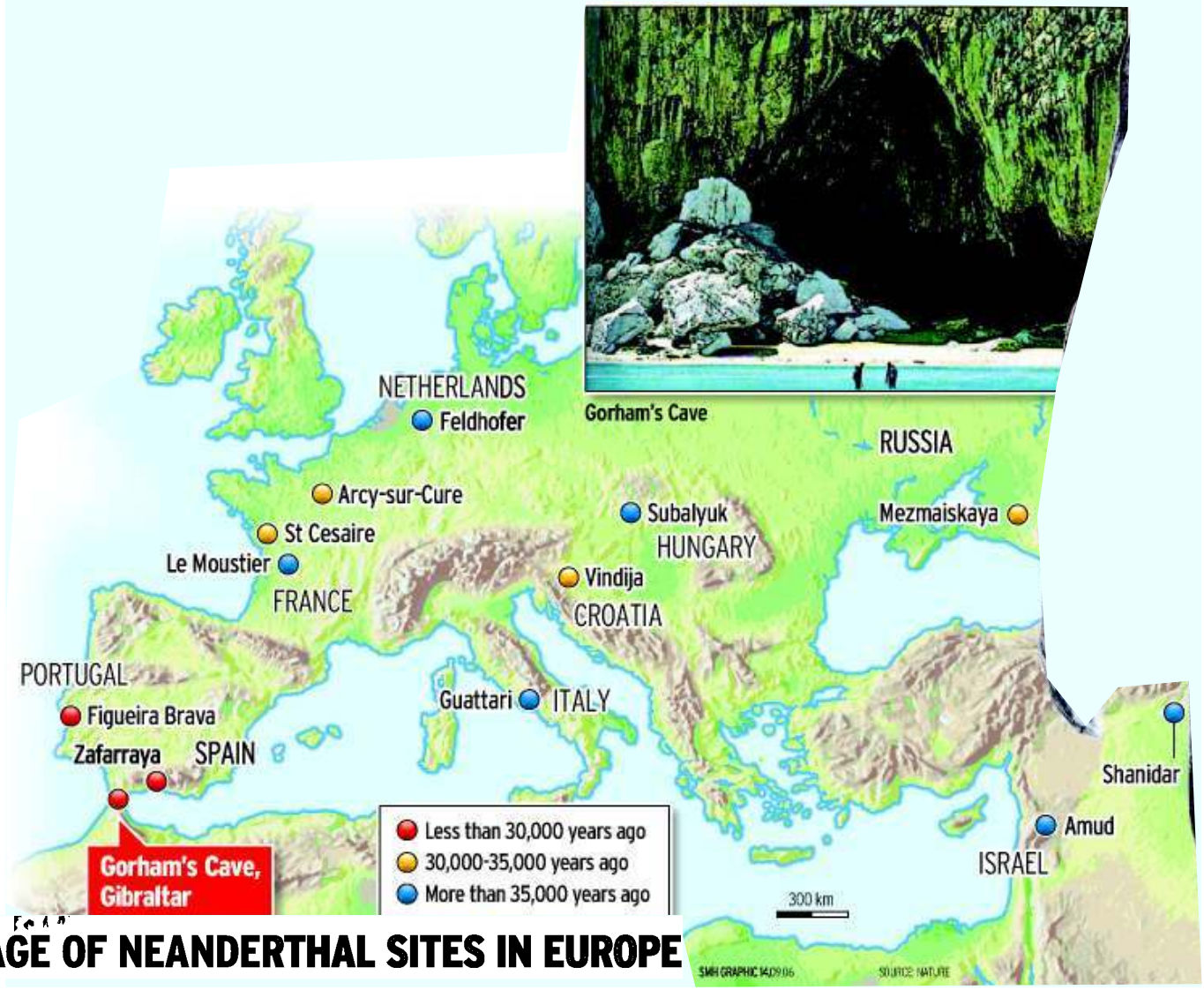

AGE OF NEANDERTHAL SITES IN EUROPE