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No pulse, but the genes are busy

For forensic scientists, knowing how gene activity rises and falls at different time points after death is useful for working out when someone died. Measuring mRNA would allow us to nail down the time since death to hours and possibly even minutes, rather than days, helping to reconstruct events surrounding the death.

It is good to see such progress being made in this area, says Graham Williams, consultant forensic geneticist at the University of Huddersfield, UK. "But substantial work is required before this could be applied to case work."

The research also raises important questions about our definition of death – normally accepted as the cessation of a heartbeat, brain activity and breathing. If genes can be active up to 48 hours after death, is the person technically still alive at that point? "Clearly, studying death will provide new information on the biology of life," says Noble. n

Race to save brief bonanza of treasures

THOUSANDS of ancient relics unearthed by climate change could soon be lost forever, destroyed by weathering and pests. The crisis is so acute that some archaeologists are urging colleagues to abandon their current field sites and focus instead on these newly exposed treasures before they vanish.

Rising seas, raging storms, melting ice and forest fires are exposing artefacts that have much to tell us about our history on Earth – from sunken shipwrecks in Svalbard to the ancient waste dumps filled with bones, shoes and carvings that are emerging all over the Arctic and further south, including in Scotland.

"This material is like the library of Alexandria. It is incredibly valuable and it's on fire now," George Hambrecht, at the University of Maryland, College Park, told *New Scientist* at the Anthropology, Weather and Climate Change conference in London last month.

"Archaeology provides the longest record of humans on Earth," Robert Kelly, at the University of Wyoming, Laramie, told the meeting. "These sites matter because they contribute

to understanding how ancient societies coped with climate change."

In Norway's Svalbard archipelago, receding sea ice has opened up previously inaccessible areas. This has enabled Øyvind Ødegård at the Norwegian University of Science and Technology in Trondheim to start investigating the estimated 1000 shipwrecks in the region, dating from 1596 to the mid-20th century. Only one wreck had been examined before.

But in January, Ødegård was alarmed when a piece of driftwood was pulled out of Rijpfjorden Bay. It was infested with what he thinks is shipworm (*Teredo navalis*), a mollusc that is voracious in its consumption of wood but was thought to be absent from such cold waters.

"We don't know if this is climate-related," he says. "It's kind of a race now because if the shipworm is suddenly present due to climate change, it is a new threat to the cultural heritage on the seabed. It would be a complete disaster if we came too late."

Recent advances in archaeological techniques mean that we can now extract immense detail from old

artefacts about the lives and environments of ancient peoples. For example, the isotopes found in dental plaque can reveal an individual's diet and where they travelled. And ancient DNA can uncover the genetic histories of crops and livestock – information that could help us adapt the species we rely on to climate change.

"The archive is being destroyed just as we are able to read it," says Thomas McGovern, an archaeologist at the City University of New York. Take Walakpa Bay in northern Alaska, he says,

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where a frozen collection of artefacts, spanning 4000 years, of the native Alaskan Iñupiat people is thawing, its contents crumbling into the sea.

In 2014, a single storm washed away half the site. Archaeologists are now racing to retrieve a 3000-year-old frozen walrus stored for food. Isotope studies of lead in the animal's teeth could reveal its diet and foraging routes, and help build a picture of the ecosystem that existed at the time.

The ability to track ancient animals' distributions has only been possible in the past year, says McGovern. This ancient data can help us better understand creatures that are economically important today, such as cod, and how they lived before Earth's habitats were hugely affected by human activity.

Some archaeologists are now calling on their peers to postpone their work on better preserved sites and focus on these disappearing treasures before it is too late. Efforts are under way to collaborate on retrieving as much of the material as possible and storing it in warehouses to be studied by future archaeologists.

"We should concentrate our efforts in the places where we are losing the evidence," says Tom Dawson at the University of St Andrews, UK, who has fought to save thousands of crumbling sites along the coasts of Scotland. "It's a no-brainer." Aisling Irwin n



COURTESY OF ANNE JENSEN

Defrosted and about to disappear