

PRESS RELEASE

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The Ancient Britons: Shrimp-like animals have survived millions of years in groundwater

Ancient shrimp-like animals have been living in underground waters in Britain and Ireland for at least 20 million years, a recent genetic study has shown.

Very few animal species are thought to be unique to the British Isles, because of the ravages of repeated glaciations. Surface species have been here for a few tens of thousands of years at the most, and they generally have wide distributions across Europe. But living in water filled crevices deep inside the rock beneath our feet there are at least 5 species of *Niphargus* (1mm-15mm long amphipods that have specialised to a life in complete darkness) which have been in Britain and Ireland for millions of years, and are not found anywhere else in the world.



Photo By Chris Procter

Niphargus have no eyes and no pigment because they live in total darkness

"We compared the genetic makeup of over a hundred species of *Niphargus* across Europe and discovered that *Niphargus* originated in what is now central France about 88 million years ago" said Bernd Hänfling of Hull University, who led the study "Here in Britain and Ireland at least five species have evolved separately from their relations in mainland Europe, and are by far the oldest endemics we have in these islands"

Niphargus survived the mass extinctions that wiped out the dinosaurs and many other species 65 million years ago. 20 million years ago the earliest *Niphargus* ancestor in the British Isles split to form two species – one which is now only found in southwest England, and a second that is only found in Ireland. The genetics shows that there were at least three more separate colonisation events between about 1 and 5 million years ago when *Niphargus* arrived from continental Europe, and evolved into unique British species.



Niphargus glenniei is only found in Devon and Cornwall, and has been there for more than 20 million years (Photo by Chris Procter).

“It is remarkable that these animals have survived for millions of years in northern Europe given the extreme climatic and geological changes that have occurred over this long period.” said Dr Louise Maurice of the British Geological Survey, a hydrogeologist on the team. “We think that the subsurface environment may be somewhat buffered from the changes that occur on the surface, enabling animals to survive within the groundwater, even during the extreme cold periods of glaciations”.



Niphargus are collected using nets lowered deep beneath the surface down boreholes

The study also found contrasting patterns across Europe that relate to geology and geomorphology. In north-west Europe there are relatively few species of *Niphargus*, which is probably because of the impacts of repeated glaciations. When *Niphargus* first evolved in

north-west Europe about 88 million years ago, the area was separated from what is now south-east Europe by a large ocean known as the Tethys Sea. It was only after the Tethys Sea closed, that *Niphargus* slowly moved into south-east Europe. South-east Europe therefore has younger species of *Niphargus*. But because of the favourable climatic and geomorphological situation, there has been a huge diversification in south-east Europe over the last 25 million years, so today we see many more species of *Niphargus* here than we do in the north-west. These extraordinary animals, adapted to live in water below ground, therefore provide a unique insight into the interactions between biological and geological processes.

“Predicting how different ecosystems will respond to climate change is one of the major challenges facing the scientific community today. If we can increase our understanding of how these *Niphargus* species have persisted for so long, it may help shed light on this important area of research” said Professor Anne Robertson, an aquatic ecologist at the University of Roehampton.

The research, published in *Molecular Ecology*, was carried out by a multi-disciplinary team combining biologists from Hull and Ulster Universities; hydrogeologists from the British Geological Survey; and ecologists from Roehampton University, Brussels University, Devon, and Manchester museum.



Niphargus have long appendages so they can move around in the dark

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Notes for Editors

Photographs are available from the dropbox link:

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The following are available for interview:

- Louise Maurice, British Geological Survey, Wallingford

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