Ancient oceans offer new insight into the origins of animal life

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(PhysOrg.com) -- Analysis of a rock type found only in the world's oldest oceans has shed new light on how large animals first got a foothold on the Earth.

A scientific team led by Professor Robert Frei at the University of Copenhagen in Denmark, and including scientists from Newcastle University, UK, and universities in Uruguay and Southern Denmark, have for the first time managed to plot the rise and fall of oxygen levels in the Earth's atmosphere over the last 3.8 billion years.

By analysing the isotopes of chromium in iron-rich sediments formed in the ancient oceans, the team has found that a rise in atmospheric oxygen levels 580 million years ago was closely followed by the evolution of animal life.

Published today in the academic journal *Nature*, the data offers new insight into how animal life - and ultimately humans - first came to roam the planet.

"Because animals evolved in the sea, most previous research has focussed on oceanic oxygen levels," explains Newcastle University's Dr Simon Poulton, one of the authors of the paper.

"Our research confirms for the first time that a rise in atmospheric oxygen was the driving force for oxygenation of the oceans 580 million years ago, and that this was the catalyst for the evolution of large

complex animals."

Distinctive chromium isotope signals occur when continental rocks are altered and weathered as a result of oxygen levels rising in the atmosphere.

The chromium released by this weathering is then washed into the seas and deposited in the deepest oceans - trapped in iron-rich rocks on the sea bed.

Using this new data, the research team has not only been able to establish the trigger for the evolution of animals, but have also demonstrated that oxygen began to pulse into the atmosphere earlier than previously thought.

"Oxygen levels actually began to rise 2.8 billion years ago" explains Dr Poulton.

"But instead of this rise being steady and gradual over time, what we saw in our data was a very unstable situation with short-lived episodes of free oxygen in the atmosphere early in Earth's history, followed by plummeting levels around 2 billion years ago.

"It was not until a second rise in atmospheric oxygen 580 million years ago that larger complex animals were able to get a foothold on the Earth."

Source: Newcastle University