Press release

MUSE Museo delle Scienze

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Nachrichten, Termine, Experten

A new research highlights the importance of past ecosystems as a measure of the health of our planet

A new international research project coordinated by the MUSE - Science Museum in Trento and the Museum of Nature South Tyrol, both based in northern Italy shows how ecosystems dating back to 260 million years ago are relevant to understanding the world today.

The results of the study which was led by the Italian paleontologist Massimo Bernardi of MUSE and show the collaboration of the Field Museum of Natural History in Chicago, the Smithsonian Museum of Natural History in Washington DC, the Universities of Göttingen in Germany and Utrecht in The Netherlands, have been published in the prestigious scientific journal "Earth-Science Reviews".

The study highlights how equatorial ecosystems from the late Permian period, although very different from modern tropical rainforests, hosted an exceptional diversity of species, including both archaic groups that were extinct elsewhere, and newly emerged groups, typical characteristics of today's equatorial ecosystems. Only a few million years later, these diverse ecosystems were decimated by the greatest ecosystem crisis in the history of the planet, the Permian-Triassic mass extinction. This event, a time of intense climate change and extremely-high rates of species extinction, was similar to the modern human-driven climate change and species extinction. The use of paleontological data to understand the modern biodiversity crisis is part of the emerging field of conservation paleobiology.

About 260 million years ago, our planet was populated by bizarre animals, including the ancestors of the dinosaurs and mammals, crocodile-sized amphibians, and many groups that are now totally extinct. New research conducted by an international team of paleontologists and geologists shows that, in the Permian, the equatorial belt was a unique area: despite being mostly covered by an apparently inhospitable desert, it hosted a rich diversity of terrestrial species, particularly reptiles and plants.

In a new article published in the journal "Earth-Science Reviews", a research team led by the paleontologist Massimo Bernardi of MUSE museum and supported by the Euregio Science Fund, has developed a global comparison of fossil sites showing unexpected similarity between the equatorial terrestrial ecosystems of the time and those of today. "The tropics were a breeding ground for biodiversity, in the distant Permian as well as today" says Massimo Bernardi. "With this study we have shown the importance, even in the past, low latitude areas both as "cradles of biodiversity ", i.e. places of rapid evolution, and as "biodiversity museums ", refuges where species that are extinct elsewhere survive", adds Kenneth D. Angielczyk, a paleontologist at the Field Museum and senior author of the paper.

Although it is well established that the warm and humid rainforests of today harbor an incredible diversity, it may seem counterintuitive that the arid deserts of the Permian harbored an exceptional multitude of species. "However - adds Fabio Massimo Petti one of the co-authors - this study demonstrates that the equatorial band played a key role for the planet's biodiversity even in ancient times and despite the fact that different kinds of climates and environmental conditions characterized the area in the past".

The foundation of the research was made during fieldwork in the Bletterbach Valley, in the Dolomites region, northern Italy, which was located near the equator in the Permian Period. As Evelyn Kustatscher of the Museum of Nature South

Tyrol explains: "The Bletterbach is a unique place nowadays, and it occupied a key geographical position in the late Permian. The fossil associations found there show a mixture of species lived there that represent more major groups of animals than is usually the case at other localities of the same age known from all over the world ".

According to the authors, in order to understand the "normal" functioning of today's ecosystems in the absence of human influence, it is essential to look at the past, and therefore the fossil record.

Ongoing human-cause climate change and habitat destruction, and their effects on ecosystems around the globe, are increasingly comparable to the events that led to the Permian-Triassic extinction 252 million years ago. Studies such as this contribute to measuring the health of our planet.

The study is part of the research project "The end-Permian mass extinction in the Southern and Eastern Alps" developed by the Museum of Nature South Tyrol, Bolzano, Italy, the MUSE - Science Museum, Trento, Italy and the Department of Geology of the University of Innsbruck, Austria.

The scientific article is freely accessible thanks to funding for scientific publications of the Research and University Service of the Bolzano Province, Italy:

Massimo Bernardi, Fabio Massimo Petti, Evelyn Kustatscher, Matthias Franz, Christoph Hartkopf-Fröder, Conrad C. Labandeira, Torsten Wappler, Johanna H.A. van Konijnenburg-van Cittert, Brandon R. Peecook, Kenneth D. Angielczyk. Late Permian (Lopingian) terrestrial ecosystems: A global comparison with new data from the low-latitude Bletterbach Biota. Earth-Science Reviews, 2017; 175: 18 DOI: 10.1016/j.earscirev.2017.10.002

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The lush equatorial ecosystem of the late Permian, about 260 million years ago, as reconstructed in the Dolomites region, Northern Italy. Drawing by Davide Bonadonna