Press Release

University of Freiburg

Rectorate

Public Relations

Fahnenbergplatz
D -79085 Freiburg

Contact:
Nicolas Scherger
Tel. +49 (0)761 / 203 - 4301
nicolas.scherger@pr.uni-freiburg.de
www.pr.uni-freiburg.de

Freiburg, 11.01.2016

Conifer cones bear their ages well, and still move it

Freiburg biologists demonstrate that fossil conifer cones possess the oldest known plant structures which still exhibit movements

Fossil conifer cones can still move their individual seed scales after millions of years. This is the finding of a study conducted by the biologists Dr. **Simon Poppinga** and Prof. Dr. **Thomas Speck** from the Plant Biomechanics Group and Botanical Garden of the University of Freiburg. The cones analyzed in the study therefore represent the oldest known plant structures that are still capable of movement and can also serve as a model for bioinspired technical applications with low maintenance requirements. The researchers published their findings in the journal *Scientific Reports*.

Cones from coniferous trees like pines open in response to dry conditions and close in response to wet conditions – a mechanism that enables them to release their seeds under favorable environmental conditions. In addition, the movement of the individual scales is passive, meaning that it does not require any metabolic energy. These attributes have recently brought conifer cones to the attention of scientists, who aim to use them as biological models for the development of technical devices capable of autonomous movement. Poppinga and Speck have now discovered that the scales continue to function in this way for an extremely long time: Fossil cones from the Eemian interglacial period, about 126,000 to 113,000 years ago, as well as the middle Miocene, about 16.5 to 11.5 million years ago, still react to changes in moisture by moving their scales. With the help of x-ray-computed tomography, the researchers demonstrated that the cones are preserved by coalification during the fossilization process and that the fossilized cones

show only very few mineral inclusions. This ensures that the fine structures responsible for moisture-dependent movement remain intact.

The study was conducted within the scope of the European research network JONAS (Joint Research Network on Advanced Materials and Systems). Besides Poppinga and Speck, scientists from BASF SE and Heidelberg University Hospital also collaborated on the study.

Caption:

Photographs of the *Keteleeria* sp. (left) and *Pinus* sp. 1 (middle) cones investigated in the study, and an x-ray-computed tomography image of the *Pinus* sp. 2 cone (right).

Photos: © Plant Biomechanics Group

Original publication:

S. Poppinga, N. Nestle, A. Šandor, B. Reible, T. Masselter, B. Bruchman, T. Speck (2016). Hygroscopic motions of fossil conifer cones. In: Scientific Reports 7:40302, DOI: 10.1038/srep40302

Contact:

Prof. Dr. Thomas Speck

Plant Biomechanics Group / Botanical Garden

University of Freiburg

Phone: +49 (0)761/203-2875

E-Mail: thomas.speck@biologie.uni-freiburg.de