

Endogenous proteins found in a 70-millionyear-old giant marine lizard

May 2 2011



One of the most well preserved mosasaur sculls in the world. Fossil at Museum of Paleonthology, University of California Berkeley, California. Photo: Johan Lindgren

(PhysOrg.com) -- With their discovery, the scientists Johan Lindgren, Per Uvdal, Anders Engdahl, and colleagues have demonstrated that remains of type I collagen, a structural protein, are retained in a mosasaur fossil.

The scientists have used synchrotron radiation-based infrared microspectroscopy at MAX-lab in Lund, southern Sweden, to show that amino acid containing matter remains in fibrous tissues obtained from a mosasaur bone.

Previously, other research teams have identified collagen-derived



peptides in dinosaur fossils based on, for example, mass spectrometric analyses of whole bone extracts.

The present study provides compelling evidence to suggest that the <u>biomolecules</u> recovered are primary and not contaminants from recent bacterial biofilms or collagen-like proteins.



KConfocal microscopic pictures of an osteocyte-similar structure. Osteocytes are cells that are producing typ I collagen. Photo: Johan Lindgren

Moreover, the discovery demonstrates that the preservation of primary <u>soft tissues</u> and endogenous biomolecules is not limited to large-sized bones buried in fluvial sandstone environments, but also occurs in relatively small-sized skeletal elements deposited in marine sediments.

A paper reporting the discovery, 'Microspectroscopic Evidence of Cretaceous Bone Proteins' is now available in the scientific journal *PLoS ONE*.





Infrared microspectroscopy of fibres isolated from a mosasaur bone. (a) SEMpicture of the fibres. The white square marks the area measured by synchrotron light. (b) Absorbans spectra from the fibre bundle reproduced in a (red=synchrotron light; blue=conventional light). (c) Comparison between absorbans spectra from recent typ I collagen, osteoid from a recent monitor lizard (varan), and fibres from a mosasaur (Prognathodon). Photo and source: Johan Lindgren

Facts:

• Mosasaurs are a group of extinct varanoid lizards that inhabited marine environments during the Late Cretaceous (approximately 100-65 million year ago).



- Collagen is the dominating protein in bone.
- The scientists have applied a broad spectrum of sophisticated techniques to achieve their results. In addition to synchrotron radiation-based infrared microspectroscopy, <u>mass spectrometry</u> and amino acid analysis have been performed.
- Virtually all experiments have been made in Lund. At MAX-lab, the experiments have been conducted at the MAX I ring, beamline 73.

More information: <u>www.plosone.org/article/info</u> %3Adoi%2F10.1371%2Fjournal.pone.0019445

Provided by Lund University

Citation: Endogenous proteins found in a 70-million-year-old giant marine lizard (2011, May 2) retrieved 8 May 2024 from https://phys.org/news/2011-05-endogenous-proteins-million-year-old-giant-marine.html

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