

Media communiqué

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Computer tomography – a tool for paleontologists too

The resurrection of an ancient rhino

Unusual finds sometimes call for unusual methods. A case in point is the Empa's computer tomograph, a device usually used to image mechanical parts, which has recently been used to scan the petrified skull of an ancient rhinoceros.

Paleontologists at the Natural History Museum in St. Gall have been using the data acquired this way to reconstruct the head and jaws of the prehistoric pachyderm.

At first glance, the object in Empa researcher Alex Flisch's hand looks like a lump of stone. On closer inspection, however, it is possible to identify – sandwiched between the light gray layers of sedimentary rock – the black, petrified remains of a skull. In fact you can even see teeth. These belonged to the upper jaw of a prehistoric rhinoceros which lived over 18 million years ago. A workman discovered the fossilized skull by chance several years ago in a block of sandstone which had lain for years in a quarry in the town of Uznach in St. Gall canton. At the beginning of last year the unusual find came into the possession of the Natural History Museum St.Gall, which sent it to the Empa in Duebendorf for investigation with its computer tomograph. Here the fossilized specimen has been subject to a thorough examination lasting several weeks.

Reconstructing the skull on the computer

The 18 inch high skull, in a glass cylinder, moves slowly back and forth in front of the x-ray tube. The x-rays pass through the 9 inch thick sandstone sample and after a good eleven minutes an image of a single slice of the rhino skull has been made – a virtual section through the fossilized bone, so to say. A total of 920 similar images were made, each a half millimeter apart. From this enormous quantity of data it has been possible to create a three dimensional model of the skull on the computer screen. One could call this the resurrection of the ancient rhino, for it is possible to view the model of the skull from every side. For Urs Oberli, a taxidermist who recreates prehistoric finds, these images and the computer tomography data will form the basis for the construction of a perfect physical model. "The great advantage of this technique is that the original sample is not destroyed by the investigation" comments Toni Buergin, the Director of the Natural History Museum St. Gall.

Reduced development times with industrial computer tomography

The Empa is the only organization in Switzerland capable of imaging fossilized samples in this way. "Computer tomographs used in hospitals are not powerful enough for this purpose" explains Alexander Flisch. The Empa's industrial tomograph, with its 450kV x-ray tube, is about three times more powerful than the medical instruments and can produce clear images of eight inch thick stone samples. For this reason it is used every now and then for archeological and paleontological purposes, such as when experts need to be able to image the inside of a petrified dinosaur egg. Scanning fossils makes a pleasant change from the routine, says Flisch. Normally the instrument is used to image prototype mechanical parts. The technology, which has been developed in the course of the EU FATIMA project, enables companies to reduce their developments times. The data from the tomograph can be used to produce a 3-D surface image of the sample which is then compared with the model created by a CAD (computer aided design) program. The comparison uncovers any differences in the two images, and resulting changes to the computer model or the mold form can be made quickly without the necessity of destroying the prototype. The process is being continuously improved – at the moment the Empa is constructing a computer tomograph which can acquire a single cross sectional image ten times faster than previously possible. This is a significant advantage for industrial applications. The prehistoric rhino fossil, on the other hand, is not in such a hurry; its petrified skull has already been waiting patiently for millions of years!

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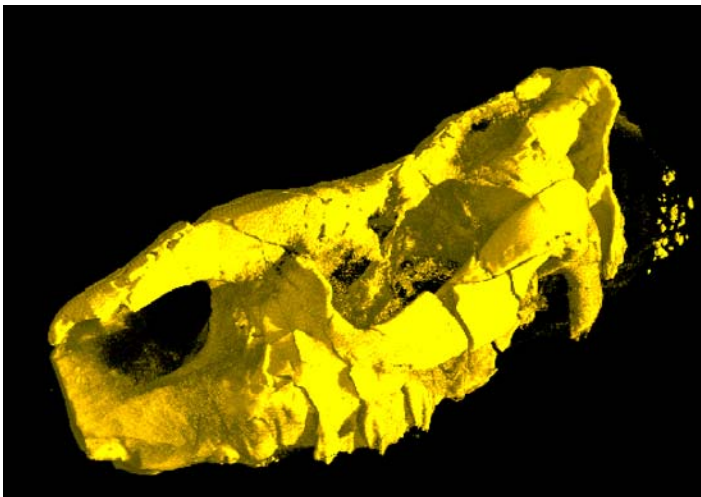
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TV-tip: The Swiss television channel SF1 will broadcast a report on Thursday 18th May 2006 at 21.05 in German on the fossil find during the "Menschen, Technik, Wissenschaft (MTW)" program.



The Empa's x-ray computer tomograph finds a new application - imaging the petrified skull of a prehistoric rhinoceros.



The ancient pachyderm's skull is resurrected using the computer tomograph, without having to destroy the fossil.

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