First studies of fossil of new human ancestor take place at the European Synchrotron

April 12 2010

Palaeoanthropologist Prof. Lee Berger of the University of the Witwatersrand, Johannesburg, South Africa, has discovered a new species of early human ancestor in one of the best-preserved skeletons of an early hominid, dated around 1.9 million years old, in the Cradle of Humankind, a World Heritage Site. This discovery was published on 9 April 2010 in *Science*, a leading international scientific journal.

The fossil's extraordinary state of preservation encouraged scientists to fully exploit a non-destructive tool called X-ray synchrotron microtomography, which has revolutionised palaeontology and even more palaeoanthropology in the last decade. Preliminary, not-yet-published results show the presence of what could be fossilised insect eggs and hints of a potential brain remnant of the hominid.

The use of X-ray synchrotron microtomography for studying fossils has been developed at the European Synchrotron Radiation Facility (ESRF) in Grenoble, France, by the paleoanthropologist Paul Tafforeau, an ESRF scientist. He originally started to use the synchrotron to study fossil primate teeth non-destructively, in addition to developing synchrotron imaging for palaeontology. The advantage of the powerful ESRF synchrotron is that it enables scientists to literally visualise the inside of a fossil block, sometimes up to the micron scale without breaking it open, with contrast, sensitivity and resolution far above those offered by conventional X-ray machines.

His wish to reach the highest levels of analysis possible with synchrotron microtomography techniques made it pertinent for Prof. Lee Berger to team up with Paul Tafforeau. Fossils of such historical and scientific value almost never travel. However, this 1.9 million year old fossil was carefully transported to the ESRF in February 2010 for an extensive two-week long investigation. In addition to the skull, many fragments of the skeleton, representing nearly forty percent of an entire body, were also analysed.

One of the key aspects of the analysis was the detailed study of the teeth of the fossil. Indeed, studying their internal growth lines and structure to the daily level could provide the precise age at death of the individual, and by comparing his real age and his developmental level (equivalent to a 13 year old modern human), should give important insights about his life history pattern 1.9 million years ago.

Prof. Lee Berger decided to push the investigation even further by using the X-rays at the ESRF to look at possible remnants of soft parts of the body that normally do not fossilise, such as brain tissue. He did not carve out entirely the stone matrix from the skull, a procedure carried out for all other hominid skulls in the past to prepare for scientific examination. The X-rays delved deep into the rock to find any fossilised traces of what had been there 1.9 million years ago. Not entirely preparing the specimen also allows to keep parts of it untouched for future generations.

The analysis of the terabytes of data has only just started, but the preliminary visualisation of the complete skull already available shows intriguing details. Among them are the fossilised insect eggs whose larvae could have fed on the flesh of the hominid after death. Researchers also noticed an extended low density area that could point towards a remnant of the brain after its bacterial decay.

It is only the second time ever that a complete skull of a hominid is examined using powerful synchrotron radiation. This kind of analysis is currently only possible at the ESRF, which is now recognised as the best institute worldwide for the non-destructive analysis of fossils. Ambitious projects are starting to further increase the possibilities of imaging for palaeontology, which will evidently be applied on the other fossils to be discovered in South Africa.

Provided by European Synchrotron Radiation Facility

Citation: First studies of fossil of new human ancestor take place at the European Synchrotron (2010, April 12) retrieved 20 April 2024 from https://phys.org/news/2010-04-fossil-human-ancestor-european-synchrotron.html