

JOHN P. MCGOVERN LECTURESHIP IN BIOMEDICAL COMPUTING AND IMAGING

"From Australopithecines to the Tyrolean Iceman : Radiology meets Anthropology"

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Since the discovery of the Tyrolean Iceman in 1991, advanced imaging and post-processing techniques have been successfully applied to anthropological research. Among the specific techniques are spiral computed tomography and 3-dimensional reconstructions, which include stereolithographic and fused deposition modeling of volume data sets. The Iceman's skull was the first to be produced using stereolithography; subsequently, it has been successfully applied in preoperative planning. With the advent of high-end performance graphics workstations and biomedical image processing software packages, 3-dimensional reconstructions have become established as routine tools for analyzing volume data sets. These techniques enabled dramatically new insights to be gained in the field of physical anthropology. Computed tomography became the ideal research tool to access the internal structures of various precious fossils without even touching--let alone damaging--them. Among the most precious are specimens from the genus *Australopithecus* (1.8 Myr-3.5 Myr), as well as representatives of *Homo heidelbergensis* (200 kyr-600 kyr) and *Homo neanderthalensis* (40 kyr-100 kyr); such fossils have been CT-scanned during the last eight years. The fossils often are filled with a stone matrix or other encrustations. During the post-processing routines, advanced filtering algorithms were used to remove these encrustations virtually (the concrete fossils remain untouched). Thus it has been possible to visualize the morphological structures that are hidden by the matrix layer. Some specimens have been partially destroyed, but it has been possible for the missing parts were reconstructed on the computer screen in order to get estimations of brain volume and endocranial morphology, both major fields of interest in physical anthropology. Moreover, the data in computerized form allows new descriptions of morphological structures using the methods of statistical shape analysis. Some of the results may change aspects and interpretations in human evolution and approaches to long-standing questions in this field. We subsume the introduction of these new imaging and post-processing techniques into a new field of research: Virtual Anthropology.



Free Lunch
for
first 25

DATE : Wednesday, April 14, 2004

TIME : 12:00 – 1:00 p.m.

PLACE: 14th Floor, Suite 1412

University Center Tower (UCT)

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