NYU dental professor receives $1.2 million to study bones and teeth

By Fred Michmershuizen, Online Editor

Dr. Timothy Bromage, a New York University College of Dentistry professor whose research on the microanatomical structure of ancestral human teeth and bones is recognized with having established the modern fields of human evolution growth, development and life history, has received the 2010 Max Planck Research Award.

The award, chosen by a joint Max Planck Society and Alexander von Humboldt Foundation selection committee, includes a stipend of approximately $1.2 million (750,000 euros), which will enable Bromage and Dr. Friedemann Schrenk of the Senckenberg Research Institute to collaborate on the microanatomical study of bones and teeth, and to research the link between metabolic states, growth rates, life spans and biological features such as sex and body size.

A portion of the award will be dedicated to training junior scientists in the United States and Germany to assist on this research.

“Dr. Bromage has fundamentally altered the field of human evolution by prompting paradigm shifts in morphology, fieldwork and experimental biology, thereby establishing the modern field of growth, development, and life history in paleoanthropology,” said Dr. Charles N. Bertolami, dean of the NYU College of Dentistry, upon announcement of the award.

Bromage is a professor of basic science and craniofacial biology and of biomaterials and biomimetics at the NYU College of Dentistry. The award selection committee cited his research with showing a relationship between bone and tooth microstructure and body size, metabolic rate, age and other biological features.

According to the NYU College of Dentistry, Bromage was the first to use biologically based principles of craniofacial development to reconstruct early hominid skulls. His computer-generated reconstruction of a 1.9-million-year-old skull originally discovered in Kenya in 1972 by renowned paleoanthropologist and archæologist Richard Leakey showed that Homo rudolfensis, modern man’s earliest-known close ancestor, looked more apelike than previously believed.

Bromage’s reconstruction had a surprisingly smaller brain and more distinctly protruding jaw than the reconstruction that Leakey assembled by hand, suggesting that early humans had features approaching those commonly associated with more apelike members of the hominid family living as long as 4 million years ago.

In human evolution fieldwork, Bromage’s 1992 discovery of a 2.4-million-year-old jaw in Malawi unearthed the oldest known remains of the genus Homo. The discovery, made in collaboration with Schrenk, director of paleoanthropology at the Senckenberg Research Institute in Frankfurt, Germany, marked the first time that scientists discovered an early human fossil outside of established early human sites in eastern and southern Africa.

In experimental biology approaches to human evolution research, Bromage discovered a new biological clock, or long-term rhythm, which controls many metabolic functions. Bromage discovered the new rhythm while observing incremental growth lines in tooth enamel, which appear much like the annual rings on a tree. He also observed a related pattern of incremental growth in skeletal bone tissue — the first time such an incremental rhythm has ever been observed in bone.

The findings suggest that the same biological rhythm that controls incremental tooth and bone growth also affects bone and body size and many metabolic processes, including heart and respiration rates.

“The rhythm affects an organism’s overall pace of life and its life span,” Bromage said. “So a rat that grows teeth and bone in one-eighth the time of a human also lives faster and dies younger.”

The Max Planck Research Award is presented jointly by The Max Planck Society, which promotes basic scientific research at top international levels, and by the Alexander von Humboldt Foundation, which promotes collaboration between scientists in Germany and other countries.

Dr. Timothy Bromage is an expert on the microanatomical structure of ancestral human teeth and bones. (Photo/NYU College of Dentistry)