

Right: A research team from Indiana University excavated fossils of early humans in Gona, in the Afar region of Ethiopia. These National Science Foundation-supported anthropologists believe the fossils come from nine individuals of the species *Ardipithecus ramidus* who lived between 4.3 and 4.5 million years ago.

While biomolecular evidence helps us to date the timing of major events in the evolution of apes and humans, there is no substitute for fossils when trying to picture the anatomy and behavioral capabilities of our early relatives. The late Miocene-early Pliocene is a particularly important era as it was roughly at that time that our ancestors and those of the chimpanzee parted company. Each new fossil helps to tell a bit more of the story of these early stages in human origins.

Several Ethiopian dig sites have yielded hominid fossils from that time period. The Gona site was previously known for the excavation of the oldest stone tools ever discovered. Plant and animal fossils indicate that these early humans lived in a low-lying area with swamps, springs, streams, and volcanic centers, with a mosaic of woodlands and grasslands.

Credit: Sileshi Semaw, Indiana University



APPENDIXES

For more information:

www.nsf.gov/news/news_summ.jsp?cntn_id=100729

Appendix 1: DESCRIPTION OF NSF DIRECTORATES AND MANAGEMENT OFFICES

The **Directorate for Biological Sciences (BIO)** provides support for research to advance understanding of the underlying principles and mechanisms governing life. Research ranges from the study of the structure and dynamics of biological molecules, such as proteins and nucleic acids, through cells, organs, and organisms, to studies of populations and ecosystems. It encompasses all processes that are internal to the organism as well as those that are external, and includes temporal frameworks ranging from measurements in real time, through individual life spans, to the full scope of evolutionary time. BIO plays a major role in support of research resources for the biological sciences including multi-user instrumentation, living stock centers, systematics collections, biological field stations, and computerized databases, including sequence databases for plants and micro-organisms. As part of the National Plant Genome Initiative (NPGI), BIO plays a major role through support for research infrastructure to enable a broad community and for research to understand the structure, organization, and function of plant genomes.

The **Directorate for Computer and Information Science and Engineering (CISE)** supports research on the foundations of computing and communications devices and their usage, research on computing and networking technologies and software, and research to increase the capabilities of humans and machines to create, discover, and reason with knowledge by

advancing the ability to represent, collect, store, organize, locate, visualize, and communicate information. CISE supports a range of activities in education and workforce that complement these efforts.

The **Directorate for Education and Human Resources (EHR)** supports activities promoting excellence in U.S. science, technology, engineering, and mathematics (STEM) education at all levels and in all settings (both formal and informal). The goal of these activities is to develop a diverse and well-prepared workforce of scientists, technicians, engineers, mathematicians, and educators, as well as a well-informed citizenry with access to the ideas and tools of science and engineering. Support is provided for individuals to pursue advanced study, for institutions to build their capacity to provide excellent STEM education, and for collaborations to strengthen STEM education at all levels by fostering alliances and partnerships among colleges, universities, school districts, and other institutions in the public and private sectors.

The **Directorate for Engineering (ENG)** supports research and education activities contributing to technological innovation that is vital to the nation's economic strength, security, and quality of life. ENG invests in fundamental research on engineering systems, devices, and materials, and the underpinning processes and methodologies that support them. Emerging technologies—nanotechnology, information

For more information:

Office of the Director
www.nsf.gov/od/

National Science Board
www.nsf.gov/nsb/

technology, and biotechnology—comprise a major focus of ENG research investments. ENG also makes critical investments in facilities, networks, and people to ensure diversity and quality in the nation's infrastructure for engineering education and research.

The **Directorate for Geosciences (GEO)** supports research in the atmospheric, earth, and ocean sciences. Basic research in the geosciences advances our scientific knowledge of the Earth and advances our ability to predict natural phenomena of economic and human significance, such as climate change, weather, earthquakes, fish-stock fluctuations, and disruptive events in the solar-terrestrial environment. GEO also supports the operation of national user facilities.

The **Directorate for Mathematical and Physical Sciences (MPS)** supports research and education in astronomical sciences, chemistry, materials research, mathematical sciences, and physics. Major equipment and instrumentation such as telescopes and particle accelerators are provided to support the needs of individual investigators. MPS also supports state-of-the-art facilities that enable research at the cutting edge of science and research opportunities in totally new directions.

The **Directorate for Social, Behavioral, and Economic Sciences (SBE)** supports research and education to build fundamental scientific knowledge about human cognition, language, social behavior, and culture and on economic, legal, political, and social systems, organizations, and institutions. To improve understanding of the science and engineering enterprise, SBE also supports science resources studies that are the nation's primary source of data on the science and engineering enterprise.

The **Office of Cyberinfrastructure (OCI)** coordinates and supports the acquisition, development, and provision of state-of-the-art cyberinfrastructure resources, tools, and services essential to the conduct of 21st century science and engineering research and education. OCI supports cyberinfrastructure such as supercomputers, high-capacity mass-storage systems, system software suites and programming environments, scalable interactive visualization tools, productivity software libraries and tools, large-scale data repositories and digitized scientific data management systems, networks of various reach and granularity, and an array of software tools and services that hide the complexities and heterogeneity of contemporary cyberinfrastructure while providing broad access and enhanced usability. OCI supports the preparation and training of current and future generations of researchers and educators to use cyberinfrastructure to further their research and education goals, while also supporting the scientific and engineering professionals who create and maintain these IT-based resources and systems and who provide essential customer services to the national science and engineering user community.

The **Office of International Science and Engineering (OISE)** serves as the focal point, both within and outside NSF, for international science and engineer-

ing activities. OISE promotes the development of an integrated, Foundation-wide international strategy and manages international programs that are innovative, catalytic, and responsive to a broad range of NSF interests. OISE also supports programs that provide international research experiences to students and young investigators, preparing them for full participation in the global research enterprise. In addition, OISE manages NSF's cooperative relationships with partner countries around the world and scientific international organizations.

The **Office of Polar Programs (OPP)**, which includes the U.S. Polar Research Programs and U.S. Antarctic Logistical Support Activities, supports multidisciplinary research in the Arctic and Antarctic regions. These geographic frontiers—premier natural laboratories—are the areas predicted to be the first affected by global change. They are vital to understanding past, present, and future responses of Earth systems to natural and man-made changes. Polar Programs support provides unique research opportunities ranging from studies of Earth's ice and oceans to research in atmospheric sciences and astronomy.

The **Office of Budget, Finance, and Award Management (BFA)** is headed by the Chief Financial Officer, who has responsibility for budget, financial management, grants administration, and procurement operations and related policy. Budget responsibilities include the development of the Foundation's annual budget, long range planning, and budget operations and control. BFA's financial, grants, and other administrative management systems ensure that the Foundation's resources are well managed and that efficient, streamlined business and management practices are in place. NSF has been acknowledged as a leader in the federal research administration community, especially in its pursuit of a paperless environment that provides more timely, efficient awards administration.

The **Office of Information and Resource Management (OIRM)** provides human capital management, information technology solutions, continuous learning opportunities, and general administrative services to the NSF community of scientists, engineers, and educators. OIRM also provides logistical support functions for NSF staff as well as the general public. It is responsible for recruiting, staffing, and other human resource service requirements for all NSF staff and visiting personnel. OIRM is responsible for the management of NSF's physical infrastructure and conference facilities; the administration of its sophisticated technology infrastructure, and the dissemination of information about NSF programs to the external community through the agency's website. It is also responsible for delivery of the hardware, software, and support systems necessary to manage the Foundation's grant-making process and to maintain advanced financial and accounting systems.

OPENING THE WORLD OF SCIENCE TO THE BLIND

The goal of the Tactile Graphics Project is to provide K–12, undergraduate, and graduate students who are blind with the opportunity to succeed. With support from the National Science Foundation, a multidisciplinary team from the University of Washington is developing ways to convert the information contained in graphic images that are crucial to understanding mathematics, engineering, and science into accessible formats.

The research team generated models to classify images by type (for example, bar charts, line graphs, or illustrations) so that the most appropriate image processing algorithms could be applied. The researchers will incorporate the image processing and classification algorithms into the Tactile Graphics Assistant, a software program that will support transcribers in producing effective tactile graphics for people who are blind.

For more information:

www.cs.washington.edu/homes/ladner/tactile/tactile.html

VLA PROBES SECRETS OF MYSTERIOUS MAGNETAR



A giant flash of energy in December 2004 from a supermagnetic neutron star thousands of light-years from Earth may shed new light on these stars. The blast was the brightest outburst ever seen coming from an object beyond our solar system.

While the intense burst faded quickly, the Very Large Array (VLA) telescope tracked the explosion's afterglow for weeks and produced a wealth of information. The VLA, one of the world's premier astronomical radio observatories, consists of 27 large radio antennas. When the data from these 82-foot antennas are combined, researchers get a detailed, ultra-high resolution image of the heavens. The VLA is one of several radio telescopes supported by the National Science Foundation.

For more information:

www.nsf.gov/news/news_summ.jsp?cntn_id=103004

Appendix 2: FY 2005 EXECUTIVE STAFF AND OFFICERS

NSF Executive Staff

Office of the Director

Arden L. Bement, Jr., Director
Kathie L. Olsen, Deputy Director¹
Thomas Windham, Senior Advisor for Science and Engineering Workforce

National Science Board

Warren M. Washington, Chair
Diana S. Natalicio, Vice Chair
Michael P. Crosby, Executive Officer

Office of Equal Opportunity Programs

Ronald D. Branch, Director

Office of the General Counsel

Lawrence Rudolph, General Counsel

Office of Inspector General

Christine C. Boesz, Inspector General

Office of Integrative Activities

Nathaniel G. Pitts, Director

Office of Legislative and Public Affairs

Curtis Suplee, Director

Office of Cyberinfrastructure

Deborah Crawford, Director (Acting)

Office of International Science and Education

Kathryn Sullivan, Director (Acting)

Office of Polar Programs

Karl A. Erb, Director

Directorate for Biological Sciences

Mary E. Clutter, Assistant Director

Directorate for Computer and Information Science and Engineering

Peter A. Freeman, Assistant Director

Directorate for Education and Human Resources

Donald E. Thompson, Assistant Director (Acting)²

Directorate for Engineering

Richard Buckius, Assistant Director (Acting)³

Directorate for Geosciences

Margaret S. Leinen, Assistant Director

Directorate for Mathematical and Physical Sciences

Michael S. Turner, Assistant Director

Directorate for Social, Behavioral and Economic Sciences

David W. Lightfoot, Assistant Director

Office of Budget, Finance and Award Management

Thomas N. Cooley, Director

Office of Information and Resource Management

Anthony A. Arnolie, Director

NSF Officers

Chief Financial Officer

Thomas N. Cooley
Office of Budget, Finance, and Award Management

Chief Information Officer

George O. Strawn
Office of Information and Resource Management

Chief Human Capital Officer

Anthony A. Arnolie
Office of Information and Resource Management

NSF Affirmative Action Officer

Ronald D. Branch
Office of Equal Opportunity Programs

¹ Replaced Joseph Bordogna in August 2005.

² Replaced Judith Ramaley in December 2004.

³ Replaced John A. Brighton in August 2005.



Appendix 3:

NATIONAL SCIENCE BOARD MEMBERS DURING FY 2005

Warren M. Washington, Chair
Senior Scientist and Head,
Climate Change Research Section
National Center for Atmospheric Research

Diana S. Natalicio, Vice Chair
President
The University of Texas at El Paso

Dan E. Arvizu
Director
National Renewable Energy Laboratory

Barry C. Barish
Linde Professor of Physics
California Institute of Technology

Steven C. Beering
President Emeritus
Purdue University

Ray M. Bowen
Former President
Texas A&M University

G. Wayne Clough
President
Georgia Institute of Technology

Kelvin K. Droegemeier
Weathernews Chair of Applied Meteorology
Director, Center for Analysis and Prediction of Storms
Director, Sasaki Institute, University of Oklahoma

Delores M. Etter
Professor, Electrical Engineering
United States Naval Academy

Nina V. Fedoroff
Willaman Professor of Life Sciences
Director, Life Sciences Consortium
Director, Biotechnology Institute
The Pennsylvania State University

Kenneth M. Ford
Director
Institute for Human and Machine Cognition
University of West Florida

Daniel E. Hastings
Associate Director
Engineering Systems Division
Massachusetts Institute of Technology

Elizabeth Hoffman
President
University of Colorado System

Louis J. Lanzerotti
Distinguished Professor of Physics
New Jersey Institute of Technology

Alan I. Leshner
CEO
American Association for the Advancement
of Science

Jane Lubchenco
Wayne and Gladys Valley Professor of Marine Biology
Distinguished Professor of Zoology
Oregon State University

Douglas D. Randall
Professor of Biochemistry
Director, Interdisciplinary Program on
Plant Biochemistry-Physiology
University of Missouri

Michael G. Rossmann
Hanley Distinguished Professor of Biological Sciences
Department of Biological Sciences
Purdue University

Daniel Simberloff
Nancy Gore Hunger Professor of
Environmental Science
Department of Ecology and Evolutionary Biology
University of Tennessee

Jon C. Strauss
President
Harvey Mudd College

Kathryn D. Sullivan
President and CEO
Center of Science and Industry (COSI)

JoAnne Vasquez
Past President
National Science Teachers' Association

John A. White, Jr.
Chancellor
University of Arkansas–Fayetteville

Mark S. Wrighton
Chancellor
Washington University

Arden L. Bement, Jr.
Member Ex Officio
Director
National Science Foundation

Michael P. Crosby
Executive Officer
National Science Board