Smithsonian Institution

Spotlight on Science at the Smithsonian

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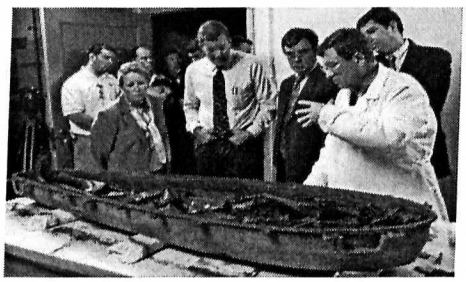
An optical image of Andromeda, the nearest major galaxy to our own Milky Way galaxy, and the home of several known supernova remnants.

Supernova Remnants in the Andromeda Galaxy

Massive stars end their lives in spectacular explosions called supernovae, and the ashes they leave behind are called supernova remnants (SNRs). Supernovae are critical to life in the universe because they create most of the heavy elements, and because they help disburse the elements into interstellar space where they can later be incorporated into new stars and planets.

Recently, supernovae have gained in popular interest for a completely different reason: they are so bright they can be used to probe the very distant universe. They helped astronomers discover, for example, that the rate of expansion of the universe seems to be increasing. SNRs hold lingering clues to the explosive supernova process because they persist long after the dramatic explosions have ended. Despite their importance, however, no supernovae remnants outside of our Milky Way galaxy have ever been imaged and studied at multiple wavelengths because they are so relatively small in angular size, forcing scientists to rely on remnants in our galaxy.

In last week's *Astrophysical Journal Letters*, Smithsonian Astrophysical Observatory astronomer Albert Kong and his colleagues published the first high-quality images of an extragalactic SNR taken in multiple wavelengths of light (radio, optical, and X-ray). The remnant is in Andromeda, the closest major galaxy to ours, located only about 2.3 million light-years away. The remnant itself appears as a ring or shell roughly 100 light-years in diameter. By comparing the morphology of this remnant with the structure of SNRs in the Milky Way, astronomers can analyze the nature of the shock waves generated in the explosion, and try to figure out more precisely how heavy elements are produced and seeded into space.



Dr. Doug Owsley working on the Tennessee cast iron coffin case as Secretary Small, Dave Evans, Sheila Burke, and Cristian Samper observe.

The Case of the Iron Coffin

An iron coffin dating to the middle of the 19th century was discovered during the 2002 relocation of the Mason family cemetery in Giles County, Tennessee. No headstone or marker was present, and the identity of the assumed family member in the coffin was unknown.

The Mason family and the Tennessee state archaeologist contacted physical anthropology curator Doug Owsley to determine the person's identity and to glean scientific information about this individual and the era in which he lived. Iron coffins were extremely expensive for their time period and typically were used by wealthy individuals. Examining this coffin offered a rare opportunity to obtain information on burial customs, period clothing, body preser-

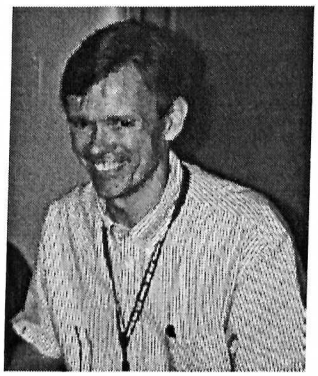
vation, and forensic data collection.

The coffin was delivered to the National Museum of Natural History on May 27. Assisting Doug Owsley, Kari Bruwelheide, and pathologist Larry Cartmell in the analysis were Laurie Burgess, Dave Hunt, Ashley McKeown, Rebecca Snyder, and a host of volunteers and interns. After a thorough examination of the clothing, by textile expert Shelly Foote of the Museum of American History, and a complete forensic examination of the remains, the person was tentatively identified as Isaac Newton Mason, who served in the Confederate cavalry during the early part of the Civil War and died in 1862. The Discovery Channel and 20/20 will air their filming of this project later this summer.

Lesley Gregorika and Melinda Zeder examine skeletons of sheep.

Just How Old Is That Old Goat?

Melinda Zeder, curator of Old World archaeology and zooarchaeology, spent last week at Chicago's Field Museum obtaining age-of-death estimates from the annual growth lines on the horns of modern sheep and goats from Iran and Iraq. This study is part of a larger project using these modern skeletal collections to try to calibrate the age of ancient sheep and goat populations. Bone fusion and tooth eruption and wear—two basic measures used in the reconstruction of mortality profiles—are key to distinguishing domestic animals from wild animals. The modern skeletal material provides important measurable baseline data that will allow Zeder to refine these widely used measures. Lesley Gregorika, one of two University of Notre Dame interns in the department, accompanied Zeder.



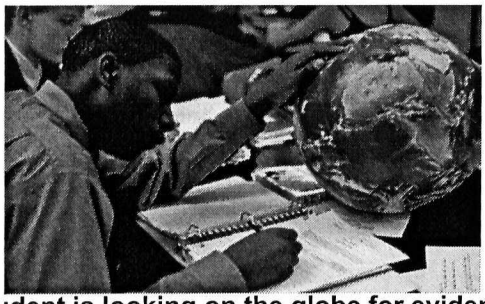
***Smithsonian* Tropical Research Institute staff scientist S. Joseph Wright .**

Paying a High Price to Win the Game

Human extraction of preferred game species from tropical forests has reached alarming levels. Because many of these species consume flowers, fruit, seeds, and leaves, their dwindling populations can seriously disrupt ecological relationships between vertebrates and the plant community. Four factors determine the severity of this disruption:

- the species selected by hunters and the intensity of the hunt;
- the possible presence of ecologically similar, nongame species able to expand their activities to fulfill the role of heavily exploited species;
- whether the harvest of game species differentially affects mutualists or pests of particular plants; and
- whether the harvest disrupts ecological mechanisms that permit plant species to coexist.

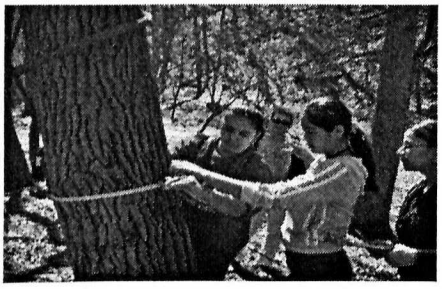
In the May issue of *Perspectives in Plant Ecology, Evolution and Systematics,* Smithsonian Tropical Research Institute staff scientist S. Joseph Wright examines hunter selectivity, the intensity of the hunt, possible compensation by nongame species, and the types and strengths of interactions among game species and plants for tropical forests to determine when and where these outcomes occur.



This student is looking on the globe for evidence that the earth's surfaces and atmosphere are moving—part of an inquiry in Lesson 1 of the Catastrophic Events module.

National Weather Service Honors Curriculum Developer

Carol O'Donnell, a former National Science Resources Center Curriculum Developer in the Earth and Space Sciences, has won the National Weather Service's Mark Trail Award for developing the "Catastrophic Events" module for the Science and Technology Concepts for Middle Schools curriculum. The award was created to honor individuals, organizations, associations, and local governments for their efforts to expand the National Oceanic and Atmospheric Administration's Weather Radio coverage across the nation, and to make the portable device, which broadcasts severe storm warnings, more accessible. The award will be featured in the *Mark Trail* syndicated comic strip, which is published in approximately 175 newspapers



Students involved in the National Zoo's Community Science Workshop in Columbia Heights measure trees at the National Zoo's biodiversity monitoring plot.

Reaching Out to Tomorrow's Scientists

The National Zoo's Biodiversity Monitoring Project is building school–scientist partnerships that permit students to use Smithsonian environmental monitoring protocols to examine the biodiversity of local ecosystems. Coordinated by the National Zoo's CRC Education Program Manager Jennifer Buff and Education Specialist Kelly Cauthorn, the project is training science teachers across the country to construct and conduct studies in biodiversity monitoring plots, and to work with their students to connect their local studies to global initiatives.

In Washington, D.C., the National Zoo's Columbia Heights Community Science Workshop has established two biodiversity study plots on Zoo grounds. Mario Castellanos, who heads the outreach program, is coordinating the efforts of a team of teenagers who are exploring the use of several scientific protocols to collect long-term environmental data for the plots. The Zoo's 163 acres are home to many native species of plants and animals. Castellanos and Zoo scientists are interested in determining how voracious white-tailed deer are affecting the ecology of the Zoo's forest habitats.

Recent Publications

Britz, R.; Bartsch, P. 2003. "The Myth of ribs in gnathostome vertebrates," *Proc. Roy. Soc. London, Biology Letters,* Published online.

Kong, A.; Sjouwerman, L.; Williams, M.; Garcia, M.; and Dickel, J. 2003. "Discovery of Radio/X-Ray/Optical-Resolved Supernova Remnants in the Center of the Andromeda Galaxy," *Astrophysical Journal Letters,* 590, L21, 2003.

Krause, G.; Heinrich, G.; Alexander G.; and Winter, K. 2003. "Capacity of production against ultraviolet radiation in sun and shade leaves tropical forest plants," *Functional Plant Biology,* 30(5): 533-542.

Linares, O. 2003. "Long-term changes revisited," *Cambridge Archaeological Journal,* 12(2): 277-279.

Linares, O. 2003. "Going to the city...and coming back?" *Africa,* 73(1):113-132.

Wright, J. 2003. "The myriad consequences of hunting for vertebrates and plants in tropical forests," *Perspectives in Plant Ecology, Evolution and Systematics,* 9: 73-86.

Web Links

Smithsonian Environmental Research Center's *Watershed Radio* website was named the "pick of the week" by the Natural Resources Defense Council's website http://www.nrdc.org/reference/picks.asp.

Spotlight on Science at the Smithsonian

Spotlight on Science at the Smithsonian is a weekly electronic newsletter about Science at the Smithsonian. It is produced for the Smithsonian community by the Office of the Under Secretary for Science. To contact the editor, e-mail mellendickt@si.edu.

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