



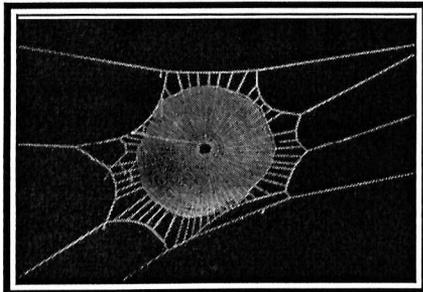
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# This week in Science

Recapping Smithsonian Science

Vol. 1, No. 2

February 10, 2003

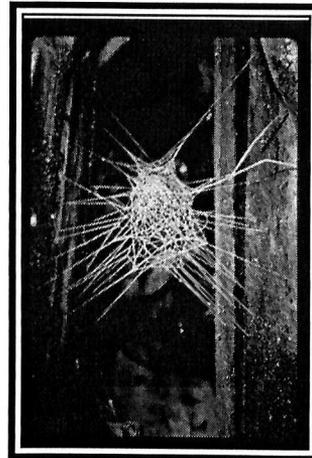


Orb Web

## Cob Webs are Cool

Spider webs are usually viewed as "offensive" adaptations: they function to catch food for the spider. Indeed, the image of an insect hopelessly tangled in the planar "National Geographic Cover" orb web is familiar to everyone. But despite its geometric elegance, the orb architecture seems to expose the spider to greater risks of predation than other web styles. A new article in the current issue of *Ecology Letters* by spider specialist Jonathan Coddington and his colleagues argues that 3-D webs, commonly called "sheet" or "cob" webs may have evolved in part to protect the spider from predators, especially wasps that hunt spiders to feed their young. Phylogenetic research already suggested that sheet and cob webs evolved from the orb architecture. Of the more than 30,000 worldwide wasp prey records cited in the article, 76% were orb-web weaving spiders and only 17% 3-D web-spinning spiders. However, on average about 81% of the web-spinning spiders in a local habitat are sheet or cob web-weavers.

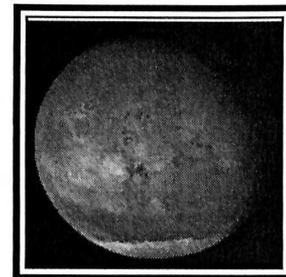
Wasps, in other words, disproportionately kill orb web-weaving spiders. Sheet and cob webs also catch prey, but apparently they are also defensive. The web surrounds or covers the spider with silk that physically protects them, and, if touched by an approaching predator, sends an early warning vibration to the host. Also, 3-D webs are not recycled daily (unlike orbs) and tend to be built in more sheltered spots and closer to impregnable retreats. 3-D web spiders spend less time exposed



Sheet/Tangle Web

to attack and live in less exposed spots. Taken altogether, the data suggest that the wasps (a younger group than orb web-spinning spiders) evolved to prey on orb-weaving spiders, and, in response, some spiders may have abandoned the orb architecture in favor of less risky designs.

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## Mars Exploration Rovers (MER)

The two Mars Exploration Rovers (MER) will be the next landers on the surface of Mars, with the ability to see the surroundings in 3d using a pair of cameras, and roving across the martian landscape up to 90 meters each day. However, to get them safely on the surface of Mars, and in the most scientifically interesting locations is the job of the MER Landing Site Selection Team. Dr. John Grant of the National Air and Space Museum's Center for Earth and Planetary Studies is Co-Chair of the Site Selection Team, and has been key in the recent decisions leading up to the eventual selection of two

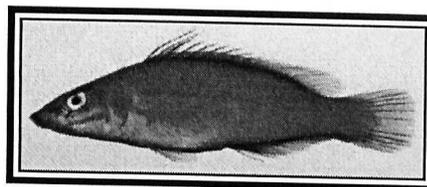
landing sites by Ed Weiler, NASA's Associate Administrator for Space Science. Based solely on science considerations, two sites are highly favored by both the broader science community and the mission Science Team. The Meridiani Planum region is notable for its apparent concentration of hematite, an iron-rich deposit whose origin remains a mystery. The Gusev Crater region is near the terminus of one of the massive outflow channels early in Mars' history. There are, however, two additional sites which remain under consideration: southern Isidis basin and in Elysium. The MER Project at JPL will soon make a final recommendation to NASA Headquarters that is based on consideration of both science and safety factors. The entire site selection process will then be reviewed prior to selection at NASA Headquarters in April.

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## The Mysterious X-Ray Sources in Galaxies

Astronomers think that massive black holes reside in the nuclei of most galaxies, where they could form naturally. Even our own Milky Way appears to have one with as much mass as 3.8 million Suns. The surroundings of these black holes often glow brightly in x-rays, as neighboring material falls in towards the center and heats up to millions of degrees. But many galaxies also have bright x-ray sources far away from their nuclei, sources which blaze in x-rays with millions of times the Sun's total energy output, or even more. No one knows what these "non-nuclear" x-ray objects are, or what kind of processes produce their extraordinarily bright x-ray emission, but, since they are not in the nuclei, scientists doubt they can be giant black holes.

A team of SAO astronomers and a colleague have compared their Chandra X-ray Observatory data with new, radio telescope images of one peculiar object, and have come up with a possible solution. Writing in last week's issue of Science magazine, the team reports that the radio results indicate the presence of jets of fast-moving, charged particles. They conclude that these mysterious x-ray sources, therefore, could actually be small black holes -- only as massive as the Sun. They appear to be very energetic because they are narrowly beaming their x-rays along jets that happen to point towards Earth.



## Research and Outreach in the South Pacific

Natural History ichthyologist and collection manager Jeff Williams participated in a marine biodiversity survey expedition to the island of Rapa, the southernmost island in French Polynesia. A team of 14 scientists from France, Italy, French Polynesia and Fiji, surveyed the fishes, corals, mollusks and algae of Rapa. Williams worked with two French colleagues, Dr. René Galzin and Dr. Serge Planes, to survey and collect voucher specimens of the fishes of Rapa. A total of 268 species of fishes had previously been reported from this remote island. Using a combination of sampling techniques including visual survey, hook and line fishing, spear fishing, and using rotenone with hand nets and scuba, the fish team was able to increase the number of species to 374, adding 106 fish species records to the fish fauna of Rapa. Over 800 of the freshly collected specimens were photographed by Williams to document fresh colors of the species.

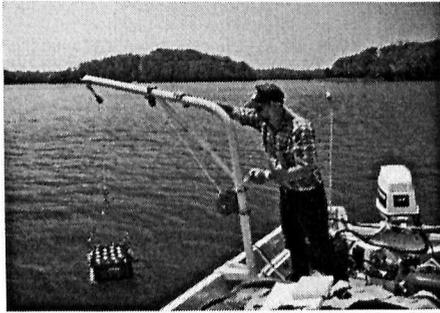


While at Rapa, the expedition scientists taught local school groups about the marine plants and animals living around their island. At community gatherings, the scientists presented preliminary findings and discoveries made at Rapa. Williams developed a photo gallery web presentation including 229 of his digital photographs of the fishes of Rapa and provided CD ROM versions to the local school and the Mayor of Rapa.

A lengthy report of the expedition with photographs appeared recently in the Tahiti Presse, 19/12/2002, entitled, "Exceptional Scientific Discoveries on the Marine Fauna and Flora of L'ile de Rapa." (English translation of the French).

## **IN THE NEWS**

### **Models for Assessing Coastal Water Quality**



SERC Phytoplankton Ecologist Chuck Gallegos received notice of a new grant award from the U.S. EPA Science to Achieve Results (STAR) program on Developing Regional Stressor-Response Models for Use in Environmental Decision-making. The \$748,749 three-year award is entitled "A shallow-water coastal habitat model for regional scale evaluation of management decisions in the Chesapeake region." The project's team of SERC CoPrincipal Investigators also includes Quantitative Ecologist Don Weller, Photobiologist Pat Neale, Biogeochemist Pat Megonigal, and Environmental Chemist Tom Jordan.

The project will develop a model of responses of shallow tributary embayments and tidal creeks of Chesapeake Bay to multiple, interacting stressors, such as climate-related changes in stream flow, UV-B, CO<sub>2</sub>, and land use. Focusing on those indicators currently proposed for use by environmental managers (chlorophyll levels, water clarity, and dissolved oxygen), the model will predict the expected distribution of indicator values within tributaries and tidal creeks in the major salinity zones of the Bay.



### **Frozen in Time: The Iceman" Phase II installation**

Visit the Western Culture Hall, that's Hall 26, in the

Natural History Museum to see a life-size mannequin of the Iceman as he probably looked just before his death, furnished with reproductions of his clothing and equipment, in a free-standing vitrine with two text rails. The reproductions were commissioned from the same archeological workshop that supplied authenticated versions for the exhibit in the South Tyrol Museum of Archaeology in Bolzano, Italy, where the Iceman's mummy and belongings are on exhibit.

The SI Office of Exhibits Central fabricated both the mannequin and casework, while text and graphics were produced by Exhibits here in NMNH. The interpretation focuses on identifying and explaining the artifacts, and on relating the methods and latest results of the ongoing scientific research on this important discovery. The vitrine will add to the existing photo-panel in the hall, and both of these installations have been made possible by generous grants from the Smithsonian Institution's Women's Committee.

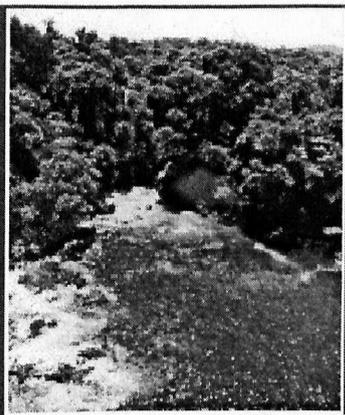
### **Members of Congress Visit SAO Submillimeter Array**

Representative Robert W. Ney, (OH-18th district), Chair of the House of Representatives' Committee on House Administration, and Representative Steven C. LaTourette (OH-19th district), Chair of the sub-committee on Economic Development, Public Buildings, and Emergency Management of the Committee on Transportation and Infrastructure, along with key staff from their offices and the two committees, visited the Submillimeter Array (SMA) telescope in Hawaii for several days last week (Jan 21-24, 2002). Their itinerary included a trip up Mauna Kea to see the SMA antennae and the control facility, and other facilities at the summit. They also toured the SMA's Hilo operations facility, and visited the construction site for the new facility.

### **Panama to Submit Coiba as a World's Natural Heritage Site**

With the assistance of STRI research associate Todd Capson and Sonia Montenegro, the National Authority of Environment (ANAM) submitted to the United Nations Educational, Scientific and Cultural Organization (UNESCO) an application to add the Coiba National Park (CNP) to the list of World Heritage Sites. The park, located in the Gulf of Chiriqu, houses Ensenada Maria reef, the second largest coral reef in the Tropical East Pacific (160 ha) and the largest in the Central American region.

According to the World Heritage Convention, "Natural Heritage Sites" are those that possess outstanding physical, biological, and geological features; habitats of threatened plants or animal species and areas of value on scientific or aesthetic grounds or from the point of view of



*Playita Sebastia, by Todd Capron*

conservation. Last year, Capron received funds from Conservation International to support a feasibility study to place buoys to delimit the boundaries of CNP, a system of radars to allow ANAM personnel to detect illegal fishing.

## **NOTEWORTHY PUBLICATIONS**

"Radio Emission from an Ultraluminous X-ray Source," Science, January 17, 2003

"A Tsunami of Hot Jupiters?," Science (News Focus), 2003 January 24, 2003.

"Stars Behaving Badly," Science (News Focus), January 24, 2003

"Plants of Paradise," Science, January 31, 2003

"Social conflict, biological ignorance, and trying to agree which species are expendable." In Kareiva, Peter, and Levin, Simon A. (Eds.), *The importance of species: Perspectives on expendability and triage*. 239-259. Princeton and Oxford: Princeton University Press.

This Week in Science is a weekly electronic newsletter about Science at the Smithsonian. It is produced by the Office of the Under Secretary for Science for the Smithsonian community. To contact the editor, call (202) 357-2903.

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