Smithsonian Institution

# Spotlight on Science at the Smithsonian

Weekly Newsletter

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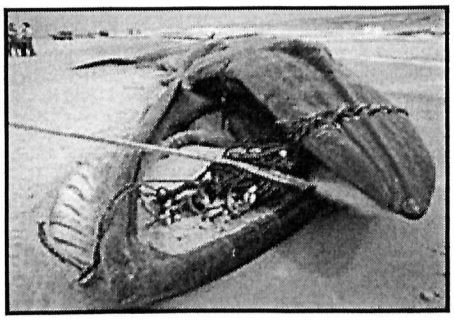


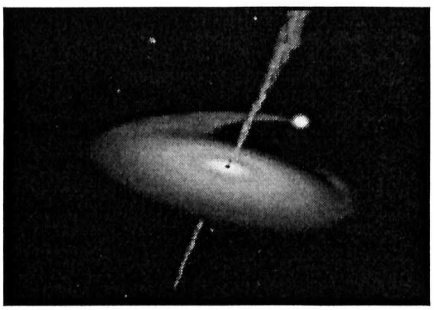
**Starved whale washes up on Carolina Beach shore.**

## Stranded Bryde Joins Its Relatives

On March 13, 2003, a Bryde's Whale was found stranded on Carolina Beach in North Carolina. Dr. Ann Pabst and Bill McLellan, former staff members of the National Museum of Natural History (NMNH), and now researchers at the University of North Carolina, Wilmington, responded to the initial stranding report. Together with their graduate students they performed the necropsy and collected valuable tissue samples from the whale. The whale, which was extremely emaciated, had what appears to be fishing gear wrapped around its rostrum, an all too frequent cause of death for whales in the Western North Atlantic.

Pabst and McLellan, recognizing the scientific importance of this specimen, contacted NMNH's Marine Mammal Program to see if we would like the whale for our research collection. Charles Potter, Collection Manager for Marine Mammals, his assistant Dee Allen and John Ososky of NMNH's Osteo-Prep Laboratory (OPL) collected the skull and skeleton, which are currently being prepared at the OPL at the Museum Support Center.

Bryde's whales are thought to be a 'species group' that includes more than one form. This group currently contains only one recognized species, *Balaenoptera edeni*. Colleagues of Pabst, McLellan and NMNH's marine mammal group, at NOAA Fisheries Laboratory at La Jolla, California will be looking at the DNA from this specimen, comparing it to DNA from other Bryde's whales from our collection and elsewhere. From these analyses and from morphometric studies of the skeletal remains, researchers hope to better understand how many species or stocks of Bryde's whales exist.



**Artist's conception of a mid-sized black hole, shown pulling in material from a star that has wandered too close.**

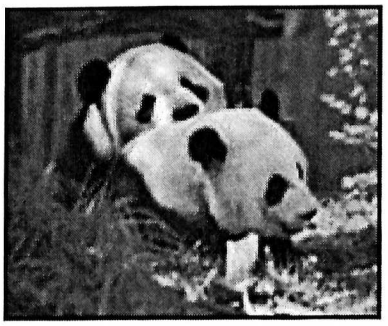
## Black Holes—Now Available in Small, Medium, and Large

Black holes in space are so dense that nothing—not even light—can escape from their gravitational clutches. For a long time, astronomers had assumed that black holes came in only two sizes: small holes (a few times the mass of our Sun) that are formed in supernovae explosions, and monsters (tens of millions of times the mass of our Sun), found at the centers of galaxies, that perhaps form when galaxies collide and merge.

Jon Miller and Giuseppina Fabbiano of the Smithsonian Astrophysical Observatory and their colleagues recently announced the discovery of convincing new X-ray evidence for mid-sized black

holes—objects hundreds or thousands of times the mass of our Sun. The astronomers discovered two such strange objects in a nearby galaxy (about 10 million light-years from Earth). They identified the objects by their "cool" temperatures—only about a million kelvins.

Unlike their large or small cousins, mid-sized black holes are a mystery to scientists, who don't understand how they are formed. Some astronomers have calculated they may be created in the final stages of the life of massive stars that contain fewer heavy elements than our Sun. If true, the result would help astronomers better understand the life cycle of all stars. These new results were reported in the March issue of *Sky and Telescope Magazine,* and appeared in the March 1 issues of Astrophysical Journal Letters.



**Giant pandas have one breeding season a year.**

## Is a Baby Panda on the Way?

Giant pandas have one breeding season a year, with mating occurring during a brief, one- to three-day period. The National Zoo's giant pandas, Mei Xiang and Tian Tian, mated successfully on April 4th in a 15-second encounter.

As breeding season approached, the physical signs indicating that the pandas were preparing to mate included increased restlessness; increased vocalizations with chirps, whines, and bleats; and increased scent marking. Training programs in place also allowed Zoo animal staff to take daily vaginal swabs and testes measurements to correlate hormonal changes with behavioral changes as the pandas approached the breeding period.

Zoo researchers, keepers, and volunteer observers maintained a close watch on the pair via direct observation and a number of video cameras located in the pandas' enclosures.

Zoo scientists were able to pinpoint Mei Xiang's ovulation dates by reviewing the panda research from last year, which included charting her urinary estrogen levels. A precipitous rise and decline in urinary estrogen—a sure sign of ovulation in giant pandas—correlated with an increase in the pandas' mating behaviors.

Since the April 4th breeding, Zoo scientists and animal staff have been working hard to evaluate urinary hormones and behavioral patterns for clues regarding a possible impending birth. Although the mating occurred close to the time of ovulation—the period of peak fertility—it is still not certain that a cub was conceived.

Pandas' gestation varies from three to six months due to delayed implantation, with frequent "pseudo" pregnancies. In the coming months, zoo endocrinologists will be looking for a hormone marker to confirm pregnancy.

## What's the Matter Between Distant Galaxies?

Space isn't empty. Our Earth circles the Sun in a thin haze of dust and some charged solar wind particles, and about 50 million kilograms of material rains down onto the Earth every year. The closest star to the Sun is about three light-years away, and the space between them also contains matter—mostly molecular hydrogen gas.

The vast, cosmic reach of intergalactic space—the space between galaxies—isn't empty either. But determining exactly what fills these regions and where the material came from is difficult because they are so transparent and remote.

In a paper in the *Astrophysical Journal,* Kurt Adelberger from the Center for Astrophysics and his collaborators report on the first results of their new sur-

vey of intergalactic matter. They studied very remote galaxies—objects whose light left on its journey when the universe was only a few billion years old and has been traveling toward Earth for about 11 billion years. There is a clever advantage to focusing on these distant galaxies: they are moving away from us so fast that their ultraviolet radiation can be readily observed from the ground.

Neutral hydrogen gas absorbs significant chunks of ultraviolet light. The team of scientists discovered that the hydrogen in the intergalactic spaces around these distant galaxies is abundant enough to produce clear evidence for ultraviolet absorption. Their analysis is consistent with the suggestion that vigorous supernovae and bursts of star formations in these young galaxies in the very early universe may have been responsible for powerful winds that blasted material out of their host galaxies and into intergalactic space.

**An army-ant column crossing a road in Gabon, central Africa.**

## A Balancing Act Among Ants

Army and leaf-cutting ants play important ecological roles in maintaining the diversity and ecological balance of rainforests. In a March 28 article in the "Top Stories" online section *of BioMedNet News and Comment,* Smithsonian Tropical Research Institute staff scientist William F. Laurance reports that clear-cutting and other significant changes in habitats around fragments of rainforest are creating islands surrounded by a sea of degraded land, seriously threatening the ecological balance of rainforest ants. Through his analysis of studies conducted by research groups in Brazil and Germany, Laurence warns that populations of leaf-cutters are increasing and army ants are declining in isolated rainforest fragments across different continents and regions. If leaf-cutters become hyperabundant in agricultural lands, they will most likely decimate cultivated trees and other crops.

## Recent Publications


Adelberger, K.; Steidel, C.; Shapley, A. 2003. "Galaxies and Intergalactic Matter at Redshift $z$~3:Overview", *The Astrophysical Journal,* February 10; 584:45-75.

Collin, R. 2003. "The Utility of morphological characters in gastropod phylogenetics: An example from the Calyptraeidae." *Biological Journal of the Linnean Society,* 178(4): 541-593.

Harrison, R.; Hamid, A.; Kenta, T.; Lafrankie, J.; Lee, H.; Nagamasu, H.; Nakashizuka, T.; Palmiotto P. 2003. "The diversity of hemi-epiphytic figs (Ficus;Moraceae) in a Bornean lowland rain forest." *Biological Journal of the Linean Society,* 178(4): 439-455.

Laurance, W. 2003. "Rainforests at risk from altered ant ecology." *BioMedNet,* March 28.

Miller, J.; Fabbiano, F.; Miller, J.; Fabio, A. 2003. "X-Ray Spectroscopic Evidence for Intermediate Black Holes: Cool Accretion Disks in Two Ultraluminous X-Ray Sources," *Astrophysical Journal Letters,* March 1; 585:37.



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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