Smithsonian Institution

Spotlight on Science at the Smithsonian

Weekly Newsletter

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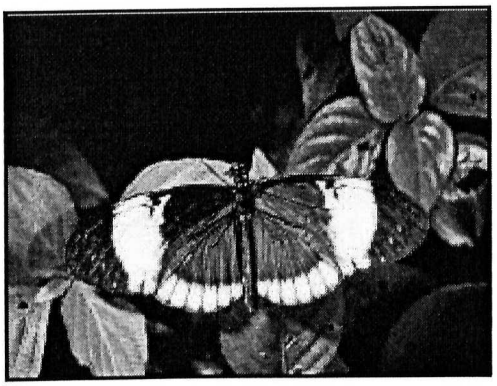


Heliconius cydno.

Shimmering Females Dazzle Eligible Males

People in small planes flying low over tropical forest often mention the tiny flashes of blue from iridescent butterfly wings that stand out against dark green jungle foliage. Up to 20 layers of transparent scales on butterfly wings scatter white light to produce this brilliant blue structural color.

Alison Sweeney (Duke University and the Smithsonian Tropical Research Institute (STRI)), Christopher Jiggins (University of Edinburgh and STRI), and Sonke Johnson (Duke University) report in the May 1 issue of *Nature* that polarized light from iridescent female *Heliconius* butterflies functions as a mating signal. When the scientists presented moving female butterfly wings to males of the same species with and without filters that eliminate polarized light, the males approached females producing polarized signals significantly more often than when the signals were filtered out. In contrast, males of another, noniridescent species approached females at the same rate, regardless of whether they were emitting polarized light.

Also reported in the *New York Times,* this research may be the first example of mate recognition based on polarized light. It offers a new view of the physical properties of butterfly wings to scientists studying the genetics and ecology of *Heliconius* butterflies.

New-born Clouded Leopards.

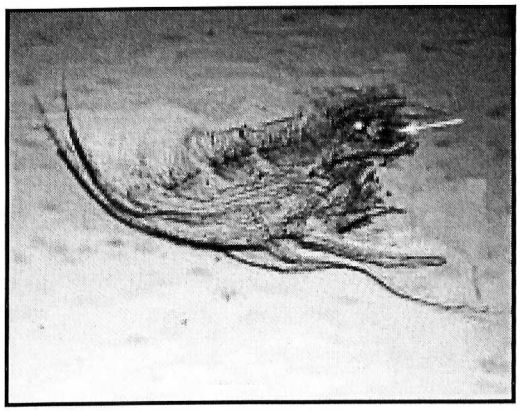
Sunny Days Ahead for Clouded Leopards

On April 22, the National Zoo's Ken Lang had very good news for colleague Dr. JoGayle Howard: the birth of the first litter of clouded leopard cubs at Thailand's Khao Kheow Open Zoo.

Once widely distributed through south and southeast Asia, the leopard cat was listed by the U.S Department of the Interior in 1980 as an endangered species. Human population growth, habitat destruction, and excessive hunting for the leopard's attractive pelt have reduced the species to isolated populations in remote locations.

In collaboration with the Nashville Zoo, the Thailand Zoological Park Organization, and the Clouded Leopard Species Survival Plan, the National Zoo undertook a clouded leopard conservation program in 2002 in Thailand, where the species still survives in the wild. They formed the Thailand Clouded Leopard Consortium to develop a long-term, successful breeding program at the Khao Kheow Open

Zoo in Chonburi, Thailand. The Consortium provides a year-round on-site Project Manager from the U.S. (currently Lang) and a Program Coordinator (currently Howard); salaries for two Thai animal keepers and a Curatorial Intern; improved nutrition, including vitamin and mineral supplementation (provided by Purina) for chicken diets; and improved enclosures to minimize stress and optimize breeding conditions. This recent birth of the cubs provides solid confirmation of the success of this unique, ambitious, multidisciplinary conservation program.



Limbs of *spinicaudatan branchiopods.*

Comparing Crustaceans, Limb by Limb

Crustaceans, like crabs and lobsters, are a very diverse group of invertebrates. Their success in today's aquatic habitats is due in great part to their ability to transform their limbs over time into many different shapes and sizes.

Frank Ferrari of the Smithsonian's Department of Systematic Biology and Mark Grygier of Japan's Lake Biwa Museum recently studied the development of the limbs of *spinicaudatan branchiopods,* because they appear to be quite different from the limbs of most other crustaceans. Surprisingly, upon examination they found that the order in which the different parts of the branchiopod limbs appear during development actually is very similar to that of copepod crustaceans. This discovery enabled them to use this developmental patterning to determine which parts of the branchiopod limb correspond to which segments of the copepod limb.

Ferrari's and Grygier's research will be invaluable to understanding evolutionary relationships among crustaceans, and is an important step in establishing a general method for correctly identifying the corresponding parts of different crustacean limbs. Their findings will be published in the *Zoological Journal of the Linnean Society.*

An image of the galaxy NGC 4945 taken in infrared light.

Revealing the Complex Structures in Galactic Nuclei

Astronomers think that nearly all galaxies, including our own Milky Way galaxy, have massive black holes at their centers. These black holes contain millions (in some cases even billions) of solar masses of material. In some galaxies (but thankfully not in our Milky Way, at least for the moment), these black holes trigger dramatic outbursts of particles and radiation in the form of jets, super winds, and other violent kinds of activity. The details of these processes are usually obscured from view in these "active galaxies" by opaque gas and dust structures that surround the nucleus.

A team of four astronomers, including Lincoln Greenhill from Smithsonian Astrophysical Observatory, have used the Chandra X-ray Observatory in conjunction with another space X-ray observatory, the Rossi X-ray Timing Explorer, to unravel the inner structure of the nucleus in one nearby active galaxy, NGC 4945. Their results indicate that, contrary to the conventional view in which the black hole is ringed by a donut-shaped cloud of dust and gas, the environment actually has several components. The central blackhole is completely

enveloped in a thick disk about one-tenth of a light-year in diameter, which itself is embedded in a larger disk about 75 light-years across. There does appear to be a surrounding cloud of material, but it is located even farther away (about 500 light-years from the core); it is thought to be responsible for a burst of supernova explosions.

The American Academy Honors STRI Scientist

The American Academy of Arts and Sciences has announced its 2003 election of 187 Fellows and 29 Foreign Honorary Members, representing 29 American states and nine countries.

Among the new fellows is STRI staff scientist Stephen P. Hubbell, founder and chairman of the National Council of Science and the Environment, and professor of Plant Biology at the University of Georgia in Athens. Hubbell is the author of more than 100 papers in tropical plant ecology, theoretical ecology, and plant-animal interactions. Edward O. Wilson has praised Hubbell's book *The Unified Neutral Theory of Biodiversity and Biogeography* (Princeton University Press, 2001) as a "provocative and enlightening work, deeply original and supported by some of the most extensive field research ever conducted in biology...."

This year's election maintains the Academy's practice of honoring intellectual achievement, leadership, and creativity in all fields and professions. Hubbell joins STRI colleagues and Academy members Ira Rubinoff, Bill Eberhard, Jeremy Jackson, and Mary Jane West Eberhard.

Recent Publications

Done, C.; Madjski, G.; Zycki, P.; Greenhill, L. 2003. "Simultaneous Chandra and Rossi XTE Observations of the Nearby Bright Seyfert 2 Galaxy NGC 4945," *Astrophysical Journal,* 588:763.

Heyer, R. 2003. "Ultraviolet B and Amphibia," *BioScience-Viewpoint*, May.

Sweeney, A.; Jiggins, C.; Johnsen, S. 2003. "Polarized Light as a Butterfly Mating Signal. *Nature* 423(6925):31-32.

Web Links

Earth's First Flower showcases a 125 million year old fossil from the oldest flowering plant found so far.

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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