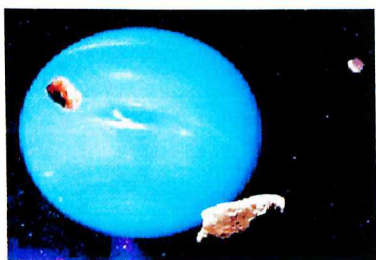


A NEWSLETTER RECAPPING SMITHSONIAN SCIENCE

January 27, 2003

Three New Moons Discovered Around Neptune



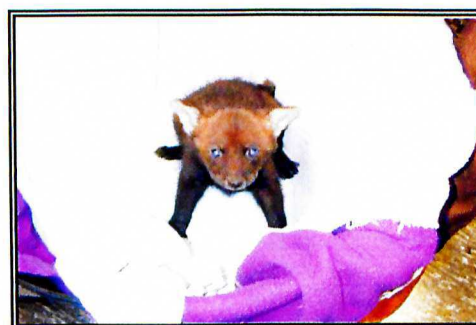
Artist's conception of three newly-discovered moons of Neptune (Credit David A. Aguilara, Harvard-Smithsonian Center for Astrophysics)

Last week an SAO astronomer, his graduate student, and three colleagues announced the discovery of three small (30-40 km diameter), previously unknown moons of Neptune, bringing the total number of moons around Neptune to eleven. The last time any moons were discovered around Neptune from the ground was in 1949; in 1989 the Voyager II flyby of Neptune discovered six more.

The astronomers believe the newly discovered moons were produced by an ancient collision between a former moon of Neptune and a passing comet, or perhaps an asteroid. This makes them quite unlike Neptune's two largest moons, Triton and Nereid, which are suspected of being objects from the outer solar system that were captured by Neptune's gravity, and also unlike our own Moon, which is thought to have been produced about 4.5 billion years ago when a giant object collided with the young Earth. Our understanding of how our Moon formed will be aided by an understanding of how other moons have formed. According to the SAO team, "The discovery of these moons has opened a window through which we can observe the conditions in the solar system at the time the planets were forming."

The Early Life of Planets

Scientists think that the Earth developed to its present size very gradually, perhaps taking about 50-100 million years after the Sun first began to shine. Astronomers at SAO trying to understand the pivotal early phases of planet formation have now found a proto-planetary system that may be only half a million years old – very early in the gestation process. They discovered that its pre-planetary disk of dust (from which planets are likely to develop later on) has already been strongly deformed, in this case by the tidal forces of a companion star. The results on this very young system will help astronomers add another piece to their understanding of how planets in general form.



Genetically Valuable Pup Born at CRC

The maned wolf is an unusually long-legged, rust-red and black colored canid native to the grasslands of south-central Brazil and nearby similar habitat. It is listed as an Endangered Species and has been the subject of propagation and behavioral research at the National Zoo for nearly 30 years. The species has never been prolific in zoos or breeding centers with the animals that do best often kept at facilities away from public exhibition.

A female maned wolf at CRC, Louise, gave birth to 3 pups on December 10. The sire is a male named, Cochise. The species pair-bonds and the zoo biologists left the male in the enclosure with the female during the birth and for the rearing of the pups. There are 28 institutions housing maned wolves in North America that participate in the American Zoo and Aquarium Association's Species Survival Plan (SSP). The National Zoo's Melissa Rodden is the SSP Coordinator for the maned wolf and recorded the Dec. 10 birth as the first of the 2002-2003 season. It is significant that this is the 2nd litter to be raised by this genetically valuable (among the genetically least-represented animals in the captive gene pool) pair.

The pups were examined at about 6-weeks-old by zoo veterinarians and received their first immunizations, all three were found to be males. Over the years that this difficult to manage canid has been maintained at the National Zoo; the Zoo's veterinarians have developed an extensive and useful medical history on the species.

Evolutionary History of Hawaiian Damselflies

Natural History entomologist Dan Polhemus, in collaboration with Dr. Steve Jordan of the Laboratoire de Biologie des Populations d'Altitude in Grenoble, France and Dr. Chris Simon of the University of Connecticut, produced an analysis of species level relationships for the damselfly genus *Megalagrion*, native to the Hawaiian Islands. This analysis is particularly noteworthy



because it combines recently developed refinements in molecular systematics with data from previous morphological analyses, revealing two major patterns of speciation that have occurred within this group.

The Hawaiian Islands were sequentially created by "hot spot" volcanoes, thus they form a chain of different ages. Speciation occurred between islands as members of species groups with specialized breeding ecologies (stream pools, stream riffles,

sleeping rock faces, etc.) sequentially colonized new volcanoes as they emerged from the sea. Also, there is a pattern of speciation within islands on the older islands of Kauai and Oahu, related to the colonization of unique and unusual breeding habitats such as acidic upland bogs or fern litter in the rainforest understory.

Use of updated molecular clock procedures to analyze the patterns derived from mitochondrial DNA suggest that the unique habitat shifts on Kauai occurred about 4.0 million years ago, while those on Oahu occurred at about 1.5 million years. Results from the molecular clock analysis also strongly suggest that the ancestral stock of *Megalagrion* arrived in Hawaii about 10 million years ago, well before the emergence of Kauai, currently the oldest of the remaining high islands capable of supporting damselflies. The age of the group thus predates the age of the existing high islands, providing a glimpse of evolution on now-vanished segments of the archipelago. Findings will be published in an upcoming issue of the journal *Systematic Biology*.

Smithsonian Collections & TNT

Smithsonian collections are always a source of surprises!! When a NASM staff opened a disarmed Fritz X, a precision-guided, armor-piercing German bomb from WWII, they found a crystalline deposit, and they asked the Smithsonian Center for Materials Research and Education (SCMRE) for analysis of that material. Walter Hopwood and Charles Tumosa identified TNT in the residue. The TNT was highly crystalline and having come from the ammonium nitrate-TNT mixture originally present in the bomb. The original material was probably removed by steam cleaning which caused the fractional crystallization. Small amounts of TNT are more a fire hazard than explosive problem.

IN THE NEWS

NMNH Briefs Council on Environmental Quality (CEQ) on Pollination

Scott Miller (Department of Systematic Biology) participated in a briefing on pollination issues for James Connaughton of the White House Council on Environmental Quality (CEQ) on January 14th. A series of national and international meetings have been held in recent years to discuss the apparent decline in populations of pollinators, and the need

for more research, as well as awareness among policy makers and resource managers. NMNH has been involved in both the North American Pollinator Protection Campaign and the International Pollination Initiative of the Convention on Biological Diversity.

The purpose of the CEQ briefing was to raise attention to the issue, and build support for a National Academy of Sciences study. Miller presented a short review of the range of government agencies involved in pollinator research and management, the status of inter-agency cooperation, and general research needs. Both NMNH and STRI have a long history of pollinator research that could benefit from increased visibility and funding.

STRI Signs Agreement with Fundación Amador

STRI director Ira Rubinoff and Fundación Amador executive director Rodrigo Eisenmann, signed a five-year collaboration agreement on Thursday, January 16, at STRI's administrative offices in Tivoli. Fundación Amador, the

Panamanian foundation established to construct and develop an ecological museum in Panama and STRI agreed to promote activities of cooperation in areas of mutual interest including exchange of information, exhibition design and



development of outreach programs. STRI has contributed with the activities of Fundación Amador, providing scientific information and technical support. Through STRI, the new museum will be the first to share exhibitions and artifacts with the world's largest network of museums, outside the United States.

NOTEWORTHY PUBLICATIONS

“On Ant Farm, a Threesome Coevolves,”
Science, January 17, 2003

“Ancient Tripartite Coevolution in Attine Ant-
Microbe Symbiosis,”
Science, January 17, 2003