

## X-ray nova debuts in southern sky

Astronomers have detected a Milky Way star just as it began a rare and explosive flare-up, emitting an outburst of X-rays and optical light that dramatically boosted its brightness.

On Jan. 10, an X-ray camera aboard the Soviet satellite GRANAT first imaged this heavenly object, located in the southern constellation Musca ("The Fly"). The intense emission from the star, now dubbed Nova Muscae 1991, made it the second strongest X-ray source in the southern sky. Four days later, astronomers Massimo Della Valle and Brian Jarvis of the European Southern Observatory (ESO) in La Silla, Chile, identified the optical counterpart of the bright X-ray source by comparing old and new photographic plates of the same sky region with X-ray images from GRANAT and the Japanese satellite Ginga.

High-resolution images taken with ESO's New Technology Telescope on the night of Jan. 14 showed that the star, invisible to the naked eye, had boosted its optical brightness a thousand-fold within the past few days. Moreover, its bluish spectrum indicated it was a hot, highly energetic star.

Della Valle and Jarvis say these observations suggest that the newly identified object represents an unusual type of exploding star called an X-ray nova, which radiates more X-rays than optical light and has been detected only four times before. In contrast, the more common "classical nova" emits about 10,000 times as much optical light as X-ray radiation.

The astronomers note that both types of novas make their fiery debut when one member of a binary star system transfers mass to its more compact companion. The mass forms a disk around the compact star and eventually falls onto the star's surface. In a classical nova, the compact star is a white dwarf and the mass transfer triggers a thermonuclear explosion that blows out an expanding envelope of hot material surrounding the binary star system. This causes a dramatic increase in optical light.

But in Nova Muscae 1991 and other X-ray novas, the compact star is believed to be a neutron star, and the outburst — prompted by the sudden release of gravitational energy as matter from the disk accretes onto the star's surface — might not have a thermonuclear component. And unlike a classical nova, this type of explosion does not expel enough matter to create an expanding envelope. However, it contains sufficient energy to heat up the disk, causing it to radiate both X-ray and optical light. In contrast to a supernova, the compact-star component of both types of novas survives the explosion and may undergo repeated outbursts, astronomers note.

Researchers continue to analyze light from the flare-up, which remains strong. Preliminary observations with Ginga, made in early February, reveal fluctuations in the nova's X-ray emission, and researchers using ground-based telescopes are watching to see whether that change will alter the star's optical output. At ESO, German astronomer Manfred Pakull has detected several broad emission lines from hydrogen, helium and nitrogen atoms and ions in the disk — an indication of its hot temperature and a sign that it rotates at a speed of several hundred kilometers per second.



Left: 1976 photograph shows a very faint binary star (Nova Muscae's predecessor) at the current position of the nova (arrow). Right: Image obtained Jan. 15 with the New Technology Telescope shows the brilliant nova at center (arrow).

## Sizing up the risk of pregnancy

When the FDA approved an implantable, five-year contraceptive in December, the device became one of the most effective birth control methods on the market. However, the method appears less reliable in some women than in others. A new research report aims to help clinicians identify individuals who may be vulnerable to unplanned pregnancies.

Norplant is the trade name for a set of six thin, rubber-like capsules filled with levonorgestrel, a synthetic hormone. Implanted under the skin of the upper arm, the capsules release levonorgestrel for about five years. The method works by suppressing the monthly release of an egg. In addition, levonorgestrel thickens the cervical lining, helping to keep sperm from reaching an egg. In most women, menstrual cycles become irregular soon after Norplant implantation.

A study described in the February *OBSTETRICS & GYNECOLOGY* reveals that regular menstrual cycles resume after the first year in up to 60 percent of women who use the device, and that women with regular cycles run a higher risk of unplanned pregnancy than those who remain irregular. For five years, a team led by Donna Shoupe and Daniel R. Mishell at the University of Southern California School of Medicine in Los Angeles studied 234 women with the implants, 10 of whom became pregnant in the course of the study. The researchers noted that eight of those 10 had regular menstrual cycles during the six months before they became pregnant. The data revealed that women with regular cycles had a five-year pregnancy rate of 17.4 percent — significantly higher than the 4.4 percent rate for women with irregular cycles.

"The reason that implant users with regular bleeding cycles are at greatest risk for pregnancy is that they have a greater frequency of ovulatory cycles than do women with irregular bleeding patterns," the researchers write in their report. They advise physicians to suspect pregnancy when a Norplant user with regular cycles misses a period.

Norplant still provides "acceptable" protection from pregnancy for women who experience regular cycles, comments Rosemarie B. Thau of the Population Council in New York City. In general, she maintains, the implants provide a very effective pregnancy shield, in many cases proving more reliable than other methods, including oral contraceptives.

## Researchers decry funding shortages

The results of a new Gallup poll suggest widespread concern among researchers and academic leaders in the biomedical field, many of whom believe the United States is losing its competitive edge to countries like Japan and Germany.

Those findings, released Feb. 13 at a press briefing in Washington, D.C., dovetail with a recent survey of campus researchers by Nobel laureate Leon M. Lederman (*SN*: 1/12/91, p.22). Like Lederman's survey, the Gallup poll revealed a pessimistic view of the federal research agenda. According to the new survey, 65 percent of university-based scientists believe that funding for their work, especially federal grant money, is drying up. Half the scientists surveyed said they expect the trend to continue — a prediction echoed by college deans and industry scientists interviewed in the poll.

These worries about a scientific funding crisis are surfacing at a time when Congress faces enormous pressures to reduce the federal deficit (*SN*: 12/15/90, p.378). Indeed, when pressed, researchers and academic leaders at last month's press briefing expressed the belief that dwindling grant money is only part of a larger crisis in biomedical research. Most scientists polled think the current "baby bust" will slow the nation's biomedical progress as fewer students enter science careers. Participants in the survey also blamed the U.S. educational system for a failure to train and recruit more young scientists.