

INDIA

New Budget Boosts 'Secret' Science

NEW DELHI—Space and atomic energy are big winners, and civilian science a loser, as India's new government presented its budget this week to Parliament. The budget also doubles spending on defense research, to \$620 million, an indication that the government plans to boost its indigenous military hardware program in the face of U.S. sanctions imposed in the wake of India's five underground nuclear tests last month. "There can be no compromise on defense preparedness," says Yashwant Sinha, India's finance minister.

The nuclear tests, ordered by the new Bhartiya Janata Party-led coalition government, have spurred a national celebration of science and technology. Visiting the test site a week after the explosions, Prime Minister Atal Bihari Vajpayee marked the achievement by coining the slogan, 'Hail Soldier! Hail Farmer! Hail Science!' He has declared 11 May, the day of the first nuclear blasts, as National Technology Day. Meeting last week with scientists, Vajpayee also outlined an ambitious 10-point agenda that included pledges to debureaucratize science, overhaul the science education system, increase industry's role in R&D, reverse a scientific brain drain, and strengthen selected areas of basic research to the point where Indian scientists capture a few Nobel Prizes by 2010.

However, this week's budget reflects little of that rhetoric, say civilian scientists. "Never take a politician at his word. It is the bureaucrats who have to implement the policies, and in India they seem to lack total imagination," says Pavagada Venkata Indiresan, an electrical and communications engineer and president of the Indian National Academy of Engineering, New Delhi. "The administration of science is in the worst possible situation today," laments M.G.K. Menon, a physicist and former science and technology minister and an adviser to the present government. Menon scoffed at the 3% increase for civilian science and technology, to \$344 million, an amount that fails to keep pace with a 6% rate of inflation. "I would thump for much more money," says Menon, "but only when it is combined with more efficient usage of resources."

Although civilian science and technology may have been given short shrift, education has found favor. A proposed 50% increase, the largest in several years, is expected to boost teacher salaries at all levels. And a new \$6 million program within the science budget for university research equipment "will help im-

prove our scientific capacity in universities," says Valangiman Subramanian Ramamurthy, a nuclear physicist and secretary of the depart-



Budget explosion. Prime Minister Vajpayee visits nuclear test site after tests, which have fueled an increase in parts of the S&T budget.

ment of science and technology in New Delhi. Agriculture has also been given a boost, with a 58% increase that aims to reverse a decline in grain production, including additional research.

The bulk of the 62% increase in space funding, to \$400 million, is targeted at the development of a new series of communications satellites. Although the space program is classified as civilian, its rockets can also serve military needs. A 68% increase for atomic energy, to \$651 million, will go for additional nuclear power plants and capacity. Within that budget, the main center for nuclear weapons research in India, the Bhabha Atomic Research Center in Mumbai (formerly Bombay), has received a 21% boost, to \$107 million. The big boost for defense research falls within the overall defense budget, which will rise by 14%, to \$1.03 billion.

In the face of the euphoria over India's public declaration of its nuclear prowess, more than 100 scientists met last weekend in Bangalore to inject a note of caution into the escalating South Asian arms race. They drafted a petition calling on the government to "avoid stockpiling of nuclear weapons, as they are expensive." At the same time, they said the country "should not sign discriminatory treaties like the CTBT [Comprehensive Test Ban Treaty]."

—Pallava Bagla

Pallava Bagla is based in New Delhi.

ASTRONOMY

Biggest Telescope Opens One Eye

AMSTERDAM—The world's largest optical telescope is wowing astronomers even before it is finished. At a press conference here last week, the European Southern Observatory (ESO) unveiled the first images from the Very Large Telescope (VLT), which will consist of four identical 8.2-meter telescopes that can operate in tandem (*Science*, 1 May, p. 670). Currently, only the first telescope is finished; the others will be completed in the next 3 years.

The test observations were hampered by clouds (very rare at the telescope site, Cerro Paranal in Chile) and a moderate earthquake. "Fortunately, the earthquake protection system put the delicate mirror in safe mode to prevent damage," says ESO astronomer Lex Kaper, a member of the First Light team. But even at this stage, the VLT was able to probe the sky in sharper detail than any other ground-based telescope, ESO astronomers said.

The VLT images reveal subtle wisps of gas in the outer regions of the Butterfly Nebula

(NGC 6302), a gas shroud thrown off by a dying star, and faint jets and bow shocks in the Eta Carinae Nebula. They also reveal fine details of galaxies and star clusters. "Already, we are reaching and exceeding the specifica-

tions that we expected to reach within 3 years," says Kaper. The VLT's active mirror support system helps explain its sharp eye. Computerized actuators at the back of the mirror compensate for distortions due to temperature changes, wind load, and gravity.

When the other three telescopes are finished in 2001, the VLT will reveal objects of unprecedented faintness in the distant universe. Says Leiden University cosmologist George

Miley: "The VLT will enable us to unravel the formation history of galaxies. Astronomers will become the ultimate historians and archaeologists [of the cosmos]."

—Govert Schilling

Govert Schilling is an astronomy writer in Utrecht, the Netherlands.



Portrait of star death. VLT image of the Butterfly Nebula, a shroud of gas ejected by a dying star.