Space Scientists Heed Call to Set Priorities

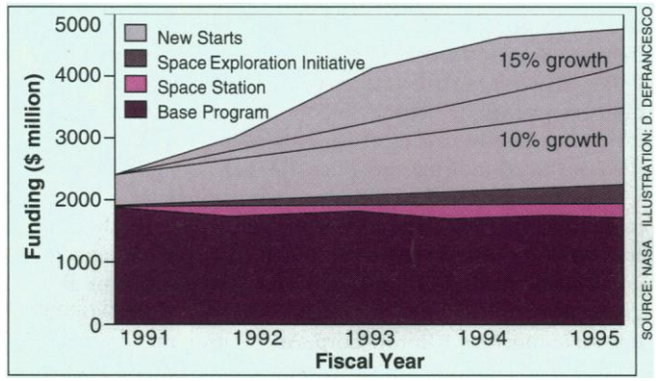
NASA's budget won't accommodate all approved projects, so researchers are trying to decide which ones should go

THREE YEARS AGO, FRANK PRESS, PRESIDENT of the National Academy of Sciences, issued a challenge to the scientific community: Set priorities within your disciplines or risk having politicians do it for you. The latest group to heed the call are space scientists, who last week gathered at the academy to map out a strategy for deciding which projects—across the entire spectrum of space research—should be shoehorned into the National Aeronautics and Space Administration's (NASA) budget in the next 10 to 20 years.

The academy's finest are moving into occupied territory, however. Aided by a hand-picked advisory group, NASA has already developed a priority list of its own (see box), which raises the question of what exactly the academy's group will contribute that's new. But John Dutton, a leader of the academy effort and dean of the college of earth and mineral sciences at Penn State University, is unconcerned that this priority-setting could run afoul of NASA's. He argues that the two would be concerned with different time scales: NASA, with the near term (5-years from now), and the academy group with the 15-to-20 year future.

Space scientists have good reason to put their projects in order in any case, says Dutton, who is chairing a special working group tackling this problem for the academy's Space Studies Board (SSB). NASA's budget, he notes, is unlikely to climb more than 3% to 5% in real dollars in the next few years, but the agency has built up a queue of future missions that require a growth rate of 15% or higher (see chart). Just to stay within the budget, NASA will have to weed out many of the projects its peer panel has already blessed, and Dutton warns that there's a risk that in the future "choices may be made that are not in the best interests of science or the nation."

To prevent that happening, Dutton's group issued a report last week arguing the case for long-term planning and suggesting ways to get started. This "phase one" pamphlet will be followed by a second report by the end of the year laying out more specific plans. In its form, the two-step process mimics one used since the mid-1980s by Lennard Fisk, chief of NASA's Office of Space Science and Applications. Fisk assembled a group of scientific advisers—called the Space and Earth Sciences Advisory Committee—that meets periodically to review NASA's science budget, solicit new ideas, and examine projects already under way. Groups advocating "new



Trouble ahead. *Even 15% growth in NASA's research wouldn't be enough to fit in all its planned projects.*

Solar Observatory Gets Lost in the Shuffle

Berrien Moore III, the affable chairman of a 25-member group of experts who advise NASA on space science, says he and his peers helped create a "sea change" in the agency's priorities last summer when they met on a retreat at Woods Hole, Massachusetts. Their aim was to rank space science missions for funding in the 1990s and, according to Moore, they helped bring about a shift in focus at NASA away from big projects toward smaller ones. In the process, however, the researchers demonstrated just how difficult the business of setting priorities can be.

The most traumatic decision resulted in a reversal of fortunes for a major project. The Space Science and Applications Advisory Committee, as Moore's panel is called, dropped a proposed $800-million Orbiting Solar Laboratory from the top of its 5-year planning list and put it at the very end, which means it would not begin to get funding until 1998. The shift accomplished two things: It allowed a more popular proposal, the Space Infrared Telescope, to advance to the head of the queue as the next big science mission, and it freed up funds for a number of smaller proposals. NASA has now adopted a "small is beautiful" philosophy, says Moore, who directs the Institute of the Earth Oceans and Space at the University of New Hampshire. Already, he notes, the agency has decided to use smaller and less expensive platforms for the $25-billion Earth Observing System.

Not everyone thinks the decision to downgrade the big solar physics project and upgrade infrared astronomy—though reached by a peer panel—was correct. "It was an extremely painful experience," says Loren Acton, a solar physicist at Lockheed who was on the Woods Hole panel. Scientists who had spent a lifetime preparing for this project saw their plans gutted overnight and several fired off letters of protest. Some relief is now in sight: NASA is considering funding a mix of small-scale solar physics research projects that would rely on ground-based sensors, balloons, and small rockets.

As for the kind of peer review conducted at Woods Hole, Acton says, "In the end, you have a kind of popularity contest, and we lost." He detected what he calls a bit of "dirty pool" in the way advocates won support for one new project. Acton points out that planetary scientists persuaded the group to add a new project to the launch queue—a Neptune or Pluto probe—on an urgent, last-minute basis, although it had not been discussed before by the committee, and the solar lab had been pending as a high-priority item for at least a decade. To Acton, it seemed that the planetary scientists joined with the astronomers (fans of the infrared telescope) to defeat the solar lab and divide the spoils.

This priority-setting exercise may be just a warmup for the ones to come this year and next, when the pinch on space science funding may grow much sharper. ■ E.M.

starts" are now expected to present their case in a standard written format, answering a number of general questions. The entire committee then debates the merits of the proposal and votes on where to place the new project within a 5-year strategic plan.

At the academy meeting, Dutton and his panel handed out a sample 27-page questionnaire that advocates of new ideas would be asked to complete before seeking entry to the list of approved projects. The proposal did not get a warm welcome, and the advice from the floor of the auditorium was to simplify it drastically, if it's to be used at all.

Whether space scientists will take the time—or accept the responsibility—for priority setting is not yet known. If they don't, the consequences could be destructive, according to Representative George Brown (D-CA), chairman of the House science committee. Brown pointed out at the academy meeting that unless scientists make a forceful case for their own preferences, Congress will fall back on political methods—and that could be disastrous. Said Brown: "If scientists fail" to exercise discipline within their own ranks, "science funding may be increasingly decided by 'political pork' awarded to localities based on political rather than scientific goals." ■ ELIOT MARSHALL

Anti-Cancer Drug IL-2 May Finally Be Approved

Is there life after death in biotech? Suppose the Food and Drug Administration (FDA) accepts a recommendation from one of its own advisory committees, widely publicized last week, to approve the drug IL-2 for treating kidney cancer. Could the Cetus Corp. recover from its strategically disastrous error in betting heavily on the experimental anti-cancer drug, only to be shot down 18 months ago when the FDA sent the company back to the drawing board to reorganize their data and expand their studies? Not really. Because that ruling triggered a humiliating takeover of Cetus, the grand old man of biotech startups, by an upstart competitor, Chiron Corp. And in its present incarnation Cetus exists only as the cancer-products division of Chiron.

So it's too late for Cetus to make a comeback as a corporation. But it isn't too late for IL-2. And the reason the FDA changed its mind about the drug is that, in the words of Jay Siegel, chairman of the license application review committee that is expected to take up the advisory group's recommendation soon, "a great deal has happened here. The picture looks considerably different than it did in July 1990."

In that month the picture was fatally flawed by several weaknesses in the Cetus trials: their small size, the concentration of positive results at one research center, and the failure to remove concerns about the drug's toxicity. Now some of those complaints have been met head-on, says Siegel.

To meet the FDA's concerns, the clinical trials were expanded to include more subjects and more institutions. In 2 years the number of patients given IL-2 alone or in combination with compounds such as lymphokine-activated killer (LAK) cells increased from 106 to 255. Furthermore, the objection that a majority (10 of 16) of the patients who responded favorably to treatment were at one lab (Stephen Rosenberg's laboratory at the National Cancer Institute) has been met by expanding the number of centers—and in the process including other centers where patients are showing favorable responses.

Side effects, however, remain a serious problem. IL-2 "causes severe toxicity in almost everybody," says Siegel—including circulatory problems that can be as severe as heart attacks and strokes. But Siegel adds that until now there had been considerable uncertainty about just how toxic the drug is; now, he says, there is "more certainty" about toxicity. He adds that there are now also improved treatments available for some side effects, such as staphylococcal infections.

In the end, the lack of other effective treatments for kidney cancer overshadowed concerns about IL-2's toxicity, and the advisory committee voted 7 to 1 to recommend approval—a vote that all but guarantees a positive response by the FDA. And that, in turn, should be good for the health of Cetus, in its current, less-mighty form. "It's a key product in their long-term strategy," says James McCamant, editor of *Medical Technology Stock Letter*.

Still, it may never be the product once envisioned. For one thing, it's not likely to be used on its own: McCamant predicts IL-2 will be most marketable as a drug used in combination with chemotherapy or with other biological response modifiers. What's more, the market for the drug—once seen by optimistic Cetus strategists as being in the range of hundreds of millions of dollars per year—is now seen as being a far more modest tens of millions. And if this reduced view is correct, it looks as if those who chastised Cetus for pinning all their hopes on IL-2 were largely right. ■ RICHARD STONE

Roche Eases PCR Restrictions

When the powerful gene amplification technique known as the polymerase chain reaction (PCR) was developed in 1983, scientists anticipated that it would spawn a lucrative new genetic testing industry. The technique can copy minute amounts of specific gene sequences, yielding sufficient DNA to diagnose genetic and viral diseases, determine a child's paternity, or help identify a rapist from the DNA in his sperm. But development of the industry has been hampered, say some, by restrictive licensing and royalty regulations. Until now.

Hoffmann-LaRoche Inc., the pharmaceutical company that acquired the full patent rights to PCR in December from Cetus Corp. of Emeryville, California, where the technology was originally invented, announced that it will relax the restrictions and reduce the royalties paid by laboratories using PCR for diagnostic and other tests. The company is still working out the details of the new regulations but hopes to have them ready sometime in February, says Douglas McQuilkin, vice president for business development of Roche Molecular Systems Inc., a Roche subsidiary recently formed to develop PCR products.

Roche's new policy has already come as a relief to leaders in the biotech industry, who learned about it when McQuilkin mentioned it at a meeting on the commercialization of biology held at the Banbury Center at Cold Spring Harbor Laboratory on Long Island. Thomas Reed, chairman and chief executive officer of Vivigen, a company in Santa Fe, New Mexico, which currently uses PCR for genetic screening, told *Science* that the current fees had discouraged many laboratories from even seeking a license. Commercial laboratories have had to make a down payment of $15,000 against royalties, which are supposed to amount to at least 15% of the cost of each test performed. The old licensing agreement also discouraged the development of new tests, Reed says, because the licensee "had to go hat in hand to Roche" to get permission for every new application. The expected removal of these restrictions should amplify the diagnostic uses of PCR—and perhaps Roche's royalties as well. ■ MICHELLE HOFFMAN