Space: 1971 Mariner Mission Knifed by Budget-Cutters

Exploration of the planets has long been proclaimed a primary aim of the U.S. space program. Despite this, the only planetary mission which the National Aeronautics and Space Administration had programed for the 4-year period from 1969 to 1973 has now been put to the knife. This mission, the 1971 Mariner flights to Mars, is the principal victim of a $234-million cut Congress has made in NASA's fiscal 1968 budget of $5.1 billion, about half of which goes directly for Apollo, the manned lunar mission.

On the other hand, Congress is authorizing a start on Voyager, NASA's first multi-billion-dollar planetary exploration program, which calls for sending unmanned spacecraft to orbit and land on Mars in 1973 and again in 1975. Although the initial authorization for Voyager was cut from the $71.5 million requested to $42 million, NASA was told to make every effort to carry out the mission as now planned—an implied promise that, despite the first-year cut, all necessary funds eventually will be forthcoming.

The space authorization bill, on which congressional action has just been completed, merely sets a ceiling on appropriations, however, and if substantial cuts should be made in the appropriations bill, Voyager, too, could become a victim.

But killing Voyager would leave NASA with no planetary exploration program in the post-Apollo period and would dismay not only many space scientists but various contractors and other economic interests which have become partly dependent on big space ventures. No action as disturbing to the space establishment as this seems likely.

Except for the loss of Mariner, NASA's scientific program has escaped serious harm from the budget-cutters, thanks in part to a freakish parliamentary situation. In the House the space authorization bill was cut by $309.3 million, with almost a third of that amount taken from funds that were to go for procurement of small and medium-sized launch vehicles such as Scout, Delta, and Centaur. This action raised the prospect that millions of dollars' worth of scientific satellites would be without vehicles to launch them.

The major cut came on a motion by Representative James G. Fulton (R-Pa.), whose intent was not to cripple NASA's scientific program but to round up hostages to be used later in bargaining with other House-Senate conferees for a reduction in procurement of the big Saturn boosters used in Apollo (*Science,* 14 July). But the Senate had cut the bill by $249 million, and it appeared for a time that there might not be enough negotiating room to avoid some crippling and unintended reductions.

A curious circumstance saved the situation. Because of a parliamentary bungle, the total spending figure authorized by the House bill was $136 million greater than the sum of the individual program "line-items." Moreover, the House parliamentarian ruled that this "total"—even though higher than the Senate's total—would set the upper limits for the negotiation. This was to make it possible, for example, for the conferees to accept the Senate authorization of $157.7 million for launch vehicles. This exceeded the House authorization for this item by $85.7 million—an amount $15 million greater than the differences between the House and Senate line-item totals. If, in this particular case of muddling through, things turned out reasonably well, the credit goes to the gods and not to the mortals in Congress.

As Fulton hoped, most of his hostages were freed in return for a deeper cut in the Apollo Applications Program (AAP), which contained large sums for Saturn boosters and for such projects as long-duration orbital flight, the Apollo Telescope Mount (ATM), and lunar exploration. However, according to a NASA spokesman, the principal effect of this cut, reducing NASA's AAP authorization by almost a fourth, from the $454.7 million requested, may be to reduce or stretch out the program of scientific and technological experiments. At this point, he said, no major program elements, such as ATM, appear in jeopardy.

The space agency's physics and astronomy program emerged largely intact from the House-Senate conference, although the authorization for the last Orbiting Geophysical Observatory (OGO) in a series of six and for the final Orbiting Astronomical Observatory (OAO) in a series of four had been cut out by the House. In a quick rescue mission, Lyman Spitzer, Jr., director of the Princeton University Observatory, which is providing the 32-inch reflecting telescope for the fourth OAO, visited Senator Clinton P. Anderson of New Mexico, chairman of the Committee on Aeronautical and Space Sciences. Though Spitzer's intervention was not necessarily the thing that proved decisive, the fact is that the authorization for OAO was restored, as was that for OGO.

The House also had made a $24-million cut in the nuclear rocket development program. In this matter Anderson clearly required no coaching. Part of the work on the nuclear rocket is done at the Atomic Energy Commission's Los Alamos facility, in the senator's home state, and, predictably, he saw to it that the House cut did not stand.

A start on the 1971 Mariner-Mars mission was authorized by the House but not by the Senate, and the Senate ultimately prevailed. Only $10.1 million was requested for the first year, but the total cost of the project was to be $216 million. Much of the cost, far higher than that of Mariner missions already completed or planned for the late 1960's, was associated with plans to eject a scaled-down model of the Voyager landing capsule into the Martian atmosphere. Anderson and his colleagues on the Senate space committee concluded that, for the data likely to be obtained, the price was too high.

However, if the 1973 Voyager "lander" mission should fail or should yield disappointing results, the senators' decision may prove an embarrassment, for NASA has duly noted Mariner's importance as an advance scout for Voyager. Indeed, some leading space scientists believe that, even with the 1971 Mariner mission, no attempt at landing a Voyager spacecraft on Mars should be made before 1975.

James A. Van Allen, University of

Iowa physicist and chairman of the committee on small planetary probes of the National Academy of Sciences' Space Science Board, has gone even further. In an appearance last January before a congressional committee, Van Allen said Voyager should be preceded by a number of small planetary missions. "We [his Space Science Board committee] favor sending a number of well-equipped scouting parties to the several planets before we send out the wagon train with all of our women and children and a full set of household furnishings as Voyager proposes to do eventually," he said.

Voyager won't have women and children aboard, but it will have at least $2.3 billion riding on it, and possibly a great deal more if this NASA estimate of the total program cost is over-optimistic. Voyager was to have benefited from the 1971 Mariner in a variety of ways, although, with the missions only 2 years apart, major alterations in the Voyager hardware on the basis of the Mariner flight experience would not have been possible. Some of the principal advantages seen in Mariner as a precursor mission are these: Mariner would test sterilization techniques for the landing capsule; test capsule delivery and landing techniques and test relay telemetry from the capsule to the spacecraft and back to earth; provide photographic data on suitable landing sites; and produce information on such questions as the Martian atmospheric temperature and pressure—data of value in selecting and conducting Voyager experiments.

According to Harry H. Hess, Princeton geologist and chairman of the Space Science Board, a sure consequence of the elimination of Mariner (which Hess hopes can be resurrected in next year's budget) will be to "degrade" the scientific information obtained from Voyager. This will be true, he says, in part because, without Mariner, much more of Voyager's data-gathering will be taken up with the mission's operational requirements (such as selecting a landing site) than would otherwise have been the case.

In February, the President's Science Advisory Committee space science and technology panels, in a study chaired by Franklin A. Long of Cornell, endorsed the NASA program for the exploration of Mars and called for other unmanned missions during the 1970's to Venus, Mercury, and Jupiter. Now, Long, though not suggesting that it is

NEWS IN BRIEF

● **THEMIS AWARDS**: The first 50 Defense Department (DOD) Project Themis awards (*Science*, 3 Feb., 7 and 21 April) will go to universities in 30 states and the District of Columbia. Total funding for the program is $20 million. Themis was established to create "new academic centers of excellence in research areas important to the [Defense] Department's long-range scientific and technological goals." A second objective is to distribute DOD research funds over a wide geographical area, favoring institutions which previously had not received significant amounts of DOD support. Of the states receiving Themis grants, Texas received the most, with five. According to a DOD announcement, all research programs under Themis will be unclassified. All grants are for a 1-year period, begin in the fall, and are renewable.

● **COMMERCE SCIENCE POST**: The top science post in the Commerce Department will be temporarily filled by Allen V. Astin, director of the National Bureau of Standards, pending a permanent appointment. Astin, who has headed the Bureau since 1952, will be the interim replacement for J. Herbert Holloman, who resigned as assistant secretary of commerce for science and technology to become president of the University of Oklahoma.

● **UNIVERSITY STAFF NEEDS**: The number of scientists and engineers with doctorates who will be available for university employment in the early 1970's is expected to fall short of the institutions' needs, according to an NSF report. The study estimates that institutions will need an additional 12,000 staff members with doctorates in the 1969–70 academic year and only 8000 will be available. However, the shortage is expected to be resolved by 1974 when the requirements and the doctoral candidates available for university employment should be about equal. The report, *Science and Engineering Staff in Universities and Colleges*, estimates that within the next 10 years employment of science and engineering staff in U.S. universities will double. It also indicates that university and college staff needs, excluding employed graduate students, will be 369,000 in 1975, 179,000 more than in 1965. Universities are also expected to require an additional 56,000 doctorates during the next decade to restore losses from attrition. The NSF report may be obtained from the U.S. Government Printing Office, Washington, D.C., for 30 cents a copy.

● **NEW YORK'S $100,000 CHAIRS**: An Albert Einstein Chair in Science has been assigned the State University of New York at Buffalo, while Columbia University has been granted an Albert Schweitzer Chair in Humanities. The chairs were created by the 1964 New York Legislature and provide annual funds up to $100,000 each to support scholars and their staffs. The Einstein Chair at Buffalo will be filled by a scholar in molecular biology while the Schweitzer Chair at Columbia will go to a scholar of advanced study and research in international relations. Neither recipient has been named. Einstein professorships previously were awarded to Efraim Racker, biochemistry, Cornell University; Elliott W. Montroll, mathematical physics, University of Rochester; C. N. Yang, theoretical physics, State University of New York, Stony Brook; Joaquain B. Diaz, applied mathematics, Rensselaer Polytechnic Institute. Schweitzer Chairs have been granted to Arthur M. Schlesinger, Jr., history, City University of New York; Conor Cruise O'Brien, contemporary literature and culture, New York University; Marshall McLuhan, mass communications, Fordham University; and Dwight Waldo, public administration, Syracuse University.

● **SOVIET-CERN AGREEMENT**: Scientists from the European Nuclear Research Organization (CERN) will participate in the use of the new Soviet 70-Bev proton accelerator nearing completion at the Serpukhov Institute of High Energy Physics (*Science*, 28 July). The 5-year agreement, which was signed in July, provides for the mounting of a series of counter experiments to be run by mixed teams of CERN and Soviet scientists. CERN has agreed to provide beam ejection and separator equipment worth nearly $2 million. Results obtained under the cooperative program will be published jointly by the two laboratories.

necessarily unsound to undertake Voyager without having the experience of the 1971 Mariner, says "It's been my instinct to feel that we should get on somewhat firmer ground before committing the big money."

William Pickering, director of the Jet Propulsion Laboratory, which has had management responsibility for Mariner and which will manage part of Voyager, says that to attempt Voyager without the benefit of Mariner would be somewhat analogous to carrying out the Apollo moon landing without having first tested landing conditions and techniques with Surveyor. Pickering does not say Voyager without Mariner is a bad idea. He does say, "The 1971 data would increase your confidence in the '73 mission."

In effect, Congress has decided to take a not too well-calculated risk—to save $216 million on Mariner, on the assumption that the Mariner mission would produce no information essential to the success of Voyager. The risk is being taken almost casually, for the hearing record suggests that the senators have given little thought to Mariner's importance as a precursor mission and a safeguard against the chance of a costly disappointment.

—LUTHER J. CARTER

Social Sciences: Progress Slow on House and Senate Bills

Twenty years ago, when the so-called hard sciences were first setting up housekeeping with the federal government, it was suggested that perhaps some support could be spared for the social sciences. In discussing this proposition, the late Representative Clarence Brown (R–Ohio) declared that support of the social sciences would result in "a lot of short-haired women and long-haired men messing into everybody's personal affairs." Explanations of greater subtlety were later devised to justify the mere crumbs, or absence of as much as crumbs, for research and training in the social sciences. But, whatever the rationale, the social sciences were accorded a low priority among the intellectual endeavors that merited federal support. The priority, of course, was never as low as the one accorded the traditional humanistic disciplines; nevertheless, relative to the wealth and attention bestowed upon the natural and physical sciences, the social sciences have not fared especially well. Last year, according to one compilation, the federal government bestowed upon them some $221 million out of the $5.5 billion that it spent on basic and applied research.

Whether with this sum the social sciences are actually suffering from financial undernourishment is a debatable matter; congressional witnesses drawn from the social sciences have recently argued both sides of the issue, though the majority of them feel more money is urgently needed. There is no doubt, however, that the social sciences are now in line to get a good deal more money, for the ingredients are accumulating for Congress to do something generous for the social sciences, and, at this point, the uncertainties concern only what and when.

The source of the uncertainties is that, after years of relative oblivion, the social sciences are now the object of two separate, partially conflicting schemes of benefaction, each offered by an ambitious member of Congress who is in a good position, amidst the balkanized congressional committee structure, to waylay the other's proposal. Since the proper nourishment of the social sciences is a subject about which most congressmen care nothing, the manner in which the two social science champions handle their affairs will probably have a decisive effect on how Congress as a whole chooses to treat the issue.

On the Senate side, S. 836, a bill to establish a National Foundation for the Social Sciences (NFSS), is being pushed by Fred R. Harris (D–Okla.), who is chairman of the Subcommittee on Government Research of the Committee on Government Operations. (See Harris' article on his bill in the 4 August issue of *Science*.) What Harris wants to do is to provide money and visibility for the social sciences by establishing a new federal agency with a mandate to give them support for research and training. His original design contained a number of curious curlicues, such as having the NFSS serve as the operating agency for foreign social science projects originating in the Defense Department. This particular feature reflected Harris' point of entry into the social science issue: general concern over the role of military and intelligence agencies in the support, open or covert, of supposedly benign academic research. Harris originally held that such research could be sanitized by channeling the money through a civilian-run NFSS. But the Senator now appears to be responsive to the warning that such authority to use transferred funds might taint all of the NFSS's foreign activities at a time when American scholars abroad often have a difficult time persuading local authorities that they are scholars and nothing but scholars. Now after months of hearings, Harris' design for the NFSS is verging toward near identity with the administrative structure and methods of operations of the National Science Foundation. The bill is yet to emerge from his subcommittee, but it is not likely to encounter any serious difficulties either there, in the parent committee, or on the floor. At age 36, Harris is one of the fast-rising youngsters of the Senate. Twenty members of the Senate have endorsed his bill, and Lyndon Johnson himself recently acknowledged Harris' industry and secure lines to the Senate's inner sanctum by putting him on the newly created Advisory Committee on Civil Disorders—which is no small accolade for a junior Senator who is trying to get ahead in this competitive world.

For Harris' bill to become law, however, it will have to make its way through the House; and the House, as it turns out, has already given its approval to a design that one of its own members worked out for helping the social sciences. The member is Emilio