

SPACE

NASA's Back to the Wall Again

by our Astronomy Correspondent

NEXT year could be a bad time for NASA as the United States comes to grips with the question of what to do with the equipment for space exploration that has been painstakingly built up during the past decade. As time passes it looks increasingly as if the more pessimistic of the outcomes that people have been visualizing could turn out to be what will happen. The deletions in the Apollo programme announced this autumn could, the Jeremiahs say, be followed by more cuts in Apollos 14-17 which will knock the bottom out of the programme. Nobody is confident either about any of the future unmanned programmes. Some say that even projects which seem to be the mainstay of the unmanned programme such as the Mars soft-landers (already postponed from 1973 to 1975) and the grand tour spacecraft may be in danger. It is in this light that two reports published by the National Academy of Sciences have to be seen—*Venus, Strategy for Exploration* and *Life Sciences in Space*, both prepared by the Space Science Board, the former in cooperation with NASA's Lunar and Planetary Missions Board.

A running commentary on the United States space programme has been the chief activity of the Space Science Board and the two reports now published are the latest in a worthy line. They are important as the forerunners of a comprehensive report on national priorities in space based on a three-week summer conference at Woods Hole, Massachusetts, under Professor H. Friedman, but which is said to have been delayed because of internal disagreements over the draft. Of the two, the report on the space aspects of the life sciences will be read more avidly by the administration of NASA—or at least it should be, for it raises some awkward questions about the quality of the biology being carried out under the wing of NASA and it launches into a redrawing of the relevant parts of the NASA management diagram. But to knock heads together is not the only purpose of the reports and both of them set out the science involved, particularly the report on Venus which is as straightforward an account of what is known about the environs, atmosphere and surface of Venus as can be found.

What the Venus report recommends is the development of a cheap planetary probe to be launched by the Delta rocket so that, with luck, full advantage can be taken of as many launch windows as possible. At present the only American spacecraft bound for Venus is to be a modified version of the Mariner design used to obtain the close-up photographs of Mars in 1969, which will fly within 3,300 miles of Venus *en route* to a close approach to Mercury in 1974. Chiefly, however, this spacecraft is aimed at providing new knowledge about Mercury; the television cameras might show some markings in the cloud cover of Venus if people are lucky. By ignoring Venus, the report implies, NASA is not falling in step with the June 1968 report of the Space Science Board which recommended a broad approach to planetary exploration, rather than concentration on a few planets. That doctrine too is now going by the board, of course. In the face of shortages of money people are asking whether perhaps after all it would be better to concentrate on one planet, with Jupiter as the obvious candidate. But the Space

Science Board is continuing to argue that Venus is worthy of study under the present circumstances, as much as anything because it seems to have a meteorology at least as interesting as that of the Earth. That is why the report, prepared by a committee under the chairmanship of the planetary meteorologist Professor R. M. Goody of Harvard University, points out that the new class of cheap spacecraft should be capable of carrying probes to drift through the atmosphere of the planet as well as soft-landers to examine the surface conditions and orbiters to provide continuous data on the environment of Venus. To begin with, a series of four missions would cost an average of \$33 million per launch, but for subsequent launches the price should come down to nearer \$20 million. In the end, the preparation of instrumentation for the hypothetical Planetary Explorer series could be done with some informality in contrast to the stringency which up to now has had to be an annoying feature of planetary research by spacecraft.

The second report, *Life Sciences in Space*, makes NASA look as murky as the clouds of Venus. It is true of course that the life sciences do not fit easily into the pattern of space research, which is why so many of the experiments proposed for Skylab and the space station have a contrived look. At best the experiments deal with the result when organisms are placed in abnormal, even irrelevant, environments, and the report begins by asking whether research on the effects of radiation and weightlessness are really worth the money. The controversial Biosatellite satellite programme which has produced meagre data on over-taxed animals at a cost of \$156 million is a case in point which the committee does not labour, presumably not wishing to rub salt into wounds. If it were not for the manned spaceflight programme the justification would be even less, and NASA's life sciences programme would, if reason held, be limited to a search for extra-terrestrial life. Indeed, as the report points out, it is

Biologists Shoot down ShuttleAn extract from the report *Life Sciences in Space*:

"If the space station and space shuttle represent the technological goals of the coming decade, then such facilities should certainly be adapted to include an appropriate program in *space biology*. As citizens and scientists, we cannot avoid uneasiness over the large costs involved relative to the prospective gains in scientific knowledge. We have asked ourselves whether a better understanding of biological rhythms, radiation effects upon man and other organisms, and the biological effects of gravity and weightlessness justifies so great an expenditure of public funds in comparison with other fundamental biological problems and critical needs for federal support of the life sciences. Yet we also realize that Skylab, the space station, and the space shuttle will be programmed or abandoned for reasons other than the expectation of making important biological findings. We therefore reiterate our conviction that if the new space facilities are to be developed they should provide for well-chosen and well-designed biological experiments."