

MARS MISSION

# Less than a national goal

Men will land on the red planet, but not in the next decade

Apollo 11 made it under the wire with only six months to spare in fulfilling President John F. Kennedy's desire of putting a man on the moon by the end of the decade. It almost certainly would not have done so, except for its lofty status of "national goal"—which implied that it was a popular-level movement and therefore deserving of full-speed-ahead treatment in space planning and budgeting, regardless of the cost.

Now President Nixon has in his hands three flight plans for the future of the U.S. in space, differing primarily in how strongly the country is committed to another, even loftier goal: Mars.

**The commitment** to a Mars landing seems certain. The question is: How soon?

The flight plans are options presented to the President by the highest-level study group he could devise, the first such panel ever assembled from within the Government to advise a President on both civilian and military space programs in detail.

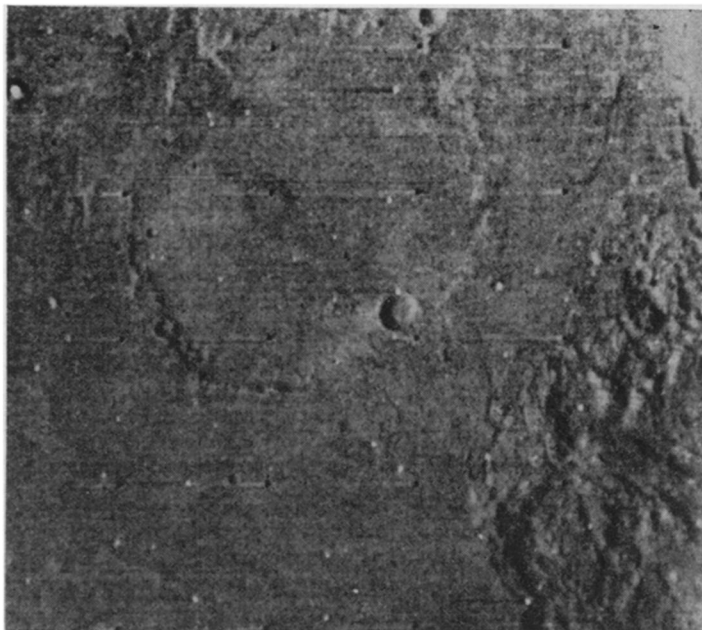
Formed in February under Vice President Agnew, who also heads the National Aeronautics and Space Council, the group includes Dr. Thomas O. Paine, Administrator of the National Aeronautics and Space Administration, Secretary of the Air Force Robert C. Seamans (former Deputy Administrator of NASA), and Dr. Lee A. DuBridge, the President's science adviser.

The panel's report concentrates on the 1970's, recommending a balanced program of unmanned planetary exploration, earth applications satellites and further manned studies of the moon.

Much of the interest in the '70's, however, and in the report's three differently paced options, is in the degree to which the coming decade will be used to prepare for sending man to Mars.

President Nixon is unlikely to make

*Terrain like none on earth or moon is the destination; the pace is the question mark.*



NASA

an instant, all-stops-out national goal of the manned Mars mission—"I'd be surprised, amazed and shocked if that were recommended to the Congress," says a Senate space committee official.

Even the fastest-paced plan put forward by the Space Task Group would not require NASA to commit itself before 1976 to a landing as early as 1983, and the slower, less costly options would put the event off until the 1990's or even past the turn of the century.

However, at least the first option would require commitment to the new technology that would be necessary for such a project. An important item is the nuclear rocket engine, vital for long-life flights with heavy spacecraft but which so far has received less than unanimous support in its on-again-off-again history (SN: 3/22, p. 283). The nuclear rocket, probably used as the third or fourth stage of a Saturn 5, would be needed to make a Mars flight feasible in less than two years with the large crews that have been discussed—possibly as many as a dozen men.

**Another important** milestone would be a large, earth-orbiting space station, both for training in long exposure to weightlessness and as a laboratory to develop the necessary life-support equipment. The Task Group's first choice option, in fact, reportedly puts a 1975 deadline on getting such a station aloft, to hold 12 men, which means that a shuttle vehicle to supply it would have to be ready even sooner.

Even without the Mars landing, these three steps—the nuclear rocket, space station and shuttle—will cost from \$4 billion to \$6 billion says NASA.

The Task Group rejected both of the current extreme positions in its recommendations, an Apollo-style national goal and the complete abandonment of all manned space flights after Apollo. The latter position had been supported, to varying degrees, by some scientists seeking to have space funds spent on less expensive, unmanned research probes.

The three options of the report, while containing basically the same elements, do vary enough in pace that the required annual funding levels would be significantly different, probably ranging from above to below NASA's planned fiscal 1971 budget request of about \$3.6 billion.

**The panel stressed** that one important feature of the 1970's in space ought to be practical payoffs on earth. All three options, therefore, include emphasis on satellites for weather forecasting, communications, natural-resources surveys and navigation. The report also recommends unmanned planetary exploration, particularly the elaborate Grand Tour mission to visit most or all of the outer planets—Jupiter, Saturn, Uranus, Neptune and Pluto—with a single space probe (SN: 8/9, p. 111), taking advantage of a fortuitous lineup of planets that will not occur again for as much as 180 years.

The focus of interest, however, is Mars, and which choice President Nixon will make and pass on to Congress. His acceptance of the report this week is significant in itself. Asked whether that meant a commitment to land a man on Mars, Presidential press secretary Ronald L. Ziegler said, "Yes, I think so." ◊

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## A puzzling terrain

Regardless of the space pace picked by President Nixon to get a man to Mars, the red planet has lately shown itself as a strong center of interest.

Scientists analyzing data from the Mariner 6 and 7 probes, which flew by Mars in July, are just beginning to understand the implications of their data, including evidence of terrain unlike anything on either earth or the moon.

And a meeting of scientists last week to begin planning experiments for the unmanned Viking Mars landing capsule in 1973 drew such a crowd—300 instead of the expected 100 or 150—that Dr. John E. Naugle, in charge of space science for NASA, commented, "I was afraid we might have our own Woodstock."

The Mariner scientists were particularly elated. Mariner 4 in 1965 had indicated that the planet was covered with vast fields of craters, surprisingly, in fact, like earth's own moon. This year's two probes, however, have shown some more puzzling types of terrain.

One is a sort of huge, apparently featureless plain, with no visible craters, mountain ridges or anything else. A Mariner 7 photo showed one such area, covering an expanse of more than 1,200 miles, with nothing at all visible on the surface down to the camera's resolution of 1,000 feet.

Since it is almost inconceivable that such a broad area would remain free from even large meteor impacts, says Dr. Robert P. Sharp of California Institute of Technology, a possible explanation might be that some unknown process is erasing them. Perhaps, he suggests, the featureless plains are covered with a fine material—"some sort of micro-popcorn," he says—that is easily redistributed over large areas.

Even more unusual is a vast expanse of jumbled, chaotic terrain rich in short mountain ranges, little valleys, crags, escarpments and other features. No such areas have ever been seen on the moon, and the closest ones on earth—the slump areas found around landslides and volcanoes—are but tiny specks by comparison.

Most intriguing in the past to Mars researchers has been the possibility that the planet, far more hospitable than hot, high-pressure Venus, might harbor some form of life. The twin Mariners measured daytime temperatures from 62 degrees F. down to minus 63 degrees F. and nighttime readings down to a still conceivably life-supporting minus 153 degrees F. But the planet's thin atmosphere is less inviting.

In the first analysis of the data following the dual flyby, Dr. George C.

Pimentel thought he saw, in the readings from the vehicles' infrared spectrometers, traces of ammonia and methane gas (SN: 8/16, p. 129). These gases, produced on earth in part as by-products of organic decay by bacteria, could mean that Mars might be a fit place for some sorts of microorganisms to live. Dr. Pimentel later found, however, when trying to reproduce the spectra with gas mixtures made in his laboratory, that the supposedly momentous spectra were actually previously unknown spectra of solid carbon dioxide, possibly, he surmises, from a fine CO<sub>2</sub> hoarfrost newly formed on the ground.

The all-important component thus conspicuously amiss from the Martian atmosphere was still nitrogen—Dr. Pimentel's erroneous observation of ammonia, NH<sub>3</sub>, would have supplied it.

"At this point," says Dr. Charles A. Barth of the University of Colorado, who looked long and hard at ultraviolet spectra but found only CO<sub>2</sub> and its photodissociation products, "I think we can say that there are no other major constituents." He concedes, however, that Mars could have as much as a few percent of nitrogen without its showing up in the ultraviolet spectra. "Earth would be like that if it had no oceans," he says.

In general, says Dr. Norman Horowitz of California Institute of Technology, the results certainly don't encourage life on Mars, although they don't exclude it. Dr. Carl Sagan of Cornell points out, in fact, that there could actually be a Martian civilization, complete with recognizable structures, and it could go undetected by the 1,000-foot resolution of the Mariner TV cameras. "You couldn't detect life on earth with that resolution," he says. ◇

## DRUG ABUSE

### A search for definitions

The functions of the Bureau of Narcotics of the Treasury Department and the Bureau of Drug Abuse Control of the Department of Health, Education and Welfare were consolidated in April 1968. The new agency—the Bureau of Narcotics and Dangerous Drugs—was assigned to the Justice Department.

Last week the first conference under the new department met to decide on methods for determining just how dangerous various drugs are. But although separate workshops were held on narcotics and analgesics, sedatives and hypnotics, stimulants and hallucinogens, the conference members, representing industry and Government as well as the

academic world, couldn't get past the problem of defining what makes a drug potentially an abuse problem.

A working definition of drug abuse, the main topic of the three-day conference, was never established. Drug abuse potential, said Dr. William Martin, director of the Federal Addiction Research Center at Lexington, Ky., "is defined by social attitudes. Personality characteristics of the abusers, values and dependence of the individuals using the drug are involved in the definition." And Dr. Jerome Jaffee of the University of Chicago Medical School felt that the term drug abuse is not and cannot be part of the scientific vocabulary. Finally, Dr. David Tedeschi of Geigy Pharmaceuticals suggested that another conference be held with more representation from psychologists and sociologists to discuss and define the question.

The scientists among the conferees, however, were uniformly disturbed over pending drug abuse legislation, introduced by the Nixon Administration as if the still-hanging questions had been answered.

"The problem of legislation," said Dr. Theresa Harwood, coordinating chairman of the conference, "kept rearing its ugly head."

Dr. Carl Pfeiffer of the New Jersey Neuropsychiatric Institute tried unsuccessfully to get the group on record against the proposed bill, which imposes even stricter penalties than at present for possession of drugs.

Others had specific complaints, including the way the bill categorizes drugs with corresponding penalties. "Some scientists," said Dr. Walter A. Pieper of Emory University, "are concerned about the severe penalties for possession of drugs that aren't all that harmful."

For example, marijuana, whose physiological effects are still largely unknown, is lumped together with drugs like heroin, and possession of them would be punishable by a minimum of five years in prison or a fine of \$25,000, with no suspension and no probation. It was felt that another category should be created to include compounds such as marijuana and peyote.

Dr. Jaffee also expressed his concern over the fact that Governmental regulatory procedures seize upon one drug. Very often the drugs under discussion have not been sufficiently investigated as to their medical uses, and the classification of the drugs by the Government is premature, he says.

The conferees also unanimously objected to the new and more complicated procedures required by the bill—including approval by the Secretary of Health, Education and Welfare and the Attorney General—before a new compound could be used in animal experiments. ◇