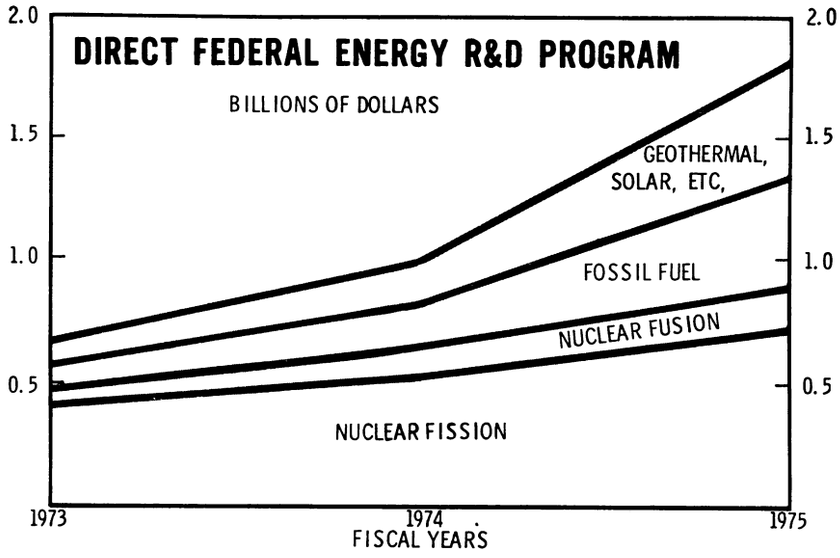
nearly doubles in new R&D budget

purities that have plagued contained plasmas.

Laser fusion will receive $10 million for unclassified research, but a separately funded military laser fusion program has been allocated $56.3 million. When questioned by SCIENCE NEWS about the significance of this apportionment, AEC Chairman Dixy Lee Ray replied that both funds will support basic research that could result in a new source of power for civilian use, but that much of the technology involved is classified. These allocations do not include high-energy laser programs of the Department of Defense.

Under the aegis of the National Science Foundation, $50 million has been allocated for solar-energy development. The immediate goal is demonstration of technological feasibility of solar collectors for use in the heating and cooling systems of buildings. Geothermal energy development was allocated $44.7 million, spread among several agencies.

Though the thrust of energy R & D has supposedly been to achieve energy self-sufficiency by 1980, in accordance with President Nixon's "Project Independence," Dixy Lee Ray told reporters the project's goal was "not well defined" and spoke instead of developing the "capability" of self-sufficiency.

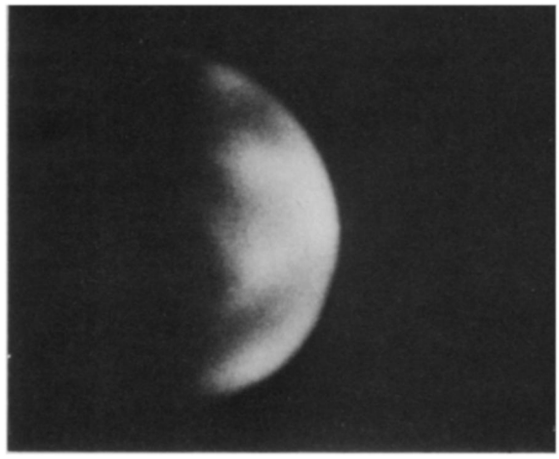


had asked for, and requires delaying the shuttle's first manned orbital flight four to six months until the second quarter of 1979, but NASA Administrator James Fletcher says he has a "firm commitment" in the form of "a piece of paper from OMB" that there will be no more cuts after this in the program's development budget. The Apollo-Soyuz mission, a single flight in 1975 in which political hopes will outweigh scientific experiments, will require only a slight increase, from $90 million to about $115 million.

Several new projects are getting their start in FY 1975. The largest is the Pioneer Venus program, which will send two spacecraft to the cloudy planet in 1978. One will study the atmosphere from orbit; the other will launch four probes to gather data all the way down to the surface (they will be soft-landers, although their survival on the surface is not a required part of the mission).

Two earth-orbiting satellites—Seasat and HCMM (Heat Capacity Mapping Mission)—will perform high-resolution monitoring of global ocean conditions (including wave height differences as small as 10 centimeters) and thermal variations (up to 10 times as accurately as the Earth Resources Technology Satellite) respectively. Seasat will be launched in 1978; the HCMM, in 1977.

The first large infrared telescope ever built will be constructed at a planned cost of $6.04 million on 14,000-foot Mauna Kea in Hawaii, chosen for its relatively low "sky noise." Although only a few parts of the infrared band can be seen through the atmosphere, the three-meter instrument is expected to offer much higher resolution than is available from smaller, satellite-borne instruments. Besides gathering data for the Mariner Jupiter-Saturn mission in 1977, it will be used in studies of galactic clusters, stellar origins and other phenomena. □



NASA

UV photo of Venus clouds from earth.

Scientists jubilant over early Mariner-Venus data

Venus was just a "secondary objective," a fortuitous skyhook whose gravity would pull the Mariner 10 spacecraft around on the vicarious first journey to Mercury, the solar system's tiniest planet. Plenty of probes had visited it before, yet for the same reason that it is the brightest world in the sky, Venus has remained a mystery.

Clouds. Seen by earthbound eyes, a blurred, impenetrable, featureless ball of fluff, refracting the light of the sun to brilliance—with Venus somewhere underneath.

Mariner 10 this week at long last provided the first close look. Mariner 10 is the first of all those spacecraft, American or Soviet, to take cameras along. One of its predecessors, Mariner 5 in 1967, first suggested that there might be something to see besides that featureless fluffball. The radio signal from Mariner 5 was bent and slowed by the Venusian atmosphere in a way that suggested the possibility of structural variations in the clouds, perhaps in the form of layering.

Earth-based photos by ultraviolet light, invisible to the unaided eye, showed vague blotches which some astronomers have guessed to be vast storms, interesting not only in their own right, but as indicators of the atmosphere's motion. Radar studies at Jet Propulsion Laboratory (which is controlling Mariner's flight) determined that Venus is rotating backwards from most of the other bodies in the solar system, taking about 243 days for a single "day." The atmosphere goes with it, but the stormlike features have suggested that the clouds are moving perhaps 50 times faster than the planet beneath.

The earliest photos this week from Mariner 10, taken of the planet's edge less than half an hour before the esti-

mated 3,585-mile closest approach on Feb. 5, seemed to indicate that there is indeed an observable cloud structure to be studied. A thin haze, possibly in a layer with a distinct bottom, appeared to border the fluffball. Anything more varied than an unblemished disk would have been exciting, and one observer described the haze in the photos as covering "a broad range of gray through white." A polarized, ultraviolet filter, one of six filters on each of the spacecraft's two television cameras, showed "some definite structure."

Computer enhancement will be used to try to find more subtle variations, with other instruments aboard the spacecraft joining in the search. A radio occultation experiment, an improvement of one on Mariner 5, was able by moving its antenna to beam its signal to earth through the atmosphere at Venus' edge for all but 90 seconds of the 21 minutes that Venus blocked the line of sight. Besides revealing possible atmospheric strata, including an ionosphere, if there is one, changes in the radio signal will help refine past measurements of the temperature and pressure profiles down to the surface. The surface pressure is believed to be about 100 times that of earth, and the Soviet Venera 7 probe, which actually reached the surface and operated there for about 50 minutes, reported a temperature of almost 900 degrees F.

A major question involves the atmosphere's composition, which seems to somewhat resemble what earth's would be like if earth had Venus' heat to volatilize the carbonates in the land and the water in the oceans. There was one report, difficult to confirm so soon after the data had been received, of the presence of helium. Knowing the amounts of such light-weight gases could be valuable in reconciling differences in the temperature data from direct Venera measurements and Mariner 5's occultation experiment. There were also hints of water, significant in the light of recent earth-based studies indicating the presence of sulfuric acid droplets in the clouds, which presumably would take up most of the available free water.

The flight controllers monitoring and controlling the spacecraft were as jubilant as the scientists poring over its Venus data. The mission, which began with malfunctioning heaters for the cameras, grew increasingly suspenseful as a variety of problems appeared, capped by an over ambitious gyro which threatened to deplete the control gas which will guide Mariner to Mercury. Mariner not only survived, it proved to be steadier than the scientists had anticipated, minimizing possible "smear" in the photos. □

Chemical for immunity: Wide-ranging promise

Some 20 years ago immunologist H. Sherwood Lawrence found that when a chemical extracted from human lymphocytes that react against a specific foreign organism was injected into a person lacking immunity to the organism, it gives the person immunity against the agent and boosts his cellular immunity in general.

Lawrence's work was a turning point in immunological research. It showed that cellular immunity could be transferred from one human to another. He dubbed the chemical that transferred immunity "transfer factor."

One of the ironies of science is that obscure findings may resurface years later and have all sorts of repercussions. So it seems with transfer factor —as reported this week at the 4th Gustav Stern Symposium on Prospectives in Virology in New York City.

The resurgence of interest in transfer factor, Lawrence attests, has been due to several things. Because transfer factor is specific for a particular bacterium (virus or tumor antigen), it is largely without serious side effects, can be stored a long time and offers exciting therapeutic potentials. The factor transfers cellular immunity only—no antibody immunity—another plus in the treatment of problems requiring primarily cellular immunity, such as viral diseases and cancer. Many scientists no longer doubt the existence of transfer factor because it has been found in animals as well as in people. What is more, the factor, if properly prepared, can be transferred from humans to monkeys, from monkeys to guinea pigs, and so on—without dangers of cross-species rejection.

Transfer factor is being vigorously tried clinically, Lawrence reports. It is being used to restore to patients immunity against tuberculosis and against certain fungus diseases. The World Health Organization is planning a field trial to use the factor to treat patients with a kind of leprosy that usually does not respond to drug treatment. The Rockefeller Foundation is undertaking a field trial to give the factor to Puerto Ricans who have one of the world's most recalcitrant tropical diseases, schistosomiasis.

There are preliminary reports from France and Norway that the factor looks promising against a usually fatal slow-virus disease, subacute sclerosing panencephalitis. The factor is being tried on some patients with multiple sclerosis, again with promising preliminary results. It is also being tried on some patients with cancer—in Hong Kong, where a particular kind of cancer, nasopharyngeal carcinoma, is endemic, and on patients with Hodgkin's disease. The factor has apparently caused some tumor remissions.

The factor even appears to be effective against cancer that is presumably of viral origin. H. Hugh Fudenberg, an immunologist at the University of California Medical Center, San Francisco, and his colleagues determined that patients with a kind of bone cancer known as osteogenic sarcoma have little cellular immunity against their cancer. Yet, their relatives and members of their households have unusually good immunity against it. This suggests that they, like the patients, had been exposed to a cancerous agent, but that they had had tough enough immunity to fight it off, whereas the patients had not. So, Fudenberg and his team took a transfer factor from the relatives' and household members' lymphocytes and gave it to the cancer patient. As they hoped, the factor had a beneficial effect.

"Preliminary results using these methods," Fudenberg says, "have been dramatic in prolonging life in several osteogenic sarcoma patients . . . unresponsive to radiation, chemotherapy and so forth."

If transfer factor can do all these remarkable things—fight viruses, bacteria and fungi and reverse cancer—what is it? No one is really sure. Evidence coming out of some labs now suggest it is a polypeptide/polynucleotide complex. Other evidence suggests that it is a double stranded RNA polynucleotide. Or, Lawrence speculates, "It could be a unique molecule telling us about a new function of cells." □

Seventeen oil spills in North Alaska since 1969

On Jan. 29, at the Prudhoe Bay airstrip on the North Alaskan slopes, an 1,800-gallon storage tank ruptured, spilling 400 gallons of diesel oil. In this case, all the oil was recovered. But there have been other oil spills with less happy endings. Although construction will not begin until at least this summer on the controversial Trans-Alaska Pipeline, there have been at least 17 spills at facilities on the slopes since drilling began there in 1969.

The worst, in fact, occurred during the first summer, when a ruptured "bladder tank," operated by British Petroleum, dumped 40,000 gallons of oil onto the snow, some of which easily found its way across the intervening 150 feet to the Arctic Ocean. On July 26, 1972, another 10,000 gallons were spilled at a road camp of the Alyeska Pipeline Service Co., which will own and operate the Trans-Alaska Pipeline,