

says Dr. Francis S. Johnson of Southwest Center for Advanced Studies and head of a panel that advises the National Aeronautics and Space Administration on Venus. He cites the radar studies and theory about how much Venus could be out-of-round; others point to the difficulty of explaining how an extremely hot and probably highly plastic surface could support high mountains.

Dr. Johnson, along with many others, feels Venera 6's altimeter was in error.

But there are warnings as well, from two scientists who have studied Venus' surface features with radar, that skepticism not be unbridled. Dr. Irwin I. Shapiro of the MIT Lincoln Laboratory points out that his measurements of low variations on the surface are confined to within a few degrees of the planet's equator. And Richard M. Goldstein of the Jet Propulsion Laboratory says his group's observations of some surface roughness extend about 35 degrees from the equator, but as yet the equipment is not capable of measuring the elevations involved. "They could be mountains, or craters, or canyons like the Grand Canyon," he says.

The Soviet measurements of temperature and pressure seemed less subject to dispute. The instruments recorded outside temperatures ranging up to 320 degrees C. and pressures to 27 atmospheres, the apparent collapse point. If the readings for Venera 5 are extrapolated from its final reported altitude of 24 to 26 kilometers from the surface, they imply surface temperatures of 530 degrees C., and pressures of 140 atmospheres; an extrapolation of the data of Venera 6, whose lower altimeter reading is questioned, gives 400 degrees C. and 60 atmospheres at the surface.

The atmospheric composition measurements also roughly agree with earlier findings. The concentration of carbon dioxide was 93 to 97 percent, of nitrogen and other inert gases 2 to 5 percent, and of oxygen not more than 0.4 percent. All these refinements fit present theory quite well.

U.S. scientists are pleased to see the oxygen figure expressed as an upper limit. The new limit figure no longer contradicts earth-based spectroscopic measurements which indicate that Venus' atmosphere consists of no more than 1 part in 100,000 of oxygen.

The new probes found a slightly higher content of water vapor in the atmosphere than did Venera 4, and this has caused some surprise. But the new figure, 4 to 11 milligrams per liter, is still not high enough for the formation of water clouds, says Dr. Michael B. McElroy of Kitt Peak National Observatory.

One other puzzling finding is still unexplained. The two probes contained photoelectric sensors designed to register any illumination above a figure roughly equivalent to the illumination on earth at dusk. The sensors were not activated, except for one reading by Venera 5, fifty times brighter than the threshold. Whether this was an instrument malfunction or some atmospheric phenomenon is unknown.

Further analysis is needed, but Dr. Johnson offers the "awfully speculative" idea that what was being recorded was sunlight carried around from the other side of the planet by Venus' super-refractive atmosphere (SN: 11/4/67, p. 439).

If this were true, says Dr. McElroy, it would tend to support the greenhouse effect explanation of Venus' very high temperatures.

This hypothesis is that the carbon dioxide in the atmosphere allows visible sunlight to enter but does not let re-radiated infrared energy escape. A difficulty with the theory is that if the atmosphere is too opaque, sunlight cannot enter at all. The instrument reading might indicate that sunlight does indeed penetrate into the lower reaches of the thick atmosphere.

CONTRACEPTIVES

Further evidence on clots

New evidence strengthens the belief that oral contraceptives are a cause of deep-vein blood clots and cerebral thrombosis (SN: 2/3/68, p. 112).

The new study, reported in the June 14 *BRITISH MEDICAL JOURNAL*, is by M. P. Vessey and Dr. Richard Doll, who also reported similar findings in 1968. The original report included women discharged from hospitals with thromboembolic disease during the years 1964 through 1966; the present study extends through 1967.

Of 84 patients with deep-vein thrombosis or pulmonary embolism, 42—exactly half—had used oral contraceptives during the month preceding onset of their illness, while only 23 of 168 controls, or 14 percent, had not taken them. These figures include the whole period of both studies. Nineteen London hospitals were surveyed, and women 16 to 40 years old were interviewed if they had been discharged with a diagnosis of deep-vein thrombosis, pulmonary embolism or cerebral thrombosis.

Of 19 women with cerebral thrombosis, 11, or 58 percent, had been using oral contraceptives, compared with an expected 3.5 percent from the experience of the control subjects. The clots affected the cerebral arteries rather than the veins in the brain.

BACK CONTAMINATION

Heroes or the plague



NASA

Apollo 11 crew tries new recovery.

From the moment the Apollo 11 astronauts arrive back on earth from their epochal visit to the moon, they will be treated not as heroes, but as bearers of the most virulent, devastating plague the world has ever known.

The extremely minute but nonetheless potentially catastrophic possibility of contamination of the earth by some lunar microorganism against which men have developed no immunity has inspired some elaborate precautions. In Houston, the Lunar Receiving Laboratory has been designed to protect the outside world from even the tiniest contact with lunar material until the moon samples have been declared safe (SN: 6/14, p. 582). But the safeguards will begin well before the LRL is even reached, with an elaborate recovery procedure that begins as soon as the Apollo spacecraft splashes down in the Pacific.

Recently, however, there has been some concern that the National Aeronautics and Space Administration has punched a hole in its own wall of safety.

Originally, the spacecraft returning from the moon-landing mission was to have been picked up with the astronauts—and any dangerous moon bugs—still sealed inside. This would have marked a departure, for plague's sake, from the usual Apollo procedure, in which the astronauts are first lifted from their spacecraft by helicopter to avoid possible hazards in recovering the heavy capsule on unpredictable open seas.

On Jan. 23, however, space officials decided that leaving the men in the spacecraft would be too dangerous, and that the existing procedure, plus some safeguards, would be used. The recovery of Apollo 9, two months later,

June 28, 1969/vol. 95/science news/611



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underlined the grounds for their decision, when a loose swivel holding the cable on the recovery ship's crane almost came loose; had it done so, it would have dumped the spacecraft back in the ocean. An alert observer spotted the loosening swivel, and the capsule was hastily lowered until it could be fixed. On the second attempt, however, the motion of the ship set the spacecraft swinging back and forth until it finally collided with the ship's side. The spacecraft was not significantly damaged, but had there been astronauts inside, they might have felt the jolting.

Lifting the 11,000-pound spacecraft, says NASA, sometimes produces dynamic loads as high as 40,000 pounds.

Opening the hatch to remove the astronauts returning from the moon is a more serious matter, which some observers have viewed as a breach in the carefully fabricated moonbug-proof armor. With all the precautions that have been taken, the argument goes, why risk exposing the interior of the spacecraft to the open air at all? In the original plan, the still-sealed spacecraft would have been placed on the deck of the recovery ship, and the astronauts would have walked through an air-tight tunnel from the hatch to the mobile quarantine van in which they would be transported to the Lunar Receiving Laboratory.

The reason it is possible to open the hatch, says Col. John E. Pickering, director of lunar receiving operations for NASA and a member of the Interagency Committee on Back Contamination, which must certify all such procedures for safety, is that any viable lunar organisms are far more likely to be in the astronauts' bodies, particularly their lungs, than loose in the spacecraft. Human lungs, he says, are far more efficient than any filter constructed by man, and are much more likely to trap tiny particles.

Once the helicopter carrying the astronauts lands on the recovery ship, the air-tight tunnel will be connected to the copter's door, and the rest of the operation will be as originally planned.

Extra precautions will be taken, however, to see that nothing living escapes while the spacecraft hatch is opened. Once the capsule is in the water, a frogman in a rubber raft will open the hatch briefly, pass in three biological isolation garments and close it again. The astronauts will don the garments, which filter their exhalations to trap all outgoing particles. Then they will open the hatch again, climb out into the raft and shut the hatch a final time. Then the frogman, who will be wearing a different kind of isolation garment to protect him by filtering his inhalations, and the astronauts, will scrub one an-

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other down with a surgical antiseptic solution. The frogman will also clean the hatch area of the spacecraft with the same solution.

Precautions against back-contamination, however, will begin before the Apollo lunar module ever leaves the moon's surface. As much contaminated equipment as possible will simply be left on the moon, including the television camera, special overshoes that the astronauts will wear on the surface, the portable life-support backpack used during surface exploration and other items.

Once back in the LM, the astronauts will brush off all possible lunar dust, and when the LM rejoins the Apollo command module in lunar orbit for the trip home, the air pressure in the command module will be kept higher than that in the LM to keep any contamination contained in the LM.

During the trip back to earth, the three astronauts will permanently store their spacesuits to avoid prolonged contact with any lunar material that might remain, as well as vacuum the spacecraft.

The precautions are exhaustive, though some critics still worry that they may not be exhaustive enough. But if some strange bug from the moon does appear, what will the reaction be? Joy at the discovery of life on another world? Or fear?

10,000 RUSSIANS

Amantadine vs. Hong Kong flu

U.S. public health officials ruled last year, during the epidemic of the Hong Kong flu (SN: 11/2, p. 444), that the drug amantadine hydrochloride had not been proved safe for that disease.

Their Soviet counterparts were less cautious, and 10,000 residents of Leningrad demonstrated that the drug, made in the United States and stocked there on pharmacy shelves for other diseases, could have limited the U.S. epidemic.

U.S. drug laws that demand proof of efficacy and safety kept the Du Pont Company of Wilmington, Del., from advertising its amantadine hydrochloride (Symmetrel) as a preventive for the Hong Kong strain, though scientists believed it would be effective. It had been developed and approved as an Asian flu drug (SN: 9/2/67, p. 228).

Meanwhile, researchers at the All Union Research Institute of Influenza in Leningrad purchased the amantadine from Du Pont last year and conducted extensive human trials in January and February when the Hong Kong epidemic peaked in that city. Dr. Anatoli A. Smorodintsev, director of the insti-

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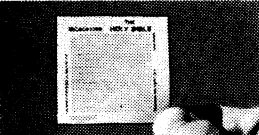
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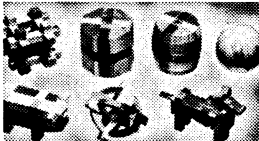
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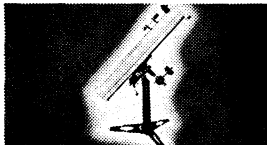
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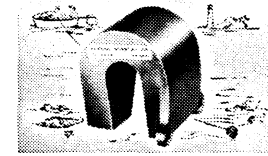
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