got 10 minutes. I'm just telling you to be thinking about getting back. Schmitt: "Yeah, we're always thinking that way. Come over here, Gene, quickly. We can't leave this."

Sometimes they debated CAPCOM. Houston wanted a double core; Schmitt didn't think is was possible, but Cernan proceeded to get it. Schmitt: "Well, you're not even going to debate the issue." Cernan: "No, it takes too much time debating it."

Later, while the crew was in lunar orbit, they began asking Houston questions about the scientific instruments. According to Sheldon Buck of the Massachusetts Institute of Technology, the traverse gravimeter indicated variations in the gravity at the site from minus 38.1 and minus 28.8 milligals at the north and south massifs and minus 26.4 and minus 25.9 a few meters from the base. Variations on the plains unit itself were much smaller. There was a small positive gravity reading at Shorty crater. The massif material extends to depth at a very steep angle under the mare, reported Marcus E. Langseth of the Lamont-Doherty Geological Observatory. If the density difference between the massifs (probably highland materials of anorthositic gabbros high in aluminum) and the lava material of the valley is 20 percent, the lava flows could be as deep as 1.5 kilometers. They could consist of many separate layers.

The lunar sounder data had some surprises. "We expected over the mare the signals would reveal smooth subsurface structure and the opposite would be true for the highlands," said Walter E. Brown Jr. of the Jet Propulsion Laboratory. But the sounder's signals were well-behaved over the highlands and bounced around over the mare "implying subsurface features."

There are some thermal surprises on the moon as well, reports Frank Low of the University of Arizona, principal investigator for the orbital infrared scanner. The normal surface soil heats to about 400 degrees K. during the lunar day, and cools to about 100 degrees K. during lunar night. But Low located a cold spot some 10 degrees K. cooler than the surrounding terrain near the crater Hohman in Mare Orientale. The spot appears to correspond to a feature that looks like a cinder cone.

The ultraviolet spectrometer, reports William E. Fastie of Johns Hopkins, revealed that the "moon is not outgasing." William Wollenhaupt of MSC says the gravity data from Apollo 17, as well as the laser altimeter data, agree well with Apollo 15's. The basins on the near side get gradually lower in elevation going east toward Smythii. From Smythii the terrain then rises 9.5 kilometers, to the highest farside point, Gagarin. Apollo 17 data show that the large depression on the far side, De-Vries, which is 4 kilometers below the mean radius, is larger than expected. It is almost directly opposite to the highest point on the near side. The depression could explain why the moon's center of figure is displaced from the center of mass. The data also reveal that most of the basins show a gravity high while the highlands show a gravity low.

The crew was delighted to learn that the heat flow sensor was working. "We doubled our data," said Langseth. The most surprising result is that the heat flow from within the moon appears to be as high at this new site as at the Apollo 15 site. "If it turns out to be the same as Apollo 15," he said, "it would give support to the growing model of a warmer interior for the moon." This would mean that the moon has a greater abundance of radioactive elements than the earth—"a fundamental difference in composition between the earth and moon." It would also mean that the moon should be stratified or differentiated so that most of the radioisotopes would be concentrated in the upper layers of the moon.

Another surprise was preliminary data from the impacts of the F4B stage and LM ascent stage. Gary Latham of the University of Texas says the new data indicate a much thinner crust than previously thought (25 kilometers deep instead of 60 kilometers). The velocity of the signals had decreased from 7 kilometers per second to 6.3 kilometers per second, which he said might mean the crust is gabbroic rather than anorthositic. But factors other than chemical composition could change the velocity. "I will defend the proposition that the crust is aluminum plagioclase-rich rocks or anorthositic gabbros," says Gast. He suggests that the crust may just vary in thickness in different areas of the moon.

President Nixon's post-splashdown statement extolling the flight as "the end of the most significant chapters in the history of human endeavor" promised a continued major national role in making space history. But all manned missions currently planned will be confined to earth orbit.

What has become an incredible part of the everyday lives of those closely involved with the Apollo program—the sounds of air pressure in the spacesuits while the men are on the surface of the moon, their sighs and laughs, the sight of men hopping around and falling down on an eerie surface that looks like white and gray silk and satin on black velvet—is over. That silent ride in space with the earth seen out of one window and the moon out of another will not be a part of man's experience for some time to come. □

National Library of Medicine

Gout: The comforts of high living.

A molecular explanation for the perils of gout

Gout, a form of recurrent arthritis, has plagued man since Biblical times. It has long been a symbol of indulgence in rich foods and fine spirits, and also a mark of intelligence, creativity and achievement. Men are more vulnerable to gout than are women.

In the 19th century, high levels of uric acid in the blood were linked with gout. In this century it has become apparent that gout attacks relate to deposits of uric acid (urate) crystals in tissue. Gerald Weissmann of the New York University School of Medicine has been zeroing in ever closer on how urate crystals might cause gouty tissue inflammation.

Last year he reported that when white cells, which are normally immunologically active, are exposed to urate crystals, white cell lysosomes (membrane-bound vacuoles) release lysozymes and other immunologically active lysosomal enzymes. Then the cells die.

Now, in the Dec. 6 NATURE NEW BIOLOGY, he and Guiseppe A. Rita of the University of Turin in Italy report that urate crystals are able to disrupt white cell lysosomes. The specific site of the disruption is the phospholipid-rich membranes that constitute the border of the lysosomes. The crystals form hydrogen bonds with the phospholipids. Specific inhibitors prevented the bonding. Weissmann believes that these effects, observed in the laboratory, may also occur in people and cause gouty inflammation.

Here is his hypothesis of what happens: Urate crystals that lie in the spaces between joints, or in other susceptible tissues, attack white cells in those tissues. The crystals are sucked up by defensive white cells. The next step—still conjectural—is that proteins in the cytoplasm of the white cells,

which tend to coat or stick to the crystals, are digested by the lysosomes. With the proteins out of the way, the crystals are free to attach to the lysosomal membranes. At this point, direct interaction between the crystals and lysosomes takes place, presumably by hydrogen bonding to lysosomal membranes. The lysosomes are disrupted; the white cells are injured; lysosomal enzymes escape and cause tissue injury.

In other words, in their efforts to destroy urate crystals, white cells release enzymes that hurt the body.

Weissmann and Rita have also discovered that only lysosomes that are rich in cholesterol or testosterone are susceptible to the crystals. Lysosomes that are rich in estrogen resist the crystals. This finding might explain why persons who over-indulge in foods rich with cholesterol and why men, who have testosterone for a sex hormone, are far more suceptible to gout than are less-indulgent eaters and women, who have estrogen for a sex hormone.

Will his findings have implications for gout therapy? "Sure," says Weissmann. "They explain how colchicine, a standard gout remedy, prevents lysosomes from merging with the phagocytic vacuole in which the gouty crystal enters the cell." He foresees that his and Rita's discoveries "may also lead to new treatment for gout that can interfere with hydrogen bonding at the membrane." He plans to work toward such treatment.

Should Weissmann's and Rita's molecular explanation for gout continue to be substantiated, it will fortify the concept that there is a final common pathway, namely the release of lysosomal enzymes, in all acute arthritic disorders. These enzymes, which are released to protect the body, inadvertently harm the body. □

Waste treatment funds: Courts get cry of foul

The latest round in the battle between President Nixon and the Congress over how much the Federal Government should spend to clean up the nation's waterways has gone to Nixon. But his opponents refuse to concede.

Blow by blow, the fight to date: Against the President's express wishes, Congress passed a group of amendments to the Federal Water Pollution Control Act that would allot $11 billion in grants for construction of local sewage treatment systems over the next two years. Nixon vetoed the bill on grounds that it was inflationary. Congress passed the measure over the President's veto.

The next move was Nixon's and it came on Nov. 28 when Environmental Protection Agency Administrator William D. Ruckelshaus announced the allotment of Federal funds for construction of waste treatment plants for fiscal years 1973 and 1974. Ruckelshaus said Nixon had instructed him to allocate no more than $2 billion for fiscal 1973 and $3 billion for 1974—a total of $6 billion less than the amount set by Congress.

The action, of course, brought cries of "foul" from several sectors. The day after Ruckelshaus' announcement, a private citizen, representing a Chicago environmentalist group, filed suit against EPA to restore the $6 billion. Last week, the city of New York sued on grounds that the President's action was unconstitutional, and would seriously injure the city's cleanup efforts. And Sen. Edmund Muskie (D-Me.), a principal author of the bill, complained bitterly that the move was a direct challenge to Congress' power to pass legislation.

The New York suit was filed on behalf of the city and other municipal governments in the state. City Corporation Counsel Norman Redlich said that he knows of "no occasion in American history where the President has directed domestic action so explicitly in contravention of an act of Congress." In practical terms, Redlich estimated that the city would get $552.9 million instead of the expected $1.21 billion. Mayor John Lindsay said the city stood to lose at least $265 million and that construction would be delayed on five sewage treatment projects: at Red Hook, Coney Island, Newtown Creek in Brooklyn, Owls Head in Queens and Oakwood Beach on Staten Island. He noted the irony that the Federal Government had sued New York just last July for not moving fast enough to clean up its adjacent waters.

Muskie, chairman of the Senate Subcommittee on Air and Water Pollution, charged that "the President has defied constitutional limitations of his powers." Both he and Lindsay expressed concern that states would now be unable to meet Federal water pollution standards.

The hub of the dispute is over a provision Congress wrote into the amendments as a concession to the Nixon Administration. The provision puts a ceiling on Federal spending: the authorizations are not to exceed $18 billion over the next three years. Furthermore, the executive branch is not required to obligate all funds authorized by the law. But, says Muskie, Congress made it clear that though these funds need not be obligated, they must be allocated, and this the President failed to do. EPA responds that there is no such provision written into the law and that no minimum expenditure was set. In other words, it is merely a matter of how the law is interpreted. □

A new design for work in America

Last year General Foods opened a Pet Food plant in Topeka, Kan. In designing it, management sought to solve problems of frequent shutdowns, costly recycling and low morale that plagued an existing plant making the same product. When the plant opened, workers were organized into relatively autonomous work groups with each group responsible for a production process. Pay was based on the number of jobs an employe could do, rather than on the job being done at a particular time.

A survey of job attitudes a few months after the plant opened indicated positive assessments by both team members and leaders. The plant was being operated by 70 workers instead of the 110 originally estimated by industrial engineers. Also, there were improved yields, minimized waste and avoidance of shutdowns.

This type of job redesign, says the Department of Health, Education and Welfare, can contribute not only to higher production but to increased physical and mental health of workers and to the quality of life in general. This is the conclusion of an HEW task force report, *Work in America,* issued this week. The report was commissioned last December by HEW Secretary Elliot L. Richardson. It was designed to examine health, education and welfare from the perspective of a fundamental social institution—work.

The task force, headed by anthropologist James O'Toole, reviewed the history and meaning of work, the problems of workers and some possible solutions.

The commission confirmed that significant numbers of workers are dissatisfied with the quality of their working lives. Among white-collar workers, for instance, only 43 percent would choose the same job if given another chance. Among blue-collar workers, only 24 percent would opt for a similar position. This discontent, the commission says, is the result of dull, repetitive, seemingly meaningless tasks, offering little challenge or autonomy. The result shows up in low production, poor quality products, high absenteeism and turnover rates, wildcat strikes and sabotage.

The task force describes the results of 34 experiments in redesigning jobs. From them, it concludes that all segments of society can gain from proper redesign of jobs. These and other suggestions of the report cannot be lightly accepted, says Richardson. They are provocative, he concludes, and deserve a large platform for debate and discussion. □