

Dr. Carneiro, "would explain why none of the Indians that spoke to these hostages were able to understand anything of their language."

Two of the word lists were gathered by Carl Fredrich Phil. von Martius, traveler and ethnologist, who in 1867 published a description of the Yuri Indians as he had seen them in the 1820's. According to Martius, the Yuri had tattooing on their faces, as had the hostages. He described them as an agricultural group of Indians, living a sedentary and peaceful life in cone-shaped huts like the one Gil and Bergès described.

**Martius and** 19th-century South American missionaries reported the Yuri living over an extensive area between the Caquetá and Putumayo Rivers, and especially at the headwaters of the Puré. The account from Gil and Bergès places the village somewhere between La Pedrera on the Caquetá and Terepacá on the Putumayo.

One question of special interest is whether the Indians are in fact using stone axes. "Another stone-ax-using group was discovered in South America last year (SN: 1/25, p. 94)," says Dr. Carneiro, "but they are really very far and few between."

Although Dr. Carneiro believes the most likely explanation for the Indians is that they are remnants of the Yuri, Dr. Gerardo Reichel-Dolmatoff of the Colombian Institute of Anthropology suggests another possibility. "Some of these Indians are probably the descendants of refugees from the notorious rubber camps of the early decades of this century (SN: 3/29, p. 314), while others may be remnants of isolated tribes who formerly lived along the major rivers." He feels they might be Yuri or Huitoto or Bora, but Dr. Carneiro says the latter two groups live farther to the west and their languages are well known.

**The new tribe** may be a group that has never been documented, says Dr. Carneiro. "But on the basis of the present evidence there is a fair chance that they are Yuri."

"In either case," Dr. Carneiro notes, "this would be a very good tribe to study, because they are probably in as nearly an aboriginal condition as can be found today."

When such studies might be done is uncertain. Not only is the trip extremely difficult—Efraín Gil's account stresses swamps they went through up to their necks—but the battle and shootings will have left possibly irreparable scars.

"The problem," says Dr. Carneiro, "is that although the hostages were released unharmed, still it's a rather ticklish situation and I'm not sure that any anthropologist is going to want to go right away to make extended studies."◇

## MOONROCKS RELEASED

### Controversy continues



NASA

*Glassy moonrock under a microscope.*

The great quarantine is almost ended. The priceless moonrocks, ensconced in the Lunar Receiving Laboratory ever since Apollo 11 brought them to earth in July, have revealed no alien organisms, nor even evidence that there ever was life on the moon. The LRL scientists are leaving for their home laboratories, as more than 140 other researchers around the world prepare for their own Houston pilgrimages to bring away bits of moonrock for the really exhaustive study that is to come.

Much has been learned about the rocks in their six weeks at the LRL—so much attention from so many top minds could hardly fail to be fruitful—but the key message for the outside researchers, and for future Apollo missions, is: The big mysteries still remain.

**With each new** discovery, theories and counter-theories spring up, in almost the same profusion that existed before the rocks arrived, about how the moon was born, how it is related to the earth, whether it had a volcanic past and whether it has a volcanic present. The surprising abundance of glassy material on the lunar surface (SN: 8/2, p. 95), for example, makes it almost a certainty that great heat was present to transform the moon's silicate rock; but there is still room for the scientists to fight about whether the heat came from within the moon or from impacting meteorites.

And even if there was volcanism in the early moon, where did it come from? One possibility is that the moon was formed, like the earth, as a molten ball. Researchers at LRL, however, have found sufficient quantities of uranium,

thorium and unstable isotopes of other elements in the moonrocks to indicate that radioactivity alone might have created enough heat to trigger volcanism.

The density of the samples has been found to be slightly greater than the mean density of the moon, yet even this simple datum has spurred contradictory ideas.

One is that the maria, or lunar seas, might be dense enough to account for the mass concentration effect that warped the orbits of some lunar spacecraft (SN: 8/2, p. 95).

On the other side are researchers who point out the Mare Tranquilitatis, from which the dense samples were taken, is not one of the maria over which a mass-con effect has been observed.

This suggests that the denser samples may be a localized phenomenon rather than representative of maria in general or even of the whole of Tranquilitatis, a notion that could be verified when Apollo 12 brings back samples from Oceanus Procellarum, a mare on the far side of the moon.

**While some scientists** debate the results from Apollo 11, others are already planning for future missions. One is Dr. Gary Latham of Lamont-Doherty Geological Observatory in Palisades, N.Y., who wants nothing less than deliberately to crash the Apollo lunar module into the moon.

Dr. Latham and his colleagues, including Dr. Maurice Ewing, also of Lamont, have been operating a transmitter-equipped passive seismometer left on the moon by Apollo 11, to detect lunar tremors, either from internal activity or from meteorite impacts. With the astronauts still on their way back to earth, the device reported three distinct, sharp seismic events. But since such events have not recurred, the scientists tend to blame them on electronic bugs.

On Aug. 27, the seismometer apparently burned out at last in the lunar heat. During the preceding month, however, it had reported hundreds of tiny, strange tremors that have set the researchers wondering. "None look like the ones we observed on earth," Dr. Latham says. The point, however, is that they are so small. Either there were no significant tremors or impacts in that time, suggests Dr. Latham, or the surface layer of the moon is so fractured and fragmented that signals are not well carried through it.

**Unfortunately, because** of the size of the tremors, the seismometer was only able to report signals down through about one mile of the moon's crust. So

Dr. Latham, in order to read deeper down, wants to make a bigger tremor.

He and the National Aeronautics and Space Administration are now discussing the possibility of crashing the ascent stage of the Apollo 12 lunar module into the moon, once it has safely carried the astronauts up to the command module waiting in orbit. The resulting impact, about 18 miles from the seismometer that the crew will leave on the surface, would provide a shock that ought to sound out the moon at least six miles down.

"It would be an extremely valuable experiment," Dr. Latham says, adding that the seismologists are learning the lunar module's weight, fuel vent rates and other characteristics in detail to get the most from the crash. "I suspect that we're going to know better than the Grumman engineers (who build it) what the LM does."

Next summer, Apollo 14 is scheduled to carry an active seismometer that will automatically throw out hand grenades to create its own shocks, but these too will be small ones, good only for about a mile down. More useful will be the network of passive seismometers that will have evolved after several Apollo moon landings. Triangulation from widely spaced sites should make it possible to track tremors at great depths.

**Also planning ahead** is Dr. Carroll Alley of the University of Maryland, mentor of the laser reflector that has been left on the moon for a variety of measurements, including the earth-moon distance with an accuracy of six inches.

The device has already shown that its mirrors can survive the extreme temperature changes from lunar night to lunar day without crippling distortion, and Dr. Alley is now negotiating with NASA about sending additional reflectors on Apollos 16 and 17.

A reflector near each edge of the moon's visible face, together with one near one of the poles, could enable extremely accurate measurements of the moon's librations, Dr. Alley says, as well as providing reference points for lunar mapping. ◇

## ORACLES NEEDED

### For technology assessment

Television was once regarded as having no future, an atomic bomb was dismissed as ridiculous, Alaska was written off as folly and the airplane was either ruled out as a freight carrier or just ruled out period.

There are many more examples of where some oracle who, in retrospect, should have known better, got his visions mixed. And in retrospect, some miscast forecasts might seem amusing.

But a growing number of people believe the world can't afford to make more technological forecasting errors. They point to air and water pollution, riots, power shortages, jammed cities and highways and social alienation as some of the consequences of not foreseeing or foreseeing inaccurately.

**As of now there** are professional seers who make it their business to foresee technological possibilities. But last week the National Academy of Sciences entered the lists on the negative side. It issued a report urging that the Government get into the business of forestalling some of technology's side effects.

The report, prepared by a 17-member panel chaired by Dr. Harvey Brooks, dean of engineering and applied physics at Harvard University, comes three years after a proposal by the House Subcommittee on Science, Research and Development of a Federal early warning system to spot the dangers of technology (SN: 10/29/66, p. 345). The new report sees technology assessment, the term for technological forecasting, as important enough to warrant both Presidential and Congressional attention.

The report recommends that the assessment function be carried out by the Office of Science and Technology, either as a separate Technology Assessment Department within OST or distributed within an expanded OST along other lines. This would be better than a separate commission or board along the lines of the Council of Economic Advisors, since the assessment question would inevitably be tied up with other science-policy issues which are dealt with in OST, says the report.

**The new Government** operation, regardless of its organization in the executive branch, would also have roots in both Houses of Congress, either as a Joint Committee on Technology Assessment or a Technology Assessment Office serving Congress as a whole.

Although acknowledging the positive contributions of technology, the report admittedly concentrates on the negative, worrying not so much about what good technology can do but how to prevent it from doing harm.

As justification for the entry of the Government into technology assessment, the report notes that, "By the mid-20th century, largely as a result of the massive Federal support of research and development stimulated by World War II, Government policy had become at least as influential as the forces of the ordinary market in setting the environment for technological change. Today the Government finances nearly 50 percent of industrial research and development and virtually every Government agency is involved in one or more programs designed to further

the development and use of some technology by providing an outlet for its goods and services, or by stimulating it at its inception, or both."

Rep. Emilio Q. Daddario (D.-Conn.), chairman of the Subcommittee on Science, Research and Development, who requested the report, says his subcommittee will hold hearings to follow up the panel's recommendations.

"**I am certain** that this straightforward and lucid report will also result in concrete action," he says. "The report shows that Congress needs the capability for independent, objective analysis of all the potentials of new technology, a capability which does not now exist. While technology assessment is a very complicated affair involving many invested interests, it can be accomplished. Congress must make sure it is."

One area the panel admits it has not covered adequately is military technology. Although not passing judgment on it, the report points out that the military's policy of keeping information secret conflicts directly with technology assessment, which must have correct and adequate information if it is to work.

## PSYCHOLOGISTS MEET

### Relevance in Washington

Professional meetings have repeatedly been hit hard by the demands of activists both within and without the ranks of their organizations. In May of this year it was the National Conference on Social Welfare (SN: 6/7, p. 549) and in July it was the American Medical Association meeting (SN: 7/26, p. 76). This week the 77th annual meeting of the American Psychological Association in Washington, D.C., was the target of protest and dissatisfaction.

The psychologists had made a determined effort in the direction of relevance; fully half of their sessions were devoted to pressing social issues. But it wasn't enough.

The meeting began Sunday, and the public disturbances began Monday when a small group of radicals, many of them sporting red arm bands, comprising two newly organized and loosely knit organizations—Psychologists for Social Action and Psychologists for a Democratic Society—took over a session on student unrest.

**They demanded** that the APA change its political orientation and get research money for really pressing problems of society. Dr. Bertram Garstoff, a radical psychologist with capital city's experimental Federal City College, told his colleagues that slowly trying to change people's attitudes isn't going to help; action is necessary.