

Tuesday during the second EVA the crew was scheduled to drive to a crater that appeared to be of volcanic origin.) Schmitt asked the scientist-astronaut debriefing him to "find out what the ash experts think a fine-grained pyroclastic should look like."

Also a puzzle was the high population of boulders that had not been visible from orbital photographs. The boulders were lighter in color than the soil, which led Cernan and Schmitt to speculate that the dust was not derived from the boulders themselves. Similar boulders outcrop from the sides of crater walls, so ground geologists believe they were looking at bedrock.

Cernan dedicated his first step on the surface to "those who made this possible" (the personnel of the Manned Spacecraft Center and the two major contractors for the spacecraft, Grumman and North American Rockwell). Schmitt's words were "this is a geologists' paradise if I ever saw one." Schmitt is the first scientist to go to the moon. He had a little difficulty doing his chores in one-sixth gravity, "Well, I haven't learned to pick up rocks yet, which is very embarrassing for a geologist," he quipped after taking a tumble to the dusty surface. He and Cernan sang and joked during their chores, much like euphoric astronauts of other missions.

Geological observations on the first EVA took a back seat to the mechanical duties of setting the sixth geophysical station on the moon. This operation took longer than expected and the first geology field trip out to Steno and Emory craters had to be cut short. Cernan drilled several 8-foot holes for the heat flow probes and for a core sample from beneath the surface. He extracted the core, which appeared to have hit bedrock, only with the help of Schmitt and a lunar jack. Although they completed only two-thirds of their geology course, they took about 421 photographs, drove about 3 kilometers in the lunar rover (and lost a fender), and collected about 13 kilograms of material.

The major geological observations and sample collections were expected to occur during the two remaining EVA's this week. The two moon men were to spend 14 more hours on the surface, driving the rover to both the north and south massifs (blocky mountain material thought to be crustal). They were scheduled to lift off the moon Dec. 14 to rejoin Evans and remain in orbit two more days before heading back to earth. While in orbit they will assist Evans in his chores of operating the lunar sounder, the ultraviolet spectrometer, the infrared scanning radiometer, and the panoramic and metric cameras (SN: 10/21/72, p. 268). Splashdown is scheduled for Tuesday, Dec. 19. □

## Living history in psychoanalysis

Three generations of psychoanalysts were on display last week in New York at the winter meeting of the American Academy of Psychoanalysis. The senior or first generation, represented by some of the founding fathers of the U.S. psychoanalytic movement, told the second generation how it was in the beginning. The third generation, represented by British psychoanalyst Ronald D. Laing, told everyone how he thinks it will be in the future.

Sandor Lorand, John A. P. Millet and Abram Kardiner—legendary names in the field of psychoanalysis—spoke at a session moderated by George L. Nicklin of Friends World College in Huntington, N.Y. Lorand and Millet described the in-fighting and bickering that was part of their movement's long struggle for acceptance in the United States. They also showed films of a 1929 meeting and some rare footage of Sigmund Freud. Lorand, a long-time Freudian, was present to accept an honorary membership in the AAP, a non- or post-Freudian society established in 1956.

Kardiner, the most outspoken of the senior analysts present, discussed his own analysis by the Viennese master and then went on to say that Freudian analysis is in serious need of revisions in important areas. "For 50 years it has not moved one iota," he charged. And as a discipline, he went on, Freudian analysis has no claim on the future if it does not begin to grow and produce useable knowledge—knowledge that can be used as a sociological tool. Freud, he says, described only one point (the Oedipus complex) on an arc that must continue to grow.

One possible direction of growth was suggested by Laing who just completed a lecture tour of 15 U.S. colleges. Ruminating before a standing-room-only crowd, he noted that the present trend on campuses is away from psychoanalysis and psychotherapy. To replace these, students and others have imported from all over the world such things as bioenergetics, meditation and yoga. These forms of mental gymnastics might seem to be in competition with psychoanalytic theory but they are not, says Laing. In fact, he says, meditative and yogic disciplines have much in common with and something to offer to psychoanalysis.

In explanation, Laing described in depth a particular, popular, 2,500-year-old form of meditation that was developed in Asia. It consists of concentration on a small light source until one can retain an image of the light after moving away from the source. Continued deep concentration on and



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absorption in this image, says Laing, produces strange things—a sense of timelessness, stillness and freedom from the world of senses.

With practice, this form of meditation becomes a type of mental hygiene. The meditator learns to become steady, calm and focused without any effort. This meditation contains no attempt to analyze or probe the mind, says Laing, but it can lead to a more advanced meditation that does. Instead of concentrating on a physical object (a light or sound), one can learn to concentrate on the sense that perceives the object. Going one more step, the meditator can learn to focus attention on the mind that records the sensory input. One becomes objectively aware of what the object, the sense organs and the mind are. Once the meditator is able to become aware of the mind, the next step is to look at the various emotions of the mind in the same way—watch them arise, develop and go away. Thus, transcendental meditation can become a kind of psychoanalysis.

With long practice, says Laing, analysts can employ these techniques of objective concentration on their own emotions and on the emotions described by their patients. Even if analysts do not practice meditation, they should understand it, warns Laing, because many individuals who are into such things might find it difficult to communicate with an analyst who is on a different wavelength.

Apparently, however, Laing and his audience of analysts were on different wavelengths. Laing's reputation as a fiery popularizer of humanistic and interpersonal psychotherapy (SN: 5/15/71, p. 335) and the best-seller status of his published works led some members of the audience to expect a rather exciting performance. Before the lec-

## Deuterium in interstellar clouds raises cosmological questions

Hydrogen is the most abundant element in the universe. It is also the simplest nuclear species; its nucleus contains only one proton. Deuterium, one of the heavy isotopes of hydrogen, which has a proton and a neutron in its nucleus, is the next simplest nucleus. Deuterium is in general much rarer than hydrogen, but the exact ratio between the two is important in theories of cosmology and stellar evolution.

Determining the ratio, or the range of ratios if they happen to differ from place to place, awaited the discovery of deuterium outside the earth. That has now been done by a team from Bell Telephone Laboratories: Keith Jefferts, Arno Penzias and Robert Wilson. The result may be troublesome for cosmologists.

Deuterium is capable of replacing hydrogen in chemical compounds. When such deuterated compounds exist, the radio waves that they give off or absorb will exhibit a different spectrum from that of the same compound with hydrogen in it. The observers used the National Radio Astronomy Observatory's 36-foot reflector at Kitt Peak, Ariz., with a special receiver built at Bell Labs and especially designed for the high-frequency work that was necessary to find deuterated compounds.

The deuterium appeared in deuterated hydrocyanic acid (DCN instead of HCN) in the Orion nebula. The initial

observation was made in April and confirmed by discovery of a second spectral line of DCN in October. "The surprise is that we found so much of it," the team remarks. The deuterium/hydrogen ratio on earth is about one to 6,000. The initial observations indicate that in Orion the DCN/HCN ratio is one to 500.

According to accepted astrophysical theory deuterium should be present in interstellar space in only trace amounts. The reason is that deuterium is a prime fuel for nuclear fusion processes that synthesize heavier nuclei from lighter ones. Deuterium would originally have been produced in the big-bang explosion in which the universe began. Any deuterium that condensed into stars—and that would have been nearly all of it—and any produced in stars would have been used to make heavier nuclei. Only the trace amount that had escaped condensation into stars should remain.

There are several outs open to the theorists. One is to refigure the evolution of the cosmos so as to get more deuterium produced originally. Another is to investigate the rates at which deuterated compounds are produced. If deuterium produces compounds more readily than hydrogen, the ratio of DCN to HCN may be much higher than the ratio of D to H. Astrochemists are investigating the possibility.

ture, for example, one person said, "I hear he takes off his socks while he talks." But the British analyst was not there to entertain and his low-key, trance-like delivery almost produced some trances.

In addition to being put off by the speaker's form, some in the audience were upset by the speech's mystical content. Transcendental meditation, like drug use, is advocacy of the egoless state. During meditation the meditator can lose sight of self and become one with objective reality. Or as Laing puts it, if you look at the ego long enough you see that it doesn't exist. It is a construct of the mind superimposed on the mind. Even to post-Freudians this type of talk is anathema. Many members of the audience have spent a good part of their lives attempting to rebuild or heal the egos of their patients.

In the past, each generation of psychoanalysts has produced new and diverse schools of thought and theory. And so, as a spokesman for the third generation, it is possible that Laing is only describing one more point on an arc that must continue to grow. □

## Heroin highs and beyond 'Pretty in a macabre way'

The causes of death among heroin addicts are generally attributed first to overdoses, then to suicide, homicide or other trauma, then to medical complications of heroin use. At a Conference on the Medical Complications

of Drug Abuse, presented by the American Medical Association last week, physicians who are into the heroin scene elaborated on some of those complications.

Ninety percent of all tetanus cases in New York City are addicts, Charles Cherubin of Metropolitan Hospital, New York City, reported. The tetanus is apparently caused by skin popping and using a quinine solution of heroin. Although there is virtually no malaria among addicts in the eastern United States because they put heroin in quinine, 50 cases of malaria have been diagnosed among addicts in California. Apparently they don't use quinine. About a third to one-half of all addicts get hepatitis from dirty needles. Fifty percent of all newborns born to addicts have hepatitis. Alcohol can complicate heroin-induced hepatitis by making the liver deteriorate three or four times faster.

"We are presently studying street heroin material," said John Sheagren of the District of Columbia General Hospital. So far he and his team have cultured 31 harmful microorganisms from the material. "Fever in addicts," he asserted, "is all that is needed to suspect deep-seated, life-threatening infection." A. I. Weidman of New York University School of Medicine and his colleagues have examined the skin of 1,000 addicts and have noted skin abscesses, ulcers, edema, hyperpigmentation. One addict, Weidman said, injected his fingers so many times they would no longer bend. Another addict ran out of veins and started injecting himself in the penis. Addicts

are using not only quinine, but sucrose, baking soda, aspirin, atrophine and strychnine as dilutants for heroin, Weidman pointed out. Addicts are also mixing penicillin with heroin, "which may create a new clinical syndrome," asserted J. Willis Hurst of the Emory University School of Medicine.

Contaminants from heroin, from the solution it is in or from the cotton it is filtered through can circulate through the blood and lodge in capillaries of the lung. J. E. Kasik of the University of Iowa described a polarizing photo of this event as "pretty in a macabre way." The cerebral complications that can result from heroin overdose, Ralph Richter of Harlem Hospital Center explained, include coma, seizures, deafness, stroke and brain damage. One patient, he noted, took 50 bags of heroin in one day and lost most of the vision in one of his eyes.

Some points were made at the conference that reinforce Richter's comment that "all of us are together in this fight." There were 300,000 addicts in the United States and 30,000 addicts in the Armed Forces last year; these numbers have since doubled. About \$450 million is being spent annually in the United States to stop addiction. A large number of professional blood donors are addicts with hepatitis. Five to 10 percent of all hospital beds are filled with addicts. One addict ran up a bill for \$250,000. Even with thousands of dollars and round-the-clock hospital care, only 30 percent of all critically ill addicts are saved. □