

## The last Apollo landing

"Okay, there it is Houston, there's Camelot right on target," Eugene A. Cernan announced while Harrison (Jack) Schmitt rattled off a continuous report on spacecraft attitude, altitude, fuel consumption and velocity. The 12-minute powered descent to the lunar surface, "was the smoothest ever," said flight director Gerald Griffin after the nearly pinpoint landing only about 200 meters east of target. But it was the last manned landing for the United States on another celestial body in the solar system for some time to come and the finality intensified the drama of what was already a breathtaking episode. "You can tell America that Challenger is at Taurus-Littrow" (SN: 11/25/72, p. 346), Cernan advised ground control. Command module pilot Ronald E. Evans was orbiting the moon in "America" just ahead and in view of the lunar module during descent. Also out of one window of the spacecraft the earth could be seen.

The lunar module Challenger arrived at the moon and landed right on time Dec. 11 at 2:54 p.m. EST, in spite of a nearly three-hour delay at launch. The automatic countdown sequencer failed to send the proper command to pressurize the liquid oxygen tanks in the F4B stage of the Saturn launch vehicle. Engineers noted what had happened immediately and manually pressurized the tank, but not in time for the computer

to register the tank in launch state. The dramatic hold occurred as the countdown hit 30 seconds before liftoff. It was the first such hold that close to launch in the manned Apollo program. When the night liftoff finally came at 12:33 a.m. EST, Dec. 7, it created an awesome daylight glow for miles, and the spacecraft was visible as a bright star for most of the launch phase.

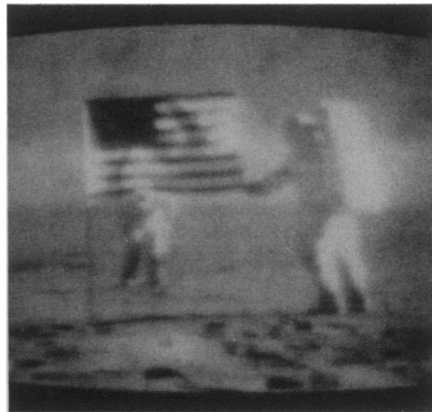
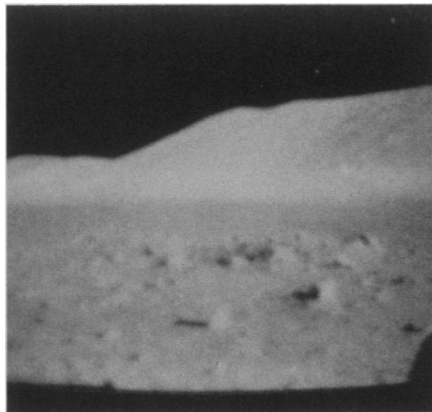
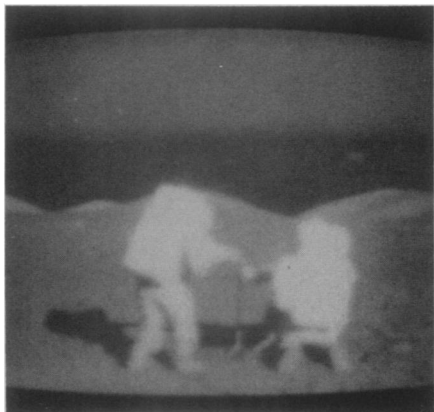
Cernan, Schmitt and Evans made up the lost time en route to the moon but the trip to the moon still went on record as one of the longest. Because the moon was just a sliver for most of the three-day journey, geologist Schmitt eyed the earth, observing ice patterns in the Antarctic and global weather trends. "You're a regular human weather satellite," quipped astronaut Gordon Fullerton. Later Schmitt used color filter techniques to look at the earth, causing ground control to call him also a human earth resources satellite. Scientists in Houston followed the weather comments with satellite photographs. Ed Mitros of the meteorological branch of the Manned Spacecraft Center said Schmitt was right on target with his observations. "He's verifying what the machines tell us but he is adding substantially." Using binoculars Schmitt was still observing weather patterns at Cape Kennedy and Houston as he went into lunar orbit. "I never thought I'd see a geologist speechless at his first

near shot at the moon, but I haven't heard a word from him yet," said Cernan as Apollo 17 approached a darkened moon. "He's probably speechless because there are no clouds to talk about," said ground control. Schmitt reported that the unlighted portions of the moon made the moon almost as dark up close as it had been from the distance of space. "I brought an airborne and a ground geologist along with me," said Cernan, "and it took them until AOS to make sure they knew where they were." AOS is acquisition of signals as the spacecraft comes from behind the moon.

But once Schmitt got oriented he provided a real-time geology tour for his listeners. Not only did he make new observations but he accompanied real-time description with background detail of what was already known of the area. "He cleared up a lot of little questions we had on some geology problems," said Farouk El-Baz of Bell Laboratories. One observation that caused a bit of excitement among the news media as well as scientists in Houston was his report of a bright flash on the surface near the crater Grimaldi. It could have been a meteorite impact. Later Evans observed a similar flash in the same area.

The landing site itself, however, held some geological surprises in store for the geologist and his companion the aviator-turned-geologist.

The valley floor of the Taurus-Littrow site appears to be covered with a dark mantling material that had generally been interpreted as young pyroclastics (explosive volcanic material and ash). The crew expected therefore to find a lot of fine-grained material but after the first seven hours stay (EVA) outside the lunar module, Schmitt could only report seeing coarse grained material similar to mare basalts but with a high percentage of plagioclase (SN: 7/1/72, p. 12). This he tentatively interpreted to be intermediate pyroxene gabbroic material. "We have a different breed of rock up here," he said. And later during the post-EVA debriefing, "I better wait until tomorrow to answer that." (Late



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

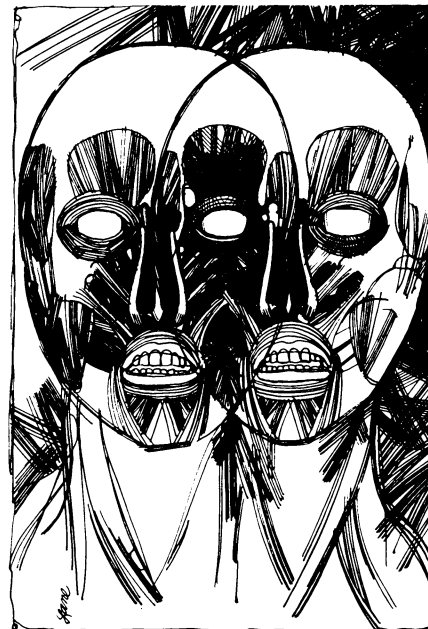
Three generations of psychoanalysts were on display last week in New York at the winter meeting of the American Academy of Psychoanalysis. The senior or first generation, represented by some of the founding fathers of the U.S. psychoanalytic movement, told the second generation how it was in the beginning. 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-