APOLLO 15'S RILLE

A possible origin

On July 30, if all goes well, the Apollo 15 lunar module will fly over one of the moon's highest mountain ranges (the Apennines) and land at their base near a geological feature of puzzling appearance—Hadley Rille.

In the May 14 SCIENCE, Dr. Ronald Greeley of National Aeronautics and Space Administration's Ames Research Center discusses various rille theories and proposes a possible origin-theory, but concludes that rock samples and photographs from Apollo 15 will refine the data.

Hadley Rille is in a valley of the Apennines east of Mare Imbrium, the largest of the moon's circular basins. The rille is about 135 kilometers long and averages 1.2 kilometers in width and 370 meters in depth. "Following the formation of the Imbrium basin," Dr. Greeley says, "basaltic lava was emitted through faults and fissures at the base of the Apennine Mountains and poured into the basin." (An elongate cleft at the head of the rille is interpreted to be a volcanic vent situated on or near a fissure). The fluid lunar lavas then flowed from the vent "into the basin through a lava channel that in some places became roofed to form a tube." Then to explain the present appearance of the rille, Dr. Greeley suggests that meteoroid bombardment probably collapsed all the roof sections of the tube and caused slumping of the rille rim.

JET NOISE

Sound absorbing material

Developing a noise abating material for fanjet aircraft engines has long been a knotty problem. The material has to be such that it will not blow away, not be affected by heat or vibration and not act as a sponge to absorb fuel, oil or moisture. The Lockheed Aircraft Corp. has now come up with a material that meets these rigid standards called Permoblique (because it is made of permeable metal and is placed at an oblique angle).

The material lines the ducts of aircraft engines and absorbs the noise by trapping sound in small metal pockets. The sound bounces around in a waffled or honey-combed cubed pocket and is dissipated in the form of heat.

APOLLO 15

Subsatellite for lunar orbit

The first release of an unmanned lunar satellite by a manned spacecraft will occur as Apollo 15 circles the moon in July. Command module pilot Alfred M. Worden will release the 80-pound scientific package from the service module bay into a 55 x 75 nautical-mile lunar orbit.

The subsatellite carries three experiments expected to be operational for a year: an S-band transponder, a magnetometer and a particles and fields experiment.

Investigator William L. Sjogren of the Jet Propulsion Laboratory in Pasadena will use the S-band to study the near-surface gravitational profile of the moon and the subsurface gravity anomalies such as mascons and impact craters.

The magnetometer will measure changes in the moon's magnetic field caused by changes in the interplanetary magnetic field, according to Dr. Paul J. Coleman Jr. of the University of California at Los Angeles. As the moon circles the earth, the magnetometer also will collect data on the earth's radiation belts, on the geomagnetic tail through which the moon will pass, and on the solar wind.

A charged particle detector will study electrons and protons. Designed by Prof. Kinsey A. Anderson of Berkeley, it will collect data on the solar flare electron fluxes, particles in the lunar atmosphere and the interaction of the particles with the magnetosphere and solar wind boundary layer over the moon.

MOON EXPERIMENTS

Pulsar to be monitored

Apollo 15 will be the first of a new line of spacecraft known as the "J series." Included in its increased capabilities is an orbital science package housed in one of the previously empty service module bays. Four spectrometers—an X-ray, gamma ray, alpha particle and mass spectrometer—will make precise measurements of the lunar surface and atmosphere from orbit.

However, before Astronaut Worden does a 45-minute spacewalk to retrieve film magazines from the experiments in the service module, the instruments will be pointed at something other than the moon.

The X-ray spectrometer will be aimed at a new type of pulsating star (SN: 3/3/71, p. 239) discovered by the satellite "Uhuru" and thought to be a black hole. The advantage of the Apollo X-ray spectrometer over the satellite is that it is not spinning and will therefore be able to observe Cygnus X-1 for a longer period.

The gamma-ray spectrometer will map the galaxies to find new gamma-ray sources. And the mass spectrometer will measure the amount of external spacecraft contamination in preparation for the use of the Apollo Telescope Mount on Skylab in 1972.

PLANETARY PHYSICS

Apollo 17 spectrometer

How the atmospheres of planets and their satellites are formed and how the atmospheres are modified and sometimes lost and destroyed are key questions to understanding the evolution of the earth and other planets in the solar system.

William G. Fastie of Johns Hopkins University is hoping that his experiment, an ultraviolet spectrometer to fly on Apollo 17 in 1972, will help provide some of the answers. NASA recently awarded the university $2.1 million to build the sensitive instrument for study of the extremely thin lunar atmosphere.

The spectrometer will also record the artificial atmosphere generated by the lunar module's gases.

Then on the way back from the moon, the spectrometer will be focused on the galaxy. "This instrument is so much more sensitive than anything we've flown before," he says, "that it may discover new ultraviolet emission sources."