Apollo 16: The moon as an astronomical base

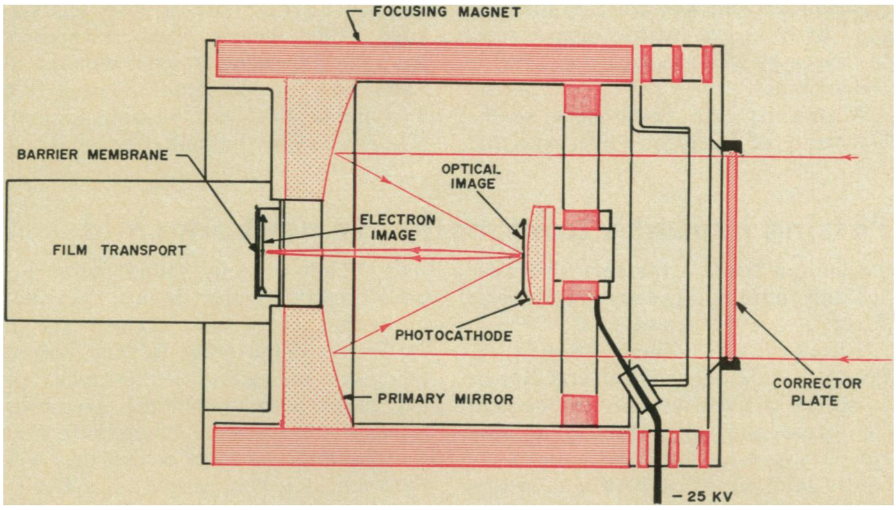
Scientists have long dreamed of using the moon as an astronomical base where observations are unhindered by the earth's atmosphere and the geocorona. If all goes well with the scheduled launch of Apollo 16 this weekend (SN: 4/8/72, p.235), part of that dream will soon become a reality.

Astronauts John W. Young, Charles M. Duke and Thomas (Ken) Mattingly will carry an ultraviolet camera to the moon for imagery and spectroscopy in the wavelength range below 1,600 angstroms, including in particular the atomic hydrogen Lyman-alpha line at 1,216 angstroms (SN: 10/9/71, p. 249). Observations of diffuse UV sources from satellites in low earth orbit, like the Orbiting Astronomical Observatory (SN: 12/5/70), p. 427), have been hindered by the fact that the geocorona (which extends out to a distance of several earth radii) is also a strong emitter of the Lyman-alpha wavelength of atomic hydrogen. The camera will be able to get a good look at the earth's outermost atmosphere and the geomagnetic field's interaction with the solar wind. But it will also be able to detect very faint emissions of UV light in deep space.

More than 12 targets will be photographed, including the earth, the Sagittarius star cloud region toward the center of the Milky Way and the Magellanic Clouds. The camera will also provide information about interstellar gas, emission nebulas and possible intergalactic gas, haloes of external galaxies and clusters of galaxies. George R. Carruthers of the Naval Research Laboratory and Thornton Page of the Manned Spacecraft Center, investigators for the camera, also expect it to pick up any permanent or transient lunar atmosphere, such as volcanic gas.

The camera is making its debut on Apollo 16. "It's really quite a fancy instrument," says Anthony England, scientist-astronaut who has been working with the Apollo 16 crew. The camera is gold-plated for thermal control, and weighs more than 50 pounds on earth. It is actually an f/1.0, three-inch focal length, Schmidt camera that uses electronographic, rather than photographic recording. Incoming light passes through the corrector plate aperture to a spherical primary mirror and is then imaged onto the focal surface. The focal surface is coated with a thin layer of potassium bromide, which emits electrons when exposed to ultraviolet light of wavelength less than about 1,600 angstroms. The photocathode surface is maintained at a negative potential of 25,000 volts causing the photoelectrons to be accelerated toward the grounded primary mirror. The magnetic field of the surrounding cylindrical magnet confines and focuses the electrons, forming an electron image on the film, behind the center hole in the mirror. This electron image is a duplicate of the optical image projected onto the photocathode.

"This electronographic technique is several orders of magnitude more efficient than ultraviolet-sensitive film," explains England. The camera is 10 to 20 times faster than a similar one using conventional photography. Furthermore, the photocathode is insensitive to visible and long-wavelength ultraviolet light. □



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Apollo 16's UV camera will make first astronomical observations from moon.

Arrhythmia: Medical clues about a leading killer

Arrhythmias—disorders of the heart's rhythm—are blamed for about half a million deaths a year. In fact the National Heart and Lung Institute has called it the leading immediate cause of death in the United States. Relatively little is known about the causes of the disorder, but this week at the Federation of American Societies for Experimental Biology meeting in Atlantic City Jesús Santos-Martínez of the University of Puerto Rico pointed out one culprit—a drug used as a tranquilizer for psychiatric patients.

He and his co-workers believe that arrhythmias induced by phenothiazines may be the cause of sudden and unexplained death among such patients. Two phenothiazine derivatives, promazine and chlorpromazine, produced marked arrhythmias in both anesthetized and active unanesthetized dogs. Arrhythmias in the anesthetized dogs were of shorter duration. Previous experiments mostly conducted on anesthetized dogs had produced conflicting results. The reason, says Santos-Martínez, is that anesthesia apparently interferes with accurate observation of the effects of phenothiazine. He concludes that psychiatrists should reevaluate their practices in administering drugs and that cardiologists should be called in on cases where large doses of tranquilizing drugs are being administered.

Other reports presented at FASEB hold out hope for successful treatment of arrhythmias. Ralph D. Tanz, Paul Allen and James Robbins of the University of Oregon Medical School, while testing the ability of a poison to induce arrhythmias, have incidentally discovered that the amount of tension on the heart's muscle tissue is also a factor. Aconitine, dried root of wolfsbane, in addition to being a legendary werewolf-repellent, is a virulent poison that induces fatal arrhythmias. The Oregon researchers applied aconitine to strips of isolated cardiac muscle. Normally these muscle strips must be electrically stimulated to make them contract, but shortly after application of aconitine the muscles began to beat automatically. After a time, the beat rate becomes faster, first passing through a pattern of alternating large and small contractions, then very fast beats, and finally fibrillation (a rapid disorganized beat).

By varying the dose of aconitine or the degree of tension under which the strip of heart muscle was placed the researchers were able to modify the time at which fibrillation and the various stages leading up to it occurred. Keeping the aconitine dosage constant and reducing tension delayed the times at which fibrillation occurred. If tension was suddenly relaxed during fibrillation or one of the lesser stages of arrhythmias, the heart beat reverted to a lower rate or arrhythmias ceased altogether.

The researchers conclude that these observations suggest that "if one could diminish myocardial wall tension, ar-