

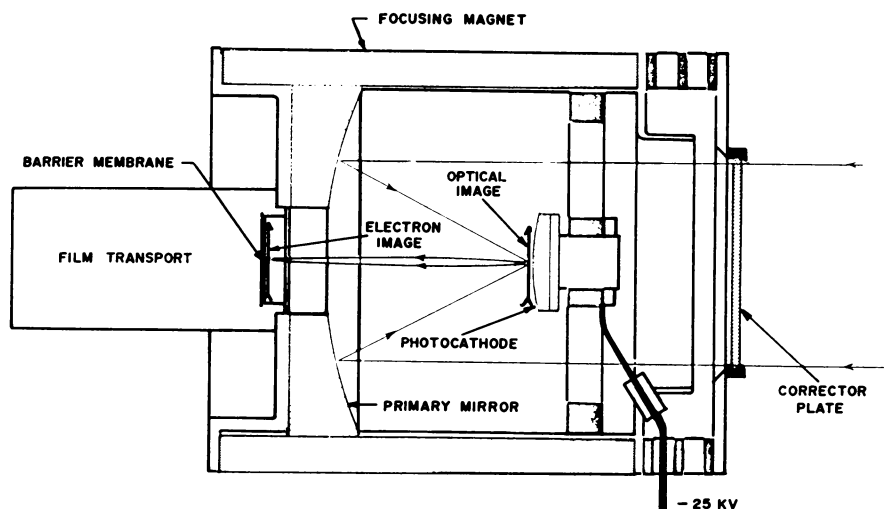
Apollo 16: The moon as an astronomical base

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



NRL

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

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. □

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 re-evaluate 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-

rhythmias might be curtailed." They also help explain why patients suffering from hypertensive cardiac disease seem to have a greater propensity to develop arrhythmias.

Meanwhile five researchers at the University of Michigan told FASEB that

a derivative of propranolol can prevent or reverse arrhythmias in dogs and isolated rabbit hearts. Two researchers from the Edgewood Arsenal Biomedical Laboratory in Maryland reported that a component of bee venom, apamin, also has anti-arrhythmic properties. □

Passing hepatitis from mother to newborn child

Children born to mothers who have hepatitis during pregnancy may become infected with the disease.

Alfred E. G. Dunn, Robert L. Peters, Irvin L. Schweitzer and Robert L. Spears of the University of Southern California and John Wesley County Hospital in Los Angeles examined the babies born to 32 women who within three months before or after delivery developed hepatitis. About 50 percent of the babies had traces of the disease, they reported this week at the annual meeting of the Federation of American Societies for Experimental Biology in Atlantic City.

Doctors at the John Wesley Hospital have found that the blood of apparently healthy infants born to women with hepatitis contained Australia antigen, a substance previously found in the blood of hepatitis patients and known to be related to liver disease. Particles similar to the Australia antigen have also been observed in the nuclei of liver cells of adults with hepatitis. The California researchers examined ten of the babies whose mothers had hepatitis and found that six of the infants had virus-like particles in the nuclei of their liver

cells. "That we only found these particles in six of the infants does not mean that the particles do not exist in the livers of the other infants. Indeed there were indications that some change had taken place within the liver cells in all of the children. It might be that we missed the particles or that they will show up at a later stage," said Dunn.

The babies showed no symptoms of hepatitis themselves, but the researchers believe they may act as carriers transmitting it to others later in life. "Nearly one percent of pregnant women who deliver their babies at the John Wesley Hospital have been shown to possess Australia antigen in their blood. If you consider the total number of women attending other hospitals and also the many women who do not have their blood tested for Australia antigen, you get quite a lot of people," said Dunn.

The California team believes that babies born to women who have hepatitis during pregnancy or shortly after delivery could represent a significant pool of hepatitis carriers and that all such babies should be systematically tested for the presence of Australia antigen. □

National parks: The wilderness cries for help

Yosemite National Park has smog, vandals and, sometimes, drag-racing. Yellowstone has autos and autos and autos. In fact, almost all the national parks have more motor vehicles than they can cope with. The National Park Service has a level of appropriations that allows the agency only to maintain parks in their present condition, with none left over for improvements. Unless there are some major changes, suggests an Advisory Board on National Parks in a report issued this week, not even the maintenance mission can continue to be accomplished for very much longer.

The national parks problem is one of once-sensible developments compounded with a modern mobile and affluent population in a new mixture that does not work. Explained a National Park Service official: When Yellowstone, the nation's (and world's) first national park, was created, its attractions were a day's stagecoach journey from the nearest railhead at Gardiner, Mont. Thus roads *had* to be

built to Old Faithful and the other attractions and hotels had to be erected near the attractions. These roads still exist, but now they carry millions of cars instead of a few stagecoaches. "The problem is not one of too many people but of too many cars," said the official.

The new report's prime emphasis is on the need for higher level of Congressional appropriations to build new facilities. The facilities, said the official, would basically be visitor centers, interpretive facilities and parking lots on the peripheries of parks, and "people mover" systems to take people to the attractions within. Such systems could include buses, monorails or articulated trams such as those that carry tourists around the U.S. Capitol Mall in Washington. NPS has already started such systems on a small scale in parks such as Yosemite and Everglades, but a major problem is the low cost-effectiveness of expensive transportation systems that sometimes could be used only three months a year. □

films OF THE WEEK

BASIC LABORATORY TECHNIQUES IN CHEMISTRY. 16mm or Super-8 (cartridges), color, sound, five films 8 to 14 min. Shows basic areas of good laboratory practices being demonstrated by science students. Many close-up shots are included. Titles include: Using the Bunsen Burner and Working with Glass; Handling, Transferring, and Filtering Chemicals; Measuring Volumes of Liquids; Use of the Triple Beam Balance, and Technique of Titration. Audience: high school or college chemistry classes; also biology and physics. Purchase 16mm series \$550; individual 16mm film \$120. Rental 16 mm series \$55; individual film \$12.50. Purchase Super-8 sound cartridge series \$375; individual cartridge \$80. All available from Warren Schloat Productions, Dept. SN, Pleasantville, N.Y. 10570.

EARTH SCIENCE: THE EARTH'S INTERIOR. 16mm, color, sound, 15 min. A presentation of the current knowledge of the earth's interior, emphasizing the methods by which the understanding is gained. From seismic, gravitational, magnetic, and thermal observations, geophysicists have concluded that below the crust is a plastic-like mantle and beneath this, a liquid core which creates the earth's magnetic field. Audience: junior, senior high. Purchase \$210 or rental \$8 from Audio-Visual Center, Dept. SN, Indiana University, Bloomington, Ind. 47401.

ISOTOPES IN ENVIRONMENTAL CONTROL. 16mm, color, sound, 14 min. Shows some of the ways radioactive atoms are being used to help preserve and restore the environment. One sequence shows how the Coast Guard compares samples of oil suspected of being dumped into coastal regions with samples of oil from ships suspected of discharging their tanks illegally. The method is neutron activation analysis. Another sequence illustrates the use of a radioactive tracer to learn more about the movement of sand under the sea, due to wave energy and strong ocean currents. Tagged sand, spread along the beaches, is detected by a mobile radiation counter, and the information is translated into maps that show for the first time the movement of sand under the sea. Purchase information from National Audiovisual Center (NAC), Washington, D.C. 20409 or free loan information from Audio-Visual Branch, Department of Public Information, U.S. Atomic Energy Commission, Washington, D.C. 20545.

THE ROCK PTARMIGAN: THE GAME BIRD OF ICELAND. 16mm, color, sound, 27 min. Deals with the life and habits of this gallinaceous bird and its struggle for existence against the forces of nature and predators. Also explains the work of ornithologists who have been studying the habits of the birds for 10 years. The bird is one of the few that never leaves Iceland, and the camera follows the birds as they prepare for their yearly spring trip to the breeding-grounds at Hrisey. After the birth of the chicks, the ptarmigan begins moving up into the snowier regions to search for other vegetation. Also included are discussions of their diet, body structure, and predators. Audience: high school, college. Purchase \$325 or rental \$17.50 from International Film Bureau, Dept. SN, 322 S. Michigan Ave., Chicago, Ill. 60604.

OXYACETYLENE WELDING—JOINING STEEL. 16mm, color, sound, 14 min. Advanced techniques in gas welding are shown, including multiple pass (thick plate) joining, structural section fabrication, and forming horizontal, vertical and overhead welds. Audience: high school, college, adult. Purchase \$215 from BFA Educational Media, Dept. SN, 2211 Michigan Ave., Santa Monica, Calif., 90404.

Listing is for readers' information of new 16mm and 8mm films on science, engineering, medicine and agriculture for professional, student and general audiences. For further information on purchase, rental or free loan, write to distributor.