cine has another advantage in that it is more effective in epidemics. The type of poliovirus that may be involved in an epidemic situation can be isolated and then administered quickly and easily in the oral vaccine to those endangered. This protection cannot be afforded by the Salk vaccine. Neither product, however, is effective if administered to a person who already has been infected by poliovirus.

Space Pictures

Four photo records of the passage of cosmic rays in space, taken aboard Air Force Discoverer satellites and Atlas rockets, have been recovered, yielding data on the radiation exposure of space vehicles and on the effect such exposure may have on future travelers. The films were part of a series of rocket and satellite experiments planned by the Geophysics Research Directorate of the Air Force Cambridge Research Laboratories to try to find some clues to the source of cosmic rays and how they get their tremendous energies.

Nuclear emulsions much thicker than ordinary photographic emulsions and stacked to provide a three-dimensional pattern were used to trace the path of the rays and measure their flux. The special emulsion stops cosmic rays entering it at angles before they pass completely through, thus capturing a complete record in the form of tracks (see cut).

The first pictures were taken from an Atlas nose cone recovered in July 1959. Emulsions were carried to an altitude of 700 miles, entering the lower Van Allen belt of trapped radiation that encircles the earth. Another Atlas nose cone, recovered in October 1960, also went into the Van Allen region and also carried emulsion packages inside the vehicle near a cage containing three mice that provided data necessary to the design of shielding for astronauts. Cosmic ray tracks on emulsions carried on board Discoverers XVII and XVIII, recovered in November and December 1960, still are being studied. Those from Discoverer XVIII are providing data on cosmic radiation entering the atmosphere over the arctic and antarctic regions.

These photographic records provide detailed analyses of single events; but for over-all pictures of cosmic-ray behavior, instrumentation that does not need to be recovered is carried into space, and the data are telemetered back. Geiger counters and proton spectrometers of the solid-state, scintillation, and Cerenkov types are some of the devices flown.

Neutron experiments are being conducted to provide data on the formation of the lower Van Allen belt. It is believed that this trapped radiation consists of protons produced by the decay of cosmic-ray produced albedo neutrons. Blue Scout rockets and satellites to be launched this year will carry boron trifluoride detectors to measure neutron density at various altitudes.

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Daylight pictures of planets, rockets, and missiles, previously unattainable, may now be transmitted to indoor screens, for continuous viewing, by the Facet-Eye camera, developed at the Air Force Missile Development Center, Holloman Air Force Base, N.M. This camera has taken clear daylight pictures of Venus and Jupiter that previously could be taken only at night. Astronomers have expressed interest in the system, according to an Air Force spokesman, although it was designed primarily to make possible a 24-hour viewing of rockets, missiles, and satellites in space. An array of 19 long-barreled telescopes, each focused on the same point in the sky, is used, and the resulting images are then superimposed on one another. The magnification is as great as it would be if one large telescope were used, but the amount of stray light is greatly reduced, and this makes it possible to obtain clear images even in the daytime.

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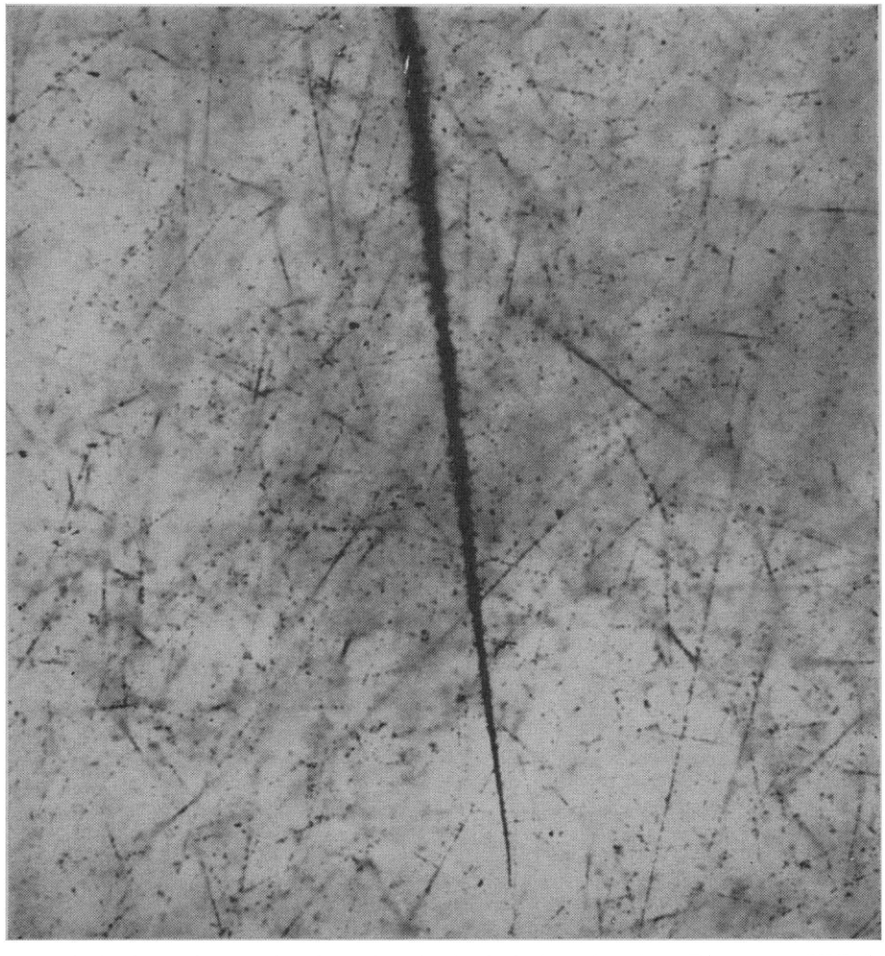
A missile-tracking ship, the *American Mariner*, carrying more than $30 million worth of radar, infrared, and optical devices, will take up station in the Atlantic Ocean to study launchings from Cape Canaveral. The 90 technicians aboard will concentrate largely on getting records of missiles returning from the upper atmosphere in order to learn more about re-entry behavior. The unarmed vessel is under the Army's operational control.



A typical photomicrograph of tracks obtained during the time Discoverer XVIII's re-entry capsule was in orbit. [Cambridge Research Laboratories, U.S. Air Force]