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An Asteroid Into the Sun May Have Glazed Moon Rock

FOR MANY scientists occupied with the analysis of lunar samples, the Apollo flights are spaced too closely together to keep up with. They scarcely scratch the surface in their examination of materials returned by Apollo 11 before being inundated with the next batch. Certainly, they have far too little time to develop well-pondered theories to guide the next stage of lunar exploration.

The biologically oriented scientists do have one simple plea: for samples less heavily contaminated with rocket exhaust and other terrestrial pollutants.

Apollo 12 nevertheless did return some precious cargo whose collection was guided by questions provoked by Apollo 11. These are the "documented samples" which were carefully photographed in place before being picked up. As Cornell University astrophysicist Thomas Gold pointed out in an article in Science magazine, some of these rocks may bear a record of fluctuations in the sun's radiation about which we have no other direct evidence.

HIS SPECULATIONS were based on 17 closeup stereophotographs of the lunar surface. These showed more detail of the fresh soil than could be seen by eye. Dr. Gold was impressed by the occurrence of glazed patches on clumps of soil near the centers of small craters.

The pictures suggest that the glazing tends to be off-center. Unfortunately, the orientation of pictures of different craters was not recorded, so they cannot be compared to see if the glazing points toward a common direction; this should be available from Apollo 12.

Glassy beads have been found within many lunar rocks and clumps of soil, and different sources of energy for melting them are being debated. Possible sources include lava sprays and meteorite impact. (The moon has no atmosphere to heat an incoming meteorite by friction.)

Dr. Gold reviews and negates a number of theories to account for the distribution of the glazed patches: splashing, exposure by erosion or formation by the impact that makes a crater. He is left with the conclusion that the glazing resulted from sudden flashing of radiant energy from a source in the lunar sky within the last 30,000 years—the estimated upper limit of time for erosion of the glaze by new micrometeorites.

SMALL CRATERS would have a focusing effect that could heat objects at the center some 20 per cent hotter than they would be on flat ground. The flash would have to be so intense that the sun is the only plausible source.

The event would have been a solar flare of about 100 times normal intensity for about one minute. This represents more than a thousandfold more energy than has been observed in solar flares to date, and might therefore have had quite a different mechanism.

This energy is the equivalent of an hour's sunshine. Delivered in a short time to the lunar surface, it could glaze unshielded lumps, but on our own surface, it should be buffered by the earth's atmosphere so as to minimize the effects except for triggering forest fires or causing superficial burns and blinding at high altitudes.

One suggested mechanism is the infall of an asteroid or comet into the sun. Such events would be very rare, and astronomical observations should enable us to predict them. On the other hand, we know very little about the processes that regulate the stability of the sun and other stars. The flash might have been a minor nova of a kind we are unable to recognize by conventional astronomy.

Thus the moon may give us a record of the long-term behavior of the sun which is crucial to the viability of our own planet.