PHYSICAL ASPECTS OF THE MOON IN ECLIPSE

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The partial eclipse of the sun, February 3, 1935. This eclipse was photographed in Nashville with a meniscus spectacle lens of 50 inches focal length and also with the same kind of lens having a focus of 144 inches. The first camera was operated by the writer and the second by Mr. Foster V. Jones, who made some exposures on plates sensitive to the near infra-red, employing an 88a (Eastman) filter. All other exposures were secured through a 58a, green filter, with process emulsions, for these have been found satisfactory in subduing the intensity of sunlight when the green filter is used. Only a minor part of the blue light gets through the filter, and the plates are sensitive to that part of the spectrum.

Clouds threatened the visibility at first, but clear sky prevailed from the mid interval to the end of the eclipse. The times predicted for Nashville were: beginning of eclipse, 15h lm, GCT; contact at angle 276 deg., measured from the North Point; middle of eclipse, 16h 5m GCT, magnitude 0.47; end of eclipse, 17h 12m GCT, angle 27 deg., from North Point of sun's disk. In all, twenty photographs were secured, some of which display fairly well the rugged skyline of lunar mountains then projected upon the sun's disk.

In an effort to identify some of these elevations, two comparison plates were used though their selenographic longitudes and latitudes are not similar to those during eclipse. However, it seems reasonable, when allowance is made for this discrepancy, that the identification is accurate. A diagram was constructed from the figures given in the American Ephemeris, thereby locating the lunar south pole upon the silhouette.

During the interval immediately following mid-eclipse, the lofty skyline of the Doerfel Mountains were in view eastward from the moon's south pole. The deep valleys in the vicinity of the huge walled plain, Bailly, which produce the effect of "Bailly's Beads" during a total eclipse were seen. Following the apparition of this region the long sweeping summits of the Leibnitz Mountains, westward from the lunar South Pole, came into view.

The total eclipse of the moon, July 16, 1935. The twelve-inch, F5, reflecting telescope constructed by Messrs. Ward and John H. DeWitt, Jr., was employed in securing twenty-five negatives of this eclipse. The DeWitt brothers, Miss Mary Noel, and the writer worked throughout the eclipse at the DeWitt Private Observatory in Nashville. Weather conditions were ideal, excepting summer tem-

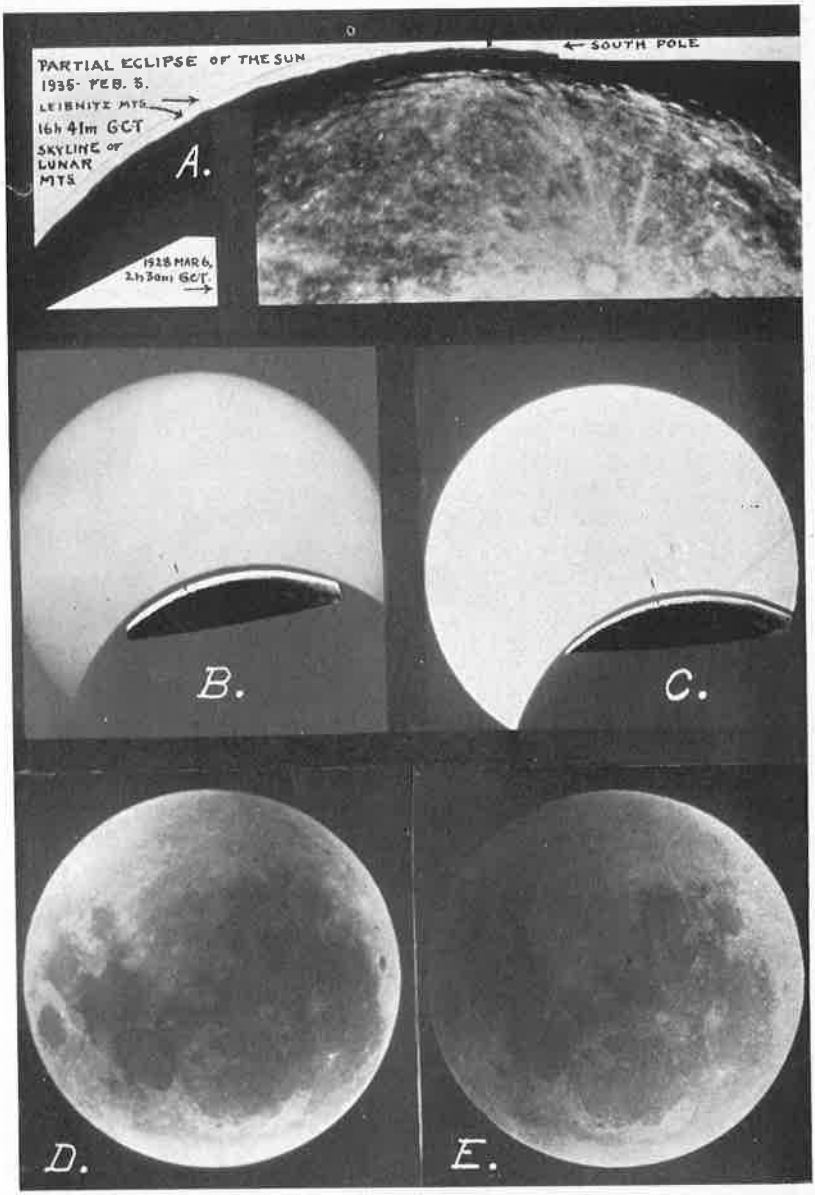

Fig. 1. *A*, Partial eclipse of the sun. Note the silhouette of lunar mountains projected upon the disk of the sun and placed against this a positive print of the moon so arranged that a part of the skyline can be compared. The libration for the eclipse skyline, 1935, Feb. 3, 16h 41m, Greenwich Civil Time is approximately: selenographic longitude, minus 0.90 degrees; selenographic latitude, minus 1.48 degrees; the sun's colatitude, plus 0.34 degrees. For the

perature which impedes manipulation of photographic materials. A temporary darkroom was constructed near the observatory, and moths, dust particles, etc., combined with softened emulsions, were the chief obstacles encountered.

An unusually bright totally eclipsed moon furnished a splendid spectacle and permitted fairly rapid exposures to be made. Photographs of the moon were secured before and after the eclipse so that lunar surface features might be compared with the various degrees of illumination occurring during totality. Especially interesting would be any effect which might be visually or photographically detected during the severe temperature changes occurring on the lunar surface during eclipse.

Professor W. H. Pickering, Mandeville, Jamaica, had requested that special attention be given to the little crater Linné, and to the mountain peaks in the crater Theophilus. Owing to the small focal images of the F5 reflector, enlargement during subsequent study of these features rather strained the quality of the negatives, and graininess has largely interfered with any definite interpretation of results. The negatives have not been measured with suitable machines, and only such measurements as could be made upon enlarged prints have been practicable. However, it is the writer's opinion that the most noteworthy effect generally distributed over the lunar disk is that many of the diffuse white spots become less diffuse, actually smaller, while subjected to the low illumination of the refracted sunrays.

Light shining through clear spaces along the rim of earth during progress of the eclipse cast sunset hues upon the moonscape, producing kaleidoscopic changes in which brilliant yellow, orange, and red were conspicuous. Mid-totality occurred at 4h 59m, GCT, and at that time the lunar disk was so brightly illuminated by sunlight refracted into the shadow that details could be photographed in all

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comparison print, 1928, March 6, 2h 30m, G. C. T., selenographic longitude, plus 3.93 degrees,; selenographic latitude, minus 6.52 degrees; the sun's colatitude, minus 1.57 degrees. *B*, Partial eclipse of the sun, Feb. 3, 1935, at 16h 10m, G. C. T., earth's selenographic longitude, minus 0.91 degrees; selenographic latitude, minus 1.47 degrees; sun's colatitude, plus 0.34 degrees. *C*, Partial eclipse of the sun, Feb. 3, 1935, at 16h 22m, G.C.T. Essentially the same data as above, the libration change being only a fraction of a degree and too small to be apparent in the photographs. Projected upon *B* and *C* at the bottom is a negative image of the moon so arranged that the south points are in line with those of the eclipse pictures. The date of this comparison picture is 1929, April 23, 3h 0m, G.C.T. Selenographic longitude, plus 4.63 degrees; selenographic latitude, minus 3.18 degrees the sun's colatitude, minus 0.50 degrees. *D*, Total eclipse of the moon at about one minute later than the middle of the total phase. Photographed through the 12-inch F 5 mirror constructed by Messrs John H. DeWitt, Jr., and Ward DeWitt, with an exposure time of 40 seconds on Panatomic Cut Film. The bright portions were shining with yellow light and graded into copper-colored darkness. Data: 1935, July 16, 5h 0m, G.C.T. South appears at the top—as seen through an inverting telescope. *E*, Total eclipse of the moon: July 16, 1935, 5h 34m, G.C.T., exposure 20 seconds.

but the deepest part of the shadow, in an exposure time of 40 seconds. This darkest core of earth's shadow was only about 1,000 miles across, measured on the photographs.

Phases of partial eclipse were secured in about ½ second exposures on slow lantern slides, the emulsion being quite insensitive to yellow and red. The exposures secured during totality were made upon Panatomic Cut Film, a fine-grain emulsion furnishing more contrast than Supersensitive Panchromatic film. These exposures ranged from ten to forty seconds.

Areas of lunar surface, including Linné, Aristarchus, and Plato, were photographed enlarged through the orthoscopic eyepiece, and furnish considerably better results than enlargements made from the focal images. These three regions thus depicted in more detail were photographed immediately after the shadow had passed from them. The crude measurements of Linné, from this enlarged view, do not disclose with certainty any change in size when compared with photographs enlarged from the other negatives. However, with the aid of a measuring machine, and measurement of density of image, some effect which has otherwise escaped detection might be found.

TREES OF THE GREAT SMOKY MOUNTAINS NATIONAL PARK[1]

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A classified list of 124 species of trees of known or probable occurrence in the Park was presented, together with a paper about the trees and forests of the Smokies. The later is addressed to a miscellaneous audience and in it such topics as the following are discussed: The Species Concept, Plant Classification, Tree Names, When is a plant a tree? Big Trees, Forests of the Smokies.

[1]Abstract of paper presented before the Botanical Section of the Tennessee Academy of Science at the Nashville meeting, November 29, 1935. This paper constituted a part of Dr. Jennison's monthly report on Wildlife Activities (U. S. National Park Service) for the period from October 15 to November 14, 1935.