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THE 100-INCH HOOKER TELESCOPE OF THE MOUNT WILSON OBSERVATORY.

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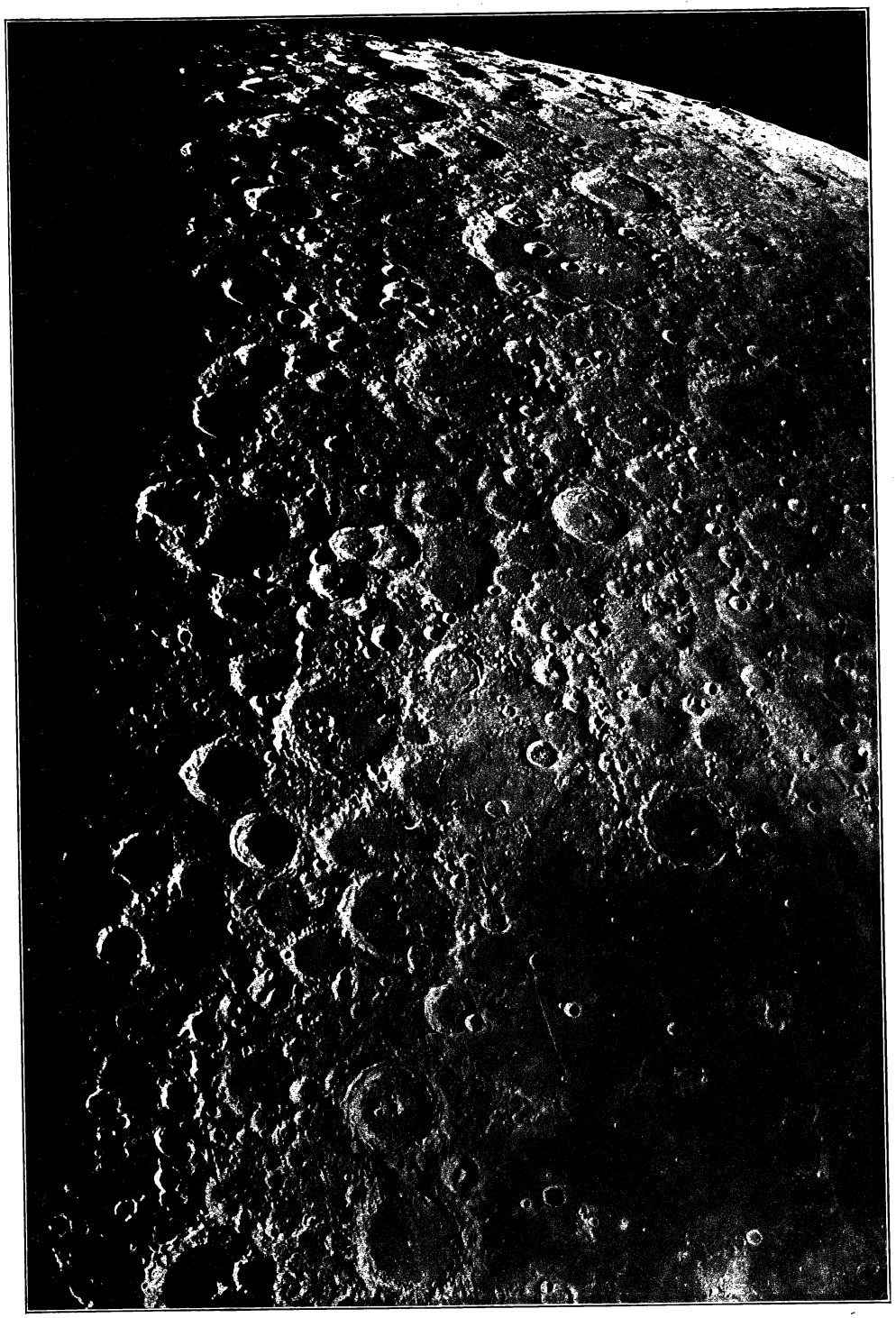
After a series of tests extending over several months, the 100-inch telescope of the Mount Wilson Observatory has been found to be a complete success. The construction of this instrument, begun several years ago, was necessarily an experiment, as it was by no means certain, after the optical and mechanical difficulties had been overcome, whether the atmosphere would be sufficiently tranquil to permit clearly defined images of celestial objects to be obtained with so large an aperture. Mount Wilson, situated in the favorable climate of Southern California, where the best of results have been secured with telescopes up to 60 inches aperture, is a site as promising as any that could be found. But as observations with smaller instruments are insufficient to settle the question, the actual performance of the telescope could not be predicted with certainty.

The tests, which permit the performance of the new instrument to be directly compared with that of the neighboring 60-inch telescope, show that the full gain in light-gathering power, to be expected from the increased aperture, has actually been attained. The 100-inch telescope thus collects nearly three times as much light as the 60-inch telescope, and concentrates it in images so sharp that the gain in brightness is fully utilized. This means that the atmosphereic conditions on Mount Wilson have proved to be good enough to meet the very severe demand.

The sharpness of astronomical photographs obtained with the 100-inch telescope may be judged from some large pictures of the moon, which bring out very small details. These were taken with the combination of mirrors that give the telescope an equivalent focal length of 134 feet. Photographs of small nebulae taken at this focus also show details of structure of great interest.

PLATE XLIX



PHOTOGRAPH OF THE MOON TAKEN WITH THE 100-INCH REFLECTOR OF THE MOUNT WILSON OBSERVATORY; EQUIVALENT FOCAL LENGTH 134 FEET.

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It will naturally be the policy of the Observatory to apply the 100-inch telescope chiefly to the study of faint and difficult objects beyond the reach of our smaller instruments. Hitherto most of the observations have been made with the aid of spectrographs attached at the 134 foot focus. The great light-gathering power permits the spectra of extremely faint stars to be photographed with moderate exposures. In this way the motions of faint stars in the heart of globular clusters and in the star-clouds of the Milky Way can be measured. By applying Adams' spectroscopic method of measuring the distances of stars, it will also be possible to distinguish between stars that are faint because they are small or feebly luminous and those that are actually bright but are rendered faint by their great distance.

A few results already obtained through the study of faint stars with the 100-inch telescope may be of interest. For the first time, except in the case of new or temporary stars, the unknown gas nebulium, the most conspicuous of the elements constituting the irregular cloud-like nebulae, has been found to be present in the atmosphere of a star (R Aquarii). This star is a faint reddish object, which varies greatly in brightness in a period of about a year.

A faint variable star in the constellation Taurus, associated with one of the few nebulae known to vary in brightness, has been found to have an extensive atmosphere in which brilliantly luminous clouds of calcium vapor are conspicuous. Another peculiarity of this star is its extremely high temperature when near its maximum brightness.

The faint companions of close double stars, when studied spectroscopically with the new telescope, have already yielded interesting results. Such systems are of great interest in the study of stellar evolution, but the fainter members, especially when very close to their bright companions, have previously been beyond the reach of our spectroscopes.

These examples will suffice to illustrate the present work of the 100-inch Hooker telescope, named for the late John D. Hooker of Los Angeles, donor of its optical parts. Several new classes of observations will soon be made with the aid of special appliances now nearing completion.