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PHOTOGRAPHS OF THE ZODIACAL LIGHT.

BY A. E. DOUGLASS.

The accompanying photographs of the western zodiacal cone were made by the writer on February 13, 1901. The lens was made by ALVAN CLARK & SONS in 1899 especially for this purpose. It has the Fraunhofer curves. Its clear aperture is 0.9 inch and its focus 1.8 inches, a ratio of 1 : 2. The mounting used in this work is largely home-made, consisting of a powerful Seth Thomas clock-movement, working into a cog-wheel having 120 teeth, attached to an inverted altazimuth mounting belonging to a two-inch telescope.

Previous to February 13th a number of photographs had been obtained with this apparatus, by exposures of an hour or more. On that date, however, trials of short exposures were made with immediate success. It appears that when the Zodiacal Light is at its best, exposures of eight minutes are ample; at its worst, thirty minutes are required, as for the Gegenschein. Impressions of the Gegenschein have almost certainly been obtained, but more experimenting is necessary before successful prints can be made.

Trials of some eight or ten different developers have been made, with the result, thus far, that two may be used with safety, a fairly strong glycin developer and a hydrochinon developer with about twenty-five drops of bromide solution for every two ounces, and perhaps a few drops of a ten-per-cent. solution of yellow prussiate of potash. The development with the glycin may be carried on for almost any length of time without fogging, but it is largely finished in thirty minutes. The development in

the hydrochinon may be continued for thirty minutes, or until the plate fogs. As far as the trials go, the glycin is slightly better than the hydrochinon.

The first negative obtained at this observatory, showing the Zodiacal Light, was on March 10, 1899. Many different lenses were tested, and a number of satisfactory negatives were obtained, of which one of the best was of the eastern cone, on October 7, 1899. This was reproduced in *Popular Astronomy*, No. 74, April, 1900. But the engraving did not by any means equal the photographic print. And, besides that, the original exposures before the present year were all made by hand-following. This tedious work was done nearly always by Mr. W. A. COGSHALL.

LOWELL OBSERVATORY,  
FLAGSTAFF, ARIZONA, March 11, 1901.

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PHOTOGRAPHIC OBSERVATIONS OF COMET II, 1900  
(BORRELLY-BROOKS).

BY H. K. PALMER.

This comet was discovered by BORRELLY, at Marseilles, and independently by BROOKS, at Geneva, N. Y., on July 23, 1900. At the time of its discovery it had a bright stellar nucleus of about the  $6\frac{1}{2}$  magnitude. It was first observed at the Lick Observatory on July 24th, and was found to be bright enough to warrant a series of photographs. Accordingly, on the 25th, this series was begun, and was continued until August 4th, when the Moon interfered. By the time the Moon was out of the way the comet had become so faint that further photographic observations were impossible.

On July 25th, the comet was photographed with the Crocker telescope, but on all succeeding nights, except August 4th, with a Willard lens attached to the five-inch Floyd telescope. The latter was used as a guiding telescope. Both the Crocker and the Willard lenses have apertures of six inches. The focal length of the Crocker is 30.82 inches, while that of the Willard lens is only 25.99 inches. On the photograph taken with the Crocker telescope, 1 degree = 0.538 inch; and on those taken with the Willard lens, 1 degree = 0.454 inch. The photographs

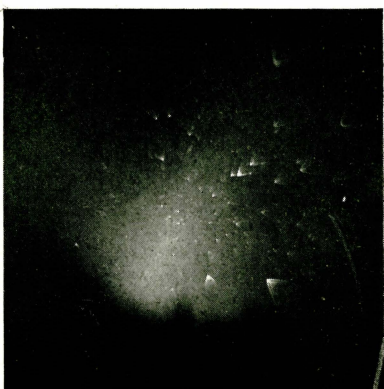




(1)



(2)



(3)

THE ZODIACAL LIGHT IN *PISCES*.

Lowell Observatory, Feb. 13, 1901.

Exposure times: (1) = 7<sup>m</sup>.5; (2) = 15<sup>m</sup>; (3) = 30<sup>m</sup>.