The belts on the disk are numbered beginning at the north limb.

B_1 = south edge of the shading, which in 1894-95 extended to the limb. Reduced latitude $+11^{\circ}18'$ (2).

B_2 reduced latitude $+10^{\circ}08'$ (2).

B_3 reduced latitude $+7^{\circ}45'$ (9), width $0^{\circ}61'$ (2).

B_6 reduced latitude $-8^{\circ}90'$ (2), width $1^{\circ}21'$ (2).

B_7 = north edge of shading, extending to south limb. Reduced latitude $-12^{\circ}00'$ (1).

The map of Jupiter for March 1, 1895 has been drawn to show the relative position of the belts and spots which have been observed. The longitude is in time from Marth's Meridian II and the latitude is distance from the apparent equator; all quantities being reduced to mean distance. No attempt has been made to show in detail

the structure of the great equatorial belt, but the relative size and position of all objects are based on micrometrical measurements.

The sketch of the planet for Febr. 15th, 1895 shows the third satellite in transit as a black spot. Near the middle of the disk the satellite appeared round and black, and at the first glance was mistaken for a shadow. When at a distance of $2^{\circ}4'$ of arc from the limb of the planet, the color was less marked and at $2''$ from the limb the satellite appeared smaller and was barely visible. When the distance from the limb was only $1^{\circ}7'$ the satellite appeared as a white disk. After emersion, when the distance from the limb of the planet was $0^{\circ}4'$, the outline was sharply defined and there was an absence of glow around the disk as though the satellite was immersed in a medium which absorbed some of its light.

The apparent latitude at transit was $-11^{\circ}49'$.

Dearborn Observatory, Evanston, Ill., 1896 February.

G. W. Hough.

Micrometrical Measures of the Annular Nebula of Lyra (M. 57)

made with the 36 inch Equatorial of the Lick Observatory by *E. E. Barnard.*

The following measures of the Ring Nebula, M. 57 were made at different times with the great telescope.

The magnifying power employed was 520. With this power the nebula was a very fine object and its different details were brought out with remarkable distinctness.

The aperture of the ring was filled with a feebler nebulosity which was estimated to be nearly midway in brightness between the brightness of the ring and the darkness of the adjacent sky. This aperture was not concentric with the outer edges of the ring, but was more nearly circular. The ends of the ring were thicker than the sides. The following end of the ring had a slightly greater extension which was less bright than the ring itself. Both the following and preceding ends of the ring were fainter and less definite. The light of the entire nebula was of a milky color. The central star was usually seen but at no time it was specially conspicuous.

The maximum brightness lies in the northern part of the ring.

Position Angles of the major axis.

	PA.
1892.502	65 ^o 1
1892.521	67.2
1892.540	68.7
1893.676	63.3
1894.158	64.4
1894.194	64.3
1895.152	67.0
1895.385	65.6
1895.440	63.3
Mean	1893.952 65.43

Outer major diameter.

1892.540	80 ^o 72
1893.676	82.15
1895.152	78.83
1895.385	81.28
1895.440	81.46
Mean	1894.439 80.89

Inner major axis.

1892.521	35 ^o 21
1892.540	36.88
1893.676	38.02
1895.152	37.23
1895.440	35.27
Mean	1893.866 36.52

Outer minor axis.

1892.521	56 ^o 80
1892.540	59.34
1893.676	60.08
1895.152	60.14
1895.385	57.14
1895.440	59.36
1894.119	58.81

Inner minor axis.

1892.521	28 ^o 56
1892.540	28.53
1893.676	31.02
1895.152	28.18
1895.440	30.53
1893.866	29.36

Some other measures were made on July 8 and July 15, 1892.

If we call the four edges of the ring (across the minor axis) A, B, C, D beginning at the south side; and similarly calling the edges in the direction of the major axis 1, 2, 3, 4, beginning at the preceding end, the following will represent these latter measures.

1892	AB	CD	AC	BD
July 8	16".02	13".93	45".67	43".65
15	15.96	14.86	—	43.49
Means	15.99	14.39	45.67	43.57

1892	1-2	3-4	1-3	2-4
July 8	17".12	16".62	55".58	54".02
15	—	24.64	60.19	56.02

Kenwood Observatory, Chicago, 1896 Febr. 22.

Unfortunately on July 15 AC and 1-2 were not measured. A full moon was shining on July 8. Though this moonlight has not had any sensible effect on the measures across the smaller diameter it has made a great difference in those from the ends of the ring. This result is what would be expected from the fainter and illdefined condition of the preceding and following ends of the ring. These parts were lost in the moonlight, which makes the measures in that direction too small on July 8. The measures of 1-2, 3-4, 1-3, and 2-4 for July 8th are therefore to be rejected.

I have made these measures in the hope that they may be useful hereafter in establishing any change that may occur in the nebula.

In A. N. No. 3200 p. 129 I have called attention to another nebula in the field of view and very near to this celebrated nebula, which I discovered on 1893, Oct. 2.

E. E. Barnard.

The Cluster Messier 5 Serpentis NGC. 5904.

By Edward C. Pickering.

An announcement was made last autumn of the variability of a large number of stars in certain clusters, especially in Messier 3 and Messier 5. See Astr. Nachr. Vol. 139, p. 137. Measurements have been made by Miss E. F. Leland of the greater portion of the forty-six variables in the latter cluster on forty-five photographic plates.

Twelve of these plates were taken in 1889 at the temporary station established by this Observatory in southern California, the others were taken at Arequipa. The periods of these variables are in general very short, not exceeding a few hours. An example is given below of one of these variables, No. 18, which follows the centre of the cluster Messier 5 about 6' and is south 5'.

From the photographs taken in 1895 the period of this variable was found to be $11^h 8^m 10^s = 0^d 464$. This period represented the observations with an average deviation of ± 0.080 mag. By changing the value of the period by 18^s to $11^h 7^m 52^s = 0^d 4638$ the average deviations are reduced to ± 0.060 mag. It thus appears that the observations of 1895 alone serve to determine the period within a few seconds. If the results are combined with those of 1889, this accuracy will be greatly increased, so that the uncertainty in the period will probably not exceed a second. Unfortunately, the number of periods between the photographs taken in 1889 and 1895 is still uncertain but will be determined from photographs taken this year. The annexed table gives the coordinates of the light curve.

Light Curve.

0 ^d 00	13 ^m 50	0 ^d 25	14 ^m 73
0.05	13.87	0.30	14.73
0.10	14.35	0.35	14.72
0.15	14.70	0.40	14.65
0.20	14.72	0.45	13.56

From this it appears that during half the time the star remains at about its minimum brightness. The maximum is of short duration, the decrease in light is rapid, and the increase is still more rapid.

Below are given the date and hundredth of a day beginning at Greenwich noon, the time of exposure in minutes, the photographic magnitude, and the residual found by subtracting from this magnitude that given by the light curve derived from all the photographs taken during the year 1895. The times of maxima are represented by the formula $J. D. 2413346.403 + 0.4638$.

Date	Exp.	Mag.	O — C
1889			
May 18.66	60 ^m	13.75	—
20.70	52	< 14.2	—
22.66	57	< 14.3	—
25.64	—	14.35	—
27.68	60	< 14.6	—
June 1.66	64	< 14.2	—
4.71	24	< 14.3	—
7.67	60	14.30	—
20.66	69	< 14.1	—
24.65	50	< 14.3	—
27.62	23	< 14.1	—
July 15.57	44	< 14.9	—
1895			
June 1.53	60	14.70	—0.10
21.54	100	14.70	0.00
24.69	60	14.35	—0.10
25.52	85	13.50	0.00
26.52	75	13.90	+0.15