derived for No. 91 from observations by the writer with the 12-inch Meridian Photometer, and the magnitudes of Nos. 91, 93, and 94, as determined with the 24-inch, are given in the successive columns of Table I.

Table I. Observations of variables.

1905	12-inch	24-inch		
	91	91	93	94
Jan. 28	..	10.8	13.0	13.5
30	..	10.4	13.0	13.5
31	..	10.7	12.9	13.6
Febr. 2	..	10.8	12.8	13.6
3	..	10.9	12.6	13.6
4	..	11.2	12.5	R
7	..	11.7	12.7	13.4
11	..	10.6	12.9	13.0
13	10.8	10.6	..	..
14	10.8	10.8	..	..
16	10.9	10.7	..	..
18	10.8	..	..	..
21	10.9	10.9	..	..
23	..	11.1	..	..
25	11.7	11.4	R	12.4
27	11.4	11.5	13.1	12.7
28	11.5	11.3	12.9	12.8
Mar. 1	..	11.1	12.5	12.9
2	11.0	10.9	12.9	12.7
3	10.8	10.7	13.0	12.8
4	..	10.7	12.7	13.0
11	..	11.0	14.0	12.4

While the variability of all three stars is thus confirmed, the absolute magnitudes of the fainter stars are uncertain. On Febr. 4, 1905, No. 94 was not visible, and was certainly fainter than the magnitude 13.6. On Febr. 25, No. 93 was certainly fainter than 13.2. The Moon prevented observations of Nos. 93 and 94, from Febr. 13 to Febr. 23. As these stars are within 40″ of each other, and are usually alternately bright and faint, it seemed probable that the period was the same for both, and that some connection existed between them. On one photograph, however, both stars appear bright, so probably the periods differ slightly.

Harvard College Observatory, 1905 March 13. *Edward C. Pickering.*

Variability of (15) Eunomia.

(Harvard College Observatory Circular No. 94).

A variation in the light of the asteroid (15) Eunomia has been established by Professor Wendell (see A. N. 4009), from observations made with the photometer having achromatic prisms, attached to the 15-inch telescope of this Observatory. The first observations were made on March 15, 1905, or J. D. 2416920. Eunomia was then near its second stationary point, so that it could be compared with the same star, +13°1875, mag. 9.0, until April 1, 1905, J. D. 2416937, inclusive. Owing to its increasing distance, both from the Sun and the Earth, its mean brightness diminished a third

Table I. Observations of (15) Eunomia.

J. D.	Diff.	E.	Phase	Corr.	M.	O—C
6920.661	0m.92	4	0d.038	0m.77	+0.15	−0.02
6920.670	1.06	»	0.047	»	+0.29	+0.02
6921.608	0.82	11	0.098	0.69	+0.13	0.00
6928.655	1.23	67	0.050	0.93	+0.30	−0.01
6928.667	1.34	»	0.062	»	+0.41	+0.02
6928.678	1.26	»	0.073	»	+0.33	−0.01
6932.578	1.19	98	0.045	0.93	+0.26	+0.01
6932.591	1.31	»	0.058	»	+0.38	0.00
6932.606	1.31	»	0.073	»	+0.38	+0.03
6932.620	1.16	»	0.087	»	+0.23	0.00
6932.633	1.03	»	0.100	»	+0.10	−0.02
6932.648	0.97	»	0.115	»	+0.04	+0.02
6932.659	0.92	»	0.126	»	−0.01	−0.01
6934.542	1.05	113	0.109	1.03	+0.02	−0.02
6934.555	1.02	»	0.122	»	−0.01	−0.01
6934.568	1.04	114	0.008	»	+0.01	0.00
6934.583	1.10	»	0.023	»	+0.07	0.00
6934.603	1.29	»	0.043	»	+0.26	+0.04
6934.617	1m.39	114	0d.057	1.03	+0.36	−0.01
6934.631	1.41	»	0.071	»	+0.38	+0.02
6934.651	1.17	»	0.091	»	+0.14	−0.05
6936.536	1.40	129	0.076	1.06	+0.34	+0.02
6936.548	1.30	»	0.088	»	+0.24	+0.02
6936.562	1.15	»	0.102	»	+0.09	−0.02
6936.575	1.08	»	0.115	»	+0.02	0.00
6936.589	1.02	130	0.002	»	−0.04	−0.04
6937.524	1.48	137	0.050	1.11	+0.37	+0.06
6937.536	1.49	»	0.062	»	+0.38	−0.01
6937.552	1.39	»	0.078	»	+0.28	−0.02
6937.569	1.28	»	0.095	»	+0.17	+0.01
6937.587	1.14	»	0.113	»	+0.03	0.00
6937.604	1.10	138	0.003	»	−0.01	−0.02
6937.625	1.16	»	0.024	»	+0.05	−0.02
6937.638	1.26	»	0.037	»	+0.15	−0.01
6937.648	1.38	»	0.047	»	+0.27	0.00
6937.661	1.50	»	0.060	»	+0.39	0.00

of a magnitude during this time. Each observation consisted of four sets, of four settings each. The mean of the times, expressed in Julian Days and decimals, is given in the first column of Table I. The observed difference in magnitude of Eunomia and the comparison star is given in the second column. It appeared from a study of these observations that the times of maximum could be expressed by the formula J. D. 2416920.116 + 0.1267 E. The values of E and of the phase are given in the third and fourth columns. It appeared from the observations that Eunomia, when at maximum on the first day, was about 0.77 magnitudes fainter than the comparison star, and 1.11 on the last day. The exact value for each day is given in the fifth column, and was found by assuming, from an inspection of the curves, the approximate values, and applying a small correction dependent on the condition that the sum of the positive and negative residuals from the light curve should be equal. It will be noticed that the diminution in the mean brightness of Eunomia, which is thus indicated, is not perfectly uniform. This may be due in part to the variations, if any, in the comparison star or in the mean light of Eunomia. Subtracting the numbers in the fifth column from those in the second, gives the observed brightness, compared with the maximum brightness after correcting for the varying mean brightness. This is given in the sixth column. The seventh column contains the residual found by subtracting the magnitude, according to the light curve represented in Table II, from the results given in the sixth column. It will be noticed that the average value of these residuals is only ±0.016.

The form of light curve is shown in Table II, the corresponding phases and magnitudes being given in the first and second columns.

Table II. Light curve.

Phase	Mag.	Phase	Mag.
$0^d.00$	$0^m.00$	$0^d.07$	$0^m.36$
0.01	0.02	0.08	0.28
0.02	0.05	0.09	0.20
0.03	0.11	0.10	0.11
0.04	0.19	0.11	0.04
0.05	0.31	0.12	0.01
0.06	0.39		

It will be noticed that the period, $0^d.1267$, does not differ greatly from that of (7) Iris, $0^d.1295$ (see A. N. 3932), and that in both cases it is still doubtful whether this period should be doubled. A careful series of observations by Mr. Leon Campbell, using Argelander's method, seems to indicate that in the case of Eunomia the period should perhaps be doubled, and that the intervals between the successive minima are alternately long and short. It is difficult to see on theoretical grounds how this can be the case, or how the alternate maxima or minima can differ in intensity, if the variation in light is wholly due to the unsymmetrical form of the body.

It is unfortunate that no easy means exists for observing and following known asteroids, except when near opposition.

Table III. Ephemeris of Eunomia.

J. D.	RA. 1855	Decl. 1855	J. D.	RA. 1855	Decl. 1855
6920	$8^h\ 7^m.6$	+13° 15′	6940	$8^h\ 11^m.0$	+12° 53′
6925	8 7.5	+13 12	6945	8 13.4	+12 44
6930	8 9.0	+13 7	6950	8 16.7	+12 33
6935	8 9.1	+13 1			

Table III contains the approximate positions of Eunomia on the dates given in the first column. The right ascensions and declinations for 1855 are given in the second and third columns. This is the most convenient epoch both for visual and for photographic observations, since the positions may be compared directly with those of adjacent stars in the Durchmusterung.

Harvard College Observatory, 1905 April 8. *Edward C. Pickering.*

Brightness of Jupiter's satellites.

(Harvard College Observatory Circular No. 95).

For many years the four brighter satellites of Jupiter have been suspected of variability. Each of these satellites appears faint when very near Jupiter. This is a subjective effect, and is always produced when a bright object is near a stellar image. It is very marked before or after the occultation of a bright star or planet by the Moon. Various other defects of the eye render the results of direct comparison of the satellites uncertain. A series of measures of the satellites has accordingly been made by Prof. Wendell, with the polarizing photometer attached to the 15-inch Telescope of this Observatory and described in the second paragraph of Circular No. 25. The plan proposed was that each satellite should be compared with the other three on three nights, and that two measures, each consisting of four sets of four settings each, should be made each night. By reversing the prism and images, and placing the latter equidistant from Jupiter, known sources of error were eliminated. The total number of settings required was 576, but unfortunately the approach of Jupiter to the Sun rendered it impossible to secure all the desired measures. The results