

THREE NEW VARIABLE STARS IN THE GLOBULAR CLUSTER M 15.

by I. IZSÁK

During the years 1937—41 and 1950—51 *L. Detre*, *G. Kulín* and *M. Lovas* took 392 plates of the globular cluster M 15 in the Newtonian focus of the 24-inch reflector of the Konkoly Observatory for a study of the period-changes of the variables in the cluster. Guilleminot Superfulgur anti-halo plates 9 cm × 12 cm were used. As a rule the exposure time was 12 minutes. The scale is 60'' to the millimeter.

I have investigated 12 pairs of plates in the blink microscope of the observatory and a total of 53 variables was found. Of these 47 occur in the list given by *Bailey*<sup>1</sup>, and 3 in *Rosino's* new list<sup>2</sup>. The remaining 3 new variables are marked in the accompanying figure. The central part was too congested on our plates to permit search in this area. This is the cause, that only three of *Rosino's* variables could be rediscovered.

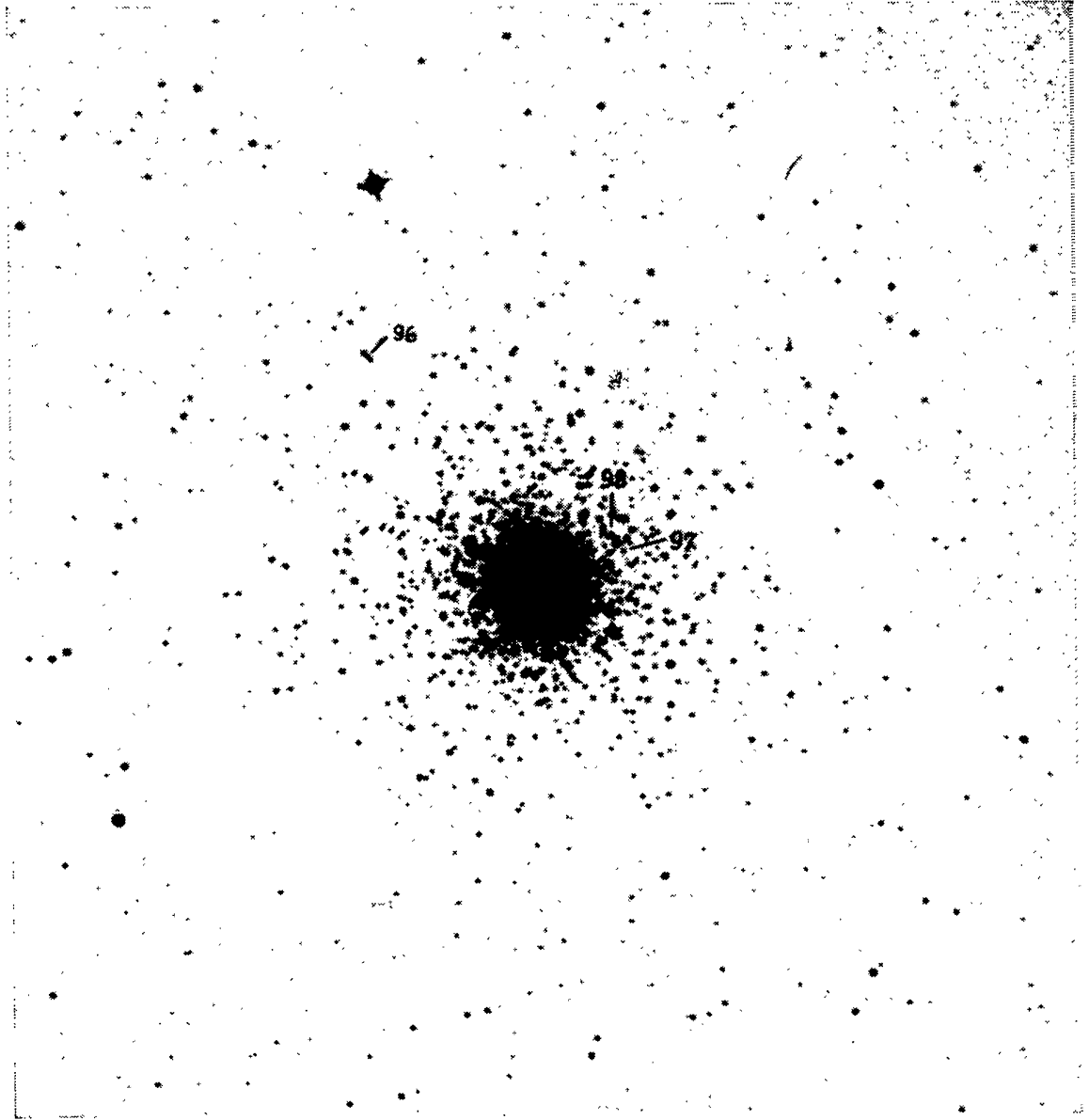
Table I.

| No. | Küstner No. | X"      | Y"      | Magnitudes |      | Type |
|-----|-------------|---------|---------|------------|------|------|
|     |             |         |         | Max.       | Min. |      |
| 96  | 1023        | + 165,6 | + 215,0 | 15,1       | 16,1 | RR   |
| 97  | 242         | — 79,5  | + 29,3  | 15,3       | 16,2 | RR   |
| 98  | 282         | — 67,1  | + 46,1  | 14,7       | 15,9 | RR   |

Table I contains the data for the new variables. The numbering is consecutive from the last variable in *Rosino's* list. The following columns give the number in *Küstner's* Catalogue<sup>3</sup>; the x and y coordinates in seconds of arc in *Bailey's* system; the range in magnitude and the type.

For the determination of the magnitudes a sequence of comparison stars was selected from *Bailey's* list. The magnitudes of the sequence stars were determined from three comparisons with the Mount Wilson photographic magnitudes in the Selected Areas 63 and 89. For this purpose the plates were measured in the Rosenberg microphotometer. Meanwhile new magnitudes were published for the cluster by *A. Brown*<sup>4</sup> and by *H. L. Johnson* and *M. Schwarzschild*<sup>5</sup> partly based on photoelectric measurements. Table II gives a comparison of all available determinations for the magnitudes of the sequence stars.

The deviations of my magnitudes from those given by *Shapley*<sup>6</sup>, *Johnson* and *Schwarzschild* and by *Brown* are of a systematic character. As all these magnitudes are based on the North Polar Sequence and as my three comparisons with S. A. 63 and 89 are consistent with each other within  $\pm 0^m 05$ ,



Identification of new variable stars in M 15  
(Plate by G. Kulin)

Table II.  
Comparison of magnitudes

| Star           |         | Magnitudes |        |         |       |                   |       |
|----------------|---------|------------|--------|---------|-------|-------------------|-------|
| Bailey         | Küstner | Shapley    | Bailey | Küstner | Brown | Johnson-Schwarzs. | İzsák |
| a              | 341     | 14,14      | 13,69  | 14,00   | 14,19 | —                 | 14,00 |
| b              | 1047    | 14,51      | 14,18  | 14,02   | 14,43 | —                 | 14,19 |
| e              | 114     | 14,76      | 14,51  | 14,31   | 14,89 | —                 | 14,67 |
| g              | 63      | 15,01      | 14,89  | 14,53   | 15,06 | —                 | 14,86 |
| k              | 1014    | 15,49      | 15,22  | 15,07   | 15,51 | —                 | 15,37 |
| l              | 677     | 15,68      | 15,31  | 14,95   | 15,61 | 15,54             | 15,68 |
| l <sup>3</sup> | 79      | —          | 15,45  | 15,24   | —     | 15,65             | 15,75 |
| m <sup>3</sup> | 112     | —          | 15,57  | 15,24   | —     | —                 | 15,91 |
| n              | 836     | —          | 15,64  | 15,20   | —     | 15,89             | 16,05 |
| m <sup>2</sup> | 1051    | —          | 15,77  | 15,24   | —     | 15,96             | 16,08 |
| n <sup>2</sup> | 1052    | —          | 15,85  | 15,88   | —     | —                 | 16,21 |
| o <sup>3</sup> | 196     | —          | 16,02  | 15,65   | —     | 16,27             | 16,33 |
| o <sup>1</sup> | 456     | —          | 16,16  | 15,76   | —     | 16,45             | 16,53 |
| p              | 628     | —          | 16,41  | 16,13   | —     | 16,70             | 16,64 |
| q <sup>2</sup> | 1050    | —          | 16,50, | 16,19   | —     | 16,73             | 16,68 |
| s <sup>3</sup> | —       | —          | 17,00  | —       | —     | —                 | 16,79 |

it is probable, that a scale error has crept into the photographic magnitudes in these Selected Areas, similarly as was found by *J. Stebbins*, *A. E. Whitford* and *H. L. Johnson*<sup>7</sup> for S. A. 57, 61 and 68.

1. Harv. Ann., 78. Part 3. 1919.
2. Ap. J., 112. 221. 1950.
3. Bonn. Veröff., 15. 1921.
4. Ap. J., 113. 344. 1951.
5. Ap. J., 113. 630. 1951.
6. Ap. J., 49. 40. 1919.
7. Ap. J., 112. 475. 1950.

Szabadsághegy, Budapest, December 29, 1951.