TWENTY-NINE NEW VARIABLE STARS IN THE GLOBULAR CLUSTER M 15

NGC 7078 = M 15, a condensed globular cluster of class IV, can be considered quite rich in variable stars. The *Catalogue of 1116 Variable Stars in Globular Star Clusters* of H. B. Sawyer gives the positions and magnitudes of 66 variables in this cluster, discovered by Bailey on Arequipa and Mount Wilson plates. Eight additional variables were found by Guthnick and Prager, according to a short communication (*Sitzungsberichte Preussischen Akademie der Wissenschaften*, **28**, 508, 1925), but the positions were not indicated. Of these 66 variables, only 3 are within a distance of 50″ from the center, probably because the central part was too congested on Bailey's plates to permit accurate search in this area.

TABLE 1

NEW VARIABLES IN M 15

No.	x	y	Küstner No.	No.	x	y	Küstner No.
67	−86″.6	−10″.4	227	82	−20″.7	+ 1″.5	.....
68	−31.8	+12.6	420	83	+16.3	− 7.4	.....
69	−37.0	−25.2	.....	84	+18.5	−16.3	.....
70	−34.0	−19.2	.....	85	+20.7	+ 2.2	.....
71	−34.8	−12.6	.....	86	+12.6	+ 4.4	.....
72	− 2.2	+34.8	556	87	+23.7	−23.7	.....
73	− 3.7	+20.0	.....	88	+ 2.2	+26.6	.....
74	+36.3	−85.8	754	89	−23.7	− 6.7	463
75	+ 2.2	−30.3	.....	90	+31.1	+ 4.4	.....
76	+ 0.7	−28.9	.....	91	+67.3	+28.9	847
77	−11.8	−22.9	.....	92	+ 9.6	−25.2	610
78	− 6.7	+47.4	533	93	+27.4	−33.3	705
79	+21.5	−23.7	.....	94	+ 3.7	+28.9	.....
80	−47.4	−26.6	345	95	+ 5.2	−40.0	599
81	−21.5	− 5.9	.....				

I have had the opportunity to examine two series of plates taken by Dr. A. Brown at the Cassegrain focus of the 82-inch reflector of the McDonald Observatory, in blue and yellow light. The scale is 1 mm = 7″.4, and, with exposure times ranging from 1 to 10 minutes, it is possible to observe single stars, without serious blending, to a distance of about 30″ from the center of the cluster. Twenty-nine new variables were found, mostly near the central part, and 55 of the 66 variables previously known were rediscovered. Of the 11 undiscovered, 3 (Nos. 26, 28, and 31) are too far from the center, in a zone which was not searched with particular attention, and 2 (Nos. 27 and 34) probably do not vary at all. The real percentage of the known variables found in this search is therefore 90 per cent. The new variables are marked in Figure 1.

Table 1 contains the positions of the 29 new variables. Successive columns give the number of the new variables, consecutively from the last known variable in this cluster; the x and y co-ordinates in seconds of arc; and the number in Küstner's *Catalogue*.

The material does not allow the derivation of accurate magnitudes and periods; it is, however, sufficient to conclude that 28 of the new variables are of the RR Lyrae type, with a mean magnitude of around 15.7. Variable No. 86 is probably a long-period cepheid with an amplitude of about 1.2 mag. and a mean magnitude of 14.0.

I wish to express my gratitude to Dr. A. Brown, who kindly placed his plates of M 15 at my disposal for measurements at the blink microscope.

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