

ROYAL ASTRONOMICAL SOCIETY OF NEW ZEALAND.

VARIABLE STAR SECTION.

CIRCULAR No. 160.

MU CENTAURI.

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SUMMARY:-

Listed are 102 maxima of MU Cen. These were derived from 1,525 visual observations made between 1954 May 24 (J.D. 2,434,887) and 1968 June 30 (J.D. 2,440,038). MU Cen is a U Gem type variable with a mean cycle of 42 days. In the absence of reliable magnitudes for the comparison stars, step estimates have been used.

The width of the maxima, defined as the interval the variable is brighter than 3.0 steps, averages 10.1 days. The rise to maximum is twice as steep as the decline. The rise is, however, somewhat slower than usual for most U Gem type variables, and averages 3.5 days. Nothing can be reported on the minima of MU Cen as the variable fades well below the limits of visibility of the instruments used.

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INTRODUCTION:

The 1950 position of MU Cen is:-

12h 10m 18s S. 44° 10.7

MU Cen is a variable of U Gem type with a range of 12.4 to 15.5; ptg and a mean cycle of 42 days (1).

This star was investigated by E. Rybka (2) on a series of plates taken by van Gent at Johannesburg. Rybka published 248 estimates and listed six maxima brighter than his step estimate of 5. He commented: "The star rises quickly in brightness from minimum to maximum and descends more slowly. Minima are long as compared with maxima. The shortest interval, observed between maxima, amounts to 36d, though there appeared once an interval of about 20d between two descending branches."

M Petit (3) gives a mean cycle of 55 days from 8 maxima communicated by A.F. Jones.

CHARTS:- Charts have been published by Rybka (2); Brun & Petit (4); Bateson, Jones & Stranson (5).

SEQUENCE: On Chart 124(5) comparison stars are identified by letters. No reliable magnitudes have been determined, as yet, for these stars. Step estimates, used in this discussion, are:-

"k" = 0.0 steps	"p" = 1.8 steps	"t" = 2.9 steps.
"n" = 0.9 "	"r" = 2.3 "	"u" = 3.3 "
"l" = 1.0 "	"s" = 2.6 "	

OBSERVATIONS:

A total of 1,525 visual observations, mainly by A.F. Jones, have been made during the period 1954 May 24 (J.D. 2,434,887) to 1968 June 30 (J.D. 2,440,038). Observations are well distributed throughout each year, except in the months of September and October. Then the records are fewer as the variable is not well placed.

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DISCUSSION:

Table 1 lists the observed maxima of MU Cen. The first column gives the reference number; the second column, the J.D. for each maximum, followed by the brightness, in steps, in the third column. The interval, in days, between successive maxima is given in the fourth column. Succeeding columns list respectively the time in days for the variable to increase from 3.0s to maximum; the time to decline from maximum to 3.0s; the total time the variable was brighter than 3.0s at each maximum. The weight assigned to each maximum appears in the eighth column. The scale used is that detailed in Circular 156.

The final column of Table 1 gives the J.D.'s, with the first four figures omitted, when there were gaps in the observations during which a maximum could have gone unobserved. A question mark in any column of the table indicates that the value concerned is considered doubtful or else could not be determined from the observations.

The intervals between successive maxima range from 25 to 121 days. The mean cycle for all observed maxima is 50.25 days. It appears probable that maxima have gone unobserved during at least 16 of these intervals. These are shown in brackets in the fourth column of Table 1. Omitting these the mean cycle is 42.3 days.

The widths of maxima, defined as the interval when MU Cen was brighter than 3.0s, range from 4.2 to 17.2 days, with an average value of 10.1 days for those maxima for which the width is reasonably certain. For these the average time taken by the variable to rise from 3.0s to maximum is 3.5 days; the decline from maximum to 3.0s averages 6.6 days. The rate of increase is somewhat slower than for most U Gem type variables.

The brightness at maxima ranges from 0.6s to 2.0s. The brighter maxima tend to be wider but the correlation is not particularly marked. Occasionally a maximum appears to be double, the variable attaining maximum and then declining 0.6 to 0.7 steps before brightening again. There also appears, at times, to be a tendency for the maxima to alternate between narrow and broad. Nothing can be stated about minima as the star is well below the thresholds of the instruments used, at such times.

CONCLUSIONS:

MU Cen is a U Gem type variable with a mean cycle of 42 days. Its maxima are broader than usual for U Gem variables. The rise is twice as steep as the fall, the average times being 3.5 and 6.6 days respectively.

This variable needs a lot more attention and its frequent maxima make it an interesting star to follow. Observers, having larger instruments, could profitably follow this star through minima.

1970 July 1

18 POOLES ROAD,
GREERTON.
TAURANGA.
NEW ZEALAND.

REFERENCES:

- (1) 1969. General Catalogue of Variable Stars, 3rd Edition, Vol. 1.
- (2) 1934 Rybka, E. Lwow Contri. 2.
- (3) 1960 Petit, M. Journal des Observateurs 43, 2.
- (4) 1957. Brun, A. & Petit, M. Variable Stars 12, 1, 97.
- (5) 1968. Bateson, F.M., Jones, A.F. & Stranson, I. "Charts for Southern Variables" Series 4. Published by F.M. Bateson.

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TABLE 1.

OBSERVED MAXIMA OF MU CENTAURI.

No.	J.D.	STEPS.	INT. d.	PRE-MAX d	POST-MAX d	ABOVE 3.0sd	WT.	GAPS.
1	2,434,949	1.0	2.0?	14?	16?	2B	899-912;935-946.
2	2,435,070	1.3	(121)	1.5?	5	6.5?	2B	(964-971;987-040; (041-067.
3	112.5	1.2	42.5	2.5?	8.5	11.0?	3	077-095;096-104
4	158.5	1.2	46.0	1.0?	7.0	8.0?	2B	142-157
5	207	0.8	48.5	2.0?	7.3	9.3?	2B	172-182;196-206
6	247.7	1.4	40.7	5.7	4.3	10.0	4	
7	296.8	0.9	49.1	3.9	6.0	9.9	4	256-268
8	334	0.9?	37.2	?	12?	?	1	306-326
9	428	1.3	(94)	4.0?	7.0	11.0?	3	344-361; 369-401
10	475	1.4	47	4.0	13.2	17.2	4	438-447
11	533	1.0?	58	?	9.3	?	2B	
12	586	1.4	53	4.0	6.5	10.5	3	567-580
13	625?	1.4?	39	?	10.0	?	2B	610-621
14	670	1.3?	45	5.0	10.0?	15.0?	3	
15	707?	1.2?	37	?	12.5	?	2B	703-712
16	761	1.3	54	?	?	?	1	722-730;734-753
17	812	1.3	51	3.0	10.5	13.5	3	765-780
18	859	1.5	47	?	6.0	?	2B	827-836
19	906	0.9	47	?	?	?	1	875-892
20	951?	1.4	45	?	8.0	?	2B	907-918;939-953
21	991.5	1.7	40.5	5.5	3.4	8.9	3	960.-979
22	2,436,034.5	1.2	43.0	5.5	?	?	2A	
23	117?	0.9?	(82.5)	?	?	?	1	(035-043;053-073 (082-112;114-130
24	156?	1.7?	39	?	?	?	1	138-159
25	196	1.2	40	?	10.5	?	2B	161-171;174-189
26	280	1.4	(84)	7.5?	7.5	15.0?	3	(206-214;225-246 (247-257
27	324	1.7	44	3.5	5.0	8.5	3	
28	372.7	1.4	48.7	6.7	6.8	13.5	5	
29	417	1.7	44.3	3.0	3.5	6.5	3	
30	459	1.6	42	4.8	9.8	14.6	3	423-432;437-447
31	546	0.9	(87)	4.0	8.0	12.0	3	(470-498;500-526 (529-542
32	586.5	1.8	40.5	1.2	4.8	6.0	3	
33	623	1.6	36.5	5.0	4.0	9.0	3	
34	659	2.0	36	?	4.8	?	2B	651-661
35	695	1.6	36	4.5	6.3	10.8	3	
36	729	1.4	34	5.5	6.0	11.5	3	
37	773	1.2	44	3.8	8.0	11.8	3	
38	804.5	1.8	31.5	?	5.0	?	2B	791-803
39	840?	1.4	35.5	?	?	?	1	818-841
40	877?	1.7?	37	?	?	?	1	854-880
41	909?	1.7?	32	?	?	?	1	884-900;902-914
42	951	1.6	42	?	7.0	?	2B	916-934
43	2,437,005	0.8?	54	4.5	10.0	14.5	3	973-986
44	051?	1.7	46	?	?	?	1	033-039;051-058
45	084.8	1.7	33.8	?	8.7	?	2B	
46	133	1.5	48.2	3.8	6.6	10.4	4	
47	220?	0.6	(87)	?	?	?	1	(146-159;160-167; (168-198;202-222
48	290	1.2	(70)	2.4	10.5	12.9	3	239-257;266-286
49	332	1.8?	42	?	?	?	1	296-313
50	376.5	1.3	44.5	3.5	8.0	11.5	3	339-347;356-366
51	470	1.1	(93.5)	3.5	8.0	11.5	3	417-436
52	516?	1.5	46	?	?	?	1	
53	619	1.2	(103)	?	?	?	1	(561-578;581-587; (593-613.

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No.	J.D.	STEPS.	INT. d	TABLE 1 (cont).			Wt.	GAPS.
				PRE- MAX d	POST MAX. d	ABOVE 3.0s d		
54	2,437,658?	1.6	39	?	4.5	?	2B	624-641;644-650;651-660
55	703	1.2	45	3.5	6.0?	9.5?	3	674-689
56	743?	1.5?	40	?	?	?	1	705-719
57	780	1.2	37	2.7	9.0	11.7	3	748-753;765-771
58	814?	1.5?	34	?	?	?	1	797-807;811-821
59	839	2.0	25	1.2	3.0	4.2	3	
60	881	1.4	42	?	9.0	?	2B	
61	972.5	1.2 (91.5)		?	3.8	?	2B	(888-902;909-944;946-962; 964-971.
62	2,438,049.8	0.8 (77.3)		3.6	6.0	9.6	3	977-017; 034-043
63	087.6	1.6	37.8	3.3	3.4	6.7	3	056-073
64	122	1.0	34.4	2.0?	10.7	12.7?	2B	094-100
65	155	1.6?	33	4.0?	5.6	9.6?	3	
66	192.9	1.3	37.9	3.2	6.0	9.2	4	
67	227	1.9?	34.1	3.0	4.5	7.5	3	
68	270?	1.4?	43	?	?	?	1	
69	315?	1.8?	45	?	?	?	1	285-314
70	357	1.5	42	3.0	6.0	9.0	3	318-353
71	412.7	1.2	55.7	4.7	5.1	9.8	3	368-382;390-402
72	485?	0.7 (72.3)		?	?	?	1	435-462
73	516?	1.7?	31	?	?	?	1	505-518
74	549	1.7	33	2.0	4.8	6.8	3	534-544
75	584?	1.5?	35	?	?	?	1	557-574;576-587
76	705?	1.0 (121)		?	5.8	?	2B	(588-614;617-675;683-698; 699-706
77	756	1.3	51	?	6.5	?	2B	716-733;739-756
78	793	1.4	37	?	4.3	?	2B	767-784
79	843	1.4	50	?	7.5	?	2B	
80	904	1.4	61	2.5	6.0	8.5	3	
81	938	1.6	34	2.3	6.0	8.3	3	918-929
82	2,439,059	?	(121)	?	?	?	1	974-997;008-028;031-065
83	099	1.1?	40	6.0	8.0?	14.0?	3	067-094
84	147?	?	48	?	?	?	1	100-120;123-150
85	188	1.1	41	?	?	?	1	171-182;189-199
86	228.5	1.7	40.5	1.5	6.0	7.5	3	209-227
87	261	1.5	32.5	4.0	7.5	11.5	3	
88	300	1.5	39	?	?	?	1	274-283
89	342	1.5	42	3.0	10.0	13.0	3	310-316;331-338
90	390?	?	48	?	?	?	1	348-393
91	465	1.3 (75)		?	?	?	1	394-413;423-448
92	499?	-2.5	34	?	?	?	1	469-498
93	547	-2.0	48	2.5?	8.5?	11.0?	2B	
94	602	1.7	55	2.0	7.0	9.0	3	567-581
95	647	1.6	45	2.0	2.5	4.5	4	
96	685	1.3	38	4.0	5.5	9.5	3	656-667
97	768	1.6?(83)		?	?	?	1	696-708;716-723;724-777
98	830	1.6	62	4.0	7.5	11.5	3	778-802;807-820
99	895	1.0	65	3.4	8.5	11.9	4	835-858
100	953?	-1.9	58	?	?	?	1	946-952;954-958
101	988	1.2	35	?	5.8	?	2B	
102	2,440,025	1.8	37	?	2.5	?	2B	