HARVARD COLLEGE OBSERVATORY.

CIRCULAR 122.

THIRTY-SIX NEW VARIABLE STARS.

In the course of the study, by Miss Leavitt, of the distribution of variable stars, the majority of the variables discovered have been fainter at maximum than the tenth magnitude. This is owing to the long exposure of the plates, taken with the 24-inch Bruce Telescope, which have been used. Not only is the number of faint stars on these plates very great in proportion to that of stars brighter than the tenth magnitude, but the discovery of variations among the brighter stars is, perhaps, disproportionately small because their images are so large that only striking variations are noticeable. Since the beginning of this work, it has been felt that the plates taken with the 1-inch Cooke lens, which cover a region of the sky 30° square and show stars of the eleventh magnitude and brighter, would furnish a valuable means of discovering the brighter variables. The Map of the Sky, described in Circular 71, is composed of plates belonging to this series. In January, 1905, four of these plates, having centres in R.A. $= 16^h$, Dec. $= -45°$, were superposed, as described in Circular 76. The positive used was very dense, and not well suited for the purpose of discovering variables, for which a thin positive is now always used. The six known variables RS Librae, RU Librae, RZ Scorpii, RS Scorpii, RR Scorpii, and RW Scorpii were rediscovered, however, together with the planet Uranus. No new variables were found, and owing to the pressure of other work, the examination of plates belonging to the Map of the Sky was only recently resumed. The region selected was that covered by Plate 50, which has its centre in R.A. $= 12^h$, Dec. $= -60°$. The Nebula in Carina and the "Coal-Sack," which had already been examined on Bruce plates of long exposure, with results given in Circulars 79, 115, and 120, are seen on these plates. Six photographs were compared, and 36 new variables were discovered, besides Nova Velorum, announced in Circular 121. The sixteen known variables, S Carinae, RX Carinae, U Carinae, RS Centauri, W Centauri, R Crucis, R Muscae, S Crucis, RV Centauri, *131360*, *102458*, *103260*, *104057*a, *104758*, *105160*, and *125564* were re-discovered,

the last six having been originally found on Bruce plates, and recently announced. In the entire region, within 15° of the centre of the plates, there are twenty-five known variables brighter, at maximum, than the tenth magnitude, omitting η Carinae, the suspected variable T Carinae, Nova (RS) Carinae, Nova Velorum, and RT Carinae which is too much involved in the nebula to be found by this method. The nine variables which might be found on these plates but were not re-discovered, are Z Carinae, Y Carinae, RZ Carinae, S Muscae, T Crucis, U Centauri, *104265*, *130656*, and *130763*. It is believed that an examination of ten good plates of any region, suitably distributed as to time, may be regarded as thorough, though no examination can be exhaustive. It may be considered satisfactory, therefore, that on six plates, 16 out of 25 known variables were re-discovered, while 36 new ones were found. This indicates that there may be from 70 to 80 variable stars in the region, which are brighter at maximum than the tenth magnitude.

In Table I, the first three columns give the designation, the Harvard number and the constellation. The fourth column gives the number in the Cape Photographic Durchmusterung. The fifth and sixth columns give the right ascension and the declination for 1900. The seventh, eighth, and ninth columns give the brightest and faintest magnitudes so far observed, and the range.

Six of the new variables probably belong to the Algol Type. All of these have been measured, but the period of only one star, *121249* — Centauri, has been determined, as it seemed best not to delay their announcement. Results of the measurements, so far as at present known, are given in the Remarks following Table I. It is expected that the observations will be published in the Annals at an early date. Some of these variables may not prove to be of the Algol Type, as was the case with variable *125564*, announced in Circular 120, whose light curve resembles that of an Algol variable, but is more nearly akin to the type of β Lyrae. Two new Algol variables, one in Carina and one in Centaurus, were discovered on Bruce plates and announced in Circulars 115 and 120, and three other variables announced in Circular 120 are probably of the same type. The number of variables of the Algol type at present known in this region, therefore, is probably eleven. Many of the new variables have short periods, the most obvious being *092673*, *104055*, *105863*, *110060*, *110551*, *113966*, *120658*, *121548*, *123559*, *124058*, *132763*, and *133357*. The periods of the following stars are probably long: *102557*, *102861*, *105061*, *105364*, *113657*, *113662*, *114161*, *114953*, *120749*, *123753*, and *134459*.

TABLE I.

NEW VARIABLE STARS.

Designation.	Harvard No.	Constellation.	C. P. D. No.	R. A. 1900.			Dec. 1900.		Bright.	Faint.	Range.
				h.	m.	s.	°	′			
092673	1269	Carina	....	9	26	29	−73	6.3	9.0	<10.0	1.0
101259	1270	Carina	−59° 2007	10	12	30	−59	42.9	9.2	10.3	1.1
101659	1271	Carina	−59° 2059	10	16	56	−59	57.0	9.8	10.5	0.7
102359	1272	Carina	−59° 2135	10	23	14	−59	9.7	9.4	10.3	0.9
102557	1273	Carina	−56° 3425	10	25	26	−57	6.2	8.0	9.0	1.0
102861	1274	Carina	−61° 1705	10	28	30	−61	16.1	8.8	9.8	1.0
104055	1275	Vela	−55° 3800	10	40	54	−55	45.8	8.4	9.4	1.0
105061	1276	Carina	−61° 1955	10	50	12	−61	30.5	9.0	9.7	0.7
105364	1277	Carina	−64° 1564	10	53	22	−64	35.9	9.0	10.0	1.0
105863	1278	Carina	−63° 1798	10	58	19	−63	43.4	9.3	10.0	0.7
110060	1279	Carina	−60° 2497	11	0	7	−60	26.3	8.8	9.6	0.8
110558	1280	Carina	−58° 3216	11	5	23	−58	17.8	7.	8.	1.
110551	1281	Centaurus	−51° 3909	11	5	29	−51	56.9	9.8	10.7	0.9
110647	1282	Centaurus	−47° 4810	11	6	34	−47	18.0	8.7	9.6	0.9
112650	1283	Centaurus	−50° 4289	11	26	31	−50	53.2	9.2	10.2	1.0
113547	1284	Centaurus	−47° 5118	11	34	57	−47	24.5	9.1	10.0	0.9
113657	1285	Centaurus	....	11	36	10	−57	6.3	9.8	13.0	3.2
113662	1286	Centaurus	−62° 2223	11	36	14	−62	8.4	8.7	9.5	0.8
113966	1287	Musca	−66° 1637	11	39	49	−66	45.0	8.7	9.7	1.0
114161	1288	Centaurus	....	11	41	42	−61	20.2	10.6	<11.4	0.8
114360	1289	Centaurus	−59° 3809	11	43	5	−60	0.5	8.8	9.8	1.0
114764	1290	Musca	−64° 1725	11	47	24	−64	50.8	9.4	10.3	0.9
114953	1291	Centaurus	−53° 4824	11	49	8	−53	36.7	9.8	10.5	0.7
120658	1292	Crux	−58° 4151	12	6	42	−58	13.6	8.7	9.3	0.6
120749	1293	Centaurus	−49° 4965	12	7	51	−49	39.0	9.1	10.0	0.9
121249	1294	Centaurus	−49° 5046	12	12	30	−49	10.8	8.8	11.4	2.6
121548	1395	Centaurus	−48° 4730	12	15	52	−48	39.3	8.3	10.2	1.9
123559	1396	Crux	−59° 4388	12	35	41	−59	14.7	8.5	9.4	0.9
123753	1397	Centaurus	−53° 5293	12	37	37	−53	58.8	9.4	<11.0	1.6
124058	1398	Crux	−58° 4490	12	40	32	−58	34.6	8.5	9.0	0.5
130359	1399	Centaurus	−59° 4781	13	3	10	−59	42.9	9.4	10.5	1.1
132763	1300	Centaurus	....	13	27	6	−63	32.4	9.5	10.5	1.0
133357	1301	Centaurus	−56° 5865	13	33	45	−57	6.4	7.6	8.7	1.1
133561	1302	Centaurus	−61° 3912	13	35	3	−61	15.8	9.8	10.8	1.0
134358	1303	Centaurus	−57° 6324	13	43	50	−58	0.3	8.0	8.9	0.9
134459	1304	Centaurus	−59° 5228	13	44	21	−59	54.7	9.7	10.7	1.0

REMARKS.

101259. Probably of the Algol type. Faint on 58 out of 453 plates measured.

101659. A twelfth magnitude star is about 0′.2 north of the variable, and renders observation difficult.

110551. C. DM. −51° 5387. Period short. Measured on 168 plates.

110647. C.DM. −47° 6583. Probably of the Algol type. Faint on 22 out of 276 plates measured.

112650. C. DM. −50° 6082.

113547. C. DM. −47° 7032.

114360. Probably of the Algol type. Faint on 49 out of 351 plates measured.

120658. Period short. Measured on 340 plates.

120749. C. DM. −49° 6898.

121249. C. DM. − 49° 6972. This star is of the Algol type. Times of minima, J. D. 2,410,002.90 + 5^d.21943 E. Faint on 30 out of 286 plates measured. Has not been observed exactly at minimum, and the range may be greater than that given in the table.

121548. C. DM. −48° 7357. Period short. Measured on 248 plates.

133357. Image often looks nebulous, and sometimes unusually sharp.

133561. Probably of the Algol type. Faint on 30 out of 233 plates measured.

134358. Perhaps of the Algol type. Faint on 58 out of 304 plates measured.

The variations of *101659*, *110060*, *120658*, and *124058*, which are difficult to observe on account of their small range, or from the close proximity of other stars, have been confirmed by Mrs. Fleming. Variations as great as 0.7 magnitude are conspicuous on these plates.

An ephemeris for *121249* is given in Table II. The first column gives the value of every fifth time of minimum, for about six months, beginning with Epoch 1450. The second and third columns give the Julian Day and decimal following Greenwich Mean Noon, and the corresponding date and Greenwich Mean Time of minima.

TABLE II.

EPHEMERIS FOR *121249*.

Epoch.	J. D.	Date.					Epoch.	J. D.	Date.				
		y.	*m.*	*d.*	*h.*	*m.*			*y.*	*m.*	*d.*	*h.*	*m.*
1450	7571.074	1906	December	26	1	47	1470	7675.462	1907	April	9	11	7
1455	7597.171	1907	January	21	4	7	1475	7701.559	"	May	5	13	27
1460	7623.268	"	February	16	6	27	1480	7727.656	"	"	31	15	47
1465	7649.365	"	March	14	8	47	1485	7753.753	"	June	26	18	7

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