HARVARD COLLEGE OBSERVATORY.

CIRCULAR 135.

25 NEW VARIABLE STARS IN HARVARD MAP, Nos. 24, 36, AND 42.

THE examination of photographs forming the Map of the Sky has been continued by Miss Leavitt, with the results described below. According to the plan adopted for this research, five photographs were superposed for each region, but the new variables thus discovered were, as usual, confirmed on a much larger number of plates. A summary of the results is given in Table I, in the same form as that employed in H. C. 130 and 133. The number of variables found during the examination, and given in the third and fourth columns, includes two in H. M. 36, and three in H. M. 42, which are either fainter at maximum than the magnitude 10.5, or are more than 15° from the centre of the plates. These five variables have been omitted from the totals and estimates given in the sixth, seventh, eighth, ninth, and last columns, in order to make the results comparable with those given in H. C. 127, 130, and 133.

TABLE I.

NUMBER AND DISTRIBUTION OF THE VARIABLES.

No.	Region.		New Variables.	Total Found.	Proportion New.	All.	Probable Number.	Proportion Found.	Probable No. Unknown.	Proportion Unknown.
	h.	°								
24	4	0	7	11	.64	18	30	.37	12	.40
36	4	−30	9	14	.64	16	24	.50	8	.33
42	16	−30	9	22	.41	40	55	.35	15	.21

The following known variables were rediscovered during this examination : — In H. M. 24, U Arietis, *034601*, R Tauri, and W Orionis; in H. M. 36, T Fornacis, T Eridani, R Caeli, T Leporis, and T Columbae; in H. M. 42, S Librae, RS Librae, R Lupi, RR Librae, U Lupi, RZ Scorpii, Z Scorpii, *161726*, *162131*, ST Scorpii, RR Ophiuchi, RS Scorpii, and RR Scorpii. The variable *161726*, in

the above list, is H. V. 1114 in the cluster, N. G. C. 6121, announced in H. C. 90. The asteroids Ceres and Nysa were also found, in each case near opposition.

The new variables are given in Table II, in the same form as Table II of H. C. 133. The numbers given in the fifth column are those of the Bonn Durchmusterung or the Cape Photographic Durchmusterung, according

TABLE II.

NEW VARIABLES.

Desig.	H. V.	Constellation.	DM.		R. A. 1900.			Dec. 1900.		Bright.	Faint.	Range.
					h.	m.	s.	°	′			
024738	3035	Fornax	−38°	233	2	47	12	−38	29.5	9.3	10.0	0.7
030310	3036	Aries	+ 9°	398	3	3	6	+10	3.6	8.8	9.5	0.7
031901	3037	Taurus	− 1°	484	3	19	15	− 1	5.2	9.9	10.8	0.9
032825	3038	Eridanus	−26°	388	3	28	10	−25	59.8	8.4	9.1	0.7
032916	3039	Eridanus	..		3	29	36	−16	29.7	9.6	<11.0	>1.4
034946	3040	Horologium	..		3	49	46	−46	7.0	8.5	<11.0	>2.5
035015	3041	Eridanus	−15°	686	3	50	7	−15	13.8	9.0	9.8	0.8
035417	3042	Eridanus	−17°	766	3	54	26	−17	31.1	10.0	10.9	0.9
040107	3043	Eridanus	− 8°	788	4	1	59	− 7	56.4	9.6	10.6	1.0
041318	3044	Eridanus	..		4	13	29	−18	45.2	8.9	13.0	4.1
041705	3045	Eridanus	− 5°	892	4	17	39	− 5	44.5	8.8	9.8	1.0
041903	3046	Taurus	+ 3°	601	4	19	15	+ 3	53.5	8.5	9.5	1.0
043227	3047	Eridanus	−27°	581	4	32	32	−27	46.9	9.7	10.5	0.8
044515	3048	Eridanus	−15°	872	4	45	13	−15	54.3	8.8	9.6	0.8
045903	3049	Eridanus	− 4°	1029	4	59	31	− 3	56.0	9.5	<10.5	>1.0
050534	3050	Columba	−34°	595	5	5	10	−34	38.7	8.8	9.7	0.9
151528	3051	Scorpius	..		15	15	36	−28	19.2	10.9	11.5	0.6
152726	3052	Scorpius	..		15	27	21	−26	50.8	10.2	<11.5	>1.3
155746	3053	Norma	−45°	7780	15	57	48	−46	1.1	8.6	10.0	1.4
155834	3054	Lupus	..		15	58	37	−34	6.2	10.0	<11.5	>1.5
160732	3055	Scorpius	..		16	7	7	−32	5.2	10.5	11.4	0.9
164132	3056	Scorpius	−32°	4244	16	41	44	−32	46.0	10.3	<11.5	>1.2
164836	3057	Scorpius	−36°	7072	16	48	2	−36	43.4	8.7	10.0	1.3
165125	3058	Scorpius	−25°	5896	16	51	15	−25	38.5	10.2	<11.6	>1.4
170432	3059	Scorpius	−32°	4382	17	4	47	−32	12.1	9.6	11.3	1.7

REMARKS.

034946. A star of magnitude 11 follows the variable about 9ˢ.

041318. A star of magnitude 13 is south of the variable about 1′.5.

044515. A star of magnitude 11 precedes the variable about 6ˢ.

151528. This star is C. DM. − 28° 11301.

160732. A star of magnitude 11.5 is north of the variable about 0′.5.

as the corresponding variables are north or south of declination $-23°$. The large number of variables of the Algol type found in this research has been remarkable from the beginning. In Table II, eight, or nearly one-third, are probably of this class or of that of β Lyrae, which is frequently difficult to distinguish from it. Their designations are as follows:— *024738, 035015, 035417, 041705, 155746, 164132, 164836*, and *165125*. The light of *155746* and *164836* does not appear to be quite constant when near maximum. The periods of *034946, 050534, 152726*, and *170432*, are probably long. Among the variables whose periods are probably short, are 041903, and *044515*. All of the new variables have been confirmed on from 10 to 40 plates.

The total number of stars examined is estimated as 18,700 in H. M. 24, 22,700 in H. M. 36, and 25,100 in H. M. 42. The number of known variables, therefore, is about one in 1000 in H. M. 24, one in 1400 in H. M. 36, and one in 600 in H. M. 42. The probable numbers are about one in 600, one in 950, and one in 450, for the three regions, respectively. It appears, therefore, that the large number of variables in H. M. 42 is really significant, and should be considered in any general discussion of the region. A large part of the constellation Scorpius is included, as well as the nebulous region in Ophiuchus. The region was found to be very rich, also, in fainter variables, of which 72 were announced in H. C. 90, besides 33 in the cluster N. G. C. 6121.

EDWARD C. PICKERING.

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