HARVARD COLLEGE OBSERVATORY.

CIRCULAR 130.

71 NEW VARIABLE STARS IN HARVARD MAPS Nos. 9, 12, 21, 48, AND 51.

IN continuation of the systematic search for variables in all parts of the sky, as described in Circulars 127 and 129, five additional regions have been examined by Miss Leavitt. The positions of these regions and some of the principal results are given in Table I. The number of the plate in the Map of the Sky, Circular 71, and the right ascension and declination of its centre, are contained in the first two columns. The third, fourth, and fifth columns give the number of new variables discovered, the total number found in this examination, including known variables, and the proportion of new variables. The number known to exist in the region at the close of the examination is given in the sixth column. This includes all previously known variables as bright at maximum as the magnitude 10.5 and within 15° of the centre of the region, with one exception given below. Novae discovered earlier than 1900, and suspected variables, are omitted. The number previously known may be found by subtracting the number given in the third column from that in the sixth. The seventh column gives the probable number of variables in the region, assuming that the number of known variables found

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. °								
9	21 +60	11	16	.69	21	32	.50	11	.39
12	4 +30	9	16	.51	28	43	.37	15	.35
21	22 +30	8	15	.53	25	36	.42	11	.31
48	6 −60	13	16	.81	22	48	.33	26	.54
51	15 −60	30	42	.72	65	122	.34	57	.47

is to the total number found as the number previously known is to the whole number in the region. The eighth column gives the proportion of the probable number which was actually found. The ninth and tenth columns give the probable number remaining undiscovered, and the proportion of these to the assumed total given in the seventh column. The plates examined for region 9 were poor in the southern part, and only very conspicuous variables could be found south of + 48°. Seven known variables, between + 45° and + 48°, have been omitted, therefore, and the region discussed in Table I extends southward from the centre 12° instead of 15°.

The following known variables were re-discovered:—In Region 9, RT Cygni, T Cephei, RU Cygni, 220550, and δ Cephei. In Region 12, U Arietis, R Persei, Nova Persei No. 2, RW Persei, RV Tauri, RX Aurigae, and RW Aurigae. In Region 21, VY Cygni, SS Cygni, RR Pegasi, WY Cygni, VZ Cygni, 215122, and 220134. In Region 48, R Doradûs, R Pictoris, and S Pictoris. In Region 51, *130763*, *133357*, *134459*, R Centauri, *145254*, *150469*, R Trianguli Australis, R Normae, U Normae, S Trianguli Australis, U Trianguli Australis, and W Normae. The activity now prevailing in the search for new variables is shown by the fact that 8 out of these 34 variables have been announced since January 1, 1906, and another, 220134, recently discovered by Mrs. Fleming, has not yet been announced.

The new variables are given in Table II, in which the successive columns give the designation, Harvard number, constellation, number in the Bonn Durchmusterung or the Cape Photographic Durchmusterung, brightest and faintest magnitudes observed, and range.

Variables *050253*, *133664*, *142950*, *144355*, *152157*, 192668, 205027, 220045, 222317, and probably *050845*, *135251*, *150554*, and *164461* appear to be of the Algol type. Many of the periods are probably short. The following stars probably vary in long periods: 041528, *043163*, *044460*, *050964*, *060659*, *124868*, and 215927. The proportion of Algol variables is remarkable, as was the case in Region 50, discussed in Circular 122.

It appears from the last column of Table I, that about a third of the variables in the three northern regions and about half of those in the two southern regions, remain to be discovered. A number of the new variables are brighter than the eighth magnitude, or have a large range. While the southern regions of the sky contain a relatively large proportion of undiscovered variables, it is evident that abundant opportunity remains for interesting research in regions accessible to American and European observers.

TABLE II.

NEW VARIABLES.

Design.	Harvard No.	Constellation.	DM. No.	R. A. 1900.	Dec. 1900.	Bright.	Faint.	Range.
				h. m. s.	° ′			
025338	2920	Perseus	+38° 606	2 53 42	+38 47.7	8.5	10.5	2.0
041041	2921	Perseus	.. ..	4 10 12	+41 29.2	10.2	11.0	0.8
041528	2922	Taurus	+28° 645	4 15 43	+28 12.9	9.6	10.6	1.0
043018	2923	Taurus	+18° 659	4 30 44	+18 33.8	10.0	10.6	0.6
043163	2924	Reticulum	~~−63° 341~~	4 31 36	−63 11.9	8.8	<11.5	>2.7
044242	2925	Perseus	+42° 1064	4 42 45	+42 7.0	8.5	9.8	1.3
044460	2926	Dorado	.. ..	4 43 58	−59 59.5	8.8	<11.5	>2.7
044750	2927	Pictor	.. ..	4 47 36	−50 49.6	10.0	11.5	1.5
044930	2928	Auriga	+30° 743	4 49 36	+30 24.4	8.6	9.6	1.0
050253	2929	Pictor	−53° 791	5 2 43	−53 16.6	9.4	10.5	1.1
050239	2930	Auriga	+39° 1192	5 2 47	+39 27.7	8.0	9.4	1.4
050442	2931	Auriga	+41° 1101	5 4 38	+42 2.0	7.4	8.0	0.6
050542	2932	Auriga	+42° 1201	5 5 31	+42 42.7	9.0	10.0	1.0
050845	2933	Pictor	−45° 579	5 8 17	−45 41.9	9.0	10.0	1.0
050964	2934	Dorado	.. ..	5 9 35	−64 26.5	9.1	<11.5	>2.4
054675	2935	Mensa	−75° 333	5 46 2	−75 17.3	9.5	10.6	1.1
060650	2936	Puppis	−50° 913	6 6 53	−50 11.2	9.0	<11.0	>2.0
061259	2937	Pictor	−59° 613	6 11 58	−59 53.2	9.2	11.0	1.8
062960	2938	Pictor	.. ..	6 29 1	−60 9.2	10.0	10.8	0.8
063455	2939	Carina	.. ..	6 34 23	−55 46.7	9.5	10.5	1.0
063852	2940	Carina	−52° 979	6 38 36	−52 20.2	8.8	9.5	0.7
070558	2941	Carina	−58° 848	7 5 7	−58 13.3	8.2	9.3	1.1
124868	2942	Musca	−68° 1793	12 48 46	−68 21.8	9.4	10.0	0.6
*125763*b	2943	Centaurus	−63° 2507	12 57 33	−63 33.7	9.8	10.5	0.7
131062	2944	Centaurus	−61° 3558	13 10 45	−62 5.8	10.2	11.0	0.8
131261	2945	Centaurus	−61° 3585	13 12 28	−61 51.3	9.2	10.0	0.8
133664	2946	Circinus	−64° 2524	13 36 15	−64 58.2	10.0	11.0	1.0
134457	2947	Centaurus	−56° 5960	13 44 2	−57 5.2	7.8	8.6	0.8
135155	2948	Centaurus	−55° 5802	13 51 34	−55 51.9	9.8	10.5	0.7
135251	2949	Centaurus	−51° 6466	13 52 0	−51 15.5	9.9	10.6	0.7
140753	2950	Centaurus	−53° 5915	14 7 22	−53 27.7	9.6	10.5	0.9
142448	2951	Lupus	−48° 6504	14 24 7	−48 14.6	10.5	11.5	1.0
142760	2952	Centaurus	−60° 5432	14 27 16	−60 31.4	8.7	9.3	0.6
142950	2953	Lupus DT	−50° 7071	14 29 45	−50 58.6	10.3	11.1	0.8
144059	2954	Circinus	.. ..	14 40 31	−59 35.0	9.5	15.0	5.5
144048	2955	Lupus	−48° 6778	14 40 46	−48 54.0	9.8	10.5	0.7
144355	2956	Circinus	−55° 6204	14 43 48	−55 30.2	9.8	10.6	0.8
144868	2957	Triang. Aust.	−68° 2226	14 48 1	−68 25.9	8.7	9.5	0.8
145571	2958	Apus	−71° 1717	14 54 59	−71 12.7	10.5	11.5	1.0
150554	2959	Norma	−54° 6379	15 5 4	−54 56.1	9.5	10.5	1.0
150970	2960	Apus	−70° 2005	15 9 39	−70 50.8	10.5	11.3	0.8

Design.	Harvard No.	Constellation.	DM. No.	R. A. 1900.			Dec. 1900.		Bright.	Faint.	Range.
				h.	m.	s.	°	′			
152157	2961	Circinus	.. ..	15	21	24	−57	43.7	10.0	11.4	1.4
153365	2962	Triang. Aust.	−65° 3122	15	33	32	−65	36.1	9.7	10.5	0.8
155344	2963	Norma	−44° 7719	15	53	14	−44	50.5	8.6	9.3	0.7
155753	2964	Norma	−53° 7039	15	57	24	−53	38.5	10.0	11.0	1.0
160561	2965	Triang. Aust.	.. ..	16	5	17	−61	50.2	9.8	<11.5	>1.7
164360	2966	Ara	.. ..	16	43	35	−60	54.4	10.3	11.1	0.8
164461	2967	Ara LR	−61° 5799	16	44	37	−61	25.0	10.0	10.6	0.6
164565	2968	Triang. Aust.	−64° 3573	16	45	4	−65	2.3	9.5	11.5	2.0
164863	2969	Ara	−63° 4037	16	48	23	−63	2.9	9.2	10.0	0.8
165161	2970	Ara	−61° 5820	16	51	36	−61	15.7	9.2	10.0	0.8
190965	2971	Draco	+65° 1327	19	9	44	+65	56.6	8.9	9.8	0.9
192668	2972	Draco	+68° 1065	19	26	9	+68	43.7	9.3	10.0	0.7
193056	2973	Cygnus	+56° 2257	19	30	22	+56	10.8	8.8	9.8	1.0
200949	2974	Cygnus	+49° 3225	20	9	52	+49	9.0	9.2	10.0	0.8
205027	2975	Vulpecula	+27° 3914	20	50	31	+27	32.3	9.0	10.2	1.2
213231	2976	Cygnus	+31° 4504	21	32	15	+31	39.1	7.3	8.3	1.0
214356	2977	Cepheus	+56° 2642	21	43	26	+56	49.9	9.2	9.8	0.6
215927	2978	Pegasus	+27° 4243	21	59	28	+27	51.6	7.2	7.8	0.6
220045	2979	Lacerta	+45° 3782	22	0	43	+45	56.2	8.4	9.2	0.8
220445	2980	Lacerta	+45° 3813	22	4	39	+45	15.0	7.	..	0.6
221453	2981	Lacerta	.. ..	22	14	11	+53	57.7	9.5	10.2	0.7
221955	2982	Cepheus	+55° 2737	22	19	22	+55	27.6	8.2	8.8	0.6
222317	2983	Pegasus	+17° 4753	22	23	44	+17	30.9	10.0	11.0	1.0
222924	2984	Pegasus	.. ..	22	29	14	+24	2.5	9.5	<11.0	>1.5
223564	2985	Cepheus	+64° 1694	22	35	42	+64	19.3	8.6	9.3	0.7
223656	2986	Lacerta	+56° 2829	22	36	54	+56	18.6	8.3	9.0	0.7
223755	2987	Lacerta	+55° 2789	22	37	27	+55	54.6	8.8	9.6	0.8
224029	2988	Pegasus	+29° 4745	22	40	2	+29	45.6	10.0	11.0	1.0
224426	2989	Pegasus	+26° 4507	22	44	18	+26	49.8	8.8	9.6	0.8

REMARKS.

124868. Suspected during the examination of region 50, described in Circular 122, but the range observed at that time was small.

144059. This star is brighter than the twelfth magnitude on all plates taken in 1906. The dates are as follows: February 14 and 17, March 24 and 27, April 24, May 10, 12, and 14, June 9, 13, 15, and 27, July 10, 13, and 24, August 24. The light gradually diminished, with some fluctuations, from the magnitude 9.5 in February to the magnitude 11.6 in August. On 55 plates taken between 1889 and 1905, the star was not seen and was fainter than the thirteenth magnitude. A fifteenth magnitude star which is probably in the same position is seen on seven early plates of long exposure. The image is not sufficiently well-defined on these plates to determine whether there is variation. The object is probably a Nova. Its magnitude and the time of its appearance are nearly the same as in the case of Nova Velorum, announced in Circular 121.

220445. This variable is difficult to observe, on account of its brightness. Confirmed photometrically by Professor Wendell, with a range of 0.3 magn.

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