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A STUDY OF NEBULÆ,

By E. A. FATH.

This paper is based on a study of the nebulæ found on plates of one hundred and thirty-nine regions of the sky taken with the sixty-inch reflector of the Mt. Wilson Solar Observatory during the years 1909-12. The plates form a portion of the work on the "Selected Areas" of KAPTEYN* undertaken by that observatory and cover the central portion of each area that can be reached satisfactorily from the latitude of Mt. Wilson. This includes all the regions from the north celestial pole to 15° south declination. Lumière Sigma plates, measuring six and one-half by eight and one-half inches, were used. The exposed area of each plate contained 1.88 square degrees. The length of the exposures was one hour each. For various reasons it was necessary to take a second plate of about twenty-five per cent. of the regions. Of the final plates seventeen were taken by Mr. HAROLD D. BABCOCK and the remaining one hundred and twenty-two by the writer.

At first it did not seem advisable to publish the list of new nebulæ because of the fact that duplicate plates were available for only one quarter of the areas. However, in order to test matters, the nebulæ were marked independently on such plates before they were compared. It was then found that so few spurious objects had been marked, particular pains being taken to exclude everything doubtful, that the list as a whole seemed entitled to considerable confidence. It is accordingly submitted below, Table I, with the hope that it may prove to be as reliable as the tests indicated.

In studying the nebulæ on these plates the following points were noted: 1. Right ascension and declination for 1910.0; 2. Dimensions; 3. Position angle of greatest diameter; 4. Brightness. The results given are the mean of two independent measures.

1. The determination of position was made by placing a plate, film down, upon paper which had been ruled so that positions could be read off directly when the position of the central star on the plate was known. The position of this star was in each instance taken from the catalogue

of the *Astronomische Gesellschaft*. The positions given are in general correct within one minute of arc. This accuracy was determined from positions of stars, several of which were measured on each plate as checks.

2. The dimensions were obtained with a scale divided in half millimeters, tenths of millimeters being estimated. A lens magnifying four diameters was used while making these measures. The dimensions in millimeters were then transformed into minutes and seconds of arc. Since practically all of the nebulæ were of elliptical outline the major and minor axes were the quantities measured.

3. A straight edge was placed parallel to the major axis and the angle between this and an hour circle was measured to the nearest degree. These angles were then transformed into position angles ranging from 0° to 180°.

4. An effort was made to estimate intrinsic brightness. For small objects this was by no means easy, nevertheless, it is believed that the estimates as a whole are fairly homogeneous. In the tables B = bright and F = faint. Various degrees are expressed by V = very and M = moderately. The order of brightness is as follows: VB, B, MB, MF, F, VF.

Table I gives a list of the new nebulæ that were found. The only column needing explanation is the 4th. Here may be found the dimensions "length by width." When the term stellar is used in the last column it signifies that the nebula was small and looked like a star surrounded by an atmosphere. This probably corresponds to psmbM in the *N. G. C.* In a number of cases the intensity diminished so gradually that no accurate measures of the dimensions could be made and they are accordingly omitted.

TABLE I.

No.	α	δ	LxW	Elong.	Inten.	Remarks
1	0 ^h 11 ^m 12 ^s	+15°35'	1'21"x11"	94°	MB	3 condensations.
2	0 11 53	+15 41	11"x 5"	161	MF	
3	0 12 12	-14 21	27 x 8	130	F	
4	0 14 40	-14 55	16 x11	113	VF	MB nucleus.
5	0 14 53	-14 14	27 x11	34	F	
6	0 14 53	-14 16	.....	...	F	Stellar.

* The Plan of Selected Areas. KAPTEYN. Groningen, 1906.

No.	α	δ	LxW	Elong.	Inten.	Remarks	No.	α	δ	LxW	Elong.	Inten.	Remarks
7	0 ^h 22 ^m 49 ^s	+30°30'	14"x3"	100°	F		69	1 ^h 13 ^m 10 ^s	-14°30'	11"x11"	...	F	
8	0 23 09	+30 06	5 x 5	...	MF	Nucleus.	70	1 13 24	-14 09	11 x11	...	F	
9	0 23 32	+30 19	27 x 3	116	F		71	1 13 28	-14 11	16 x11	113	MF	Stellar.
10	0 23 35	+30 42	14 x14	...	F		72	1 13 28	-14 40	16 x 5	75	F	
11	0 23 50	+30 40	5 x 3	...	MF	Stellar.	73	1 13 48	-14 22	11 x 8	56	MF	Stellar.
12	0 23 57	+30 13	14 x 5	26	F		74	1 14 18	+15 37	5 x 5	...	F	
13	0 24 21	+30 31	19 x 3	112	MF	Double.	75	1 14 36	-15 00	14 x14	...	MB	Stellar.
14	0 24 41	+30 04	8 x 3	...	F	Nucleus stellar.	76	1 14 54	-14 23	16 x11	31	MB	Stellar.
15	0 25 26	+30 12	8 x 3	113	F		77	1 15 06	-15 00	14 x14	...	VF	
16	0 25 29	+30 06	5 x 3	0	F		78	1 15 08	-14 12	19 x19	...	VF	
17	0 43 16	+45 52	.....	...	MF	Stellar.	79	1 15 11	+15 08	3 x 3	...	F	
18	0 48 18	- 0 06	14 x14	...	F		80	1 15 33	+15 32	5 x 5	...	B	Stellar.
19	0 48 20	- 0 08	11 x 8	83	F		81	1 17 23	+15 49	8 x 8	...	MF	
20	0 49 16	+ 0 30	5 x 5	...	MB	Stellar.	82	1 17 30	+15 50	22 x 8	29	MF	
21	0 49 31	+ 0 26	8 x 5	152	F		83	1 23 57	+30 26	11 x 8	...	MB	Stellar.
22	0 49 37	+ 0 35	8 x 5	12	F		84	1 24 25	+30 10	16 x14	136	F	
23	0 50 21	+ 0 07	14 x 5	113	MF	4 neb.spots with	85	1 24 28	+30 10	14 x 5	90	F	
24	0 50 21	+ 0 53	54 x11	75	MF	[star(?)NW end.	86	1 24 49	+30 25	5 x 5	...	F	
25	0 50 54	+ 0 33	5 x 3	12	F		87	1 25 08	+29 56	19 x 3	177	F	
26	0 50 56	- 0 03	8 x 5	135	F		88	1 25 41	+29 55	11 x11	...	F	
27	0 51 07	+ 0 13	5 x 5	...	MF	Stellar.	89	1 25 41	+30 31	14 x 5	157	MB	
28	0 51 09	+ 0 09	3 x 3	...	MF	Stellar.	90	1 25 49	+30 22	11 x 5	165	F	
29	0 51 26	- 0 13	14 x 8	0	F		91	1 25 49	+30 27	14 x 8	138	MB	
30	0 51 29	+ 0 08	3 x 3	...	F	Stellar.	92	1 25 50	+30 01	27 x 5	138	F	
31	0 51 32	+ 0 12	3 x 3	...	F		93	1 25 56	+29 58	14 x11	120	F	
32	0 51 37	+ 0 11	3 x 3	...	F		94	1 26 13	+29 59	11 x 5	3	MF	2 nuclei.
33	0 52 10	+ 0 11	.....	...	B	Stellar.	95	1 26 25	+29 57	11 x 8	108	F	[s. brighter.
34	0 52 54	+ 0 17	8 x 5	78	F		96	1 26 45	+30 02	16 x11	58	MF	Almost certainly [spiral.
35	1 09 46	-15 01	11 x11	...	F	Stellar.	97	1 35 15	+45 23	5 x 5	...	B	Stellar.
36	1 09 46	-15 08	19 x11	78	F		98	1 47 57	+ 0 54	16 x11	47	F	
37	1 09 51	-14 59	11 x11	...	F	Stellar.	99	1 48 37	+ 0 36	11 x 8	153	F	
38	1 10 19	-14 27	14 x14	...	VF		100	1 49 14	+ 0 17	5 x 5	...	VF	
39	1 10 26	-14 36	11 x11	...	MF		101	1 49 29	+ 0 31	14 x11	90	F	
40	1 10 26	-14 42	16 x16	...	VF		102	1 49 37	+ 0 43	5 x 5	...	F	
41	1 10 27	-14 56	8 x 5	140	F		103	1 49 45	+ 0 11	5 x 3	50	F	
42	1 10 36	-14 09	5 x 5	...	F		104	1 51 13	+ 0 16	5 x 3	90	MB	
43	1 10 41	-14 20	14 x 8	140	MB	Stellar.	105	1 51 33	- 0 11	5 x 5	...	VF	
44	1 10 42	-14 33	14 x14	...	MB		106	2 14 10	+14 51	14 x11	36	F	
45	1 10 54	-14 57	16 x 8	75	F		107	2 16 19	-14 40	24 x 5	8	F	
46	1 11 00	-14 55	24 x11	141	MF		108	2 17 07	+15 09	2 x 2	...	MB	Stellar.
47	1 11 03	-14 27	8 x 8	...	MB	Stellar.	109	2 17 17	-14 42	5 x 5	...	F	Stellar.
48	1 11 12	-14 30	8 x 8	...	MF	Stellar.	110	2 17 35	-14 30	.....	...	F	Stellar.
49	1 11 16	-15 00	19 x11	0	MF		111	2 26 49	+30 13	14 x11	...	MB	Stellar.
50	1 11 26	-14 18	16 x 8	150	F		112	2 26 57	+30 45	27 x 8	46	F	
51	1 11 32	-14 39	8 x 3	58	F		113	2 27 26	+30 25	16 x11	...	MB	Stellar.
52	1 11 38	-14 52	14 x 5	28	F		114	2 27 35	+30 21	27 x14	12	MB	Looks very much like neb. star.
53	1 11 42	-14 51	5 x 5	...	F		115	2 27 47	+30 07	19 x 8	130	MB	
54	1 11 50	-14 14	5 x 5	...	MB		116	2 28 05	+30 27	27 x 8	147	B	
55	1 11 53	-14 24	27 x 8	121	MF		117	2 28 06	+30 28	24 x14	6	MF	
56	1 11 59	-14 24	8 x 5	0	MF	Stellar.	118	2 28 10	+29 48	16 x11	17	MB	
57	1 11 59	-14 40	8 x 5	25	MF		119	2 28 29	+29 47	22 x22	...	MB	One arm of spiral
58	1 12 00	-14 31	5 x 3	90	MF		120	2 28 32	+29 46	19 x 8	105	F	[vis.
59	1 12 03	-14 22	19 x11	129	F		121	2 29 25	+30 21	14 x 8	110	F	
60	1 12 10	-14 49	14 x 3	161	F		122	2 29 30	+29 46	11 x 5	170	MF	
61	1 12 11	-15 05	11 x 8	169	MF	Stellar.	123	2 29 30	+29 50	19 x19	...	MB	Some detail.
62	1 12 14	-14 29	11 x 8	120	F		124	2 29 52	+29 59	5 x 5	...	MF	[Spiral (?)
63	1 12 19	-14 22	14 x11	90	VF		125	2 30 42	+30 08	14 x 8	39	VF	
64	1 12 36	-14 41	8 x 8	...	MF		126	2 32 52	+30 27	54 x41	17	VF	One arm of spiral [vis.
65	1 12 41	-14 29	19 x 8	150	MB	Stellar.	127	2 51 19	+ 0 20	1'00 x14	145	MF	Nucleus.
66	1 12 52	-14 45	8 x 8	...	MF								
67	1 13 04	-14 52	19 x11	147	F								
68	1 13 08	-14 06	8 x 8	...	F								

No.	α	δ	LxW	Elong.	Inten.	Remarks	No.	α	δ	LxW	Elong.	Inten.	Remarks
128	2 ^h 53 ^m 47 ^s	+ 0° 16'	19"x 8"	16°	F		190	7 ^h 17 ^m 16 ^s	+15° 02'	19"x 8"	102°	F	
129	3 09 31	+14 35	27 x 5	142	F		191	7 35 05	+45 16	11 x11	...	F	
130	3 09 49	+14 52	11 x 8	35	F		192	7 36 07	+44 27	14 x11	63	F	
131	3 10 31	+15 12	27 x 8	154	F		193	7 36 37	+45 20	8 x 8	...	F	Stellar.
132	3 10 43	+14 43	14 x14	...	F		194	7 36 42	+44 45	11 x 5	42	VF	
133	3 10 54	+15 34	11 x 8	0	F		195	7 37 28	+44 56	16 x 5	163	MB	
134	3 11 01	+15 16	11 x 5	163	B	Stellar.	196	7 37 43	+44 47	3 x 3	...	MB	Stellar.
135	3 11 11	+15 16	14 x14	...	MB		197	7 37 53	+44 31	11 x11	...	MF	
136	3 11 51	+14 55	16 x11	50	F		198	7 37 57	+44 39	8 x 8	...	MF	
137	3 12 04	+14 45	14 x 5	35	MB		199	7 38 01	+44 44	16 x11	125	F	Bright nucleus.
138	3 12 04	+15 10	35 x11	45	MB	Bright nucleus.	200	7 38 15	+44 21	19 x16	?	MF	
139	3 12 09	+14 34	11 x 8	0	MF	Stellar.	201	7 38 47	+44 37	33 x 5	87	MB	
140	3 12 19	+14 30	14 x 8	63	F		202	7 39 37	+45 05	16 x11	115	MF	
141	3 12 26	+15 39	14 x11	0	F		203	7 40 08	+44 28	8 x 5	168	F	
142	3 49 11	- 0 24	11 x11	...	F		204	7 40 13	+45 00	35 x14	175	F	Bright nucleus.
143	3 50 51	- 0 26	14 x 5	143	MF		205	7 40 31	+44 29	27 x11	164	MB	
144	3 51 51	- 0 19	14 x 8	58	MF		206	7 41 15	+44 41	22 x 8	132	MB	
145	4 01 49	+74 46	8 x 5	57	MF	Stellar.	207	7 42 11	+44 54	14 x11	?	MB	Stellar.
146	4 07 54	+75 20	8 x 5	0	F		208	7 42 35	+44 35	11 x 8	54	F	
147	4 11 06	-15 32	19 x 8	108	F	Star at western	209	7 48 45	- 0 14	14 x14	...	MF	
148	4 11 08	-14 34	14 x 8	148	MF	[end.]	210	8 11 22	+74 16	33 x11	135	MF	
149	4 11 22	-15 30	11 x 8	0	MF		211	8 14 27	+74 42	19 x 8	51	F	
150	4 11 33	-14 52	...	...	MB	Stellar.	212	8 15 17	+15 16	8 x 8	...	F	
151	4 12 54	-15 29	...	...	MF	Stellar.	213	8 15 17	+14 46	11 x 8	8	F	
152	4 13 58	-15 39	8 x 5	156	F		214	8 15 37	+14 48	11 x 5	77	MB	
153	4 14 16	-15 01	19 x11	165	MF		215	8 18 51	+15 02	22 x16	0	B	
154	4 14 20	-15 04	5 x 5	...	MB		216	8 23 42	+30 29	16 x 8	90	F	
155	4 14 26	-15 13	1'35"x 8"	21	F	MF nucleus.	217	8 23 55	+30 34	19 x19	...	F	
156	4 14 36	-14 42	14 x 8	33	F		218	8 24 00	+30 16	14 x11	90	F	
157	4 15 08	-14 43	14 x14	...	F		219	8 24 05	+30 17	8 x 5	0	F	
158	4 15 10	-15 40	14 x14	...	F		220	8 24 17	+29 31	22 x11	38	F	
159	4 15 18	-14 38	16 x11	90	F		221	8 24 18	+30 16	14 x 8	112	F	
160	4 21 11	+29 44	27 x11	163	VF		222	8 24 35	+29 35	22 x11	12	MF	
161	4 23 03	+30 23	22 x 5	42	F		223	8 24 38	+29 36	19 x11	10	F	
162	4 45 52	- 0 32	27 x16	65	F	Stellar.	224	8 25 17	+30 10	8 x 5	111	F	
163	4 46 10	- 0 30	14 x 8	116	MB		225	8 25 38	+30 05	5 x 5	...	MB	Stellar.
164	4 46 38	+ 0 16	27 x14	110	F		226	8 26 04	+29 51	14 x11	119	F	
165	4 47 18	+ 0 08	8 x 8	...	MF		227	8 26 08	+29 58	5 x 5	...	F	
166	4 47 38	- 0 01	11 x 5	153	F		228	8 26 35	+29 32	19 x 8	10	MB	
167	4 47 52	+ 0 23	8 x 5	...	MB	Stellar.	229	8 26 46	+30 00	8 x 5	?	B	Nucleus at one [end.]
168	4 47 56	+ 0 07	41 x 5	140	MB	Nucleus at center	230	8 26 55	+29 57	27 x22	...	F	Irregular.
169	4 48 04	+ 0 22	33 x 5	90	F	Nucleus at center	231	8 27 02	+30 14	41 x11	12	B	
170	4 48 18	+ 0 26	16 x 3	109	F		232	8 27 10	+29 31	27 x11	166	MF	
171	4 48 22	- 0 07	8 x 5	11	F		233	8 27 48	+30 09	14 x 8	13	F	
172	4 48 24	- 0 05	8 x 5	0	F		234	8 27 49	+29 45	14 x11	176	MF	
173	4 49 16	+ 0 08	14 x11	0	F		235	8 27 58	+30 31	14 x14	...	MB	
174	4 49 40	- 0 02	41 x11	94	F		236	8 28 03	+29 55	14 x11	25	F	
175	4 50 04	+ 0 05	14 x14	...	F		237	8 28 05	+29 48	46 x27	63	MF	
176	4 50 18	+ 0 03	14 x 8	160	F		238	8 28 20	+29 51	16 x 5	...	F	
177	4 50 24	- 0 13	24 x14	142	MB		239	8 28 27	+29 45	14 x14	...	F	
178	5 14 52	-14 49	5 x 5	...	F	Stellar.	240	8 28 42	+30 33	16 x11	...	MF	Near corner of [plate.]
179	5 14 54	-14 50	3 x 3	...	F	Stellar.	241	8 29 02	+30 13	22 x 8	155	MF	
180	5 15 28	-14 44	5 x 5	...	MF	Stellar.	242	8 29 03	+30 13	8 x 8	...	F	Stellar.
181	5 16 43	-14 46	14 x 8	150	F		243	8 29 38	+30 01	41 x27	...	MF	Irregular.
182	5 37 45	+45 00	14 x14	152	B	Spiral.	244	8 38 37	+44 42	22 x11	39	F	
183	5 56 52	- 0 29	14 x 5	84	MB		245	8 39 00	+44 56	14 x14	...	MF	
184	7 03 39	+59 51	54 x11	20	VF		246	8 39 14	+44 51	5 x 5	...	B	Stellar.
185	7 09 31	+59 45	8 x 8	...	VF		247	8 39 14	+44 52	19 x 5	99	MF	
186	7 10 21	+59 50	8 x 8	...	F		248	8 39 15	+44 51	19 x 5	150	MB	
187	7 11 39	+59 31	54 x24	158	F	Bright nucleus.	249	8 39 52	+45 06	14 x 3	171	F	
188	7 16 27	+15 25	8 x 5	...	MB	Stellar.	250	8 41 24	+44 31	19 x 5	31	F	
189	7 16 55	+15 09	19 x 5	48	F	MB nucleus.							

No.	α	δ	LxW	Elong.	Inten.	Remarks	No.	α	δ	LxW	Elong.	Inten.	Remarks
251	8 ^h 41 ^m 40 ^s	+44°55'	22"x11"	169°	MB		311	9 ^h 53 ^m 05 ^s	+0°25'	41"x8"	41°	F	
252	8 41 54	+44 53	5 x 5	...	MF		312	9 53 06	+0 07	11 x 8	71	MF	
253	9 01 31	+59 26	24 x14	1	MF		313	9 53 11	+0 08	5 x 5	...	MF	Stellar.
254	9 09 13	+14 38	11 x11	...	F		314	9 53 11	0 00	8 x 5	106	MF	
255	9 09 58	+14 24	8 x 8	...	MB	Stellar.	315	9 53 13	+0 10	8 x 8	...	MB	Stellar.
256	9 10 11	+14 05	14 x 8	0	F		316	9 53 38	-0 15	14 x11	129	F	
257	9 10 43	+14 56	14 x 8	155	F		317	9 53 46	-0 25	8 x 8	...	F	
258	9 10 51	+14 07	11 x 5	60	F		318	9 53 51	0 00	19 x 8	150	MF	
259	9 10 53	+13 57	27 x11	165	F		319	9 53 51	-0 26	11 x11	...	F	
260	9 10 53	+14 12	5 x 3	61	F		320	9 53 53	-0 25	8 x 8	...	F	
261	9 10 59	+13 59	14 x14	...	F		321	9 53 59	-0 25	8 x 8	...	F	
262	9 11 23	+15 08	5 x 5	...	F		322	9 53 59	+0 30	19 x14	29	F	
263	9 11 33	-14 59	5 x 3	90	F	Stellar.	323	9 54 01	-0 30	11 x 8	...	MF	Stellar.
264	9 11 34	-14 58	8 x 5	130	F	Stellar.	324	9 54 33	+0 26	22 x11	49	F	Stellar.
265	9 11 38	-14 41	8 x 8	...	F	Stellar.	325	9 54 53	+0 10	22 x16	...	MB	Stellar.
266	9 12 01	-15 30	8 x 5	0	F		326	10 12 08	+15 28	16 x16	...	F	
267	9 12 11	-15 29	14 x 5	155	F		327	10 13 10	+15 34	16 x 5	145	F	
268	9 12 32	-15 38	19 x11	106	F	Double.	328	10 13 27	-15 01	.....	...	MF	Stellar.
269	9 12 33	+14 14	14 x 5	75	F		329	10 13 41	+14 40	14 x 5	0	MB	
270	9 12 56	-15 31	8 x 5	150	F		330	10 14 35	-14 52	14 x14	...	MF	
271	9 13 00	-14 57	14 x 8	48	F		331	10 14 38	+14 50	27 x11	152	MF	
272	9 13 04	-15 21	8 x 5	151	F		332	10 14 41	-15 22	.....	...	MF	Stellar.
273	9 13 04	-15 23	.....	...	F	Stellar.	333	10 15 05	-14 40	14 x 8	131	F	
274	9 13 09	+13 51	27 x16	130	MF	MB nucleus.	334	10 15 39	-14 53	19 x 8	14	MF	
275	9 13 53	-15 27	22 x 8	166	MF		335	10 15 42	+14 45	16 x 8	160	MF	
276	9 13 58	-15 33	14 x 8	163	MF		336	10 15 51	-15 00	8 x 5	33	MF	
277	9 21 49	+29 47	27 x14	145	MB	Nucleus at	337	10 16 24	+15 11	27 x11	29	F	
278	9 22 21	+29 56	14 x 5	45	MB	[center.]	338	10 16 49	-15 09	16 x 5	150	F	
279	9 22 27	+29 48	16 x16	...	F		339	10 16 54	+15 21	14 x14	...	F	
280	9 22 51	+30 01	8 x 5	47	MB		340	10 17 07	-14 51	.....	...	MF	Stellar.
281	9 23 13	+29 55	5 x 5	...	F		341	10 17 21	-14 49	14 x14	...	MF	
282	9 23 41	+30 28	19 x 3	10	F		342	10 18 09	-14 49	14 x11	55	F	
283	9 23 45	+29 51	16 x14	0	F		343	10 22 38	+30 19	8 x 5	...	MF	Stellar.
284	9 23 49	+30 31	22 x11	147	MB	Star involved.	344	10 23 34	+29 36	8 x 8	...	MB	
285	9 24 41	+30 31	8 x 5	0	F		345	10 34 56	+45 04	11 x 8	57	F	
286	9 24 43	+30 23	14 x11	30	MB		346	10 35 26	+45 38	14 x14	...	F	
287	9 25 51	+29 54	19 x 5	40	MF	Faint nucleus at	247	10 37 45	+45 00	14 x 3	98	VF	
						[center.]	348	10 37 46	+44 59	5 x 3	17	B	
288	9 25 55	+30 25	54 x14	44	MB	Faint nucleus at	349	10 39 11	+44 41	5 x 5	...	F	
						[center.]	350	10 41 02	+45 14	5 x 5	...	F	
289	9 26 19	+29 49	5 x 3	90	F		351	10 49 16	-0 39	11 x 5	0	F	
290	9 26 19	+30 22	11 x11	...	F		352	10 49 17	-0 20	5 x 5	...	VF	
291	9 26 21	+29 32	8 x 8	...	MF		353	10 49 19	-0 20	11 x 5	143	VF	
292	9 26 34	+30 11	41 x14	45	F	Bright nucleus.	354	10 49 51	-0 40	8 x 8	...	F	
293	9 27 46	+29 33	5 x 5	...	F		355	10 50 03	-0 14	8 x 5	127	F	
294	9 36 01	+44 35	19 x11	115	F		356	10 50 25	+0 06	8 x 8	...	VF	
295	9 38 04	+44 43	14 x 3	39	F		357	10 50 25	-0 40	11 x11	...	VF	
296	9 41 13	+44 23	27 x14	45	F		358	10 50 29	-0 37	8 x 5	0	F	
297	9 49 35	+0 22	16 x11	60	F		359	10 50 39	-0 27	22 x 5	60	F	
298	9 49 48	-0 18	14 x 8	162	F		360	10 50 42	-0 05	16 x 3	104	F	
299	9 50 21	-0 20	8 x 8	...	MF	Stellar.	361	10 50 45	-0 28	11 x 5	115	F	
300	9 50 53	+0 08	8 x 5	...	F	Stellar.	362	10 51 25	-0 29	3 x 3	...	MF	
301	9 51 13	+0 20	5 x 5	...	MB	Stellar.	363	10 51 47	-0 25	5 x 5	...	MF	
302	9 51 19	+0 14	22 x 5	135	MF		364	10 51 59	-0 31	14 x 8	62	VF	
303	9 51 39	+0 32	27 x 5	0	F		365	10 52 01	-0 35	16 x 8	108	VF	
304	9 51 41	-0 07	8 x 5	40	F		366	10 53 35	-0 18	33 x11	115	MF	
305	9 51 51	-0 12	11 x 8	49	F		367	10 53 37	-0 32	14 x 8	90	B	
306	9 52 18	-0 07	5 x 5	...	F		368	10 53 38	-0 35	14 x 8	53	B	
307	9 52 25	+0 09	5 x 3	151	MF		369	10 59 38	+60 11	14 x19	90	MB	
308	9 52 35	+0 03	11 x11	...	F		370	10 59 42	+60 10	16 x11	77	MF	
309	9 52 35	0 00	14 x 5	106	F	Small nucleus.	371	10 59 54	+60 15	8 x 3	21	MF	
310	9 52 43	-0 02	8 x 5	24	MF		372	10 59 56	+60 09	16 x14	80	F	

No.	α	δ	LxW	Elong.	Inten.	Remarks	No.	α	δ	LxW	Elong.	Inten.	Remarks
373	11 ^h 00 ^m 34 ^s	+59°26'	.....	...	MB		435	11 ^h 57 ^m 02 ^s	+29°28'	14"x 5"	90°	F	
374	11 01 19	+59 41	8"x 5"	90°	F		436	11 57 04	+29 24	19 x11	63	F	
375	11 03 19	+59 15	22 x 8	75	MF		437	11 57 08	+29 10	14 x11	0	F	
376	11 04 00	+59 43	5 x 3	0	F		438	11 57 11	+29 52	16 x11	70	F	
377	11 04 17	+59 45	8 x 5	176	F		439	11 57 12	+29 05	14 x11	0	F	
378	11 04 36	+59 42	19 x 5	33	MF		440	11 57 28	+29 21	8 x 8	...	B	
379	11 05 14	+59 15	22 x22	...	F		441	11 57 35	+29 21	5 x 5	...	F	
380	11 05 19	+59 26	8 x 5	155	F		442	11 57 41	+30 00	19 x 8	56	F	
381	11 05 56	+59 59	16 x 8	24	MF	Star at S. end.	443	11 57 48	+29 35	8 x 5	141	MB	
382	11 09 14	+59 36	27 x11	130	F		444	11 57 54	+29 32	8 x 5	90	MB	
383	11 11 02	-15 18	16 x14	90	MF		445	11 57 58	+29 59	19 x11	130	MF	
384	11 11 22	-15 39	22 x 8	24	F		446	11 58 02	+29 31	8 x 5	0	MF	
385	11 11 36	-14 56	27 x16	145	F		447	11 58 07	+29 36	5 x 3	11	F	
386	11 12 15	-15 31	14 x11	173	F		448	11 58 14	+29 57	8 x 8	...	F	
387	11 14 45	-15 15	16 x 8	90	MB	Stellar.	449	11 58 18	+29 12	14 x14	...	F	
388	11 15 30	-15 15	11 x 8	101	F		450	11 58 18	+29 34	11 x 5	111	MF	
389	11 15 39	+15 01	8 x 8	...	F		451	11 58 22	+29 07	14 x 8	18	F	
390	11 16 10	+14 38	11 x 8	58	F		452	11 58 24	+29 06	11 x11	...	F	
391	11 16 23	+14 22	8 x 8	...	F		453	11 58 24	+29 35	5 x 5	...	F	
392	11 16 23	+14 24	8 x 8	...	VF		454	11 58 24	+29 45	8 x 8	...	F	
393	11 17 07	+14 29	22 x 8	170	MF		455	11 58 36	+29 46	5 x 5	...	F	
394	11 17 24	+15 13	16 x 8	36	F		456	11 58 38	+29 58	8 x 5	37	F	
395	11 17 57	+14 47	11 x 5	41	F		457	11 58 39	+29 46	5 x 5	...	F	
396	11 18 21	+15 03	8 x 5	24	F		458	11 58 40	+29 37	5 x 5	...	F	
397	11 19 17	+14 45	8 x 5	12	VF		459	11 58 47	+30 02	8 x11	171	F	
398	11 19 51	+14 33	22 x14	150	F		460	11 58 56	+29 28	8 x 5	164	F	
399	11 19 55	+14 54	11 x 5	68	F		461	11 58 57	+29 16	8 x 8	...	MF	
400	11 19 57	+14 58	5 x 5	...	F		462	11 59 00	+29 11	8 x 8	...	F	
401	11 21 11	+15 09	22 x11	21	F		463	11 59 04	+30 07	24 x11	43	MF	
402	11 21 19	+14 29	14 x14	...	F		464	11 59 17	+29 35	3 x 3	...	F	
403	11 28 42	+29 26	14 x14	...	F		465	11 59 22	+29 25	11 x 3	53	F	
404	11 29 12	+29 29	14 x14	...	F		466	11 59 24	+29 40	8 x 5	49	F	
405	11 30 23	+30 23	.....	...	F	Stellar.	467	11 59 31	+29 27	5 x 5	...	F	
406	11 30 26	+30 03	14 x 8	26	F		468	11 59 38	+29 25	8 x 8	...	VF	
407	11 32 31	+30 40	19 x11	15	F		469	11 59 43	+29 12	14 x 5	120	F	
408	11 34 02	+44 22	5 x 5	...	F		470	11 59 50	+29 45	3 x 3	...	F	
409	11 34 06	+44 49	22 x 8	118	MF		471	11 59 51	+29 49	11 x 8	52	F	
410	11 36 14	+44 59	27 x11	79	F		472	11 59 52	+29 20	8 x 8	...	MF	
411	11 36 42	+45 00	5 x 5	...	F		473	11 59 53	+29 49	11 x 5	103	F	
412	11 48 12	+ 0 07	14 x11	15	F		474	11 59 54	+29 25	8 x 5	90	F	
413	11 49 16	- 0 01	14 x 8	28	F		475	12 00 00	+30 09	5 x 5	...	F	
414	11 49 34	- 0 38	16 x11	95	MF		476	12 00 05	+29 50	8 x 8	...	VF	
415	11 49 36	+ 0 01	14 x11	17	F		477	12 00 36	+30 07	8 x 8	...	F	
416	11 50 16	- 0 28	19 x11	2	F		478	12 00 54	+29 41	11 x 8	97	B	
417	11 50 52	- 0 04	11 x11	...	F		479	12 00 55	+29 31	11 x11	...	F	
418	11 51 11	- 0 03	11 x 5	42	F		480	12 01 16	+29 06	27 x11	134	F	
419	11 51 22	- 0 05	11 x 5	90	F		481	12 01 20	+30 00	16 x 5	7	F	
420	11 51 24	+ 0 24	16 x14	18	F		482	12 01 23	+29 41	14 x11	20	F	
421	11 51 34	- 0 03	8 x 8	...	F		483	12 01 32	+29 53	8 x 8	...	VF	
422	11 51 34	+ 0 17	8 x 5	0	F		484	12 10 07	+15 25	19 x14	19	F	
423	11 51 38	+ 0 18	16 x11	150	F		485	12 10 10	+14 29	14 x11	90	F	
424	11 51 44	+ 0 18	11 x11	...	F		486	12 10 11	+14 36	33 x11	144	F	
425	11 52 02	- 0 01	8 x 8	...	F		487	12 10 38	+14 49	22 x22	...	F	
426	11 52 19	- 0 28	19 x 8	80	F		488	12 10 53	+14 53	14 x14	...	F	
427	11 55 13	+29 39	22 x14	57	F		489	12 10 55	+15 11	14 x 8	129	MB	
428	11 55 25	+29 56	14 x11	...	F	Near edge of [plate.	490	12 10 58	+14 26	16 x11	47	F	
429	11 55 53	+29 39	14 x 8	90	F		491	12 11 08	+14 55	22 x14	51	F	
430	11 55 57	+29 29	16 x14	?	F		492	12 11 16	+15 21	19 x 8	162	MF	
431	11 56 12	+30 23	8 x 8	...	VF		493	12 11 18	+14 32	35 x16	30	F	
432	11 56 24	+29 05	19 x11	15	F		494	12 11 21	+14 42	14 x11	29	F	
433	11 56 33	+29 51	8 x 8	...	F		495	12 11 21	+14 30	19 x11	155	F	
434	11 56 35	+29 47	14 x 5	?	MF		496	12 11 21	+14 55	16 x 8	11	F	

No.	α	δ	LxW	Elong.	Inten.	Remarks	No.	α	δ	LxW	Elong.	Inten.	Remarks
497	12 ^h 11 ^m 21 ^s	+14° 57'	54"x22"	0°	MB		559	12 ^h 53 ^m 08 ^s	+45° 05'	14"x14"	...	MF	
498	12 11 22	+14 45	11 x 8	28	F		560	13 01 57	+29 33	16 x14	98°	F	
499	12 11 25	+14 44	14 x 8	107	MF		561	13 02 14	+29 23	11 x11	...	VF	
500	12 11 25	+14 31	24 x11	115	F		562	13 03 22	+29 19	14 x 5	6	F	
501	12 11 27	+14 41	16 x11	34	B		563	13 03 47	+29 29	22 x 8	0	F	
502	12 11 35	+14 30	41 x 5	15	MF		564	13 04 00	+29 30	14 x 8	156	F	
503	12 11 40	+14 45	14 x11	62	F		565	13 04 24	+29 22	11 x 8	34	F	
504	12 11 43	+14 43	11 x11	...	MF		566	13 04 29	+29 21	19 x 8	0	F	
505	12 11 43	+14 39	19 x11	50	F		567	13 04 34	+29 22	22 x11	3	MF	
506	12 11 47	+14 35	8 x 8	...	F		568	13 05 42	+29 18	14 x14	...	VF	
507	12 11 51	+15 00	8 x 8	...	B		569	13 06 30	+29 28	19 x 8	101	F	
508	12 11 55	+14 32	19 x11	135	MF		570	13 10 02	+14 39	33 x16	82	F	
509	12 12 01	+14 25	8 x 8	...	MF	Near edge of	571	13 11 07	+15 02	14 x14	...	F	
510	12 12 00	-15 30	22 x16	47	F	[plate.	572	13 11 38	+14 36	11 x11	...	F	
511	12 12 02	-15 25	19 x 8	54	F		573	13 11 55	+14 36	11 x11	...	F	
512	12 12 05	+15 02	16 x 8	140	MB		574	13 12 14	+15 04	11 x 5	35	VF	
513	12 12 05	+14 33	11 x 8	10	F		575	13 12 21	+14 54	41 x19	0	MB	2 branched spiral. [N. br. shorter [and more curved [than S.
514	12 12 07	+14 50	14 x 8	155	F		576	13 12 25	+14 53	14 x 5	120	MB	
515	12 12 29	+14 40	14 x 8	144	F		577	13 12 57	-15 03	8 x 5	90	MF	
516	12 12 39	+15 04	16 x11	80	F		578	13 12 58	-15 01	8 x 5	90	MF	
517	12 12 46	+14 55	8 x 5	44	F		579	13 13 12	+14 44	8 x 3	153	F	
518	12 12 48	+15 10	5 x 5	...	F		580	13 13 14	+14 24	16 x 5	104	VF	
519	12 12 56	+15 23	19 x11	16	F		581	13 13 14	-14 50	27 x 8	178	F	
520	12 12 59	+14 25	14 x14	...	F		582	13 13 16	-14 50	30 x11	147	F	
521	12 13 01	+14 27	16 x 8	162	F		583	13 13 26	-15 13	41 x24	154	MF	
522	12 13 08	+15 14	16 x16	...	F		584	13 13 34	+15 10	19 x 8	35	F	
523	12 13 09	+14 28	14 x11	160	F		585	13 13 36	+14 55	8 x 5	79	F	
524	12 13 29	+14 36	5 x 5	...	F		586	13 13 36	-15 18	41 x19	34	MB	
525	12 13 31	+15 15	14 x14	...	MF		587	13 13 48	+14 45	5 x 5	...	MF	
526	12 13 37	+14 27	8 x 5	164	F		588	13 13 54	-14 35	41 x11	19	F	
527	12 13 59	+15 19	11 x 8	41	F		589	13 13 59	+14 32	14 x 5	72	F	
528	12 14 11	+15 21	5 x 5	...	F		590	13 14 00	+14 21	14 x14	...	F	
529	12 14 28	+14 29	16 x11	148	F		591	13 14 09	+14 31	14 x 8	123	MB	Spiral (?)
530	12 14 29	-15 39	16 x16	...	F		592	13 14 22	-15 33	27 x14	0	VF	
531	12 14 39	+14 23	11 x11	...	MB		593	13 14 28	-15 27	16 x11	17	F	
532	12 14 51	+14 59	5 x 5	...	F		594	13 14 30	-15 21	8 x 5	90	F	
533	12 14 55	+14 29	27 x27	...	VF		595	13 14 30	-14 40	41 x14	13	MF	2 nuclei.
534	12 15 35	-15 02	8 x 5	21	MF		596	13 14 37	-14 40	11 x11	...	MF	
535	12 15 46	-15 00	8 x 5	81	F		597	13 14 41	-15 23	8 x 5	69	F	
536	12 18 18	+75 20	8 x 8	...	MB	Stellar.	598	13 15 04	+15 02	16 x11	172	MB	
537	12 36 35	- 0 15	8 x 8	...	F		599	13 15 12	-14 45	8 x 8	...	F	
538	12 36 59	+ 0 22	.....	...	MF	Stellar.	600	13 15 27	+14 51	16 x14	57	MB	
539	12 37 11	- 0 22	14 x 8	58	F		601	13 16 23	-15 21	11 x 8	7	F	
540	12 37 23	- 0 41	.....	...	F	Stellar.	602	13 16 27	-15 21	16 x11	160	F	
541	12 38 19	- 0 44	1/48 x27	70	F		603	13 16 28	-15 26	14 x 8	...	MB	Stellar. Near
542	12 39 53	+ 0 02	.....	...	F	Stellar.	604	13 16 38	-15 38	16 x 8	150	F	[corner of plate.
543	12 40 21	+ 0 27	.....	...	MF	Stellar.	605	13 16 48	-15 01	41 x11	48	F	
544	12 47 43	+44 35	27 x19	64	F		606	13 16 51	-15 29	16 x11	122	MF	
545	12 48 16	+44 21	5 x 5	...	F	Stellar.	607	13 17 38	+59 01	11 x11	...	MF	
546	12 50 00	+44 31	14 x11	157	F		608	13 20 30	+59 45	8 x 8	...	MF	
547	12 50 02	+44 25	8 x 8	...	F		609	13 20 31	+58 53	5 x 3	14	F	
548	12 50 08	+45 30	27 x 5	175	F		610	13 20 37	+59 15	16 x 3	108	MF	
549	12 50 15	+44 25	11 x11	...	F		611	13 20 58	+59 30	5 x 5	...	VF	
550	12 50 28	+44 21	.....	...	MB	Stellar.	612	13 21 14	+59 48	19 x 8	77	MB	
551	12 50 40	+44 39	41 x19	106	F	Stellar nucleus.	613	13 21 18	+58 58	11 x 5	21	F	
552	12 51 17	+44 25	33 x14	148	F		614	13 21 20	+58 57	19 x 5	173	VF	
553	12 51 23	+44 47	22 x 8	143	MF		615	13 21 42	+58 57	8 x 5	...	F	Stellar.
554	12 51 30	+44 44	8 x 5	115	F		616	13 22 34	+59 33	3 x 3	...	F	Stellar.
555	12 51 38	+44 29	19 x14	104	F		617	13 23 18	+59 37	11 x 8	172	MF	
556	12 51 41	+44 29	22 x11	108	F		618	13 24 04	+59 53	19 x11	13	F	
557	12 52 23	+45 10	27 x11	35	F		619	13 24 26	+58 54	8 x 3	0	VF	
558	12 53 00	+45 00	14 x11	20	MF								

No.	α	δ	LxW	Elong.	Inten.	Remarks	No.	α	δ	LxW	Elong.	Inten.	Remarks
620	13 ^h 24 ^m 29 ^s	+58° 54'	8'' x 3''	170°	F		679	14 ^h 50 ^m 02 ^s	+45° 33'	27'' x 16''	74°	MF	
621	13 25 06	+59 33	14 x14	...	F		680	15 00 01	+29 39	22 x14	45	F	
622	13 25 39	+59 29	5 x 5	...	VF		681	15 00 07	+29 16	8 x 8	...	F	
623	13 25 40	+59 45	14 x 8	13	F		682	15 01 01	+29 40	22 x 8	63	F	
624	13 25 56	+59 30	8 x 8	...	VF	V. close to b.star.	683	15 01 25	+29 07	11 x 8	62	F	
625	13 25 56	+59 31	14 x 3	50	VF	V. close to b.star.	684	15 01 47	+29 37	14 x 8	140	MF	
626	13 26 04	+59 29	5 x 5	...	F	Stellar.	685	15 02 13	+29 36	8 x 5	157	F	
627	13 26 12	+58 53	1'35 x41	0	MF	Many stellar [nuclei. Irreg. [with a number [of condensations.	686	15 02 23	+30 15	11 x11	...	F	
						Stellar.	687	15 02 25	+29 45	14 x 8	34	MF	
628	13 27 08	+58 48	5 x 5	...	F		688	15 02 41	+30 04	22 x 5	40	F	
629	13 27 34	+59 20	5 x 5	...	VF		689	15 02 51	+29 53	16 x16	...	F	
630	13 27 39	+59 23	5 x 5	...	F	Stellar.	690	15 03 21	+29 49	5 x 3	90	F	
631	13 33 50	- 0 40	14 x 8	155	MB		691	15 03 25	+29 49	5 x 5	...	VF	
632	13 34 18	- 0 21	.....	...	F	Stellar.	692	15 03 33	+29 48	16 x 8	100	F	
633	13 35 15	- 0 45	14 x11	148	F		693	15 03 57	+29 10	11 x11	...	F	
634	13 35 15	- 0 10	14 x 8	70	F		694	15 04 05	+29 03	14 x11	162	F	
635	13 46 54	+45 17	19 x11	136	F		695	15 04 07	+29 55	5 x 3	140	F	
636	13 49 46	+45 30	5 x 5	...	F		696	15 04 15	+29 58	5 x 5	...	VF	
637	13 50 30	+44 39	14 x 8	10	F		697	15 04 18	+29 58	8 x 5	27	VF	
638	13 53 19	+44 55	27 x 8	170	B	Shaped like V.	698	15 04 23	+29 58	8 x 5	50	VF	
639	13 56 57	+30 00	19 x 5	78	F		699	15 04 26	+30 07	16 x 8	57	F	
640	13 57 01	+29 58	27 x27	...	F		700	15 04 33	+30 14	8 x 8	...	F	
641	13 58 29	+29 49	5 x 3	90	MF		701	15 04 33	+29 58	19 x 5	80	F	
642	13 58 30	+29 09	8 x 8	...	F		702	15 04 35	+29 55	14 x14	...	F	
643	13 59 43	+29 48	19 x 5	176	F	Star involved.	703	15 08 47	-15 07	2'16'' x 2'16''	...	VF	Spiral.
644	14 00 12	+30 06	5 x 5	...	F		704	15 09 16	+15 08	14 x11''	0	VF	
645	14 00 33	+29 36	19 x 5	161	MF		705	15 09 57	+14 13	19 x 8	15	F	
646	14 00 35	+29 38	11 x11	...	F		706	15 10 18	-15 20	11 x 8	72	F	
647	14 00 37	+29 01	14 x 8	12	MF		707	15 10 30	+14 41	19 x 5	130	F	
648	14 01 11	+29 51	16 x 8	170	F		708	15 10 41	-15 37	11 x11	...	F	
649	14 01 14	+29 52	19 x 5	43	F		709	15 11 29	+15 18	14 x11	120	VF	
650	14 01 35	+29 51	5 x 5	...	F		710	15 12 18	-15 04	8 x 8	...	VF	
651	14 01 37	+29 32	5 x 5	...	F		711	15 12 27	+59 11	41 x22	17	MF	
652	14 02 00	+29 38	8 x 5	90	F		712	15 14 04	-15 40	11 x11	...	MF	Stellar.
653	14 02 05	+29 20	8 x 8	...	F		713	15 14 49	+59 10	27 x14	43	F	
654	14 02 13	+30 06	8 x 5	0	F		714	15 14 52	+59 45	.....	...	F	Stellar.
655	14 03 51	+29 19	16 x14	0	F		715	15 15 35	+59 25	14 x11	0	F	Stellar.
656	14 08 40	-14 53	11 x 8	48	F		716	15 16 47	+59 47	1'13'' x 8	60	MF	
657	14 13 08	+14 52	14 x 8	112	F		717	15 16 50	+59 18	19 x16	25	MF	
658	14 13 08	+15 01	8 x 5	70	VF		718	15 17 59	+59 27	8 x 5	54	F	
659	14 14 04	+15 03	8 x 5	74	F		719	15 18 01	+59 45	19 x14	152	F	
660	14 14 11	+15 35	14 x14	...	F		720	15 18 15	+60 32	8 x 5	15	F	
661	14 14 15	+15 25	19 x 5	102	F		721	15 18 27	+59 31	27 x14	101	F	
662	14 14 36	+15 35	8 x 8	...	VF		722	15 32 18	+ 0 12	8 x 5	66	MF	
663	14 15 18	+15 41	14 x11	90	F		723	15 33 46	- 0 10	8 x 3	163	MB	
664	14 15 26	+15 21	19 x 8	41	F		724	15 34 18	+ 0 10	5 x 5	...	F	
665	14 15 30	+15 11	11 x 5	39	MF		725	15 36 06	+ 0 07	41 x14	40	F	
666	14 15 42	+15 04	14 x11	90	F		726	15 46 13	+44 59	14 x11	...	MB	Stellar.
667	14 15 43	+15 29	5 x 5	...	F		727	15 48 23	+45 09	16 x 8	145	F	
668	14 15 54	+15 05	14 x11	90	F		728	15 48 38	+44 30	8 x 5	3	MF	
669	14 16 01	+15 45	8 x 5	11	F		729	15 50 06	+45 07	11 x 5	162	F	
670	14 16 18	+15 51	19 x19	...	F		730	15 51 56	+44 49	5 x 5	...	MF	Stellar.
671	14 16 35	+15 24	33 x16	175	MF		731	15 56 06	+29 41	8 x 8	...	F	
672	14 18 01	+15 19	14 x 8	90	MF		732	15 56 34	+29 40	5 x 5	...	MF	
673	14 18 11	+15 29	27 x14	165	MB		733	15 57 40	+30 05	27 x 5	137	F	
674	14 45 04	+44 48	35 x14	123	F		734	16 06 30	+74 51	5 x 5	...	F	
675	14 45 24	+44 49	33 x 8	140	MF		735	16 11 06	+15 03	14 x 8	145	F	
676	14 46 14	+45 14	8 x 8	...	MF		736	16 11 48	+15 31	16 x 8	130	MF	
677	14 47 49	+45 25	27 x14	169	F		737	16 11 50	+15 23	11 x11	...	F	
678	14 48 24	+44 53	16 x11	108	F		738	16 11 54	+15 28	14 x14	...	F	
							739	16 11 56	+15 28	16 x 8	150	MF	
							740	16 12 16	+14 44	5 x 5	...	F	

No.	α	δ	LxW	Elong.	Inten.	Remarks	No.	α	δ	LxW	Elong.	Inten.	Remarks
741	16 ^h 12 ^m 20 ^s	+15°06'	16"x 8"	160°	MF	Double.	803	17 ^h 47 ^m 26 ^s	+45°01'	22"x11"	33°	F	
742	16 12 28	+14 50	14 x 8	108	F		804	17 47 36	+45 25	14 x11	0	F	
743	16 12 32	+14 52	41 x 3	142	F		805	17 48 04	+44 49	8 x 5	54	F	
744	16 12 33	+14 56	19 x11	149	F		806	17 48 18	+45 01	11 x 5	44	F	
745	16 12 35	+15 02	33 x 8	119	F		807	17 49 03	+44 37	.....	...	MB	Stellar.
746	16 12 39	+15 27	11 x11	...	F		808	17 50 03	+45 00	.....	...	MB	Stellar.
747	16 12 44	+14 47	3 x 3	...	MF		809	17 50 23	+45 00	16 x14	154	F	
748	16 12 44	+15 11	14 x 8	0	F		810	17 50 53	+45 20	16 x11	90	F	
749	16 12 45	+15 24	14 x 8	167	F		811	17 51 02	+45 26	16 x11	38	F	
750	16 13 00	+15 07	3 x 3	...	F		812	19 20 50	+60 48	19 x 5	163	F	
751	16 13 10	+15 37	11 x11	...	F		813	19 24 35	+60 38	8 x 5	...	F	
752	16 13 18	+15 08	11 x 5	171	F		814	19 44 12	+44 54	22 x19	...	MF	Somewhat irreg.
753	16 13 21	+15 22	14 x11	11	F		815	20 08 29	-14 45	14 x14	...	F	
754	16 13 30	+15 15	5 x 5	...	F		816	20 08 58	-15 01	11 x 8	96	F	
755	16 14 20	+14 31	14 x14	...	F		817	20 09 00	-15 01	11 x 5	90	F	
756	16 14 34	+14 46	11 x11	...	F		818	20 09 46	-15 04	5 x 5	...	F	
757	16 17 02	+74 27	16 x11	0	F		819	20 11 11	-14 38	41 x19	0	F	F nucleus.
758	16 18 42	+75 21	27 x14	90	VF		820	21 11 07	-14 45	.....	...	MF	Stellar.
759	16 19 46	+74 35	14 x 5	0	F		821	22 12 54	+15 46	.....	...	MF	Stellar.
760	16 21 18	+75 02	8 x 8	...	F		822	22 13 03	+14 46	35 x 8	156	F	
761	16 44 52	+45 18	5 x 5	...	F		823	22 14 08	+15 24	8 x 3	22	F	
762	16 45 16	+45 57	14 x 8	156	MF		824	22 35 51	- 0 11	.....	...	F	Stellar.
763	16 46 10	+45 11	5 x 3	0	F		825	22 37 52	+ 0 43	14 x 8	53	F	
764	16 48 08	+45 33	5 x 5	...	F		826	22 37 57	+ 0 35	5 x 3	45	F	
765	16 48 14	+45 33	5 x 5	...	F		827	22 38 35	- 0 03	.....	...	F	Stellar.
766	16 55 51	+30 05	14 x14	...	MF		828	22 38 38	- 0 03	.....	...	F	Stellar.
767	16 56 22	+30 05	16 x16	...	F		829	22 38 39	- 0 04	.....	...	F	Stellar.
768	16 56 58	+29 37	19 x14	156	F		830	22 38 43	- 0 01	8 x 5	128	F	
769	16 57 38	+29 32	14 x11	90	F		831	22 38 44	0 00	8 x 5	22	F	
770	16 58 02	+30 27	11 x 8	130	F		832	22 58 46	+30 11	5 x 5	...	F	
771	16 58 02	+30 18	11 x 8	...	MB	Stellar.	833	23 01 33	+30 36	8 x 5	0?	B	Stellar.
772	16 58 36	+29 48	5 x 5	...	F		834	23 03 38	+29 41	.....	...	F	
773	16 58 43	+29 40	5 x 5	...	MF		835	23 11 21	+14 59	16 x11	60	F	
774	16 59 34	+30 00	8 x 5	50	MF		836	23 11 23	+15 31	11 x 8	0	F	
775	17 01 26	+29 26	14 x11	160	F		837	23 11 53	+15 22	.....	...	MF	Stellar.
776	17 02 42	+30 02	16 x11	114	VF		838	23 11 55	+15 15	.....	...	MF	Stellar.
777	17 24 21	+59 38	33 x11	109	F		839	23 12 07	+15 24	35 x11	36	MF	
778	17 24 29	+59 32	54 x 8	90	F		840	23 12 16	+15 05	.....	...	MB	Stellar.
779	17 24 37	+59 42	19 x14	116	F		841	23 12 41	+15 21	.....	...	MF	Stellar.
780	17 24 42	+60 24	8 x 8	...	F		842	23 13 11	+15 38	.....	...	MB	Stellar.
781	17 25 44	+59 48	5 x 5	46	MF		843	23 13 47	+14 49	5 x 3	9	F	
782	17 26 03	+60 06	14 x14	...	MF		844	23 13 55	+14 57	8 x 5	111	B	
783	17 26 11	+59 43	5 x 5	...	B		845	23 14 06	+14 48	19 x 8	43	MF	
784	17 26 12	+59 42	22 x11	4	F		846	23 14 09	+15 28	8 x 3	6	MF	
785	17 26 45	+60 10	8 x 8	...	MF		847	23 14 29	+15 22	16 x 5	141	F	
786	17 26 49	+60 03	19 x 8	11	MF		848	23 14 41	+15 13	8 x 8	...	F	Stellar.
787	17 27 11	+60 05	5 x 5	...	F		849	23 15 02	+15 35	54 x14	81	F	
788	17 28 45	+59 25	8 x 8	...	F		850	23 15 33	+15 27	1'00 x16	158	MF	
789	17 28 53	+59 36	16 x16	...	F		851	23 16 09	+15 42	27 x11	49	F	
790	17 28 54	+60 25	14 x14	...	MB	Nucleus S. end.	852	23 16 27	+15 42	14 x11	90	MB	
791	17 29 09	+59 42	33 x 8	33	MF		853	23 36 27	+ 0 32	11 x11	...	VF	
792	17 29 43	+60 10	14 x14	...	F		854	23 39 10	+ 0 12	5 x 5	...	F	
793	17 29 53	+60 27	8 x 5	90	F		855	23 39 24	+ 0 24	14 x 5	112	F	
794	17 29 59	+60 02	8 x 8	...	F		856	23 39 24	+ 0 01	1 08 x 11	39	F	Bright nucleus.
795	17 30 02	+59 34	41 x11	39	F		857	23 39 33	+ 0 59	8 x 8	...	F	
796	17 30 18	+59 35	11 x 3	167	F		858	23 39 38	+ 0 19	16 x11	140	MB	Possibly spiral.
797	17 30 49	+59 31	54 x 8	143	F		859	23 39 55	+ 0 46	11 x 5	19	F	
798	17 31 07	+60 00	8 x 8	...	B		860	23 40 20	+ 0 38	5 x 5	...	F	
799	17 31 14	+60 09	19 x 8	148	F		861	23 40 26	+ 0 46	5 x 5	...	F	
800	17 31 49	+59 46	16 x 5	112	VF		862	23 40 28	+ 0 41	8 x 5	62	F	
801	17 32 24	+59 33	11 x11	...	F		863	23 40 32	+ 0 46	16 x 5	34	F	
802	17 46 36	+44 57	8 x 5	38	F		864	23 41 46	+ 0 08	5 x 5	...	MF	

Table II is a list of previously discovered nebulae which were found on the plates and which were measured in the same way as those of Table I. The following lists were available for comparison: DREYER's New General Catalogue and the two supplementary Index Catalogues; WOLF's Königstuhl lists including No. XII; the Lick Observatory list found in Vol. VIII of the *Publications* of that observatory, and the second Harvard list in *Harvard Annals* 72, No. 2. In the column of identifications no distinction is made between the first and second Index Catalogues as the objects are numbered consecutively from the first to the second; the Wolf list and number and the Harvard number are given only if the object is not listed in the *N. G. C.* and *I. C.* The abbreviations are self-explanatory.

TABLE II.

No.	α	δ	LxW	Elong.	Inten.	Remarks
1	0 ^h 15 ^m 12 ^s	-14°38'	.....	...	MB	IC 9 Stellar.
2	0 26 35	+30 18	5"x 5"	...	F	NGC 140 Stellar
3	1 28 47	+30 12	58'43" x 36'00"	...	MF	NGC 598, M 33.
4	1 50 17	+ 0 22	8"x 8"	...	B	IC 172.
5	1 51 18	+ 0 50	27 x27	...	F	IC 173.
6	1 51 41	+ 0 53	14 x11	28°	F	IC 175.
7	2 14 44	+15 24	5 x 5	...	MB	NGC 882.
8	2 16 36	+15 21	5 x 5	...	MB	IC 1794.
9	4 12 04	+75 04	2'30" x 1'35"	155	F	NGC 1530 Spiral [F except near nucleus.
10	8 11 07	+74 15	14 x11"	?	B	NGC 2544.
11	8 14 02	+74 17	41 x16	100	MB	NGC 2550.
12	8 27 52	+29 50	1'08"x35"	149	MB	NGC 2604. [Probably spiral.
13	9 22 33	+30 22	19 x19	...	B	IC 2476 Stellar.
14	9 22 35	+30 11	27 x11	115	B	IC 2475.
15	9 22 39	+30 24	8 x 8	...	F	IC 2478.
16	9 22 45	+30 23	19 x11	146	B	IC 2479.
17	9 22 59	+30 06	14 x11	...	B	IC 2480 Stellar.
18	9 24 58	+29 55	27 x14	163	B	NGC 2893.
19	9 27 45	+30 19	16 x14	...	MB	IC 2490.
20	9 42 57	+44 30	54 x22	51	MF	NGC 2998. Al- [most certainly spiral.
21	10 24 17	+29 57	4'32"x 1'8"	45	F	NGC 3254. Spir.
22	10 48 17	- 0 12	19"x11"	157	F	HN 1291.
23	10 48 45	- 0 07	35 x11	148	F	HN 1297.
24	10 48 45	- 0 12	16 x14	142	F	HN 1298.
25	10 49 47	+ 0 07	49 x 8	51	MF	IC 655.
26	11 17 19	+14 37	16 x 5	102	F	IC 2752.
27	11 17 19	+14 38	27 x 5	78	F	IC 2754.
28	11 17 35	+14 40	5 x 5	...	F	IC 2761.
29	11 17 41	+14 42	5 x 5	...	F	IC 2765.
30	11 17 45	+14 41	8 x 8	...	MF	IC 2769.
31	11 19 45	+14 20	22 x11	161	F	IC 2799.
32	11 21 07	+15 10	41 x11	32	F	IC 2810.
33	11 34 44	+45 13	16 x11	18	F	W XII 76.
34	11 51 02	- 0 16	19 x 8	139	MB	HN 1481.
35	11 55 56	+29 30	11 x 8	?	MF	W VIII 360.
36	11 56 10	+29 26	11 x 5	18	F	W VIII 369.
37	11 ^h 56 ^m 18 ^s	+29°22'	19"x19"	...	MF	W VIII 375.
38	11 56 24	+29 32	14 x14	...	F	W VIII 378.
39	11 56 24	+30 12	14 x 8	0	F	W VIII 377.
40	11 56 24	+30 11	14 x 8	?	F	W VIII 376.
41	11 56 30	+29 29	19 x 8	139	MB	W VIII 381.
42	11 56 32	+30 11	8 x 8	...	F	W VIII 383.
43	11 56 57	+29 25	22 x14	63	MF	W VIII 404.
44	11 57 10	+29 55	16 x11	150	MF	W VIII 424.
45	11 57 10	+30 12	14 x 8	0	F	W VIII 415 or [417.
46	11 57 22	+30 01	16 x 5	146	MF	W VIII 425.
47	11 57 30	+29 35	8 x 3	98	F	W VIII 436.
48	11 57 50	+29 52	16 x11	60	MF	W VIII 453.
49	11 57 50	+29 58	41 x 8	61	B	W VIII 455.
50	11 57 54	+29 30	5 x 5	...	MB	W VIII 458.
51	11 57 57	+29 44	8 x 5	59	F	W VIII 460.
52	11 58 09	+29 21	14 x 5	108	MB	W VIII 465.
53	11 58 29	+29 57	5 x 5	...	MF	W VIII 473.
54	11 58 46	+29 55	1'35" x 8"	58	MB	W VIII 483.
55	11 58 57	+30 12	16 x11	108	MF	W VIII 492.
56	11 58 58	+30 09	11 x11	...	F	W VIII 494.
57	11 59 12	+30 07	11 x11	...	F	W VIII 496.
58	11 59 16	+30 13	1'21" x 8"	159	MF	W VIII 498.
59	11 59 29	+29 28	19 x16	171	MB	W VIII 512.
60	11 59 34	+29 25	19 x 8	90	F	W VIII 515.
61	11 59 34	+29 50	8 x 8	...	F	W VIII 516.
62	12 00 25	+29 21	19 x19	...	F	W VIII 557.
63	12 00 36	+29 16	27 x27	...	F	W VIII 561.
64	12 01 18	+29 56	14 x14	...	F	W VIII 586.
65	12 10 28	+14 32	2'02" x19"	125	MB	IC 3061.
66	12 10 39	+14 56	27 x22	8	B	IC 3065.
67	12 10 50	+14 25	11 x11	...	MF	NGC 4208.
68	12 11 05	+14 25	2'02"x1'13"	66	MB	NGC 4212. Spiral. Bnucleus.
69	12 11 33	+14 54	14"x 8"	176	F	IC 3077.
70	12 11 39	+14 43	16 x14	131	MF	IC 3080.
71	12 12 08	+14 47	19 x11	0	B	IC 3093.
72	12 12 18	+15 01	54 x14	96	MB	IC 3096.
73	12 12 43	+14 42	8 x 5	0	MF	LO 364.
74	12 12 48	+15 07	5 x 5	...	F	LO 365.
75	12 12 51	+14 51	16 x 8	125	F	LO 366.
76	12 12 54	+15 09	8 x 8	...	F	LO 367.
77	12 12 55	+14 36	19 x 8	41	F	LO 368.
78	12 12 57	+14 59	5 x 5	...	F	LO 369.
79	12 13 14	+14 42	8 x 5	160	F	LO 371.
80	12 13 15	+14 35	22 x14	57	F	LO 372.
81	12 13 23	+14 41	14 x11	0	F	LO 375.
82	12 13 25	+14 51	5 x 5	...	F	LO 377.
83	12 13 29	+14 57	5 x 5	...	F	LO 378.
84	12 13 33	+15 00	8 x 5	40	F	LO 379.
85	12 13 38	+15 11	19 x14	120	F	LO 380.
86	12 13 39	+14 57	8 x 5	77	F	LO 381.
87	12 13 41	+15 10	14 x 8	30	MF	LO 382.
88	12 14 08	+15 01	8 x 8	...	F	LO 386.
89	12 14 09	+14 44	5 x 5	...	F	LO 387.
90	12 14 15	+14 44	5 x 5	...	F	LO 388.
91	12 14 17	+14 55	4'17" x 4'4"	45	MB	NGC 4254. Fine [spiral.
92	12 14 25	+15 01	5 x 3"	75	F	LO 390.
93	12 14 25	+15 03	11 x 5	64	F	LO 389.
94	12 14 29	+15 00	5 x 5	...	F	LO 391.
95	12 14 31	+14 29	22 x16	151	MF	IC 3142.

No.	α	δ	LxW	Elong.	Inten.	Remarks	No.	α	δ	LxW	Elong.	Inten.	Remarks
96	12 ^h 14 ^m 37 ^s	+14°38'	14"x14"	...	F	LO 393.	152	14 ^h 36 ^m 20 ^s	+ 0°04'	33"x11"	104°	B	NGC 5719.
97	12 14 39	+15 02	16 x 8	60°	MF	LO 394.	153	14 38 10	+ 0 01	41 x11	30	MB	NGC 5733.
98	12 14 57	+14 54	11 x 8	11	F	LO 397.	154	15 00 41	+29 59	5 x 5	...	F	NGC 5840.
99	12 14 58	+15 23	33 x30	?	B	NGC 4262.	155	16 14 34	+15 47	16 x11	?	MF	IC 1209.
100	12 15 03	+14 55	11 x11	...	F	LO 398.	156	16 15 00	+14 21	27 x14	155	MB	NGC 6113.
101	12 15 13	+14 47	11 x11	...	F	LO 399.	157	16 47 30	+45 34	16 x16	...	MF	NGC 6241.
102	12 15 31	+15 28	33 x16	?	MB	IC 781.	158	16 57 06	+29 51	11 x11	...	MB	NGC 6274.
103	12 15 35	+14 38	16 x 8	90	F	LO 402.	159	16 57 18	+29 57	27 x16	...	MF	NGC 6282.
104	12 15 41	+15 12	5 x 5	...	VF	LO 404 (?).	160	17 26 09	+60 05	54 x27	25	MF	NGC 6381.
105	12 15 53	+15 03	11 x11	...	MF	LO 405.							[Spiral.
106	12 16 03	+14 43	8 x 8	...	F	LO 406.	161	17 27 22	+60 10	1' 8 x16	8	F	NGC 6390 (?)
107	12 19 38	+75 27	27 x22	0	MF	NGC 4363.	162	17 30 36	+59 41	19 x 8	...	F	NGC 6399.
108	12 32 13	+74 45	1'00 x 5	1	MF	IC 802.	163	18 44 54	+45 40	11 x 8	...	MB	NGC 6702.
109	12 33 57	+74 41	33 x22	100	VB	NGC 4589.	164	18 45 14	+45 31	19 x19	...	B	NGC 6703.
110	12 37 55	+ 0 25	2 16 x54	55	MF	NGC4632 Spiral	165	20 59 46	+29 31	1 08 x16	173	MF	NGC 7013.
111	12 38 23	+74 55	22 x16	80	VB	NGC 4648.	166	22 59 41	+29 40	... x 5	...	MF	NGC 7473.
112	12 38 40	- 0 09	1 21 x27	31	MF	NGC4642.Spiral	167	23 11 41	+15 21	54 x14	76	MB	NGC 7567.
113	12 39 14	- 0 04	1 48 x1'35"	15	F	NGC4653.Spiral							
114	12 40 32	+ 0 02	4 32 x54"	36	MF	NGC4666.Spiral							
115	12 40 55	- 0 03	1 08 x27	0	MB	NGC 4668.							
116	13 01 40	+29 30	35 x 8	30	F	W IX 68.							
117	13 01 42	+29 46	14 x14	...	B	W IX 69.							
118	13 02 00	+29 33	46 x14	140	B	NGC 4966.							
						Alm't cer. spiral.							
119	13 02 04	+29 39	11 x 8	71	MF	W IX 80.							
120	13 02 04	+30 08	1'08"x14	90	F	W IX 81							
121	13 02 16	+29 40	19 x11	0	MF	W IX 84.							
122	13 02 17	+29 51	16 x11	0	MF	W IX 85.							
123	13 02 20	+29 20	41 x19	0	MF	W IX 91. Some- [what irreg.]							
124	13 02 25	+29 51	5 x 5	...	MF	W IX 93.							
125	13 02 30	+29 37	14 x 5	38	F	W IX 94.							
126	13 02 45	+30 23	11 x11	...	MF	W IX 97.							
127	13 03 40	+29 11	14 x14	...	MB	W IX 107.							
128	13 03 55	+29 20	27 x11	22	F	W IX 117.							
129	13 04 38	+29 31	27 x19	90	MF	W IX 129.							
130	13 04 38	+30 02	14 x 5	130	MB	W IX 130.							
131	13 04 40	+29 13	41 x16	10	F	W IX 134.							
132	13 04 52	+29 22	11 x11	...	MB	W IX 135.							
133	13 04 58	+29 51	14 x11	77	B	W IX 137. (?)							
134	13 05 14	+29 28	14 x 5	90	MF	W IX 142.							
135	13 05 30	+29 23	1 48 x1'8"	132	MF	NGC 5000.							
						[Spiral. Looks [somewhat like [letter S.							
136	13 05 44	+30 31	24 x14"	153	MF	W IX 152 or 153							
137	13 06 32	+30 11	41 x22	5	MF	IC 4210.							
138	13 06 45	+30 07	16 x16	...	B	NGC 5004.							
139	13 06 45	+30 03	38 x16	170	MF	W IX 162.							
140	13 31 00	- 0 28	.....	...	MB	HN 1688.							
141	13 31 33	- 0 35	24 x11	147	MF	HN 1693.							
142	13 31 35	- 0 03	19 x 8	143	MF	HN 1694.							
143	13 31 36	- 0 35	19 x11	0	MF	HN 1695.							
144	13 31 45	0 00	27 x14	152	MF	HN 1696.							
145	13 33 31	+ 0 29	14 x14	...	MB	HN 1707.							
146	13 33 50	+ 0 13	19 x11	21	B	IC 903.							
147	13 34 10	+ 0 01	27 x11	155	MF	HN 1709.							
148	13 34 36	- 0 40	16 x11	90	MF	HN 1713.							
149	13 35 14	+ 0 07	8 x 5	0	MB	HN 1714.							
150	14 35 14	- 0 20	41 x11	54	F	NGC 5705.							
151	14 35 36	+ 0 06	54 x14	?	B	NGC5713.Spiral [but v. peculiar.]							

NOTES.

N.G.C. 476. Not found.

N.G.C. 588, 592, 595, 604, involved in N.G.C. 598 = M. 33.

N.G.C. 1141-2. Not found.

N.G.C. 4572. Can this be identical with I.C. 802?

N.G.C. 5204. This may be identical with No. 627 in Table I. If so the N.G.C. position is incorrect in α .

N.G.C. 6274. This has been identified with No. 158 in Table II. Nothing found in N.G.C. position 1^m west.

N.G.C. 6390. Probably identical with No. 161 in Table II. N.G.C. position probably in error.

N.G.C. 6393, 6394. Cannot be found unless identical with Nos. 789 and 791, respectively, in Table I.

N.G.C. 6610. Not certainly present.

N.G.C. 6702, 6703. N.G.C. positions apparently incorrect. From the descriptions they have been identified with Nos. 163 and 164 in Table II.

N.G.C. 7551. Not found. Double star in this position.

N.G.C. 7738-9. Not found.

I.C. 131, 132, 133, 134, 135, 137, 139, 140 and 143 are all involved in N.G.C. 598 = M. 33.

I.C. 419. This nebula was discovered by WOLF (A.N., 3130), on a plate taken with a 6-inch lens. He describes it as "Ein heller, wenige Minuten langer, schmaler Nebelfleck." Not found on Mt. Wilson plates. There is a row of small stars extending in an east-west direction. Length of row somewhat over 1'.

I.C. 2733, 2789, 3091. Not found. Double star in each position.

I.C. 2755, 2805. Not found. Faint star in each position.

W VIII, 372. Not found 11^h56^m11^s, + 29°30'.

W IX, 67, 95, 110, 113, 125. Not found.

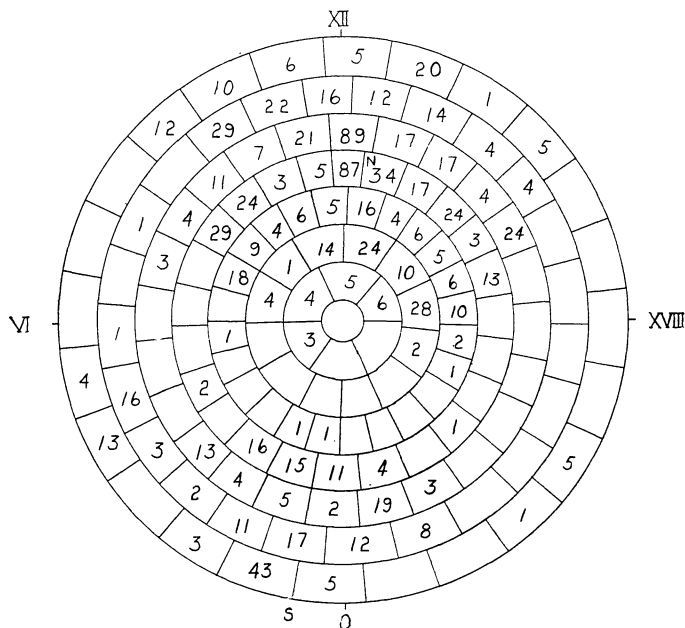
W IX, 79, 118. Not certainly present.

W IX, 147. Appears connected with N.G.C. 5000.

DISCUSSION.

Distribution. The distribution of the nebulae has been the subject of many investigations and there is little or no new material added here. The figure shows the results obtained. It represents the sky from the north pole to 22° 5' south declination. The circles are 15° apart so that any point half way between is at declination 75°.

60° . . . - 15°. Right ascension is indicated along the circumference. The center of each area thus represents the corresponding "Selected Area." The numbers give the number of nebulae found on the respective plates. The north and south galactic poles are indicated by N and S respectively. It is evident from the figure that the number of nebulae in a region does not depend wholly on the galactic latitude. The clustering around the northern pole is much more marked than around the southern.



Orientation. Practically all the nebulae found on these plates are elliptical in outline, the ellipticity varying from a circle to a narrow line. Most of them are too small to show any details of structure. It does not seem unreasonable to suppose that a large proportion of them are spiral for their appearance could be duplicated in every respect by mere reduction in size of known spiral nebulae. The spiral nature can be detected with certainty in the larger objects only but the well-authenticated cases pass so gradually to smaller and smaller ones in which less and less structure is evident that the probability that these small elliptical forms are merely unresolved spirals appears very great. An assumption is implied in the above, namely, that most of the material of a spiral nebula lies in one plane and that when the line of sight is perpendicular to this plane the general outline is approximately circular. On this assumption an effort was made to determine whether the planes of the nebulae showed any preferential orientation with respect to any plane. None could be found.

Number of nebulae. On the one hundred and thirty-nine plates of this series there were found one thousand thirty-one nebulae, an average of 7.4 nebulae per plate. It would require nearly 22,000 plates of the size used to photograph the entire sky. On the assumption that the areas photographed are fair samples this means that the sixty-inch reflector, with exposures of one hour on Lumière Sigma plates, would be able to record 162,000 nebulae. This number could undoubtedly be increased with longer exposures but to what extent it is difficult to say.

The great difference between the above estimate and the half million of Dr. PERRINE* from the one hundred and four plates of the KEELER program with the Crossley reflector of the Lick Observatory made it appear advisable to attempt to learn the cause of the difference. The average exposure on the Lick plates was approximately three hours. Seed "27" plates were used. Through the kindness of Director CAMPBELL and Dr. H. D. CURTIS of that observatory a similar plate was exposed for three hours on "Selected Area" 56. Dr. CURTIS marked 48 nebulae on the Crossley plate while I had marked 49 in the same angular area on the 60-inch plate. The large mirrors of both telescopes were not in the best condition when the corresponding plates were taken. Another comparison was possible for the region surrounding the spiral nebula *N.G.C.* 4254. The Crossley plate for this region was exposed 3^h 19^m. Within the areas common to the two plates there are thirty-three faint nebulae on the Lick list† and thirty-four on the Mt. Wilson list. On the strength of these two comparisons it appears that for faint nebulae an exposure of about three hours with the Crossley reflector on a Seed "27" plate is approximately equivalent to an exposure of one hour with the 60-inch reflector on a Lumière Sigma plate. This does not seem improbable since 1. The Lumière plate is approximately twice as rapid as the Seed plate; 2. Owing to the difference in angular aperture of the two instruments the intrinsic brightness of the image of a surface at the focus of the 60-inch is greater than that of the Crossley reflector in the ratio $\left(\frac{5.8}{5.0}\right)^2$; 3. The advantage of brilliancy of image because of the failure of the photographic reciprocity law. If this conclusion is correct the two series of plates are directly comparable, or, we might say that if the KEELER areas had been photographed with the 60-inch instrument Dr. PERRINE's estimate of 500,000 nebulae would be duplicated. It was therefore necessary to seek some other cause for the difference in the estimated numbers.

The point next in order was to consider the correctness

* Lick Observatory *Bulletins*, 3, 47, 1904.

† Lick Observatory Publications, Vol. VIII.

of the assumption upon which both estimates are based. This assumption is that the plates of each series are so distributed that they can be considered fairly representative of the entire sky. In order to test this the positions of the centers of the plates were plotted on a small chart of the sky. A difference between the two series quickly came to light. Approximately thirty-three per cent. of the Crossley plates are located within 45° of the north galactic pole while less than twenty per cent. of the "Selected Areas" are found within the same region. Since there can be little question that the plates of the latter series are quite uniformly distributed over the sky it is evident that the former series is not. The relatively large proportion of the Crossley plates in the neighborhood of the north galactic pole, where there is so marked a condensation of nebulae, is undoubtedly a great if not the determining factor in producing the difference in the two estimates of the probable number of nebulae in the sky.

There is another factor which should be considered but it is difficult to form any estimate of its importance without additional observations. Dr. KEELER's apparent purpose when making out his observing program was to photograph the larger nebulae and clusters. The question arises whether there are more or less smaller nebulae near the larger ones than in fields somewhat removed from the latter. In Dr. PERRINE's article on the number of nebulae (*loc. cit.*) he states that more nebulae were found on plates showing no large objects than on the others. It seems possible that this may be due to the fact that the plates showed only about 0.8 square degrees. The area

outside the larger objects was therefore rather small and should not be compared directly with the total area when only small objects were photographed. The only "Selected Area" plates which throw any light on this matter are the two containing *N.G.C.* 598 and 4254. The first contains fifteen nebulae while the four nearest it on the north, south, east and west average 8. The second shows eighty-eight while the average of the surrounding four is thirty-six. These averages would be of greater value if they were obtained from plates within 5° of the two central ones, but since none of this nature are available the evidence must be taken for what it may be worth. It at least indicates another possible reason for the difference mentioned.

SUMMARY.

The results of this investigation may be summed up as follows:

1. There is a great condensation of nebulae toward the north galactic pole and a similar but much less marked one toward the south galactic pole.
2. On the assumption that most of the nebulae are approximately disk-shaped the planes of the disks appear to be oriented at random in space.
3. The probable number of nebulae in the sky which could be photographed with the 60-inch reflector with exposures of one hour on Lumière Sigma plates is 162,000.
4. 864 new nebulae were discovered.

Smith Observatory, Beloit, Wis., July 25, 1913.

ADDENDUM.

Professor WOLF's *Koenigstuhl-Nebel-Listen* 13 and 14 have been recently received at this observatory. Seven objects from Table I are represented in the above lists. The following identifications appear probable: 1 is *W XIII*, 108, and 83, 89, 91, 94, 95 and 96 are *W XIV*, 169, 197, 202, 217, 225 and 234 respectively.

1913, November 24.

ON A TEMPERATURE GRADIENT TERM IN THE COLLIMATION CONSTANT OF THE ALBANY MERIDIAN CIRCLE,

BY SEBASTIAN ALBRECHT.

Within recent years quite elaborate precautionary measures have been taken to insure accuracy in some of the constants employed in the reductions of meridian circle observations, with special reference to fundamental work. This is especially true of the clock-rate, by means of the temperature and pressure controlled Riefler clocks, and of the azimuth of the transit-instrument, by such work as that of GILL and HOUGH at the Cape Observatory. The level is usually determined by several observations on the nadir as part of the observing program for each day.

In this way, however, a knowledge of the level of the instrument is tied up with the collimation. The collimation is quite generally considered subject to little change, and for this reason it is determined at much longer intervals, usually from one to several weeks.

For the meridian circle of the Dudley Observatory the collimation varies linearly as a function of the temperature.* In view of this direct dependence of the collima-

* CARNEGIE Institution of Washington, Year Book 11, p. 166; 1912.