

ASTRONOMISCHE NACHRICHTEN.

N^o 2859.

Catalogue No. 7 of Nebulae discovered at the Warner Observatory.

In the following list of nebulae are embraced those discovered since the publication of Dr. Dreyer's »New General Catalogue«, and, also a few others which were sent him too late for insertion in that valuable work. For the most part they are exceedingly difficult objects, requiring exquisite seeing, prolonged scrutiny of the field, and an eye trained specially for the work.

The power used is 132, given by a positive periscopic eye piece of large dimensions, made expressly for this kind of work by Gundlach. In front of the field lens, are two horse hairs at right angles to each other, which can be seen without artificial illumination. To the point of inter-

section the center of each nebula is brought and there held by the driving clock until the circles are read.

The right ascensions of those discovered since March 8 1888 are more accurate than those found previously, being generally within one or two seconds, and never, unless off from the meridian, exceeding three seconds of their true position. The process resorted to is new and will be described in due time.

An inspection of all the lists will show the extraordinary number found in Draco, a region formerly supposed to contain but few nebulae.

No.	Date of discov.	α 1890.0	δ 1890.0	Descriptions and remarks
1	1887 Oct. 8	0 ^h 14 ^m 20 ^s	+58° 42' 1"	F * involved in v L e e e F nebulosity e e e diff. in line with 2 st. of = mag. which with a 3 rd forms a right angled triangle.
2	» » 18	1 3 35	— 2 16 6	e F; S; l E; * close nf.
3	» » 12	1 56 50	+10 32 46	e F; p S; l E or i R; B * sf; p F * nr. f.
4	» » 15	2 25 25	+0 46 45	v F; S; R.
5	» » 12	2 29 15	+12 21 0	v F; v S; R; m b M.
6	» » 15	2 34 24	+2 0 45	e e F; v S; R; triangle with 2 st. e e e diff.
7	1887 Nov. 8	2 48 25	+12 22 26	e e F; p S; E; sf of GC. 620.
8	1887 Oct. 15	3 30 45	—34 48 56	p F; p S; e E; east and west.
9	1887 Nov. 24	5 1 20	—3 29 20	
10	1888 Feb. 3	7 53 35	—0 21 49	e e F; v S; R.
11	1888 Mar. 8	8 16 45	+4 36 17	v F; p S; R; nr. p end of 4 st. in an arc of a circle. 1 st of 3.
12	» » 8	8 17 25	+4 43 31	e F; S; R; l b M. 2 nd of 3.
13	» » 8	8 17 40	+4 39 40	e e F; e S; R; e e diff.; 3 rd of 3.
14	1888 Apr. 12	10 39 55	+17 30 8	e F; S; v E; in meridian * 10 mag. 5' nf.
15	» » 12	10 42 5	+18 46 0	v F; p S; l E; forms a curve with 2 st. f.
16	» » 11	11 16 15	+18 24 28	e e F; p S; R; * nr. nf; New General Catalogue 3605, 7, 8 in field.
17	» » 17	11 20 15	+59 45 43	p F; p S; R; forms right angle with 2 st.
18	» » 17	11 58 25	+63 6 17	e e F; p S; R; bet. 2 distant st., one a coarse D e e diff.
19	» » 3	12 14 0	+56 36 39	e F; p S; R; bet. 2 st. in meridian, n. one = 13 mag.
20	» » 6	12 16 5	+16 20 30	e F; S; R; nearly bet. 2 st. east and west; NGC. 4312 and several others near.
21	» » 7	12 19 55	+16 44 0	e F; p S; R; B * n; 4405 f.
22	» » 3	12 35 30	—4 25 39	v F; v S; R.
23	1888 May 6	12 36 33	+12 20 45	e F; p S; R; bet. 2 st.; all 3 point to 4621.
24	» » 6	12 36 35	+13 12 0	e F; p S; e E.
25	» » 5	12 41 10	+10 27 13	e e e F; v S; R; * with F companion nf; np of 2.
26	» » 5	12 41 25	+10 27 43	e e F; v S; R; sf of 2.
27	» » 6	12 44 35	—4 46 44	e e e F; p S; R; nearly bet. 2 st. east and west; 2 nd of 3; 4705, 4718 near.
28	1888 June 1	12 51 35	+64 12 50	e e e F; v S; bet. 2 st. 11 and 12 mag. p and f close to latter; an e e e diff. object.
29	1888 Apr. 17	13 3 15	+60 44 44	v F; p S; R; B * p.

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30	1887 Apr. 24	13 ^h 16 ^m 6 ^s	-12° 9' 13"	v F; p S; R.
31	" " 24	13 18 23	-11 53 10	v F; v S; nearly bet. 2 st.; GC. 3517 nr. np.
32	1888 Apr. 8	13 31 30	+50 30 40	ee F; S; v E; v diff.; nearly bet. 2 st.
33	" " 8	13 35 5	+51 16 40	e F; p S; R.
34	" " 17	13 43 45	+57 10 10	e F; p S; R.
35	1888 June 7	13 45 40	+72 36 6	eee F; S; R; coarse D * nf points to it; np of 2.
36	1888 Apr. 7	13 46 10	+14 38 0	v F; c E; p S; 3 B st. nr. f.
37	" " 7	13 46 55	+14 39 30	e F; v S; R; p close * f.
38	" " 7	13 47 10	+14 39 30	e F; S; R; 3 others suspected.
39	1888 June 7	13 47 38	+71 43 38	ee F; S; R; B * f little south; sf of 2.
40	1888 May 6	13 47 38	+51 31 0	ee F; p S; R; coarse D * nr. sp.
41	1888 Apr. 12	14 3 0	-0 37 8	e F; v S; R; e F * attached s.
42	1888 July 2	14 13 0	+58 19 10	ee F; S; l E; e diff. in vacancy; np of 2.
43	" " 3	14 13 32	+58 9 10	eee F; S; v E; eee diff.; sf of 2.
44	1888 June 7	14 16 52	+72 6 6	F; S; R; B M.
45	1887 July 23	14 26 15	+54 26 30	eee F; p S; R; another or a few F st. nr.
46	1888 May 6	14 30 40	+48 31 0	eee F; S; R; nearly pointed to by 2 D st.; 1 st of 3.
47	" " 6	14 30 45	+48 26 15	eee F; S; R; 2 nd of 3.
48	" " 6	14 30 50	+48 25 0	ee F; p S; R; 3 rd of 3.
49	1888 June 11	14 36 20	+69 29 53	e F; S; R; D * nr. f points to it.
50	1888 July 4	14 42 3	+50 51 45	ee F; L; R; forms arc of a small circle with 2 st.; 3 p B st. nr. sf in form of arc of a large circle.
51	1888 Apr. 8	14 42 20	+50 50 5	e F; p S; R; bet. a p B * and a coarse D *, nearer the latter.
52	" " 7	14 47 0	+63 42 54	v F; p S; R.
53	" " 8	14 47 42	+54 49 40	p F; v S; R; in vacancy.
54	1888 July 4	14 48 25	+51 43 15	ee F; S; R.
55	1888 Aug. 2	14 54 0	+68 52 10	ee F; S; R; D * in field f.
56	" " 2	15 10 32	+67 46 40	ee F; S; v E.
57	1887 July 13	15 31 15	+68 37 25	v F; p S; i R; D * nr. nf. Edward.
58	1888 June 18	15 39 38	+82 57 40	eee F; S; l E; eee diff.; np of 2.
59	" " 18	15 41 5	+82 48 40	p F; v S; R; * nr.; sf of 2.
60	1888 Apr. 12	15 44 28	+12 44 6	v F; v S; R.
61	1887 July 13	15 47 8	+72 47 35	ee F; p S; R; Not GC. 4146. Edward.
62	1888 Aug. 2	15 48 10	+69 44 10	v F; p S; R; forms arc of circle with 2 st.; sp of 2.
63	" " 2	15 49 55	+69 54 10	ee F; S; R; ee diff.; nf of 2.
64	1888 July 2	15 52 40	+70 41 40	v F; p S; R.
65	" " 4	15 53 15	+48 24 35	v F; S; R; sp of 2.
66	" " 4	15 53 30	+48 29 20	p F; p S; R; B M; p B * nr. nf; nf of 2.
67	1888 June 15	15 55 45	+20 2 6	ee F; p S; l E; triangled with 2 nr. st. n.
68	1888 May 16	15 59 0	+14 2 43	e F; e S; R; stellar nearly bet. 2 distant F st.
69	1888 June 8	16 0 25	+18 15 18	ee F; p S; i R; 2 p B st. nr. s.
70	" " 3	16 0 28	+17 53 48	eee F; p S; bet. 2 st. 10 th of 12.
71	" " 3	16 0 28	+18 3 3	eee F; p S; R. 11 th of 12.
72	" " 3	16 0 37	+17 53 18	eee F; S; R. 12 th of 12.
73	" " 7	16 1 15	+18 29 18	eee F; p S; i R; bet. 2 st.
74	" " 7	16 1 25	+18 32 43	eee F; S; R; another and 6061 nr. in line.
75	" " 7	16 1 27	+18 34 18	eee F; S; l E; another and 6061 nr. in line.
76	1888 Apr. 7	16 2 45	+11 4 7	eee F; nr. p * of 3 in a line.
77	1888 Aug. 2	16 4 40	+69 58 10	p F; p S; l E; * 12 mag. p close s; sp of 2.
78	" " 2	16 5 55	+69 54 10	eee F; p S; i R; eee diff.; D * nr. points to it; nf of 2.
79	1888 Apr. 7	16 7 40	+10 9 6	e F; p S; R.
80	" " 8	16 9 6	+9 48 7	e F; S; l E; B * p.
81	1888 June 3	16 9 59	+11 34 55	ee F; S; R.
82	1888 July 2	16 15 30	+68 40 40	v F; S; R. 1 st of 4.
83	" " 2	16 15 30	+66 14 48	e F; S; R; F * close p. 2 nd of 4.

No.	Date of discov.	α 1890.0	δ 1890.0	Descriptions and remarks
84	1888 Aug. 2	16 ^h 15 ^m 55 ^s	+68° 37' 10"	eee F; p S; R; eee diff. 3 rd of 4.
85	" " 2	16 16 25	+69 56 40	eee F; S; R; eee diff.
86	1888 July 2	16 16 40	+68 29 0	v F; p S; l E. 4 th of 4.
87	1887 July 19	17 0 40	+63 51 40	e F; p S; R.
88	" " 19	17 9 50	+60 0 18	eee F; p S; R; bet. 2 st. p and f.
89	" " 19	17 25 30	+58 35 10	p B; p S; R; sp of 2.
90	" " 19	17 25 40	+58 37 40	p B; p S; R; nf of 2.
91	" " 19	17 37 10	+59 26 45	eee F; p S; R; ee diff.
92	1888 May 16	17 45 32	+17 14 29	eee F; p S; R; ee diff.
93	1888 June 11	17 46 48	+62 15 30	eee F; S; R; bet. a * and 3 st. slightly curved; np of 6488 eee diff.
94	1887 July 25	17 47 45	+21 33 32	eee F; p L; R; F * v nr. nf; another F * nr.
95	1887 Oct. 18	18 7 15	+36 0 30	eee F; p S; R; in a semicircle of st.; eee diff.
96	1888 June 11	18 14 15	+55 33 14	e F; p S; R; nearly bet. 2 p B st.
97	1887 Oct. 19	18 25 40	+39 40 5	v F; S; l E; nearly bet. a D and single *.
98	" " 19	18 26 15	+39 55 5	eee F; p S; l E; 3 st. in line point to it.
99	1888 July 12	18 46 15	+40 7 6	eee F; S; i R; eee diff.; F * close nf both in line with 3 v F st. in form of arc of circle. The F * is in the middle. Not 6695.
100	1887 Sept. 16	20 25 50	— 9 26 24	eee F; S; R; 8 th mag. * s.

Notes.

No. 9. This nebula is no. 30 of my list II, which from its omission in Dr. Dreyer's New General Catalogue I thought advisable to re-insert here. Its description there is »Nebulous *; e F; p S; R; p GC. 1005 5^s and is about 1'5 n. GC. 1005 is also a nebulous star = H. V. 32, which Auwers describes as being nr. and sf a B *. This B * is the above nova.«

No. 30, 31. These are numbers 53 and 55 of list VI, which inadvertently were not sent to Dr. Dreyer, and, therefore, are not incorporated in the body of the NGC., but are in the appendix and, being liable to be overlooked, are inserted here.

No. 70, 71, 72. After the completion of my improved method of reading right ascensions directly from the circle, I remeasured the members of this interesting group, and am enabled to identify M. Stephan's 3, which are NGC. 6040, 1, 2. His places are in close agreement with mine. During the process, two others were detected, with the probability that one in my list IV was not again seen, if so, the no. observed is 13 in a field of 30'.

Following are the places of the 12 for 1890.0:

Warner Observatory, Rochester N. Y., 1888 Aug. 4.

α 1890.0	δ 1890.0
15 ^h 59 ^m 28 ^s	+18° 2' 5"
15 59 36	+18 0 47
15 59 40	+18 0 2
15 59 58	+18 10 0
15 59 59	+18 5 3
16 0 0	+18 2 32
16 0 3	+18 4 3
16 0 5	+18 4 2
16 0 10	+18 1 47
16 0 28	+17 53 45
16 0 29	+18 3 0
16 0 37	+17 53 17

No. 97, 98. These together with NGC. 6646, are in finder field with Vega. The three are near together and exactly in line, with 6646 in the middle. Strange, H. missed 97, as it is as bright as his own, though very much smaller. Not at all surprising however that he failed to notice 98, as it is a very difficult object with me, though Prof. Barnard with the 12 inch at the Lick Observatory, pronounces it easy, showing the superiority of his atmospheric conditions over my own.

Lewis Swift.

Schreiben des Hrn. W. R. Brooks betr. die Entdeckung des Cometen Barnard 1888 Sept. 2.

The comet discovered by Barnard Sept. 3 was independently discovered by me the next morning Sept. 4, and telegraphic announcement made at once to Dr. Swift of the Warner Observatory Rochester. Telegram of Barnard's discovery did not reach me until this morning (Sept. 5) or 24 hours after my telegram was sent to Swift.

The comet is rather faint — not very faint — nearly round, and with some central condensation.

Smith Observatory, Geneva N. Y., U. S. A., 1888 Sept. 5.

William R. Brooks, Director.