A CATALOGUE OF Hα-EMISSION REGIONS IN THE SOUTHERN MILKY WAY

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Summary

In connection with an Hα atlas of the Southern Milky Way being produced at Mount Stromlo, a catalogue has been made of the H II regions distributed about the galactic equator within galactic latitude limits ±15°, and extending from galactic longitude 190° to 12°. The results of this survey have been compared with those of previous surveys overlapping the region investigated.

In 1957, a survey programme of the Southern Milky Way for the detection of H II regions was initiated at Mount Stromlo Observatory by Professor B. J. Bok. This programme was carried out with a Meinel-Pearson 8-inch *f*/1 flat field Schmidt which was mounted as a counterweight to the 6-inch Farnham refractor used as the guiding telescope. The camera was delivered to Mount Stromlo in December 1957, when observations were commenced, the Milky Way programme being completed in April 1959.

Optical quality of photographic images depends in large part upon the quality of the objective filters used in the particular survey. The filters used here were Chance OR1 with Kodak 103a-E emulsion for the Hα plates, and Chance OY1 with Kodak 103a-D emulsion for the yellow comparison plates. The glass disks, each 8·25 inches in diameter, were 8 mm (OR1) and 5 mm (OY1) thick. After final adjustment of the camera it was found that the smallest well-exposed images on the 103a-E emulsion were 17 microns in diameter. This figure was regarded as acceptable in view of the limiting resolution imposed by the emulsion.

The measured colour transmissions of the filters are given in Table I.

TABLE I

Filter	Wavelength A	Hα						
		5600	5800	6000	6200	6400	6563	6600
Chance OR1, 9 mm	Transmission	0	0	0	0	6·5	52	61
Chance OY1, 5 mm	(per cent)	0	48	83	88	86		88

At wavelengths of 6300 A and 6364 A, where prominent night sky lines of [O I] occur, the transmission of the OR1 filter was less than 2 per cent.

The survey was carried out in two parts: in 1958, Hα and comparison plates were obtained on 26 centres of the region along the Lund galactic plane commencing at $l = 190°$ and extending to $l = 12°$ through southern declinations, together with 26 North and 26 South plates centred at $b = \pm 9°$. The plate centres are 7 degrees apart in longitude and the diameter of the coma-free field is 12 degrees. The area of the sky surveyed, then, is 194 degrees long and a maximum of 30 degrees wide.

The majority of the plates were obtained by Rodgers, the remainder by Campbell. The possible H II regions were detected by a blink comparison of the Hα and yellow plates. The plate pairs were exposed to approximately the same limiting stellar magnitude, which is near 14 on the visual scale. The exposure times averaged 20 minutes for the red plates and 7 minutes for the yellow. The blinking technique was preferred to the "negative–positive superposition" method used by Gum (**1**), being simpler and one that takes advantage of the excellent optical quality of the camera which may otherwise be lost in any copying process. The plates were blinked by Whiteoak, Rodgers and Campbell, and the positions, dimensions and estimated brightnesses of the H II regions are given in Tables II and III.

The columns of the Tables are:

1. Current catalogue number.
2. New galactic longitude, l^{II}.
3. New galactic latitude, b^{II}.
4. Old galactic longitude, l^{I}.
5. Old galactic latitude, b^{I}.
6. Right ascension, α_{1950}.
7. Declination, δ_{1950}.
8. Dimensions (minutes of arc).
9. Estimated brightness on a scale of bright (b), medium (m), or faint (f).
10. The number of the object in other catalogues.

The tables are followed by a list of remarks concerning individual nebulae. The coordinates have an estimated accuracy of ± 3 min of arc in right ascension and declination. Comparison is made with surveys of Gum (**1**), Sharpless (**2**), NGC (**3**), Hase and Shajn (**4**), and Bok, Bester and Wade (**5**). NGC or IC numbers in parentheses refer to clusters in emission regions. Catalogues in column 10 are designated thus: HS: Hase and Shajn; E: Sharpless; BBW: Bok, Bester and Wade; and G: Gum. Reduction from equatorial coordinates was effected using the computer SILLIAC of the University of Sydney.

Table II contains regions with dimensions greater than 4 min of arc, which are unambiguously H II regions. Table III contains objects with diameters less than 4 minutes, found to be bright on the Hα plates, some of which are stellar or semi-stellar and may include emission-line B stars, planetary nebulae, Wolf–Rayet stars or variable stars. The known variables listed in the Variable Star Catalogue of B. V. Kukarkin *et al.* (**6**) and detected in the survey have been omitted from Table III. In the higher latitude fields, only objects definitely found to be H II regions are noted in Table II.

It is our experience that in this survey we have reached fainter limiting emission measures in a given region of the sky than did Gum, primarily because of the increase in resolution of our camera. This has resulted in the detection of large areas of faint diffuse emission particularly in the region of Vela-Puppis. Gum (**7**) discovered large areas of Hα emission in Vela and Puppis, and Abt, Morgan and Strömgren (**8**) photographed this object at low altitude with an 8-inch, $f/1$ Schmidt camera. The nebula as defined by the latter work is inside the area of the present survey. We have found that the outlying fragments in Antlia and Pyxis are in fact joined to the brighter main body of the nebulae in Vela and Puppis, that faint emission fills the shell structure of the brighter part of the nebula near $07^h\,50^m$; $-45°$, and that there are extensions to the nebula,

to the outer parts in Antlia and Pyxis, near δ Canis Majoris, and near the galactic equator to longitude 249°. The overall dimensions of the nebula then become 27° × 42°, elongated along the galactic plane and symmetrical about it. Considerable difficulty lies in the adequate description and cataloguing of this nebula due to its size and complex brightness distribution. For this reason Table II lists only the extensions of the Vela-Puppis nebula found here but not described by Gum (**9**) or in the Yerkes survey of Abt, Morgan and Strömgren.

To give pictorial representation of these nebulae, Mount Stromlo Observatory is preparing a complete Hα atlas of the region surveyed, together with key charts giving right ascension, declination and new galactic coordinates based on the recent recommendations of the Commission 33b of the International Astronomical Union.

TABLE II

Table of regions greater than 4′ diam

o.	l^{II}	b^{II}	l^{I}	b^{I}	α_{1950}	δ_{1950}	Dimensions	Brightness	Comparison
					h m	° ′	(min of arc)		
1	223·0	−1·5	190·7	−0·2	07 02	−09 30	150×150	m	NGC 2327; HS 111,
	→226·9	→+0·3	→194·6	→+1·1	→07 14	→−12 24			113, 114; G 2, 3
2	223·8	−1·9	191·5	−0·6	07 02	−10 27	14×14	b	IC 2177; HS 109; G
4	224·4	+3·2	192·1	+4·6	07 21·5	−08 30	60×60	f	
5	227·8	−0·2	195·5	+1·1	07 16·1	−13 09	8×8	b	NGC 2359; HS 116; G 4
6	231·6	−4·3	199·2	−3·1	07 08·0	−18 24	12×10	b	G 5
7	232·6	+0·9	200·3	+2·2	07 29·5	−16 51	17×15	m	(NGC 2409)?; G 6
9	234·4	−12·2	201·9	−11·0	06 43	−24 20	90×30	f	
10	234·4	− 0·2	202·1	+ 1·0	07 29·0	−18 54	18×14	f	
11	234·6	−10·0	202·1	− 8·8	06 52	−23 35	60×20	f	
12	234·7	+ 0·9	202·4	+ 2·1	07 33·7	−18 42	6×3	b	G 7
13	234·8	− 0·1	202·5	+ 1·1	07 30·1	−19 18	12×10	m	
14	235·6	− 4·1	203·2	− 2·9	07 17·0	−21 50	6×4	m	(NGC 2367)
15	237·5	− 7·3	205·0	− 6·2	07 08	−25 00	300×300	f	
16	243·3	+ 0·6	211·0	+ 1·6	07 51·2	−26 15	33×33	b	(NGC 2467); G 9
19	253·8	− 0·5	221·5	+ 0·4	08 13·5	−35 42	48×40	b	G 10
20	254·5	0·0	222·2	+ 0·9	08 17·5	−36 00	10×10	m	NGC 2579; G 11
22	258·1	+12·1	226·1	+12·9	09 13·5	−31 10	45×45	m	
27	260·1	+ 0·5	227·8	+ 1·3	08 36·5	−40 12	100×100	m	G 14
32	261·6	+ 0·9	229·3	+ 1·6	08 43·0	−41 09	27×27	m	G 15
33	263·0	+ 1·4	230·7	+ 2·1	08 49·5	−41 54	95×80	m	G 17
35	264·6	+ 0·1	232·3	+ 0·8	08 49·7	−43 55	30×30	m	G 18
36	265·2	+ 1·4	232·9	+ 2·1	08 57·5	−43 33	12×6	m	G 20
37	267·0	+ 0·1	234·7	+ 0·7	08 58·5	−45 45	13×3	f	Part of NGC 2736
38	268·0	− 1·0	235·7	− 0·5	08 57·5	−47 16	40×40	m	G 22, 23 24,
40	269·3	− 1·4	236·9	− 0·8	09 01·0	−48 27	8×8	b	G 25
41	270·3	+ 0·8	238·0	+ 1·3	09 14·8	−47 45	8×4	m	
42	274·1	− 1·3	241·8	− 0·9	09 22·4	−51 54	9×7	b	G 26
45	282·2	− 0·1	249·9	+ 0·1	10 10·0	−56 09	16×16	f	
46	282·4	− 1·3	250·0	− 1·1	10 06·0	−57 15	15×15	f	
47	283·0	− 2·7	250·6	− 2·5	10 03·5	−58 42	25×20	m	
48	283·5	− 1·0	251·1	− 0·8	10 14·0	−57 36	15×10	b	NGC 3199; G 28
49	284·3	− 0·3	252·0	− 0·2	10 22	−57 27	90×35	b	(NGC 3247); G 29
50	284·3	+ 0·4	252·0	+ 0·5	10 24·5	−56 54	12×12	m	
51	286·0	+ 0·5	253·7	+ 0·5	10 36·1	−57 42	12×12	b	
52	287·2	+ 0·4	254·9	+ 0·5	10 43·5	−58 18	15×15	b	BBW 25500; G 32
53	287·4	− 0·9	255·0	− 0·8	10 40	−59 30	210×210	vb	NGC 3293, 3324, 337 IC 2599; BBW 25500; G 30, 31, 3
54	288·8	+ 0·7	256·5	+ 0·8	10 56	−58 42	210×60	m	(NGC 3503)? (NGC
	→289·4	→− 2·1	→257·0	→− 2·1	→10 50	→−61 30			3572)? G 34, a, b, 3
	→291·1	→− 0·3	→258·8	→− 0·4	→11 09	→−60 36			36, 37
55	290·4	− 3·0	258·0	− 3·0	10 54·2	−62 45	8×8	m	
57	291·6	− 0·5	259·3	− 0·5	11 12·5	−60 56	170×40	m	NGC 3603; G 38, a,

TABLE II—*continued*

No.	l_{II}	b_{II}	l_I	b_I	α_{1950}	δ_{1950}	Dimensions	Brightness	Comparison
					h m	° ′	(min of arc)		
58	292·4	− 4·9	260·0	− 5·0	11 04·3	−65 18	7×7	m	
59	293·0	+ 4·5	260·8	+ 4·4	11 35	−56 40	180×150	m	
60	293·7	− 1·4	261·4	− 1·5	11 26·5	−62 30	50×50	b	IC 2872; BBW 2620 G 39, 40
61	294·2	− 2·3	261·8	− 2·4	11 28·3	−63 30	15×15	b	G 41
62	294·8	− 1·5	262·4	− 1·6	11 35	−62 54	80×80	b	IC 2944, 8; BBW 26201; G 42
63	296·7	+ 7·1	264·6	+ 6·9	12 05	−55 00	250×40	f	
	→299·5	→+13·5	→267·6	→+13·2	→12 28	→−49 00			
65	301·0	+ 1·2	268·7	+ 0·9	12 31·5	−61 18	11×6	m	G 43
68	301·7	+ 1·0	269·4	+ 0·7	12 37·3	−61 36	15×15	f	
69	302·2	+ 0·3	269·9	0·0	12 41·5	−62 18	5×3	m	G 45
74	305·2	0·0	272·9	− 0·4	13 07·8	−62 33	15×12	f	
75	306·3	+ 0·2	273·9	− 0·2	13 16·5	−62 15	18×13	m	BBW 27300; G 48a
78	307·9	+ 0·2	275·6	− 0·3	13 30·5	−62 00	45×30	f	BBW 27500; G 48b
79	308·7	+ 0·6	276·4	+ 0·1	13 36·5	−61 30	9×5	m	BBW 27600; G 48c
80	309·3	− 0·5	277·0	− 1·0	13 43·5	−62 24	21×10	m	BBW 27700; G 48d
82	311·0	+ 0·4	278·7	− 0·2	13 55·7	−61 12	5×4	b	
83	311·9	− 0·5	279·6	− 1·1	14 05·0	−61 50	60×50	f	BBW 27901
85	313·5	− 0·4	281·1	− 1·0	14 17·0	−61 10	25×20	f	BBW 28100
91	321·2	− 0·5	288·8	− 1·3	15 12·5	−58 01	11×10	f	BBW 28801
92	322·2	+ 0·6	289·9	− 0·2	15 14·5	−56 30	8×5	f	BBW 28900
94	326·2	+ 0·9	293·9	0·0	15 37·0	−54 00	20×20	f	BBW 29400a
97	327·1	− 0·5	294·8	− 1·4	15 47·7	−54 36	6×5	m	BBW 29401
98	327·6	− 0·8	295·3	− 1·7	15 51·5	−54 30	6×5	b	BBW 29501; G 49
102	331·9	− 1·0	299·6	− 2·0	16 14·0	−51 48	12×8	b	BBW 29902
103	332·4	− 0·4	300·1	− 1·4	16 13·3	−51 00	5×3	b	
104	332·9	− 1·4	300·5	− 2·4	16 20·2	−51 24	20×20	m	
105	332·9	+ 1·8	300·6	+ 0·8	16 06·3	−49 00	45×35	b	BBW 30000; G 51
106	332·9	− 0·6	300·6	− 1·7	16 17·0	−50 48	35×20	m	
107	336·4	− 0·2	304·0	− 1·3	16 29·8	−48 03	8×4	b	NGC 6164, 5; G 52
108	336·5	− 1·3	304·1	− 2·3	16 35·0	−48 40	210×120	f	(NGC 6193); BBW 30402; G 53
110	340·9	− 0·8	308·6	− 1·9	16 50·0	−45 00	7×3	b	G 54
111	341·1	− 1·0	308·8	− 2·2	16 51·5	−45 00	5×3	b	G 54
113	342·7	+ 1·8	310·4	+ 0·6	16 45	−42 00	360×300	m	(NGC 6231); BBW 31100; G 55
114	343·9	− 4·7	311·5	− 5·9	17 18	−45 00	330×330	f	
119	347·7	+ 1·9	315·4	+ 0·7	17 01·3	−38 00	180×145	m	(NGC 6281); BBW 31500; G 57, a, b; E 1
120	348·3	+ 0·5	316·0	− 0·8	17 09·0	−38 24	6×6	b	G 58; E 2
123	349·5	− 0·8	317·2	− 2·1	17 17·8	−38 09	75×75	f	NGC 6337; G 59; E
125	350·0	+ 0·2	317·7	− 1·0	17 15·0	−37 09	8×8	f	
126	350·6	+ 1·0	318·2	− 0·3	17 13·5	−36 18	16×4	m	BBW 31800a
127	351·4	+ 0·7	319·1	− 0·6	17 17·0	−35 48	50×25	b	NGC 6334; BBW 31800b; E 7; HS 119; G 61, 62, 63, 64a, b, c
128	351·4	− 0·1	319·1	− 1·4	17 20·4	−36 15	10×10	f	
129	351·9	+12·7	319·7	+11·4	16 34·0	−28 00	180×180	m	
130	352·4	+ 2·1	320·1	+ 0·8	17 14·2	−34 06	30×20	m	E 4
131	353·2	+ 0·7	320·9	− 0·6	17 22	−34 18	170×55	b	(NGC 6357); BBW 32100; HS 120; E G 66
132	355·4	+ 0·2	323·1	− 1·1	17 30	−32 42	110×80	m	(NGC 6383); BBW 32301; HS 121; E 11; G 67
133	355·9	+ 1·5	323·6	+ 0·2	17 26·0	−31 36	45×40	m	BBW 32300; E 10; G 68
134	358·5	− 1·9	326·2	− 3·3	17 46·1	−31 14	60×50	m	BBW 32603; E 17; G 69
137	359·8	− 0·2	327·4	− 1·6	17 42·6	−29 18	18×18	b	BBW 32801; E 13
138	000·1	+ 0·2	327·7	− 1·2	17 41·7	−28 49	8×4	m	E 12
140	000·2	− 0·4	327·8	− 1·8	17 44·2	−29 02	12×12	f	BBW 32701; E 16
141	000·4	− 0·2	328·0	− 1·6	17 44·0	−28 46	6×4	f	E 15
143	003·5	+ 2·1	331·2	+ 0·7	17 42·5	−24 54	7×6	m	Near NGC 6432

TABLE II—*continued*

No.	l_{II}	b_{II}	l_I	b_I	α_{1950}	δ_{1950}	Dimensions	Brightness	Comparison
					h m	° ′	(min of arc)		
144	004·4	+ 0·5	332·1	− 1·0	17 50·7	−25 00	85×65	f	BBW 33201; HS 123; E 19; G 71
145	006·6	+ 0·1	334·3	− 1·3	17 57	−23 15	90×35	f	HS 124; E 20; G 74a, b
146	006·6	− 1·5	334·3	− 2·9	18 03	−24 00	120×90	b	NGC 6523(M8), 6559; BBW 33402; HS 126; E 23, 27, 29, 30; G 72, 75
147	007·2	− 0·2	334·9	− 1·7	17 59·5	−22 54	16×16	b	NGC 6514 (M 20); HS 125; E 22; G 76
149	008·7	− 0·6	336·4	− 2·0	18 04·0	−21 45	120×30	m	HS 129; E 24; G 77a
151	011·0	− 1·8	338·6	− 3·3	18 13·5	−20 25	100×35	f	NGC 6526; HS 134; E 32, 33; G 77b
153	012·2	− 1·8	339·9	− 3·3	18 16·0	−19 20	60×20	f	(IC 1283, 4); BBW 33903; HS 140; E 39; G 78
154	012·7	+ 2·0	340·4	+ 0·5	18 03·0	−17 00	40×30	f	
155	012·9	+ 0·3	340·6	− 1·1	18 09·3	−17 41	10×10	m	HS 133; E 31
156	013·7	− 0·8	341·4	− 2·2	18 15·0	−17 30	50×50	f	HS 136; E 34
157	014·3	+ 0·1	342·0	− 1·4	18 13·2	−16 36	60×60	b	(IC 4701); BBW 34101; HS 137; E 35; G 79
158	015·2	+ 3·3	342·9	+ 1·8	18 03·5	−14 12	23×23	m	BBW 34201; HS 128; E 25; G 80
159	015·3	− 1·8	343·0	− 3·3	18 22·0	−16 36	15×15	m	
160	015·4	− 0·8	343·1	− 2·3	18 18·5	−16 00	70×60	b	NGC 6618; (IC 4706, 7); BBW 34202; HS 144, 145; E 43; G 81a, b
161	016·1	− 0·3	343·8	− 1·7	18 18·0	−15 09	80×40	m	HS 143
162	016·7	− 0·5	344·4	− 1·9	18 20·0	−14 40	22×10	b	BBW 34401; HS 146; E 44; G 82
163	016·9	− 2·3	344·6	− 3·8	18 27·1	−15 24	10×9	m	
164	016·9	− 1·2	344·6	− 2·7	18 23·0	−14 51	8×6	b	HS 148; E 46
165	017·0	+ 0·8	344·6	− 0·7	18 16	−13 54	90×66	b	NGC 6611; BBW 34400; HS 142; E 42; G 83
166	018·4	− 0·3	346·1	− 1·8	18 22·6	−13 09	15×15	f	HS 147; E 45
167	019·0	+ 1·3	346·6	− 0·2	18 18	−11 54	180×90	m	(NGC 6604); BBW 34600; E 41; G 84, 85
169	022·0	+ 0·1	349·7	− 1·4	18 28·2	−09 48	7×7	m	HS 150; E 48
170	022·6	+ 0·3	350·3	− 1·2	18 28·5	−09 09	7×5	f	
171	023·2	+ 0·6	350·9	− 0·9	18 28·6	−08 27	5×5	m	HS 151; E 49
172	024·6	− 0·1	352·3	− 1·6	18 33·8	−07 32	7×7	f	HS 155?; E 53
173	025·4	+ 0·2	353·1	− 1·2	18 34·0	−06 41	17×17	m	BBW 35201; HS 154; E 52
174	028·8	+ 3·4	356·5	+ 1·9	18 29·2	−02 13	5×4	f	HS 152
175	029·1	− 0·7	356·8	− 2·1	18 44·2	−03 48	7×5	m	HS 159; E 57
176	030·5	+ 0·4	358·2	− 1·0	18 42·7	−02 04	8×8	m	HS 158; E 56
177	031·9	+ 1·4	359·6	0·0	18 41·8	−00 24	12×12	m	HS 156; E 55
179	036·4	− 1·7	004·1	− 3·1	19 01·2	+02 09	20×15	f	
181	038·8	+ 2·0	006·5	+ 0·6	18 52·3	+06 00	5×5	f	

TABLE III

List of possible regions less than 4′ diam.

No.	l_{II}	b_{II}	l_I	b_I	α_{1950}	δ_{1950}	Dimensions	Brightness	Comparison
					h m	° ′	(min of arc)		
3	224·2	+1·2	191·9	+2·5	07 14·0	−09 18	4×4	b	HS 115
8	233·9	−0·1	201·6	+1·1	07 28·3	−18 27	3×2	b	
17	243·5	−1·0	211·1	0·0	07 45·4	−27 13	2×2	b	
18	250·3	−2·2	218·0	−1·3	07 57·2	−33 42	1×1	b	
21	257·6	+0·6	225·3	+1·4	08 28·8	−38 10	1×1	b	

TABLE III—*continued*

o.	l^{II}	b^{II}	l^{I}	b^{I}	α_{1950}	δ_{1950}	Dimensions	Brightness	Comparison
					h m	° ′	(min of arc)		
23	258·5	+1·4	226·2	+2·2	08 35·0	−38 21	2×1	b	
24	258·7	−1·4	226·3	−0·7	08 23·6	−40 12	3×2	f	
25	259·2	+1·3	227·0	+2·1	08 36·9	−39 02	2×1	b	
26	259·7	+2·9	227·5	+3·6	08 44·6	−38 27	3×3	m	
28	260·1	−3·4	227·8	−2·7	08 19·6	−42 33	2×1	b	
29	260·2	−3·3	227·8	−2·6	08 20·0	−42 32	2×2	b	G 13
30	260·2	−3·1	227·9	−2·4	08 21·1	−42 29	2×2	b	G 13
31	260·7	−3·2	228·4	−2·5	08 22·3	−42 55	3×2	b	
34	264·4	+1·4	232·1	+2·0	08 54·4	−42 56	2×2	b	G 19
39	269·2	−1·1	236·8	−0·6	09 01·9	−48 12	2×2	b	
43	277·2	−3·8	244·8	−3·5	09 25·5	−55 54	2×2	b	NGC 2899; G 27
44	277·8	−3·6	245·4	−3·3	09 29·6	−56·05	2×2	f	
56	291·1	−2·1	258·7	−2·1	11 03·3	−62 12	2×1	m	
64	299·4	−0·3	267·0	−0·6	12 16·7	−62 41	3×2	b	
66	301·1	+0·9	268·8	+0·6	12 32·6	−61 39	2×1	m	G 44
67	301·2	+0·8	268·9	+0·5	12 33·0	−61 45	4×4	m	
70	302·7	−1·0	270·3	−1·3	12 45·6	−63 34	1×1	b	
71	302·9	+1·3	270·6	+1·0	12 47·3	−61 18	4×3	b	G 46
72	303·2	+1·6	270·9	+1·3	12 50·3	−61 00	2×2	f	
73	303·4	+1·4	271·1	+1·0	12 52·0	−61 12	2×2	m	
76	307·2	−3·5	274·8	−3·9	13 29·8	−65 45	3×2	b	NGC 5189; G 47
77	307·6	−5·0	275·1	−5·4	13 35·4	−67 10	1×1	b	
81	310·6	+0·6	278·3	+0·1	13 51·9	−61 06	1×1	m	
84	312·6	−2·7	280·2	−3·3	14 16·4	−63 40	1×1	m	
86	315·0	−2·3	282·7	−3·0	14 35·5	−62 27	3×3	m	
87	320·2	+0·8	287·9	+0·1	15 01·0	−57 19	2×2	b	
88	320·2	+0·5	287·9	−0·3	15 02·7	−57 36	3×2	b	
89	320·4	−1·0	288·1	−1·7	15 09·5	−58 46	4×4	f	
90	321·0	+2·2	288·7	+1·4	15 01·5	−55 46	0·5×0·5	m	
93	322·6	−2·5	290·2	−3·3	15 29·7	−58 54	2×2	m	
95	326·7	+0·8	294·4	−0·1	15 39·7	−53 47	3×2	b	BBW 29400 c
96	326·9	−1·0	294·6	−1·9	15 48·9	−55 06	2×2	f	
99	328·7	−0·5	296·3	−1·4	15 55·8	−53 35	4×2	b	G 50
00	329·1	+2·0	296·8	+1·0	15 47·7	−51 22	1×1	m	
01	331·7	−1·0	299·3	−1·9	16 12·6	−51 54	2×2	b	
09	339·7	−0·3	307·3	−1·4	16 43·0	−45 39	2×2	b	
12	341·7	+5·6	309·5	+4·4	16 27·0	−40 12	2×2	b	
15	344·4	+7·3	312·1	+6·1	16 29·6	−37 06	4×2	m	
17	345·5	−1·0	313·1	−2·2	17 06·2	−41 33	2×2	b	
18	347·3	−0·5	315·0	−1·8	17 10·0	−39 48	2×2	m	
21	348·4	−1·1	316·0	−2·3	17 15·5	−39 15	3×2	m	E 5
22	348·9	−1·1	316·5	−2·4	17 17·1	−38 54	2×2	m	
24	349·6	+1·1	317·3	−0·2	17 10·4	−37 00	3×2	m	NGC 6302; E 3; G 6
35	359·0	−0·7	326·6	−2·0	17 42·4	−30 12	2×2	m	
36	359·0	−3·6	326·7	−5·0	17 54·4	−31 40	1×1	m	
39	000·1	−0·3	327·8	−1·7	17 43·8	−29 02	2×2	m	E 14
42	000·6	−0·7	328·3	−2·1	17 46·5	−28 50	2×2	b	E 18
48	008·2	+0·6	335·9	−0·8	17 58·5	−21 35	2×2	b	
50	009·3	+0·3	337·0	−1·2	18 02·1	−20 48	2×2	b	
52	012·2	+4·3	339·9	+2·9	17 53·3	−16 19	2×2	m	
68	021·3	+2·5	349·0	+1·0	18 18·0	−09 16	1×1	b	
78	036·3	−1·2	004·0	−2·6	18 59·2	+02 19	2×2	m	
80	038·4	+3·5	006·0	+2·1	18 46·3	+06 19	1×1	b	
82	040·0	−1·3	007·7	−2·7	19 06·3	+05 32	3×3	m	E 61

Notes to Tables II and III

1 Horseshoe-shaped bright region 2° in diameter, with 8′×5′ concentration at $07^{h}\ 03^{m}.0$, −12° 12′. Fainter region 150′ diameter, centred on $07^{h}\ 08^{m}$, −09° 30′.
2 Circular, connected to 1 by faint emission.
5 Circular region
6 Contains diffuse outer region.
7 Circular region.
9 Part of the Vela-Puppis Nebula ?
11 Part of Vela-Puppis ?
13 Circular region.

Notes to Tables II and III—continued

14 Possibly connected with Vela-Puppis. Possible concentration in 15.
15 Loop, possibly connected with Vela-Puppis.
16 Circular region.
19 Large area with one bright edge.
20 Surrounded by diffuse emission; could be associated with 19.
22 Part of Vela-Puppis ?
27 Region showing structure.
30 Two small regions $1' \times 1'$.
31 Connected with Vela-Puppis ?
32 Circular region.
33 Almost circular, with more intense area " comma "-shaped.
36 Group of 3 bright regions—" S "-shaped.
37 Filamentary.
38 Emission region containing four concentrations at: $08^h\,57^m.5$, $-47°\,16'$ ($6' \times 4'$); $08^h\,57^m.7$, $-47°\,22'$ ($3' \times 2'$); $08^h\,58^m.0$, $-47°\,08'$ ($9' \times 7'$); and $08^h\,58^m.4$, $-47°\,20'$ ($12' \times 9'$).
40 Bright region possibly associated with diffuse surrounding background emission.
42 Circular.
43 Stellar-like.
48 Bright crescent shape.
49 Emission region outlying η Carina nebula.
50 Possibly associated with 49.
51 Bright knot possibly separated from main η Carina nebula by obscuration.
52 Bright knot in η Carina nebula separated from main region by absorption.
53 Main irregular η Carina nebula. Boundaries at $10^h\,28^m$, $-58°$; $10^h\,55^m$, $-58°\,18'$; $10^h\,27^m$, $-60°\,48'$.
54 Outlying η Carina, with concentrations at: $10^h\,57^m.5$, $-61°\,00$ ($40' \times 20'$); $10^h\,58^m.0$, $-59°\,20'$ ($70' \times 40'$) (filamentary); $11^h\,08^m.0$, $-59°\,54'$ ($25' \times 25'$); $11^h\,10^m.5$, $-58°\,30'$ ($25' \times 10'$).
55 Circular region, appears to have central star; not part of η Carina.
57 Appears obscuration-bounded and contains bright crescent-shaped region $50' \times 20'$.
59 3° diameter loop.
60 Outlying part of λ Cen nebula. Contains bright regions centred at: $11^h\,26^m.5$, $-62°\,21'$ ($21' \times 18'$); $11^h\,26^m.5$, $-62°\,42'$ ($15' \times 10'$).
61 Circular region near λ Cen nebula.
62 Main λ Cen nebula, uneven intensity.
63 Large band of emission.
65 Region has diffuse edges.
74 Crescent-shaped.
75 Diffuse edges.
76 Planetary ?
78 Brighter central region ($10' \times 6'$).
82 Circular.
85 Possibly obscuration bound.
86 Crescent-shaped.
91 Possibly obscuration bound.
93 Like a planetary in appearance.
94 Circular and filamentary.
96 Appears to be surrounding a star.
98 Appears to be distributed about a faint central star.
100 Stellar-like.
101 Stellar-like.
106 Contains two bright areas: $16^h\,15^m.5$, $-50°\,51'$ ($20' \times 7'$); $16^h\,17^m.0$, $-50°\,42'$ ($12' \times 12'$).
107 Bright region near 108.
108 Irregular intensity variation with bright region at $16^h\,36^m$, $-48°\,30'$ ($60' \times 60'$).
109 Stellar-like.
110 Could be connected to 113 by faint emission.
111 Near 110, possibly connected.
113 Large loop of ionization in region of fainter emission. Boundaries: ($16^h\,37^m$, $-41°50'$) to ($16^h\,58^m$, $-41°\,30'$); and ($16^h\,50^m$, $-43°\,30'$) to ($16^h\,45^m$, $-39°\,40'$).
114 Ring of emission 50′ wide.
116 Concentration inside 113.
119 Filamentary, with bright concentration at $16^h\,57^m.4$, $-38°\,13'$ ($15' \times 15'$).
120 Contains dark central rift.
123 Loop.
127 Faint extensions to $17^h\,10^m$, $-35°\,30'$. Composed mainly of four bright concentrations.
129 Region contains the star τ Sco.
130 Appears to be a more centrated region of a large area of diffuse emission.
131 Concentrations at: $17^h\,21^m.0$, $-33°\,58'$ ($30' \times 30'$); $17^h\,21^m.8$, $-34°\,10'$ ($9' \times 9'$); $17^h\,23^m.1$, $-34°\,27'$ ($6' \times 6'$); $17^h\,23^m.9$, $-34°\,03'$ ($5' \times 5'$).
132 Crescent-shaped bright region with faint extensions to $17^h\,35^m$, $-34°$.
133 Almost circular.

Notes to Tables II and III—continued

134 Circular.
136 Stellar in appearance.
137 Near galactic centre.
138 Diffuse edges.
140 Perhaps connected to 141.
144 Circular.
146 Main bright area divided in three, probably by obscuration, with centres: $18^h\ 01^m.8$, $-24°\ 12'$ ($100'\times45'$); $18^h\ 03^m.0$, $-23°\ 30'$ ($45'\times45'$); $18^h\ 06^m.5$, $-23°\ 50'$ ($60'\times50'$).
147 Almost circular.
150 Stellar in appearance.
151 Band of emission, one side bounded by heavy obscuration.
152 Stellar in appearance.
153 Faint region with bright area [$18^h\ 14^m.7$, $-19°\ 40'$ ($19'\times19'$)] at one end.
155 Two concentrations: $18^h\ 08^m.9$, $-17°\ 36'$ ($7'\times7'$); $18^h\ 09^m.3$, $-17°\ 40'$ ($8'\times5'$).
156 Possibly local concentration of general diffuse emission present. Brighter region at $18^h\ 14^m.0$, $-17°\ 18'$ ($40'\times20'$).
157 Faint extensions to $18^h\ 01^m$, $-14°\ 00$ (E 25); and $18^h\ 14^m$, $-17°\ 00$.
159 Surrounded by diffuse emission.
160 Surrounded by diffuse emission 40′ wide.
162 Oval-shaped, possible concentration of general diffuse emission present.
165 Appears connected with adjacent regions by diffuse emission.
166 Surrounded by diffuse emission.
169 Circular region.
175 Crescent-shaped.
180 Stellar-like.

The majority of the nebulae listed in Tables II and III show complex structure over large areas. In part this complexity is due to overlying absorption. Thus in many cases the identification of individual exciting stars from existing spectral data is impossible; an example of this is the extremely faint nebulosity against which the Southern Coalsack is silhouetted. The dimensions of this nebulosity approximately 7 degrees in diameter, are similar to those of the whole concentration of B stars forming the I Crucis association, and it is probable that all the earlier stars of the association contribute to the excitation of the nebula.

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References

(1) C. S. Gum, *Mem. R.A.S.*, **67,** 155, 1955.
(2) S. Sharpless, *Ap. J.*, **118,** 362, 1953.
(3) J. L. E. Dreyer, New General Catalogue 1953.
(4) V. F. Hase and G. A. Shajn; *Bull. Crimea. Ast. Obs.*, **15,** 11, 1955.
(5) B. J. Bok, M. J. Bester and C. M. Wade, *Daedalus*, **86,** 9, 1955, Harvard Reprint No. 416.
(6) B. V. Kukarkin, P. P. Parengo, Yu. I. Efremov and P. N. Kholopov, *General Catalogue of Variable Stars*, 2nd edition, 1958.
(7) C. S. Gum, *Observatory*, **72,** 151, 1952.
(8) H. A. Abt, W. W. Morgan and B. Strömgren, *Ap. J.*, **126,** 322, 1957.
(9) C. S. Gum, *Observatory*, **76,** 150, 1956.