CARBON STARS AT THE GALACTIC EQUATOR IN A ZONE 4° WIDE

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A catalogue is given of 271 carbon stars within a galactic zone 4° wide from longitude 333° through zero to 201°. The classification was made on objective-prism plates, utilizing the near infrared spectral region from λ 6800 to λ 8800. Of these stars, 222 are new. A way to separate the N and the R stars is suggested, with the results indicated in the catalogue. The limiting infrared magnitude of the survey is about 11.

The cyanogen bands in the near infrared furnish a ready means for recognizing carbon stars on objective-prism spectra of low dispersion. These stars are the N and R stars grouped in one class by Keenan and Morgan (1941). The present list of such stars was observed on plates taken with the 2° objective prism attached to the Burrell Schmidt-type telescope. The dispersion at the telluric A band with this combination is 3400 A/mm. The spectral range examined was from λ 6800 to λ 8800. No widening was used in the exposures. The *CN* bands at λλ 7945, 8125, and 8320 produce marked weakening in the continuum in this region, while the bands on the short-wave-length side of the A band produce the appearance of a highly reddened star. The segregation of the carbon stars can be made with certainty, even with dense or with very weak spectra. However, when the *CN* bands are very weak, that is, when the star is of class C0, C1, or C2, it is difficult to recognize them with this dispersion, particularly when the spectra are not of the proper density.

In the present list of carbon stars an effort has been made to divide them into the N and R classes by comparing their spectra with the spectra of known N and R stars. Standards were selected from Sanford's list (1944). As far as possible, available plates on which some of the stars in this list were present were utilized. In addition, a number of plates, each with multiple exposures, were taken to provide means for accurate matching of spectra. Thirty-eight stars, of which 18 were of class N and 20 were of class R, were selected as standards.

The weakening of the continuum produced by the absorption of the *CN* bands λλ 7945, 8125, and 8320 was estimated on an arbitrary scale by comparing the spectrum of each star with the spectrum of a standard of approximately the same density. Likewise, the apparent "color" was estimated arbitrarily by the shortening and narrowing of the spectrum on the short-wave-length side of the A band.

The corresponding estimates for each of the thirty-eight stars are plotted in Figure 1, with the *CN* strength as abscissa and the "color" as ordinate. The relative strength of the bands increases with the numerical value of the estimate. Dots represent N stars and crosses R stars.

The distribution of these points suggests an approximate way to separate the N and the R stars. The region nearer the origin is occupied by the class-R stars, which are mostly early type. The N stars occupy the area within the broken lines. The two R stars within the rectangle were both R8, a class also difficult to segregate in other spectral regions. Another discordant classification occurs at the left boundary of the rectangle. The right and upper region of the figure is occupied by class-R stars. The assigned numerical values can be estimated with reasonable consistency. The values given in the figure represent the average of two independent estimates.

The method described above was utilized in segregating the N and the R stars in a belt 4° wide along the galactic equator. The area of 912 square degrees contains 271 carbon stars. Of these, 127 were compared with the standards, and estimates of the strength of the bands were made. For the rest of the stars, either the classification was made without the need of comparison with standards, or the comparison was made, but no estimates were given, as the spectra were too dense or too weak.

Among the 271 stars, 49 were either in Sanford's (1944) or in the Dearborn list (Lee *et al.* 1943, 1947). The spectra of 8 of these stars were too dense for assignment of a numerical estimate of band strength, but comparison with the standard spectra of the same density produced classifications in agreement with the published ones. All gave accordant classifications. For the remaining 41 stars, estimates of band strength were available. Five discordances are present; in addition, star No. 215 (Table 1*b*) was classed as R by Lee and by us and as N by Sanford.

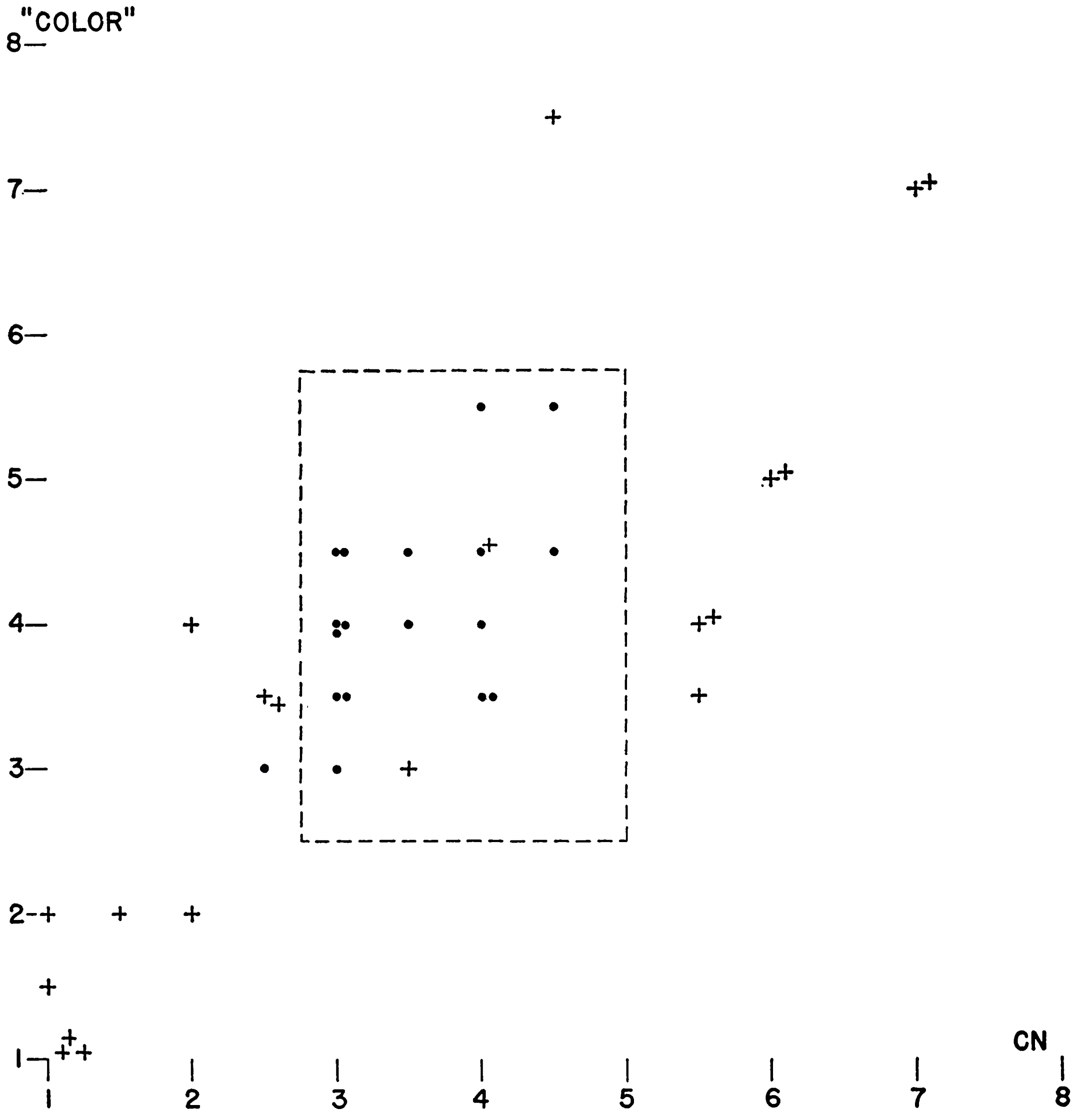

FIG. 1.—Plot of (•) and R (+) standard stars. The *CN* strength is given as abscissa and the "color" as ordinate.

All the 127 stars for which numerical estimates of band strength and "color" were available are plotted in Figure 2. As in the previous figure, the arbitrary estimate of the strength of the *CN* bands is given in the abscissa, and the arbitrary estimate of "color" as the ordinate. The dots indicate that the stars were classed as N, and the crosses as R stars. A circle around a dot or a cross indicates that the classification is in agreement with the published classification. If a disagreement exists, a triangle is placed around the dot or cross.

Tables 1*a* and 1*b* give the list of the 271 carbon stars which are within ±2° of galactic latitude from longitude 333° through zero to 201°. A few stars are included which are less than a degree north or south of the latitude limits given. Only stars with very weak *CN* bands are not included, as they are difficult to detect even in spectra of moderate density

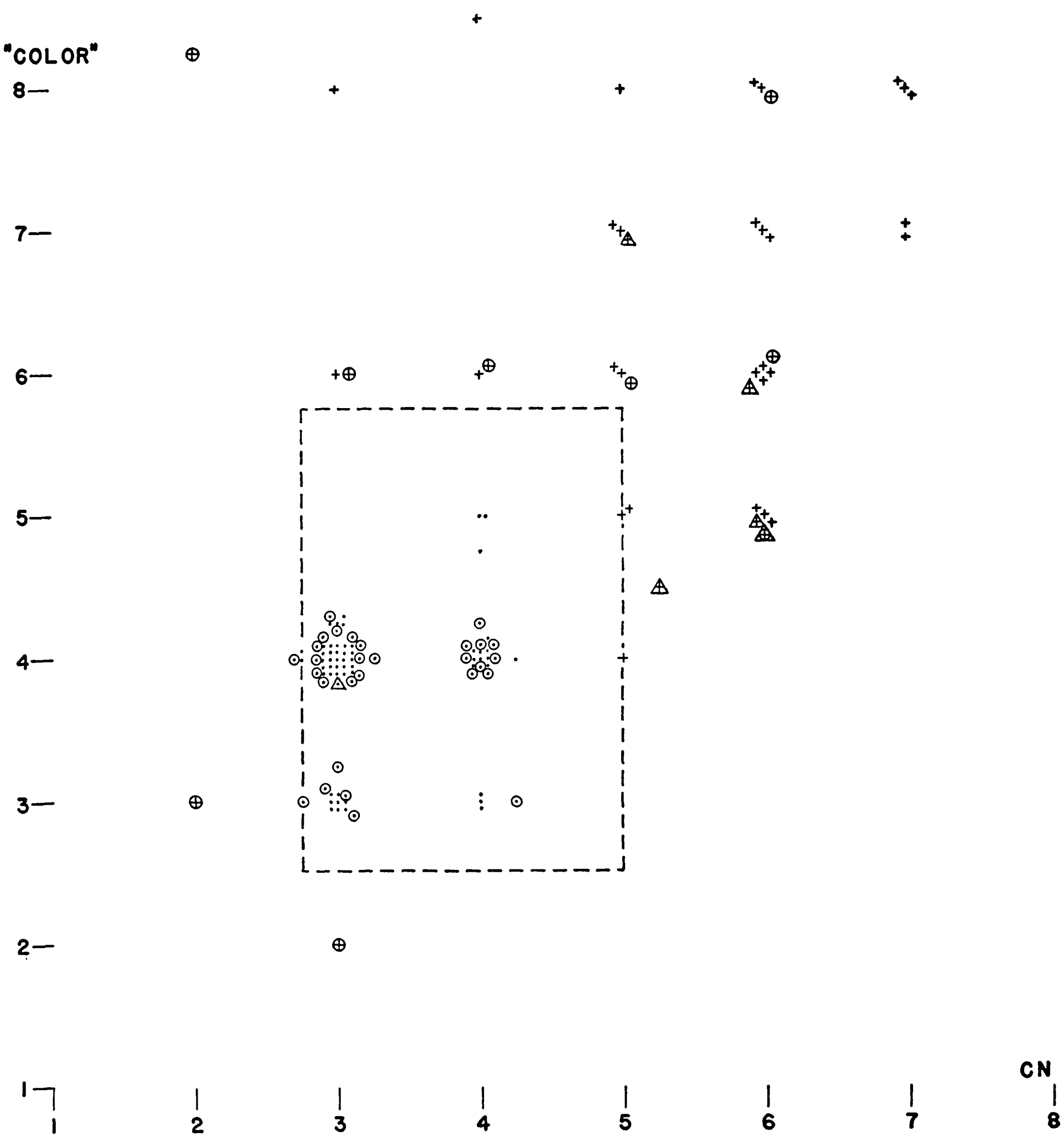

FIG. 2.—Plot of 127 N (·) and R (+) stars. The *CN* strength is given as abscissa and the "color" as ordinate. A circle around a dot or a cross indicates that the classification is in agreement with the published classification. If a disagreement exists, a triangle is placed around the dot or cross.

Table 1a

Carbon Stars

No.	B.D.		1900		m_i	Sp	l	b	Remarks
1	62°	25	$0^h08^m.0$	+62°54'	7.0	R	86	+1	UX Cas, R2*, I?
2	57	702	3 03 .7	+57 31	4.1	R	108	+1	HD 19557, R6*
3	51	762	3 34 .1	+51 11	3.7	N	116	-2	N*
4	50	920	4 03 .9	+51 05	7.8	R	119	+1	FR Per, R3*, I
5	50	961	4 09 .0	+50 23	7.1	N	120	+1	SY Per, Ne*, LP
6	38	955	4 45 .9	+38 20	3.5	N	133	-2	N*
7	38	1035	5 02 .2	+38 52	5.7	N	135	+1	TX Aur, N*, I?
8	35	1046	5 12 .5	+35 41	6.2	N	139	0	HD 34467, N*
9	32	957	5 15 .3	+32 24	5.9	N	142	-1	UV Aur, Ne*, SR
10	34	1044	5 20 .5	+34 04	6.6	N	141	+1	S Aur, N*, LP
11	24	943	5 39 .1	+24 23	5.1	N	151	-1	TU Tau, N*, I
12	8	1263	6 12 .3	+ 8 34	6.3	N	169	-2	N*, D38
13	3	1381	6 39 .4	+ 3 25	7.3	N	177	+2	CZ Mon, N*, I
14	-4	1708	6 48 .2	- 4 27	3.4	N	185	0	GY Mon, N*, I
15	-7	1742	7 02 .1	- 7 24	3.7	N	189	+1	RY Mon, N*, LP
16	-11	1805	7 03 .4	-11 46	1.7	N	193	0	W CMa, N*, I
17	-17	1866	7 10 .1	-17 13	7.3	N	199	-2	N*
18	-19	4805	17 56 .5	-19 10	6.5	R:	338	0	N*
19	-13	4918	18 12 .7	-13 29	3.2	N	345	0	
20	-15	4923	18 13 .6	-15 39	6.0	R:	343	-2	4006, R6*, I
21	-7	4633	18 31 .7	- 7 41	5.3	N	352	-2	RX Sct, N*
22	5	3950	18 42 .5	+ 5 21	5.4	N	5	+2	4376, N*, L
23	10	3764	18 57 .6	+10 06	6.1	N	11	+1	
24	35	4002	20 06 .6	+35 39	6.7	N	41	0	RY Cyg, N*, I?
25	38	3957	20 09 .8	+38 26	4,2	N	44	+2	RS Cyg, Ne*, SR
26	53	2736	21 51 .5	+54 02	6.0	N	67	0	V413 Cyg, D342, N, I
27	60	2432	22 40 .4	+61 12	4.8	N	76	+2	HD 215484, N*
28	59	2564	22 41 .2	+59 22	7.5	R	75	+1	
29	59	2810	23 56 .2	+59 48	1.7	N	85	-2	WZ Cas, N*, SR

Table 1b

Carbon Stars

No.	B.D.		Δx	Δy	1900		m_i	Sp	l	b	Remarks
30	61°	7	-.4	.2	$0^h03^m.7$	+62°10'	8.0	R	86	+1	
31	63	22	-.3	-.3	0 11 .9	+63 16	10.0	N	87	+1	
32	60	60	-1.7	-1.1	0 23 .6	+60 34	10.8	N	88	-1	
33	60	71	-1.8	-2.8	0 29 .4	+60 46	8.8	N	89	-1	
34	60	79	-1.2	-1.6	0 33 .8	+60 13	10.8	N	89	-2	
35	62	155	.1	2.3	0 44 .4	+62 45	11.0	C	91	+1	
36	59	132	1.8	1.9	0 47 .0	+59 39	10.4	N	91	-2	
37	62	164	-.1	-1.4	0 47 .6	+62 49	8.3	R	91	+1	
38	62	175	1.7	1.8	0 52 .8	+63 16	10.0	N	92	+1	
39	60	141	-2.5	-1.3	0 53 .3	+60 10	10.4	N	92	-2	AV Cas, M
40	61	198	-1.8	-1.2	0 56 .6	+61 20	8.0	R	92	-1	HO Cas, D240, R, I
41	60	163	-3.1	-.7	0 58 .4	+60 50	9.5	N:	92	-1	
42	59	203	.7	.9	1 06 .7	+59 50	11.2	N	93	-2	
43	59	205	.5	-1.0	1 06 .9	+59 19	10.4	N	94	-2	
44	62	224	1.1	2.4	1 07 .2	+62 26	7.5	R	93	+1	
45	62	236	-1.5	.3	1 12 .2	+62 22	9.2	R	94	+1	
46	61	272	-3.2	-.8	1 22 .0	+61 45	9.2	R	95	0	
47	62	294	.3	-3.5	1 35 .4	+62 35	10.9	N	96	+1	
48	62	292	1.6	0.0	1 35 .7	+63 06	10.1	N	96	+2	
49	60	322	-.9	.4	1 37 .8	+60 19	11.5	C	97	-1	
50	62	301	-1.2	-.3	1 38 .4	+62 27	11.1	N	97	+1	
51	62	303	-.8	-1.7	1 38 .5	+62 37	11.1	N	97	+1	
52	58	299	-.7	.4	1 40 .8	+58 32	11.1	C	98	-2	
53	58	334	.3	1.1	1 49 .8	+58 46	7.6	N	99	-2	X Cas, Ne*, M
54	58	334	.6	2.2	1 50 .0	+58 49	10.5	N	99	-2	
55	59	482	-.5	-2.6	2 17 .4	+59 17	11.0	C	102	0	
56	59	531	2.8	2.3	2 36 .0	+59 58	11.0	C	104	+1	
57	59	550	-1.2	1.9	2 42 .4	+59 36	10.8	N	105	+1	
58	58	521	5.6	1.0	2 43 .0	+58 27	10.6	N	106	0	
59	59	560	.1	.3	2 45 .4	+59 35	10.0	N:	105	+1	
60	58	524	2.9	-.7	2 46 .6	+59 05	8.3	R	106	+1	
61	57	711	-3.9	1.1	3 08 .8	+58 02	9.0	R	109	+2	D 257? N
62	55	773	-.3	-1.9	3 15 .2	+55 40	10.9	C	111	0	
63	52	701	.4	-.1	3 25 .6	+52 23	8.1	R	114	-2	BI Per, D 262, R, I
64	51	760	-2.5	2.0	3 32 .4	+51 48	8.1	R	115	-2	BK Per, I
65	51	791	.8	-1.7	3 45 .6	+51 46	10.0	N	117	0	
66	50	918	-1.2	1.1	4 03 .0	+51 11	9.8	N	119	+1	
67	52	777	2.4	3.6	4 03 .2	+52 26	10.4	N	118	+2	
68	50	926	-.7	-.2	4 04 .8	+50 54	10.6	N	119	+1	
69	48	1057	2.3	-1.7	4 06 .0	+48 06	8.6	R	121	-1	
70	46	864	.5	-.3	4 11 .8	+46 55	9.1	R	123	-1	
71	46	871	.9	-.2	4 14 .2	+46 48	10.7	N	123	-1	
72	47	985	1.0	-2.2	4 16 .4	+47 39	11.3	N	123	0	
73	49	1179	-.5	2.1	4 17 .9	+51 00	11.5	C	121	+2	
74	49	1179	2.0	1.6	4 18 .7	+50 58	9.1	N:	121	+2	
75	44	965	.1	-.6	4 24 .0	+45 02	8.0	R	126	-1	AT Per, I
76	48	1103	-.2	3.3	4 24 .4	+48 46	10.7	C	123	+2	
77	47	1017	-3.7	-4.4	4 31 .2	+47 00	10.8	N	125	+1	
78	41	929	-1.6	2.7	4 32 .8	+41 26	7.3	N	130	-2	AV Per, N*
79	42	1022	1.5	-1.4	4 33 .5	+43 00	9.2	N	129	-1	
80	41	929	2.7	.4	4 33 .8	+41 18	11.0	N	130	-2	

Table 1b

Carbon Stars

No.	B.D.		Δx	Δy	1900		m_1	Sp	l	b	Remarks
81	42°	1048	1.4	-3.0	$4^h40^m.2$	+42°39'	11.4	C	130	0	
82	38	940	2.7	1.4	4 41 .8	+39 08	10.7	N	132	-2	
83	45	989	4.3	-.7	4 42 .4	+45 36	10.2	N	128	+2	
84	39	1077	.2	-1.9	4 43 .2	+39 45	10.7	N	132	-2	
85	42	1066	0.0	-.7	4 43 .8	+42 30	10.0	N	130	0	
86	43	1094	.1	.5	4 44 .0	+43 31	9.2	N	129	+1	
87	43	1104	.3	.5	4 46 .2	+43 40	10.8	N	130	+1	
88	40	1076	-1.6	-1.0	4 46 .6	+40 31	10.1	N	132	-1	
89	41	1005	-4.6	1.0	4 47 .6	+41 18	10.3	N	131	0	
90	41	1004	.2	-1.6	4 48 .8	+41 42	10.6	C	131	0	
91	42	1121	.4	2.8	4 52 .5	+42 38	9.9	N	131	+1	
92	38	1008	-3.6	1.8	4 54 .8	+38 21	11.3	C	135	-1	
93	41	1043	-1.8	-2.4	4 55 .7	+41 48	9.7	N	132	+2	
94	42	1139	2.3	0.0	4 56 .0	+42 10	10.1	N	132	+2	
95	37	1039	-.7	.9	4 59 .4	+37 17	9.2	N:	136	-1	DI Aur, I
96	39	1171	-1.4	-.2	4 59 .5	+40 02	9.1	N	134	+1	
97	40	1183	.7	.8	5 01 .6	+40 18	10.5	N	131	+1	
98	39	1198	-3.2	2.0	5 03 .4	+39 15	8.5	R:	135	+1	
99	39	1196	-.9	1.3	5 03 .4	+39 43	10.0	N	135	+1	
100	33	965	.8	-2.3	5 03 .8	+33 53	8.8	R	139	-2	DS Aur, D 174? N, I
101	34	967	3.0	1.4	5 07 .5	+34 42	11.0	N	139	-1	
102	36	1066	-.4	-.1	5 09 .8	+36 58	11.4	C	138	+1	
103	30	876	-.9	-1.2	5 18 .0	+30 26	11.2	N	144	-2	
104	33	1036	-.6	2.2	5 18 .4	+33 44	9.5	N	141	0	
105	32	983	-2.1	-.2	5 19 .6	+32 19	11.4	N	143	0	
106	31	964	.8	1.8	5 20 .2	+31 55	10.4	N	143	0	
107	34	1053	-.1	.8	5 21 .4	+34 25	10.8	N	141	+1	
108	31	995	-1.1	-.8	5 24 .6	+31 49	10.6	N	144	0	
109	28	815	-3.0	-.7	5 25 .5	+28 12	10.6	N	147	-1	
110	29	921	1.1	2.0	5 25 .8	+29 28	10.6	N	146	-1	
111	32	1019	3.3	-.1	5 26 .0	+32 52	9.4	R	143	+1	D 180?R
112	29	926	-3.4	1.3	5 26 .1	+29 37	9.8	R	146	-1	
113	33	1087	-.8	-2.2	5 28 .3	+33 47	10.4	N	142	+2	
114	30	964	-4.3	-2.7	5 31 .2	+30 00	9.8	N	146	+1	
115	30	963	1.2	-1.0	5 32 .4	+30 23	11.2	N	146	+1	
116	28	858	-2.3	-2.0	5 35 .9	+28 15	10.8	C	148	+1	
117	21	954	-1.4	-1.0	5 38 .6	+21 51	8.0	R	154	-2	
118	25	960	1.1	.7	5 39 .7	+25 27	9.9	N	151	0	
119	25	971	.5	.3	5 40 .4	+25 35	10.5	N	151	0	
120	25	999	-1.1	1.2	5 43 .8	+25 14	10.7	C	151	0	
121	22	1054	-1.1	1.3	5 44 .0	+22 14	10.3	N:	154	-1	
122	20	1184	.2	-.3	5 50 .9	+20 53	8.2	R	156	0	
123	24	1055	-2.8	.6	5 53 .7	+24 49	9.9	N	153	+2	
124	21	1081	-.3	-.1	5 55 .0	+21 06	9.8	N	156	+1	
125	18	1082	-.1	-1.3	5 59 .4	+18 32	9.4	N	159	0	
126	13	1156	-2.2	-2.3	6 05 .8	+13 00	10.4	C	165	-1	
127	12	1061	-3.1	.7	6 06 .8	+12 14	9.6	C	165	-1	EI Ori, I ?
128	9	1167	-.2	1.4	6 10 .8	+ 9 55	8.9	C	168	-2	728, I?
129	14	1232	1.2	-1.3	6 12 .0	+14 31	8.9	N	164	+1	D 36, N
130	6	1196	0.0	-.6	6 14 .3	+ 6 52	9.8	N	171	-2	

Table 1b

Carbon Stars

No.	B.D.		Δx	Δy	1900		m_1	Sp	l	b	Remarks
131	7°	1254	1.9	2.7	$6^h16^m.5$	+ 7°23'	6.3	N:	171	-2	BN Mon, N*, SR
132	8	1312	-.3	.2	6 18 .4	+ 8 33	9.8	N	170	-1	
133	8	1312	1.3	-1.0	6 18 .7	+ 8 30	9.2	N	170	-1	D 45? N
134	8	1379	1.5	3.2	6 27 .1	+ 9 03	10.0	N	171	+1	
135	5	1347	1.4	1.5	6 34 .0	+ 5 50	10.8	C	174	+1	
136	-1	1343	-.1	1.0	6 37 .7	- 1 07	9.7	N	181	-1	
137	-5	1768	-1.3	-3.4	6 39 .1	- 5 27	9.8	R	185	-3	
138	+0	1595	.2	-2.4	6 41 .9	+ 0 42	10.3	N	180	+1	
139	+0	1605	-3.2	-.2	6 42 .1	+ 0 20	8.5	N	180	+1	DE Mon, D 59, N, I
140	+0	1600	.4	-.2	6 42 .5	+ 0 47	7.8	N	180	+1	DF Mon, N*, I
141	-5	1830	.8	.8	6 46 .6	- 5 08	11.2	C	185	-1	
142	-6	1786	.8	-.4	6 47 .6	- 7 02	6.8	N	187	-2	W Mon, N*, I
143	-7	1626	1.6	-1.1	6 50 .2	- 7 55	8.3	R:	188	-1	EM Mon, M
144	-9	1738	.9	-1.4	6 52 .2	-10 02	10.0	N	190	-2	
145	-5	1910	0.0	-.9	6 55 .4	- 5 17	10.8	N	186	+1	
146	-5	1925	-2.4	-2.5	6 56 .4	- 5 23	10.6	N	187	+1	EU Mon, I
147	-9	1787	1.1	-.2	6 56 .6	- 9 10	10.8	C	190	-1	
148	-9	1825	2.0	-1.4	7 00 .0	- 9 28	10.6	C	191	0	
149	-11	1785	-.4	-.4	7 01 .4	-11 37	9.8	C	193	-1	
150	-13	1825	1.0	-2.5	7 02 .6	-13 39	10.9	N	195	-2	
151	-13	1836	1.5	2.5	7 03 .8	-13 19	10.3	N	194	-1	
152	-15	1708	-.5	-.5	7 09 .1	-15 23	9.7	N	197	-1	
153	-10	1945	-2.0	-.2	7 10 .5	-10 26	10.0	N	193	+2	
154	-12	1866	-.4	.3	7 10 .9	-12 41	9.5	N	195	+1	
155	-17	1876	-1.0	1.3	7 11 .1	-17 23	8.3	N	199	-1	N*
156	-16	1887	-.7	1.0	7 14 .2	-16 03	9.3	N	198	0	
157	-18	1794	-.9	.3	7 16 .2	-19 01	9.7	N	201	-1	
158	-15	1780	0.0	-1.8	7 17 .2	-15 25	9.5	N	198	+1	
159	-22	4454	-7.2	-5.8	17 47 .2	-23 18	10.4	N:	333	0	
160	-22	4454	6.6	-4.3	17 50 .0	-23 12	10.0	N:	334	-1	
161	-17	4987	-3.1	3.0	17 55 .1	-17 00	8.7	N	340	+2	
162	-14	4855	.2	0.0	17 56 .3	-14 20	9.3	N	342	+3	
163	-13	4845	1.4	-3.4	18 00 .0	-13 17	10.5	N	343	+2	
164	-14	4885	2.3	2.0	18 01 .4	-14 37	7.0	N	343	+1	
165	-16	4786	-4.2	.8	18 10 .1	-16 31	8.9	R	342	-1	
166	-11	4588	0.0	1.0	18 12 .6	-11 48	10.0	N	346	0	
167	-9	4731	-1.2	1.7	18 20 .3	- 9 25	10.6	N	349	0	
168	-6	4759	1.9	1.3	18 20 .6	- 6 19	11.1	N	352	+1	
169	-10	4699	1.3	-2.2	18 22 .4	-10 14	11.0	N	349	-1	
170	-6	4768	-.2	.9	18 22 .6	- 5 59	8.2	R	353	+1	
171	-6	4785	-.6	.3	18 26 .8	- 6 31	9.9	N	353	0	
172	-8	4631	1.0	2.1	18 28 .1	- 8 32	10.9	C	351	-1	
173	-2	4658	1.2	-3.6	18 29 .8	- 2 11	11.3	N	357	+1	
174	+0	3971	-.8	3.5	18 29 .8	+ 0 47	10.8	C	0	+3	
175	-3	4329	1.1	1.0	18 33 .0	- 2 57	10.9	N	357	0	
176	-2	4711	.8	.2	18 37 .1	- 2 23	11.3	C	358	-1	
177	3	3781	1.2	-.2	18 38 .1	+ 3 59	10.1	N	3	+2	
178	+0	4005	-2.8	-2.1	18 38 .9	- 0 03	11.4	N	359	0	
179	1	3782	-2.4	-2.8	18 41 .8	+ 0 58	11.4	C	359	-1	
180	1	3798	1.1	-.3	18 47 .0	+ 1 28	10.5	R	2	-1	

Table 1b

Carbon Stars

No.	B.D.		Δx	Δy	1900				m_i	Sp	l	b	Remarks
181	7°	3943	1.1	2.1	18^h	$58^m.4$	+ 7°22'		9.4	R	9	-1	Extremely red
182	13	3899	-1.6	-3.3	19	00 .6	+13	32	8.6	N	14	+2	
183	13	3926	.3	1.9	19	05 .8	+14	02	10.0	N	15	+1	
184	14	3831	-2.8	2.2	19	08 .2	+14	33	10.1	N	16	+1	
185	18	3997	.8	-1.1	19	10 .1	+18	25	8.7	N	20	+2	
186	17	3904	-.2	.8	19	11 .0	+17	14	8.5	N	19	+1	
187	16	3857	.9	.3	19	23 .1	+17	01	10.7	C	20	-1	
188	18	4117	-.7	-1.4	19	28 .2	+18	28	8.3	R	22	-1	4712, L?
189	26	3601	-1.2	1.4	19	31 .6	+26	21	8.1	N	29	+2	AR Vul, I
190	27	3446	1.9	1.5	19	33 .6	+28	03	10.4	N:	31	+2	Overlapped
191	27	3452	.7	3.4	19	35 .1	+27	23	10.0	N	30	+2	
192	28	3438	2.4	1.2	19	38 .8	+28	49	11.0	N	32	+2	
193	30	3707	-1.2	-.4	19	39 .2	+30	05	10.6	C	33	+2	
194	25	3983	-1.3	-2.2	19	44 .6	+25	53	7.8	R	30	-1	
195	30	3768	-1.3	-.2	19	46 .2	+30	46	8.4	N	35	+1	
196	32	3629	-.7	.2	19	51 .8	+32	14	10.7	N	36	+1	V467 Cyg, SR
197	30	3816	-1.1	.2	19	52 .6	+30	32	10.6	C	35	0	
198	31	3855	-.6	2.7	19	53 .0	+31	28	11.1	N	36	0	
199	33	3694	-.3	-.8	19	58 .2	+33	19	10.7	N	38	+1	
200	30	3863	-.3	-4.0	19	58 .4	+30	28	6.9	N	36	-1	4995, N*, E?
201	34	3883	-1.8	.2	20	04 .2	+35	01	10.5	N	40	+1	
202	34	3883	3.8	-1.8	20	05 .6	+34	55	8.4	N:	40	0	
203	35	4006	.6	2.8	20	07 .4	+35	48	7.9	R	41	0	V429 Cyg, D217, R, LP
204	33	3793	.4	2.5	20	07 .8	+33	48	11.1	N	40	-1	
205	33	3793	2.4	.7	20	08 .2	+33	42	9.7	N	40	-1	
206	36	3970	-1.1	-2.2	20	11 .8	+36	42	7.9	R	42	0	V432 Cyg, D218, R, I
207	37	3876	.4	-.1	20	14 .8	+37	09	6.7	R	43	0	WX Cyg, Ne*, M
208	33	3861	.2	-.1	20	16 .0	+33	53	10.7	N	41	-2	
209	40	4161	-1.0	.7	20	21 .6	+40	24	10.5	N	47	+1	
210	37	3934	.2	-2.6	20	23 .0	+37	57	7.9	R	45	-1	
211	42	3790	.3	-1.0	20	31 .6	+42	49	11.4	N	50	+1	
212	45	3219	2.8	-.5	20	32 .3	+45	08	9.6	N	52	+2	
213	43	3710	.6	-1.2	20	42 .2	+43	07	9.0	R:	51	0	
214	46	3067	-2.0	2.5	20	46 .0	+46	26	10.6	N	54	+1	
215	44	3596	1.2	1.3	20	46 .9	+45	02	7.1	R	53	0	DS Cyg, N*, I, D330, R
216	42	3920	1.2	-1.6	20	54 .2	+42	22	10.6	C	52	-3	
217	45	3355	-1.1	1.1	20	55 .8	+45	17	10.6	N	54	-1	
218	47	3243	.3	-1.0	20	55 .8	+47	13	8.5	R	56	+1	
219	47	3251	-1.3	-2.1	20	56 .8	+47	17	8.8	R	56	0	
220	45	3370	.6	-1.4	20	59 .0	+45	44	10.3	N	55	-1	
221	44	3701	.8	.7	21	03 .0	+44	54	11.3	N	55	-2	
222	49	3465	-1.2	2.6	21	03 .6	+49	31	11.1	N	58	+1	
223	45	3421	-.9	-.5	21	04 .2	+45	23	10.5	N	55	-2	
224	46	3201	-.6	2.6	21	05 .2	+47	00	9.0	R	57	-1	V573 Cyg, M
225	46	3204	1.9	-1.3	21	06 .6	+46	20	8.6	R	56	-1	V577 Cyg, LP
226	47	3350	.3	-3.5	21	12 .6	+47	15	9.7	N	58	-1	
227	49	3492	-2.5	1.6	21	13 .4	+49	59	10.5	N:	60	0	
228	47	3410	-.9	.8	21	22 .8	+48	11	11.3	N	60	-2	
229	49	3536	1.6	3.1	21	27 .2	+49	24	10.5	N	61	-1	
230	52	2966	-3.4	-.7	21	28 .2	+52	36	11.3	N	63	+1	

Table 1b

Carbon Stars

No.	B.D.		Δx	Δy	1900		mi	Sp	l	b	Remarks
231	53°	2655	-1.1	-2.7	$21^h33^m.4$	+54°04'	10.9	N	65	+1	
232	53	2703	-1.4	-.1	21 42 .4	+53 39	9.1	N	66	0	
233	51	3143	.3	1.3	21 43 .0	+52 06	7.1	N	65	-1	D 339, R
234	52	3043	.8	-1.2	21 46 .6	+52 10	8.7	N	65	-1	
235	54	2640	-2.2	.9	21 48 .4	+54 37	7.9	R	67	+1	
236	52	3053	-.6	1.1	21 49 .4	+53 01	9.1	N:	66	-1	
237	52	3065	-1.5	-.3	21 51 .8	+52 25	9.1	N	66	-2	
238	57	2427	1.0	2.2	21 52 .6	+57 10	10.8	N	69	+2	
239	55	2650	1.6	-3.9	21 53 .4	+55 43	10.3	N	68	+1	
240	52	3070	2.4	6.5	21 54 .0	+53 20	9.1	N	67	-1	
241	54	2655	-1.4	-1.4	21 54 .4	+54 25	10.1	N	67	0	
242	52	3070	4.7	-1.3	21 55 .0	+52 54	9.9	N	67	-1	MQ Cyg, M
243	54	2654	2.0	3.2	21 55 .4	+55 01	9.9	N	68	0	
244	54	2672	-2.9	-3.0	21 57 .8	+54 04	11.5	C	68	-1	
245	53	2768	2.5	1.0	21 58 .8	+53 22	9.7	N	67	-1	
246	55	2701	1.2	-.2	22 08 .9	+55 16	9.0	R	70	-1	
247	53	2830	.9	.2	22 12 .4	+54 02	8.0	N	69	-2	
248	53	2834	.5	-.2	22 12 .8	+53 31	9.2	N	69	-2	
249	55	2738	-.4	2.1	22 19 .4	+56 12	10.6	N	71	-1	
250	58	2427	.3	-2.0	22 20 .2	+58 14	10.0	N	72	+1	
251	57	2531	2.0	-1.3	22 23 .0	+57 40	10.6	N	72	0	
252	55	2766	-1.0	-.5	22 28 .0	+55 13	10.4	N	72	-2	
253	57	2558	-1.7	2.8	22 28 .7	+58 06	6.4	N	73	0	N*
254	58	2449	.5	.9	22 28 .8	+59 02	9.8	N	74	+1	
255	57	2571	1.8	-3.1	22 34 .5	+57 57	10.4	N	74	0	
256	57	2578	1.9	-1.1	22 36 .1	+58 07	11.0	N	74	0	
257	55	2803	-.1	1.6	22 41 .1	+56 05	5.7	N	74	-2	DV Lac, N*, I
258	58	2479	-.6	-2.0	22 42 .4	+59 03	8.6	N	75	0	
259	57	2606	2.5	.3	22 43 .6	+57 47	10.8	C	75	-1	
260	59	2574	-2.2	-1.7	22 44 .0	+59 27	9.8	N	76	+1	
261	56	2878	-.4	2.4	22 46 .1	+57 00	10.0	N	75	-2	
262	58	2486	.9	.7	22 46 .3	+58 17	9.8	N	75	-1	
263	59	2585	-.2	-.2	22 47 .4	+60 02	10.0	N	76	+1	
264	60	2537	.3	-.7	23 20 .8	+60 46	10.0	N	80	0	
265	61	2472	-1.3	-1.8	23 27 .8	+61 34	7.0	N	82	+1	DS Cas, D 362, N, I
266	61	2493	-.3	-.7	23 34 .8	+61 50	10.9	N	82	+1	
267	62	2316	2.1	-2.2	23 48 .8	+62 10	10.3	N	84	+1	
268	59	2805	1.1	1.3	23 55 .6	+59 19	11.1	N	84	-2	
269	60	2652	.6	1.7	23 55 .8	+61 02	10.9	N	85	0	
270	59	2815	.2	.1	23 57 .0	+59 25	10.1	N	85	-2	
271	60	2664	.4	1.2	23 59 .0	+60 23	9.1	R	85	-1	

and impossible to detect in dense or in very weak spectra. The two tables differ in one respect only. The first lists all carbon stars which are in the *BD* catalogue. The second gives a reference *BD* star near the carbon star and co-ordinates in millimeters in the scale of the *BD* chart from the reference star to the carbon stars. Positive Δx indicates the direction of increasing R.A., and positive Δy indicates the direction of the north.

The infrared magnitudes, designated by m_i, are approximate and are given to furnish added means of identification. They were estimated from the density of the spectra. To obtain approximate visual magnitudes, 3.6 may be added to the infrared magnitudes. This value was derived by establishing the relation between the *BD* magnitude and ours.

Three classes of stars are given in the spectrum column, N, R, and C. Among the first two classes a few misclassifications may exist, particularly when the estimated values are close to the boundaries of the division between the two classes and in view of the results obtained above. Stars having spectra near the limiting magnitude of the plate were classed as C. However, regardless of the density of a spectrum, the weakening of the continuum produced by the presence of the *CN* bands λλ 7945, 8125, and 8320 was observed with certainty in all stars included in the two tables. The last two columns give the galactic longitude and latitude to the nearest degree. The sources for the "Remarks" were the following:

a) *Sanford's* (1944) *catalogue.*—The asterisk after a spectral class denotes his classification.

b) *Lee's* (1943, 1947) *catalogue.*—The "D" followed by a number and a spectral class denotes that the class was obtained from the Dearborn catalogue. A question mark after the number indicates that the given co-ordinates leave some doubt as to the identification of the star.

c) *The General Catalogue of Variable Stars* (Kukarkin and Parenago 1948).—Here the notations are as follows: *I*, irregular; *LP*, long period; *SR*, semiregular; *M*, Mira-type; and *L*, unknown type with slow fluctuations of brightness.

d) *The Catalogue of Stars Suspected of Variability* (Kukarkin *et al.* 1951).—A number followed by a type of variability was obtained from this catalogue. The notations are the same as given above.

A discussion of the surface distribution of the stars given in this table is to be presented separately, in order that it may include carbon stars at high galactic latitudes as well as other relatively cool stars.

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