SPECTRAL CLASSIFICATION OF STARS LISTED IN MISS PAYNE'S CATALOGUE OF c STARS*

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Received November 10, 1950

ABSTRACT

Spectral types on the Yerkes system have been determined for 102 stars included in the c-star catalogue published by Miss Payne in 1930. The stars studied are those of types A3–K5, with the exception of certain variable stars. Though 36 of the stars have been classified as belonging to luminosity classes I*a* and I*b*, 30 others appear to be less luminous than normal giants; among the latter are 9 metallic-line stars. The great majority of the stars situated at high galactic latitudes are of low luminosity. Brief descriptions and references are given for a number of astrophysically important peculiar stars in the catalogue.

The catalogue of c stars published as an appendix to Miss Payne's book *The Stars of High Luminosity*[1] was intended to include all stars known at the time whose spectra showed high-luminosity characteristics, exclusive of those of types O, M, and N. It consists largely of stars whose spectra were noted to be peculiar on Harvard objective-prism plates but also contains a considerable number of late-type stars which had been classified as supergiants at the Mount Wilson Observatory.

In the present paper most of the accessible stars of this catalogue of types A3 and later are classified on the system of the Yerkes *Atlas of Stellar Spectra*[2] and the recent revised list of standard supergiant stars published by Morgan and Roman.[3] The spectra used were obtained at the Yerkes and McDonald Observatories with dispersions of 125 A/mm and 76 A/mm, respectively. Some of the stars involved have not heretofore been classified from slit spectrograms, though a large fraction have been previously discussed in the Mount Wilson Observatory spectroscopic parallax work.[4]

Miss Payne's catalogue contains 156 stars of types A3 and later. Twenty-three of these are cepheid variables and 2 are RV Tauri stars; these have not been considered in the present work, nor has the slow nova RT Serpentis nor the abnormal eclipsing system W Serpentis. In addition, 27 stars have not been observed because of their southerly declinations. Consequently, 102 stars of the catalogue are listed in Table 1. Also 3 additional stars which are described as peculiar in the *Henry Draper Catalogue* but which are not included in Miss Payne's catalogue have been added at the end of the table. The letters "MW" after the HD number indicates that the high-luminosity characteristics of the star are not mentioned in the *Henry Draper Catalogue*, but have been noted at the Mount Wilson Observatory. A number of other stars in Table 1 were also independently discovered to be c stars at Mount Wilson. An asterisk following the revised spectral type indicates that the type is that recently assigned by Morgan and Roman.[3] The proper-motion data have been taken from the list of high-luminosity stars of R. E. Wilson[5] and from other sources; they have not been reduced to a uniform system

* *Contributions from the McDonald Observatory, University of Texas*, No. 199.

[1] "Harvard Observatory Monographs," No. 3 (New York: McGraw-Hill Book Co., 1930).

[2] W. W. Morgan, P. C. Keenan, and E. Kellman, "Astrophysical Monographs" (Chicago: University of Chicago Press, 1943).

[3] *Ap. J.*, **112**, 362, 1950. The writer is greatly indebted to these authors for access to this list prior to publication.

[4] *Mt. W. Contr.*, No. 511; *Ap. J.*, **81**, 187, 1935.

[5] *Mt. W. Contr.*, No. 643; *Ap. J.*, **93**, 212, 1941.

TABLE 1

DATA ON THE STARS CLASSIFIED IN THE PRESENT INVESTIGATION

HD Type	HD Number	Name	α(1900)	δ(1900)	l	b	m_v	Revised Type	V	μ	Remarks
A3..	13929	.....	2h10m5	+57° 34′	102°	− 2°	8.0	Fm	− 9	0".022	1
	17093	38 Ari	2 39.5	+12 1	130	−41	5.16	A7 IV	− 2.2	.146	
	27628	60 Tau	4 16.4	+13 50	149	−23	5.76	Fm	+43 V	.117	2
	59612	HR 2874	7 25.6	−22 49	205	− 1	4.80	A5 I*b*	+36.3	.005	
	84123	.....	9 37.8	+42 31	146	+51	6.82	F0p	+15.3 V	.104	3
	125335	.....	14 13.7	+10 58	327	+62	7.13	Fm	−29.0 O	.049	4
	210221	HR 8443	22 3.8	+52 49	68	− 2	6.50	A3 I*b**	−26.5	.015	
A5..	34578	19 Aur	5 13.4	+33 52	141	− 1	5.16	A5 II*	− 4.2	.012	
	40536	2 Mon	5 54.3	− 9 34	183	−15	5.10	Fm	+22.2 O	.054	5
	142846	.....	15 51.7	+15 2	354	+44	8.07	F2 IV	.....	.036	
	148743	HR 6144	16 25.1	− 7 17	336	+25	6.39	A7 I*b*	+ 2.1 V	.025	6
	218393	.....	23 2.6	+49 40	74	− 9	6.85	Bpe	var.	.015	7
F0..	571	22 And	0 5.1	+45 31	84	−16	5.08	F2 II*	− 4.8	.005	
	1778	.....	0 17.0	+53 3	86	− 9	8.0	F3 II	.....	.011	
	24550	.....	3 49.2	+ 4 53	152	−34	7.65	F3 II–III	+15	.027	
	33054	14 Ori	5 2.5	+ 8 22	160	−17	5.47	Fm	+ 4.3 V	.069	8
	36673(MW)	α Lep	5 28.3	−17 54	188	−24	2.69	F0 I*b**	+24.7	.011	
	40535	1 Mon	5 54.3	− 9 24	182	−14	6.28	F2 II	+16 V	.018	9
	70761	HR 3291	8 18.6	−26 1	215	+ 7	5.86	F2 I*b*	+64.0	.009	10
	70825	.....	8 19.0	+24 17	167	+32	7.27	F2 IV	− 2	.058	
	75276	HR 3496	8 43.9	−45 48	233	− 1	5.83	F0 I*b*	+32.0	.008	
	105702	11 Vir	12 5.0	+ 6 22	247	+67	5.74	Fm	− 9.2	.161	11
	110628	.....	12 38.4	+26 40	256	+89	6.71	F2n III	.....	.022	
	116108	.....	13 16.4	+61 46	82	+56	9.1	F3 IV	.....	.....	
	137052	ε Lib	15 18.8	− 9 57	321	+36	5.08	F5 V	− 9.7 O	.175	
	143584	HR 5964	15 56.2	+50 10	45	+47	5.90	F0 IV	+ 4.0	.061	
	149748	.....	16 31.7	+63 2	60	+39	7.22	Fm	−21.7	.050	12
	164136	ν Her	17 54.7	+30 11	23	+22	4.48	F2 II*	−22.0	.006	
	194943(MW)	ρ Cap	20 23.2	−18 9	355	−31	4.96	F2 III	+19.5	.028	13
	201638	.....	21 5.8	+35 5	48	− 9	8.72	B0.5 I*b*	.....	.020	
	201700	.....	21 6.2	+46 0	56	− 2	8.1	B3 IV	.....	.....	
	214470	31 Cep	22 33.3	+73 7	81	+13	5.22	F4 II–III	+ 0.7	.172	
F2..	13824	.....	2 9.6	+57 45	102	− 2	8.60	F2 IV	.....	.055	
	43382	.....	6 10.8	+35 10	145	+10	6.62	F6 V	.....	.066	
	90089	HR 4084	10 18.9	+83 4	95	+34	5.34	F2 V	+ 7.0	.085	
	102942–3	HR 4545	11 46.0	+33 56	149	+77	6.14	Fm	+ 0.8	.024	14
	130818	RY Boo	14 45.2	+23 27	358	+62	7.0–7.4	F6 IV	+ 1.9	.051	15
	178524	π Sgr	19 3.8	−21 11	343	−15	3.02	F2 II	− 9.8	.043	16
	181615–6	υ Sgr	19 16.0	−16 8	350	−15	4.35–4.44pe	Ape	+ 8.2 O	.005	17
	187258	.....	19 44.0	+18 24	24	− 5	7.6	Fm	.....	.026	18
	207826	.....	21 46.8	+66 20	74	+10	6.51	F3 IV	−15.2 O	.061	
F5..	7927	φ Cas	1 13.8	+57 42	95	− 4	5.25	F0 I*a**	−24.7 V	.002	19
	20902	α Per	3 17.2	+49 30	115	− 5	1.90	F5 I*b**	− 2.4	.035	
	24546	43 Per	3 49.2	+50 24	118	− 1	5.47	F5 IV	+25.7 O	.160	
	31964	ε Aur	4 54.8	+43 40	130	+ 2	3.7–4.5pg	A8 I*a*	− 2.5 O	.006	20
	50058	.....	6 46.4	+29 34	154	+15	7.66	F5 V	.....	.083	
	61715	HR 2957	7 35.5	−48 22	229	−12	5.65	F4 I*ab*	+11.0	.009	
	67523(MW)	ρ Pup	8 3.3	−24 1	211	+ 6	2.88	F6 II	+46.6 V	.097	21
	74180	HR 3445	8 37.3	−46 18	233	− 2	4.06	F2 I*a*	+25.3 V	.008	22
	83808–9(MW)	ο Leo	9 35.8	+10 21	193	+43	3.76	Comp.	+27.1 O	.143	23
	161471	ι^1 Sco	17 40.6	−40 5	318	− 7	3.14	F2 I*a**	−27.6 V	.006	24
	163506	89 Her	17 51.4	+26 4	19	+22	5.48	F2 I*a**	−29.4 V	.005	25
	195295	41 Cyg	20 25.3	+30 2	39	− 6	4.09	F5 II*	−18.8	.011	
	196524	β Del	20 32.9	+14 15	27	−17	3.72	F5 III	−21.0 O	.111	26
F8..	54605	δ CMa	7 4.3	−26 14	206	− 7	1.98	F8 I*a**	+34.3 V	.006	27
	65228(MW)	11 Pup	7 52.6	−22 37	208	+ 4	4.35	F8 II	+13.8	.026	
	128027	.....	14 29.5	− 4 13	314	+48	7.6	F8 V	.....	.025	
	161796	.....	17 42.5	+50 5	44	+30	7.27	F3 I*b*	.....	.022	28
	171620	.....	18 30.8	+34 20	30	+17	7.8	F6p	−32.8	.268	29
	171635	45 Dra	18 30.9	+56 58	53	+24	4.95	F7 I*b**	−11.7	.011	
	172052	.....	18 32.9	−23 16	338	− 9	6.79	F5 I*b*	.....	.018	
	180028	.....	19 9.8	+ 5 52	9	− 4	7.24	F6 I*b*	− 5.9	.022	
	194093	γ Cyg	20 18.6	+39 56	46	+ 1	2.32	F8 I*b**	− 7.6	.006	
	224014	ρ Cas	23 49.4	+56 57	83	− 4	4.1–6.2	Pec.	−42.6 V	.005	30
G0..	14662	HR 690	2 16.9	+54 55	104	− 4	6.46	F7 I*b**	−26.2	.032	
	26673–4(MW)	52 Per	4 8.1	+40 14	127	− 7	4.89	Comp.	+ 3 V	.030	31
	30353	.....	4 41.8	+43 6	129	0	7.7	Ape*α*	var.	.014	32
	31910	β Cam	4 54.5	+60 18	117	+12	4.22	G0 I*b**	− 1.7	.015	
	57146	HR 2786	7 14.8	−26 25	207	− 5	5.40	G0 II	+33.1	.016	
	62058	R Pup	7 37.0	−31 25	214	− 3	6.64 V	G0 I*a**	.....	.020	33
	63700	ξ Pup	7 45.1	−24 37	209	+ 2	3.47	G3 I*b**	+ 3.7 V	.002	34
	67594(MW)	ζ Mon	8 3.6	− 2 41	193	+17	4.41	G2 I*b**	+29.6	.016	
	97334	HR 4345	11 7.1	+36 21	151	+69	6.32	G0 V	− 2.6	0.324	

* Type by Morgan and Roman, *Ap. J.*, **112**, 362, 1950.

TABLE 1—*Continued*

HD Type	HD Number	Name	α(1900)	δ(1900)	*l*	*b*	m_v	Revised Type	*V*	μ	Remarks
G0..	108134	.....	12h20m3	+61°14′	94°	+57°	7.41	G0p	−46.7	0".142	35
	159181(MW)	β Dra	17 28.2	+52 23	46	+32	2.99	G2 I*b*	−20.1 V	.013	36
	.....(MW)	RZ Oph	18 40.9	+ 7 7	6	+ 3	10.0–10.9pg	F3 I*b*	+ 0.7 V	.....	37
	187203	HR 7542	19 43.7	+10 26	17	− 9	6.38	F8 I*b*–II	− 4.9	.012	38
	192876	α^1 Cap	20 12.1	−12 49	359	−26	4 55	G3 I*b**	−25.9	.019	
	209750	α Aqr	22 0.6	− 0 48	28	−43	3.19	G2 I*b**	+ 7.6	.021	
	217476	HR 8752	22 55.9	+56 24	76	− 3	5.48	G0 I*a**	−58.4 V	.005	39
	222574(MW)	104 Aqr	23 36.6	−18 23	30	−72	4.95	G0 II*	+ 4.8	.016	
G5..	16901(MW)	14 Per	2 37.5	+43 52	111	−13	5 58	G0 I*b*	− 3.5	.008	
	18474	HR 885	2 53.1	+46 49	113	− 9	5.61	Gp	+ 6.4	.032	40
	25056	.....	3 53.8	+53 35	116	+ 2	7.35	F9 I*b*	− 6.3	.004	
	86728	20 LMi	9 55.3	+32 26	162	+54	5.60	G2 V	+54.6	.680	
	101501	61 UMa	11 35.7	+34 46	149	+75	5.46	B8 V	− 5.4	.390	
	180262	HR 7300	19 10.8	+14 54	17	0	5.69	G5p	−22.9	.014	41
K0..	25878(MW)	XX Cam	4 0.9	+53 6	118	+ 2	8.7–10.3pg	Fp	+15.9	.006	42
	29094–5(MW)	58 Per	4 29.7	+41 4	130	− 3	4.46	Comp.	+ 4.2 O	.021	43
	52497(MW)	ω Gem	6 56.4	+24 21	160	+14	5.21	G5 II*	− 8.8	.002	
	78004	HR 3614	9 0.7	−46 42	236	0	3.69	K2 III	+24.3	.058	
	192577–8(MW)	o^1 Cyg	20 10.5	+46 26	50	+ 6	3.95	Comp.	− 6.9 O	.006	44
	192909–10(MW)	o^2 Cyg	20 12.3	+47 24	51	+ 6	4.16 V	Comp.	−14.4 O	.001	45
	205114–5(MW)	HR 8242	21 28.1	+52 11	63	+ 1	6.20	Comp.	−24.0 V	.009	46
	213310–1(MW)	5 Lac	22 25.4	+47 11	68	− 9	4.61	Comp.	var.	.011	47
K2..	44537(MW)	ψ^1 Aur	6 17.2	+49 20	133	+17	6.6–7.2pe	K5 I*ab**	+ 4.2 V	.006	48
	50877	o^1 CMa	6 49.9	−24 4	202	− 9	4.12	K3 I*ab**	+36.3	.013	
	184398–9	HR 7428	19 29.2	+55 31	54	+16	6.52	Comp.	− 5.2 O	.018	49
K5..	106690	2 CVn	12 11.1	+41 13	112	+75	5.80	M1 III	−15.2	.042	
	192410	.....	20 9.6	−17 9	354	−27	7.76	K5 III	.....	.044	
	196725(MW)	θ Del	20 34.1	+12 58	26	−18	6.06	K3 I*b*	−14.2	.008	
	200905(MW)	ξ Cyg	21 1.3	+43 32	54	− 3	3.92	K5 I*b**	−19.9 V	.008	50
	6474	.....	1 0.7	+63 15	92	+ 1	8.4	G0 I*ab*	.....	.027	51
	172365	HR 7008	18 34.7	+ 5 10	4	+ 4	6.30	F8 I*b*–II	−18.5	.017	52
	180583	HR 7308	19 12.0	+27 45	28	+ 6	6.06	F6 II	−13.4	0.021	

NOTES TO TABLE 1

1. K-line A3, metallic spectrum F2 III.
2. Classified by Roman, Morgan, and Eggen (*Ap. J.*, **107,** 107, 1948) as K-line A5, metallic spectrum F2. Velocity range 39 km/sec (*Pub. Dom. Ap. Obs. Victoria,* **7,** 337, 1945).
3. All lines are abnormally weak, as in the early-type subdwarfs. Velocity range 20 km/sec (*Pub. David Dunlap Obs.*, **1,** 251, 1942).
4. K-line A5, metallic spectrum F2 III.
5. K-line A5, metallic spectrum F0 III.
6. Velocity range 12 km/sec (*Pub. Dom. Ap. Obs. Victoria,* **7,** 1, 1937).
7. This well-known shell star has been recently studied by Merrill (*Ap. J.*, **110,** 420, 1949), and by Halliday (*J.R.A.S. Canada,* **44,** 149, 1950).
8. K-line A3, metallic spectrum F5 II–III. Velocity range 14 km/sec (*Pub. Dom. Ap. Obs. Victoria,* **1,** 287, 1921). Visual binary: $d = 1".0$, $\Delta m = 0.8$.
9. Velocity range 25 km/sec (*Mt. W. Contr.*, No. 593; *Ap. J.*, **88,** 34, 1938).
10. Visual binary: $d = 0".1$, $\Delta m = 0.3$.
11. K-line F0, metallic spectrum F5 III.
12. K-line A3, metallic spectrum F3 II.
13. Visual binary: $d = 2".2$, $\Delta m = 5.0$.
14. K-line A5, metallic spectrum F5 II.
15. This star was once considered to be a cepheid but was later shown to be an irregular variable. The spectrum appears quite normal.
16. Visual triple system: $d = 0".1$, $\Delta m = 0.1$, and $d = 0".4$, $\Delta m = 2.3$. The close pair should eventually give a good absolute magnitude and mass for this rather luminous system.
17. This apparently hydrogen-poor star has been extensively studied by Greenstein (*Ap. J.*, **91,** 438, 1940, and later) and many others. The light-variability found by S. Gaposchkin has been recently confirmed by Eggen and Kron (*Pub. A.S.P.*, **62,** 171, 1950).
18. K-line F0, metallic spectrum F5 III.
19. Velocity range 10 km/sec (*Pub. A.S.P.*, **36,** 137, 1924).
20. The type given is from a spectrogram taken December 12, 1949. *Hβ* is weaker than normal for this type, and the spectrum is probably slightly variable, even outside eclipse. The primary of this well-known system shows semiregular variations in radial velocity and light which have been discussed by McLaughlin (*Ap. J.*, **79,** 235, 1934).
21. Velocity range 11 km/sec (*Ann. Cape Obs.*, Vol. **10,** Part 8, 1928). The *Ca* II lines are rather weak for the type given (cf. *Harvard Ann.*, **28,** 96, remark 82, 1897).
22. Velocity range 14 km/sec (*Pub. Lick Obs.*, Vol. **16,** 1928).
23. Primary F6 II, secondary about A2.
24. Velocity range 16 km/sec (*Ann. Cape Obs.*, Vol. **10,** Part 8, 1928).
25. Velocity range 8 km/sec (*Pub. Lick Obs.*, Vol. **16,** 1928).
26. Visual binary: $d = 0".5$, $\Delta m = 1.0$.
27. Velocity range 6 km/sec (*Pub. Lick Obs.*, Vol. **16,** 1928).
28. The lines are very strong, and some may have an unusual intensity. This high-latitude supergiant deserves further study.
29. The lines, especially of hydrogen, are weak, as in the subdwarfs.
30. The remarkably variable spectrum of this very luminous star has not yet returned to its "normal" type of F8 I*a*. The spectrum has been described in recent years by Keenan (*Ap. J.*, **106,** 295, 1947), Thackeray (*M.N.*, **108,** 276, 1948), Greenstein (*Ap. J.*, **108,** 78, 1948), and others.

NOTES TO TABLE 1—*Continued*

31. Primary G5 II, secondary A or B. Velocity range 33 km/sec (*Pub. A.S.P.*, **30,** 352, 1918).
32. This star, which appears to be a somewhat later-type analogue to υ Sagittarii, has been studied by the writer (*Ap. J.*, **111,** 333, 1950). The proper motion given was determined by Dr. G. Van Biesbroeck. A photometric study of this object would be very desirable.
33. R Puppis is the brightest star in the galactic cluster NGC 2439; the writer has obtained a visual absolute magnitude of −7.2 for it (*A.J.*, **55,** 165, 1950). Gould discovered this star to be variable visually, and subsequently a photographic variation of 0.6 mag. was found at Harvard (*Harvard Ann.*, **45,** 315, 1901), but other observers have not found the star to be variable. The radial velocity is near +70 km/sec.
34. Velocity range 8 km/sec (*Ann. Cape Obs.*, Vol. **10,** Part 8, 1928).
35. The spectrum of this star has been found by Dr. N. G. Roman to resemble that of a subdwarf (*Ap. J.*, in press).
36. Velocity range 10 km/sec (*Pub. A.A.S.*, **6,** 105, 1927).
37. A velocity range of 24 km/sec has been published for this eclipsing system by Adams, Joy, and Sanford (*Pub. A.S.P.*, **36,** 139, 1924), but Hiltner found no orbital variation on low-dispersion spectrograms (*Ap. J.*, **104,** 396, 1946). The value of the velocity given in the table is the average of Hiltner's determinations. The type given is that of the primary and is taken from a plate obtained on April 17, 1948. The spectroscopic luminosity of this system is considerably greater than that derived by Lohmann (*Zs. f. Ap.*, **27,** 161, 1950).
38. The G band is considerably stronger than in γ Cygni, F8 I*b*, and the luminosity is probably somewhat lower. The strength of *CH* may be slightly abnormal.
39. Velocity range 7 km/sec (*Pub. Lick Obs.*, Vol. **16,** 1928).
40. The spectrum is extraordinarily peculiar, with the line spectrum matching fairly well G5 III but with no trace of *CN* or *CH* absorption. This star may be a unique case of *low* carbon abundance (see *Harvard Ann.*, **56,** 104, remark 15, 1912).
41. In general, the spectrum is similar to G5 II, but the hydrogen lines are definitely weaker than normal for this type. The *CH* band is probably of slightly abnormal strength. The common proper-motion companion, HD 180243, m_v = 7.8, is of type A1 V. Its radial velocity agrees well with that of the brighter star (*Ap. J.*, **111,** 221, 1950).
42. This recently discovered variable star was shown to be spectroscopically similar to R CrB by the writer (*Ap. J.*, **107,** 413, 1948).
43. Primary G8 II, secondary A or B.
44. Primary K2 II, secondary about B3 V. R. H. Wilson, Jr., has interferometrically found this system to have a separation of 0".06, and McLaughlin has observed an atmospheric eclipse (*A.J.*, **55,** 153, 1950).
45. Primary K3 I*b*–II, secondary A or B. McLaughlin has recently discussed the variation of the spectrum of this system during eclipse (*Ap. J.*, **111,** 449, 1950).
46. Primary G0 II, secondary A. Velocity range 11 km/sec (*Pub. Dom. Ap. Obs., Victoria,* **3,** 209, 1925).
47. Primary M0 I*b*–II, secondary A. Velocity range 33 km/sec (*Ap. J.*, **88,** 201, 1938).
48. Velocity range 7 km/sec (*Pub. Lick Obs.*, Vol. **16,** 1928).
49. Primary K2 II–III, secondary A. The spectrum shows strong emission lines of *Ca* II.
50. Velocity range 11 km/sec (*Pub. Lick Obs.*, Vol. **16,** 1928).
51. The G band is slightly stronger than in R Puppis.
52. See remark 38.

and are thus of indicative value only. Variable radial velocity or the existence of a spectrographic orbit is indicated by a "V" or "O" in the radial-velocity column. Remarks concerning individual stars follow the table.

An enumeration of the number of stars which have been classified into various categories is given in Table 2. The listing is subdivided according to whether the star was

TABLE 2

NUMBERS OF STARS IN VARIOUS GROUPS

Type of Object	Included because of Harvard Objective-Prism Observation	Included because of Mount Wilson Slit-Spectra Observation
Lum. classes I*a* and I*ab*	10	1
Lum. classes I*b* and I*b*–II	19	7
Lum. classes II, II–III, and III	15	5
Lum. classes IV and V	18	0
Composite spectra (primary more luminous than class III)	1	7
Metallic-line stars (dwarfs)	9	0
Subdwarfs	3	0
Peculiar stars	6	1

noted to be a c star at the Harvard Observatory or solely at the Mount Wilson Observatory. It is seen in Table 2 that 30 stars, of a total of 102, have been classified as less luminous than normal giants; but no star included in the catalogue on the basis of observation by slit spectra is among these. On the other hand, the great majority of the

stars which have been classified as of high luminosity were noted as such on the Harvard objective-prism plates. This is especially true of stars resembling δ CMa and γ Cygni.

It was one of the purposes of the program to determine whether an appreciable number of the many high-latitude stars listed in the c-star catalogue are actually supergiant stars. As might have been expected, most of these objects proved to be of low or intermediate luminosity, among them being several metallic-line stars which are known to be dwarf stars, despite the fact that in many ways their spectra resemble F-type stars of

TABLE 3

HIGH-LUMINOSITY STARS AT MODERATELY HIGH GALACTIC LATITUDE

Star	m_v	Type	l	b
HR 6144	6.39	A7 I*b*	336	+25°
89 Her	5.48	F2 I*a*	19	+22°
HD 161796	7.27	F3 I*b*	44	+30°

luminosity classes II or III. The only high-luminosity stars found fainter than 5th magnitude with a galactic latitude greater than 20° are the three objects listed in Table 3.

Although this investigation has, on the one hand, confirmed the statement of Wilson[5] that a considerable number of stars included in the c-star catalogue are not actually of high luminosity, it has also resulted in the discovery of several stars of considerable astrophysical interest. Peculiar objects to which attention has been directed as a result of their inclusion in Miss Payne's catalogue are the following: two stars showing subdwarf spectral characteristics, HD 84123 and HD 171620; the apparently hydrogen-poor star, HD 30353; the "hot" carbon star, XX Cam; and the unusual object which appears to show a deficiency of carbon, HR 885. In addition, a number of southern high-luminosity stars have been classified on slit spectra for the first time.