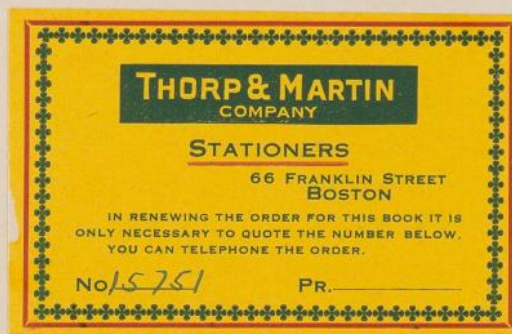


KG
11366
1230

C.H.L. (1)



w Cronis 050001

3

Date	Plate#	J.D. #	Mag	Remarks	Date	Plate#	J.D	Mag	Remarks
6/4	RH 2687	26319	9.5		6/6	AX 845	24054	10.8	
	AC 27084	25587	9.8			AX 881	24082	10.7	
	AM 16656			cant use - near edge		AX 936	24121	10.5	
	AY 285	24065	10.3			AM 16495	23781	9.9	
	AC 28882	26335	9.4			AM 16522	23788	9.9	
	RH 2570	26272	10.1			AM 16555	23795	9.9	
	RH 2931	26400	10.1			AM 16606	23819	10.3	
	RH 2512	26257	10.4			AM 16671	24138	9.9	
	RH 9	25258		cant use		AM 16153	23403	10.5	
	RH 10	25263	9.7			AM 16128	23353	10.3	
	RH M	25263	9.7			AC 26016	25982	10.5	
	AC 28939	26355	9.7			AX 966	24166	9.7	
	ACT 8955	26357	9.8			AX 1349	24417	10.2	
	AC 26868	25266	9.7			AX 1420	24497	10.6	poor
	AX 334	23751	9.7			AX 1425	24499	10.6	"
	AC 20740	21924	9.7			AX 1490	24528	10.5	"
	AC 20697	21909		Too faint		AX 1504	24534	10.8	"
	AC 22914	22593	9.5			AX 1518	24547	10.9	"
	AC 22298	22345	10.2			AX 1530	24553	10.8	"
	AC 22240	22336	10.4			AX 1867	24760	10.8	"
	AC 21246	22024	9.7			AX 1959	24801	10.7	"
	AC 23281	22707	10.2			AX 1988	24826	9.75	
	AC 23564	22774	9.6			AX 2041	25179	9.7	
	AC 26255	24571	10.5	poor plate		AX 2058	25189	9.8	
	AC 26557	24852	9.7			AX 2102	25230	9.5	
	AC 26869	25267	9.7			AX 2130	25267	9.7	good
	AC 29044	26394	9.7	poor plate		AX 2161	25288	9.6	
	AX 42	23467	10.5			AY 321	24078	10.6	poor
	AX 385	23782	9.7			AY 378	24108	10.4	"
					6/6	AY 825	24434	10.1	

w Cronus 0500 01

✓ AY 1763	25178	98	pm
✓ AC 26551	24847	99	"
✓ AC 27031	25562	97	
✓ AC 27784	25889	97	
✓ AC 27875	25921	98	pm
6/7 ✓ AC 23413	22729	97	
✓ AC 24197	22968	97	
✓ AC 24300	22988	97	
✓ AC 24458	23032	97	
✓ AC 24493	23043	97	
✓ AC 24534	23054	97	
✓ AC 24620	23088	95	
✓ AC 24912	23340	102	
✓ AC 25072	23433	104	
✓ AC 25088	23439	107	
✓ AC 25426	23724	102	
✓ AC 25467	23743	102	
✓ AC 25532	23780	101	
✓ AY 1371	24942	102	
✓ AY 1617	25135	97	
✓ AY 1860	25204	98	
✓ AY 892	24496	106	
✓ AY 893	24496	106	
✓ AY 894	24496	106	
✓ AY 895	24496	108	
✓ AY 1177		103	
✓ AY 320	24078	106	
✓ AY 403	24124	103	
✓ AY 824	24435	103	
✓ AC 28659	26252	101	

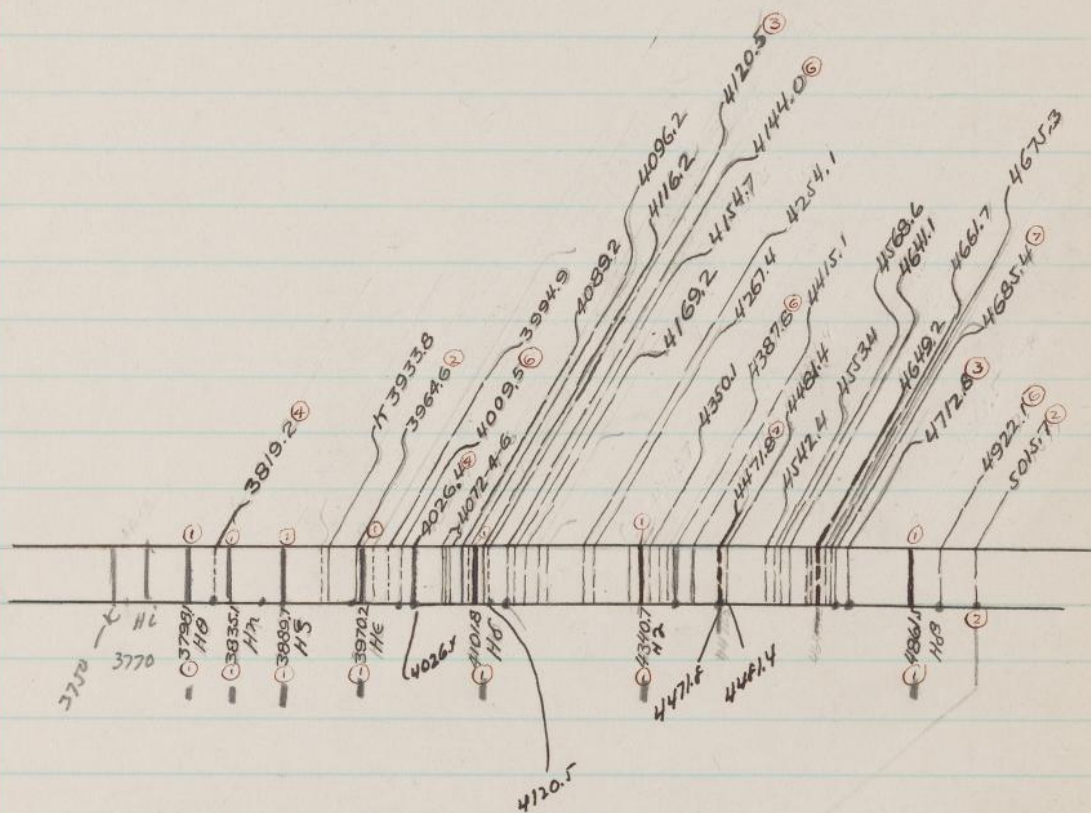
6/7 ✓ AC 28731	26272	104	
✓ AC 28843	26321	98	
✓ AC 28850	26326	98±	
✓ AC 28882	26335	97-	
✓ AX 25	23437	105	
✓ AX 358	23767	98	
✓ AX 418	23799	99	
✓ AX 443	23810	102	
✓ AC 27805	25893	98	
✓ AC 27857	25912	98	
✓ AC 27941	25946	98	
✓ AC 26552	24847	101	
✓ AC 27028	25560	97	
AC 27047	25566	97	
AC 27113	25600	97	
AC 27153	25611	97	
AC 27205	25626	99	
AC 24972	23371	101	
AC 25067	23432	105	
AC 25130	23459	103	
AC 25148	23467	103	
AC 25196	23499	102	
AC 23424	22733	101	
AC 24301	22988	98	
AC 22457	23032	97	
AC 24494	23043	96	
AC 24928	23348	100	
AC 24932	23349	101	
AC 21070	21995	97	
AC 21882	22239	100	

6/8	AC 22025	22295	10 1
	AC 22130	22312	10 2
	AC 22361	22363	10 1
	AC 22934	22601	9 5
	AC 23161	22679	9 7
	AC 23202	22689	9 7
6/9	AC 20895	21959	9 8
✓	AC 21040	21991	9 7
✓	AC 21081	21996	9 7
✓	AC 21874	22238	9 75
✓	AC 22104	22307	10 15
✓	AC 22405	22371	9 8
✓	AC 23124	22680	9 55
✓	AC 26715	26270	10 05
✓	AC 28123	26025	10 1
✓	AC 28197	26051	9 9
✓	AC 26577	24862	9 8
	AC 27205	25626	9 8
	AC 27742	25870	9 8
	AC 24986	23379	9 95
	AC 25772	24181	9 7
	AC 26516	24818	10 1
	AC 26520	24825	10 2
	AI 19440	23364	9 7
	AI 19459	22766	9 5
	AI 19497	22375	9 5
	AI 26278	25314	9 9
	AI 26770	25560	9 78
	AI 27601	25894	9 8
	AI 23747	24 116	10 1

6/9	AI 23808	24146	9 8
	AI 24553	24536	10 5
	AI 24887	24767	10 7
	AI 24982	24807	10 8
	AI 25203	24888	9 9
	AI 25233	24906	9 75
	AI 21614	23100	9 7
	AI 21987	23322	10 1
	AI 22050	23348	10
	AI 22239	23437	10 4
	AI 22788	23699	10 3
	AI 22859	23726	10 1
	AI 23655	24081	10 5
	AI 20205	22692	9 7
	AI 20350	22717	10 0
	AI 20504	22759	9 8
	AI 21040	22940	9 7
	AI 21114	22957	9 7
	AI 21330	23001	9 8
	AI 21362	23019	9 75
	AI 21580	23086	9 7
	AI 19214	22314	10 2
	AI 19244	22322	10 5
	AI 19301	22334	10 2
	AI 19317	22336	10 5
	AI 19331	22338	10 4
	AI 19571	22393	9 6
	AI 19585	22402	9 6
	AI 20066	22641	9 44

A121370	23029	9 7
A121390	23031	9 7
A121568	23081	9 7
A122009	23327	9 8
A122039	23345	9 8
A122881	23734	10 1
A123794	24141	9 9
A123855	24176	9 8
A124264	24416	10 0
A124427	24477	10 5
A124968	24803	10 3
A125044	24826	10 1
A125884	25183	9 5
A125887	25184	9 4
A126019	25229	10 1
A126055	25240	9 7
A126692	25529	9 6
A126759	24557	9 7
A12936	25612	10 0
A126985	25627	10 1
A127038	25630	9 8
A127732	25944	9 8
A120499	22753	9 7
A121323	22999	10 0
A121354	23018	9 7
A121549	23078	9 5
A121592	23088	9 7
A121620	23103	9 7
A122058	23350	10 1
A122121	23376	10 8

6/11 A122147	23387	9 9
A122174	23399	10 3
A122798	23701	10 4
A123667	24083	10 3
A123818	24148	10 7
A23847	24166	9 8
A124967	24802	10 2
A125106	24848	10 2
A125120	24855	10 1
A125957	25204	10 -
A126819	25586	9 8
A126874	25600	9 7
A127647	25912	9 8
A125029	24820	10 1
A125906	25189	9 7
A127061	25648	9 7
A127521	25866	9 8
A125746	25149	9 8
A124547	24168	10 5
A125850	25176	9 8



Intensities of Lines in B Stars (H.A. XVIII (2) p. 235)

Des.	λ	B Orion.	B1A β Cent.	B2A γ Orion.	B3A α Per.	B4A ϕ Vel.	B5A γ Crux	B6A λ Cent	B	B1	B2	B3	B4	B5	B6
									4712.8	4	4	4	5	3	10
H ϵ	3704.	18	25	22	25	25			H β 4861.5	25	35	40	50	60	80
H γ	3711.8	10	20	20	20	25		20	4922.1	7	10	10	10	8	1
H δ	3721.9	18	22	30	25	35		40	5015.7	5	5	4	4	4	-
H λ	3734.2	18	25	35	35	40		60	D $_2$ 5875.9		20	10			
H κ	3750.2	20	30	40	50	50	80	80							
H ζ	3770.8	25	35	40	50	60	80	90							
H θ	3798.1	25	35	40	50	60	80	90							
He	3819.2	15	18	20	20	10	2	0							
H η	3835.5	25	35	40	50	60	80	90							
H ξ	3889.1	25	35	40	50	60	80	90							
	3964.6	3	3	7	5	2	0	0							
He	3970.2	25	35	40	50	60	80	90							
	4009.5	4	7	10	10	5	1	0							
He'	4026.4	15	20	22	22	12	8	5							
	4089.2	15	5	2	-	-	-	-							
H δ	4101.8	25	35	40	50	60	80	80	4154.7	2	2	2	2	1	0 0
	4116.2	10	2	-	-	-	-	-	4169.2	2	2	3	3	1	0 0
	4120.5	5	8	6	6	3	2	-	4186						
	4144.0	5	8	12	12	7	3	-	4254.0	3	4	2	1	-	-
H γ	4340.7	25	35	40	50	60	80	90	4267.4	2	3	5	5	3	2
	4350.1	5	8	15	15	7	3	0							
	4387.8	5	8	15	15	7	3	0							
	4471.8	15	18	22	22	10	5	4	4415.1						
	4481.4	2	2	3	4	7	6	7							
H γ	4542.4	2	-	-	-	-	-	-							
H δ	4553.4	5	5	4	2	1	0	0	4542.4	2	-	-	-	-	-
	4568.6	4	3	3	1	0	0	0							
	4641.1	4	4	4	-	-	-	-							
	4649.2	25	10	4	1	-	-	-							
	4685.4	2	3	1	-	-	-	-							
	4685.4	3	1	-	-	-	-	-							

	B	B ₁	B ₂	B ₃	B ₅	B ₆	B ₉		B	B ₁	B ₂	B ₃	B ₅	B ₆	B ₉
	$\epsilon_{\text{cor.}}$	$\rho_{\text{cor.}}$	$\tau_{\text{cor.}}$	α_{Par}	ϕ_{Vel}	τ_{gru}	λ_{Corr}								
H ^c ②	3613.6	3						Unid	3920.6	2	3	3	2	2	0 0
	3634	2	5					ParH	3925.9		1	0	0	0	
H π	3691.5	-	1	-	-	1		ParH	3926.8	2	3	5	6	5	0 0
H δ	3697.4	8	5	-	-	15		CaI	3933.8	3	2	4	4	8	5 8
H ϵ	3704.0	18	25	22	25	25		Unid	3936.	0	0	2	1	0	0 0
H γ	3711.8	10	20	20	20	25	20		3945	2	2	2	1	0	0 0
H μ	3721.9	18	22	30	25	35	40		3954.8	2	2	2	1	0	0 0
	3728.1	1					0		3962.	2	0	0	0	0	0 0
H λ	3734.2	18	25	35	35	40	60	He ②	3964.6	3	3	7	5	2	0 0
H κ ①	3750.2	20	30	40	50	50	80 80	He ③	3970.	25	35	40	50	60	80 90
	3760.1	5	5		0	0	0 0		3975.2	1	1	0	0	0	0 0
H δ ①	3770.8	25	35	40	50	60	80 90		3982.8	2	2	1	0	0	0 0
	3779.5	2	-	-	-	-	-	Unid.	3994.9	2	3	5	1	0	0 0
	3784.6	2	-	-	-	-	-	He ⑥	4009.5	4	7	10	10	5	1 0
	3790.9	2	-	-	-	-	-	He ④	4026.4	15	20	22	22	12	8 5
H θ ①	3798.1	25	35	40	50	60	80 90		4036.0	0	1	2	0	0	0 0
H δ ④	3819.2	15	18	20	20	10	2 0		4042.2	0	1	2	0	0	0 0
H η ①	3835.5	25	35	40	50	60	80 90		4069	3	3	3	1	0	0 0
Si ⁺	3856.2			1	3	8	0 0	Ox II	4072.0	2	3	3	1	0	0 0
Si	3863.2			1		5		Ox II	4075.9	3	4	3	1	0	0 0
	3864.0			1					4084.9	1	3	2	0	0	0 0
He ③	3867.6	1	2	6	2	1	-	S III	4089.2	15	5	2	0	0	0 0
He ②	3872.4	1	2	4	2	1	-	S III	4096.9	4	2	1	0	0	0 0
	3876.4	-	2	4	-	-	-	H δ ①	4101.8	25	35	40	50	60	80 90
	3881.7	1	1	0	-	0	0 0		4111.2	0	1	1	0	0	0 0
H δ ①	3889.1	25	35	40	50	60	80 90	S III	4116.2	10	2	0	0	0	0 0
	3912.2	2	3	3	1	0	0 0	He ⑥	4120.5	4	8	6	6	3	2 0
Unid	3918.7			3	2		0 0	Si ⁺	4128.5	0	1	1	2	3	3 0

		B	B.	B ₂	B ₃	B ₅	B ₇	B ₉		B	B.	B ₂	B ₃	B ₅	B ₇	B ₉
		$\bar{e}_r$								$\bar{e}_r$						
Sn ⁺	4131.4	0	-	1	2	3	3	3		4591.6	2	2	1	.	.	.
He ⁶	<u>4144.0</u>	⁴ 5	8	12	12	7	3	-		4598.2	2	2	1	.	.	.
Se ²	4154.7	2	2	2	2	1	0	0		4611.2	2	2	.	-	.	.
	4169.2	2	2	3	3	1	0	0		4619.8	1	2	2	1	.	.
	4186.2	2	2	1	1	0	0	.	Se ²	4630.6	2	2	3	.	.	.
	4190.5	2	2	1	1	0	.	-		4641.1	4	4	4	.	.	.
Ca	4226.7									4649.2	25	10	4	1	0	0
	4254.1	3	4	2	1	0	0	0		4661.2	2	3	1	.	.	.
Cs ²	4267.4	2	3	5	5	3	2	0		4675.3	2	3	1	.	.	.
	4276.7	2	3	2	0	0	0	.	He ^{II}	<u>4685.4</u>	<u>3</u>	1	.	.	.	.
	4285.1	2	3	2	0	.	.	.	He ³	<u>4712.4</u>	<u>4</u>	<u>4</u>	4	5	3	1
②	4318.0	3	2	2	0	.	.	.	He ³	<u>4861.5</u>	<u>25</u>	<u>35</u>	40	50	60	80
H ¹⁰	4340.7	25	35	<u>40</u>	50	60	80	90	H ¹⁰	<u>4922.1</u>	<u>7</u>	<u>10</u>	10	10	8	1
	4350.1	3	3	1	0	0	0	0	⑥	<u>5015.7</u>	5	5	4	4	4	0
Ox	4367.3	2	2	1	0	0	0	.	②	<u>5047.4</u>	2	3	3	3	1	.
	4373.2	0	2	1	0	-	.	.	He ³							
Fe ⁶	<u>4383.4</u>	⁵ 5	8	15	15	7	3	0								
	4395.7	1	2	2	0	0	0	0								
Fe	4415.1	3	5	2	0	.	.	.								
He ⁵	<u>4437.9</u>	0	2	3	3	0	.	.								
	4447.7	0	2	2	0	.	.	.								
	4453.0	0	2	2	0	.	.	.								
He ⁴	<u>4471.8</u>	¹⁵ 15	18	22	22	10	5	4								
H ⁹	4481.4	2	2	3	4	7	6	7								
H ⁷	4542.4	2	0	0	0	.	.	.								
Se ^I	4553.4	5	5	4	2	1	0	0								
Se ^{II}	4568.6	4	3	3	1	0	0	0								
Se ^I	4576	2	2	3	1	0	0	.								

Series

2P-4D	4861.3	6	1P-3D	4921.9
2P-5D	4340.5		1P-4D	4387.9
	4101.8		1P-5D	4143.8
	3970.1		1P-6D	4009.3
	3889.1			
	3835.1	7	3D-4F	4685.8
	3797.9			He
	3770.8		4F-8G	4859.4
	3750.2			4541.6
1s-2p	He		add	4338.7
1s-2p	5015.7		below	4119.9
1s 3P	3964.7	8	Calc.	4318.65
1s 4P	3613.6			
1s-5P	3447.6	9	1s ² -2p ²	3888.6
1p ² -3s ²	4713.4		1s ² -3p ²	3187.7
1p ² -4s	4120.9			
1p ² -5s	3867.4	8	4F-13G	4025.6
				3966.5
1p ² -3d ²	4471.7			3923.5
1p ² -4d ²	4026.4			
1p ² -5d ²	3819.6			
1p ² -6d ²	3705.5			
1P-3S	5047.8			
1P-4S	4437.5			

The Orion Cluster

See Kapteyn on Parallaxes & motions of the brighter galactic helmin stars bet. Galact. long. 150° - 216° .

Parallaxes π for the Orion Cluster are Kapteyn 0.0034", Bergstrand 0.008" & Rasmussen 0.0055. - Stars very far away.

Proper motions are small - but account must be taken of foreshortening

Plate IX of Mt Wilson Contrib. shows that bright B. stars bet. $5^{\circ}20m$ & $5^{\circ}40m$ on both sides of eq. are most numerous. This suggests a local group - a cluster - Most of these stars belong to the Oes-B₃ group. Outside the group are many B₅-B₉ stars. The radial veloc. of the Oes-B₃ stars are very nearly equal.

The real motions of these stars very nearly parallel & equal more than with the stars outside the limits - The group is local - like the Pleiades & the Hyades. It surrounds the Orion Nebula - which according to Rasmussen & Kapteyn possibly forms part of the group. Rasmussen considers the group as $5^{\circ}13m$ to $5^{\circ}40m$, $\delta = +7^{\circ}6' - 14^{\circ}$. (the latter covering 2 degrees - otherwise -9.7 is the lowest - δ).

The stars considered as part of the Orion Cluster

Star.	Sp.	m	π	R.A.	δ	M _x	
an. P.G.C. 1147 π_4 Or.	B ₃	3.78	0.003	4-45.9	+5.26	-2.60	8.4
1159 π_5 "	B ₃	3.87		4-49	+2.17	-2.43	6.7
1262 π "	B ₅	3.68		5-12.8	-6.57	-2.54	3.5
1277 λ Dep.	B ₂	4.29		5-15.0	-13.17	-1.78	6.8
1284 θ Or.	B ₃	4.65		5-16.7	-0.29	-1.81	7.5
1295	B ₃	5.64		5-18.35	-0.15	-0.58	?
1301 η Or.	B ₁	3.44		5-19.4	-2.29	-2.78	5.85
1303 δ "	B ₂	1.70	0.005	5-19.8	+6.16	-3.60	8.0
? 1314 γ "	B ₂	4.66	0.003	5-21.6	+3.0	-1.56	6.7
1332 β "	B ₃	5.52		5-26.	+3.13	-0.70	6.9
✓ 1339 δ "	B	2.48	0.003	5-26.9	-0.22	-3.08	4.5

P.G.C.: Publ. Gen. Cat of Stars

*Adopted M. - Kapteyn AP. 48. p. 279-80-81

P.G.C	Name	Sp.	m	π	RA	δ	M	
no plates (1340)	v Cr.	B.	4.64		5-27.1	-7.23	-1.58	170
(1361)		B ₁	5.58		5-30.1	-6.4	-0.64	0.76
* (1370)	e Cr.	B.	1.75	0.008	5-31.1	-1.16	-4.71	⁴⁵⁹ (-3.74)
? (1389)	o "	B	3.78		5-33.7	-2.39	-2.68	²⁵⁶ 4.2
(1398)	s "	B	2.05	0.006	5-35.7	-2.0	-4.17	⁴⁵⁹⁻⁰⁰⁵⁴ (4.06)
(1399)		B ₃	5.00		5-35.5	-1.10	-1.22	¹³⁴ 7.5
(1435)	x	B	2.20	0.028	5-43.0	-9.42	-3.80	⁴¹⁴ (0.56)
								4.226

In a local group, the proper motions shd be nearly equal. The distribution of spectra of the group shd. differ from the rest of the sky. - In the above group Oes-B₃ predominate = 77% (within limits Gal. lat. 180°-216°, b -30° to +4°) The mean parallax $\pi = 0.0054$. Observations on Melula Group seem to indicate a cluster - especially due to similarity in directions of motions.

Table ~~XXX~~ of Miss Paynes Stellar Atmos. gives Characteristic Lines as follows

B ₀	-	H	He	Si ⁺⁺	~~Ca~~	~~Fe~~	He+	O+
B ₁		H	He	Si ⁺⁺				O ⁺ *
B ₂		H	He*					
B ₃		H	He					
B ₅		H	He				Si ⁺	Ca+
B ₇		H	He				Si ⁺	Ca+ Mg+
B ₉		H	He				Si ⁺	Ca+ Mg+

* Max. of lines used as criteria of class

Perrine's statements must be taken with quite a few grains of salt.

Perrine A.S.P. J. 48. 25

General Notes on B Stars

- (1) Strong preference of B Stars for Milky Way
- (2) Great distance
- (3) " absolute brightness + (far > A)
- (4) Small number. - (A) far outnumber (B)
- (5) Broadening of spectral lines confined to classes A-B-O.
(a sign of great activity)
- (6) The stage of Class B. in spectra results from same cause as the similar stage in Nova Persei - the principal difference in the two cases being one of intensity affecting the element of time.
- 1* - Conditions there are favorable to the production or maintenance of the B spectral stage - in a manner allied to the outbursts of the novae - Also by evolution from the gaseous nebulae in the galaxy. - In other regions - stars are older - no B stars.
- 3-4. - The course of evol. is toward the nebulae rather than away - B is an upward stage. toward "

1x Here matter is plentiful to cause an increase of energy - being more > that lost by radiation. In regions where there is little or no cosmic matter, radiation will > energy recd. & direction of change will be toward later types (4)

Class B stars closely allied to Wolf Rayet stars which belong bet P & B. Nebular cond. is climax of evolutionary activity. The novae are in the general course of evol. in regions where cosmic matter is plentiful

Stellar bodies encounter cosmic matter in the form of clouds - finely divided state - create disturbances in stars atmos - form an atmosph. The stage of spectral type

will depend on the mass of the matter encountered, and the violence of the encounter - the most violent reaching the nebular stage - on the way to which class B is passed then O. Planetary neb. are relatively moderate

outbursts in which gaseous nebulosity has been generated - Violent outbursts give large irreg. neb. ②

Increasing stages of activity show broadening of lines and bands - absorption and emission - declining stages by narrow lines

① thrown off as a shell - appear as a ring-neb. - with central star. A central star must be the necessary factor, even tho not seen now.

② Speed of outburst overcomes the central attract. & the gaseous nebulosity carried to great dist. The finely divided matter in distant galactic regions may be such condensed nebulosity - as Orion - the result of a great catastrophe. ③

In the Pleiades, the stars are slightly older in type, & nebulosity not self luminous (B5-A0) type

(3) Many bright stars of early type have masses of nebulosity near - appear to be connected with them.

(4) If stellar bodies result from condensation of neb. and the accumulation & condensation cause rise in T. enough to disrupt it & thus repeat? Most neb. masses have one or more bright stellar bodies near centre from which the neb. may have been ejected - Could the reverse be the case?

Classification

Intensity distrib. - rather than wave lengths - important
Detailed analysis of typical spectra with highest possible
dispersion & resolv. power - from objective prism plates. From
the ratios of line intensities, the degree of ionization in the
spectrum may be found.

Averages of intensities of multiplets must be
used.

7/14

28

Estimating Intensities

As a preliminary for an intensity basis, I used Miss Cannon's intensities of lines - for H β , H γ H δ He etc. (HA 28. Table ~~XXIII~~)
 Later on I shall set up standards for Helium lines only.

For plate x 8119, she assigns 25 - to each H γ line. This estimate appearing satisfactory, from an examination of several B $_0$ plates even tho an arbitrary standard, I compared my first few plates with it to get accustomed to He. values. The estimates appearing below, were made directly from the plates - and not until an entire class was completed, was any attempt made to compare them with Miss Cannon's estimates, thus avoiding any tendency to bias. The Helium lines in the 2nd column are arranged in order - the first column indicating their groups. (see p. 1).

E. Orionis (B) (Ab. Mag - 4.71.)

	x 8119	C 398	3977	6343	Ave.	Groups	C 120, 398, 3977, 6343, 1302,
	03 p.	2977	2977	2977			
(2)	3613.6	0	-	-	0	0.00	(2) $\begin{matrix} 0.00 \\ 2.50 \\ 3.50 \end{matrix}$ 2.00
(4)	3819.2	15	13	-	15	14.00	
(3)	3867.6	1	0	0	0	0.30	(3) $\begin{matrix} 0.30 \\ 3.00 \\ 3.25 \end{matrix}$ 2.18
(2)	3964.	3	3	2	2	2.50	
(6)	4009.5	3	3+	3	3	3.00	(4) $\begin{matrix} 14.00 \\ 13.25 \\ 15.25 \\ 42.50 \end{matrix}$ 14.17
(4)	4026.4	15	12	14	14	13.25	
(3)	4120.5	4	3	3	2+	3.00	
(6)	4144.0	4	5	5	3+	4.25	(5) 0.00 0.00
(6)	4387.8	5	3	5	3+	4.00	(6) $\begin{matrix} 3.00 \\ 4.25 \\ 4.00 \\ 7.00 \end{matrix}$ 4.56
(5)	4437.9	0	0	0	0	0.00	
(4)	4471.8	18	15	14	14	15.25	6/7635 12.67
(7)	4685.4	3	3	2	3	2.75	(7) 2.75 2.75
(3)	4712.8	4	3	3	3	3.25	6/26.66 4.28 44
(6)	4922.1	7	-	6	8	7.00	
(2)	5015.7	3	-	-	2	3.50	

Sharp lines - Helium lines show clearly

(2)

C439
Pom
Vul

C2244

C2281

C1111

C6367

C6054

ave

K Orionis (B.)

M = -3.80

M

M

M

M

M

M

M

2	3613.6	-	-	-	-	-	-	3.9	3.5
4	3819.2	-	15	-	-	18	13	15.3	
3	3867.6	-	-	-	-	-	-	2.5	3.1
2	3964.5	5	3	4	5	3	3	3.9	
6	4009.5	3	3	3	3	3	3	3.0	14.3
4	4026.4	12	12	13	15	15	12	13.2	
3	4120.5	3	2	3	3	2	2	2.5	0.0
6	4144.0	5	4	3	5	4	5	4.3	3.0
6	4387.8	5	3	5	7	6	6	5.4	4.9
5	4432.9	0	0	0	0	0	-	0.0	7.0
4	4471.8	15	15	15	15	12	14	14.4	
7	4685.4	2	3	2	2	1	2	2.0	2.0
3	4712.8	4	3	5	4	3	3	3.7	4.65
6	4922.1	7	6	7	7	8	7	7.0	
2	5015.7	-	-	-	-	3	3	3.0	

6/77.7
12.9

(3)

C442

C6210

C3015

C241

C6616

C6430

ave

K Orionis B.

M = -4.17

M

M

M

M

M

M

M

2	3613.6	-	-	-	-	-	-	-	
4	3819.2	-	15	-	15	11	12	14.25	1.9
3	3867.6	-	-	-	-	-	-	-	
2	3964.5	-	1	0	0	0	0	0.20	2.4
6	4009.5	2	3	2	0	2	1	1.7	
4	4026.4	15	15	15	13	13	14	14.2	14.11
3	4120.5	2	3	3	3	1	1	2.2	
6	4144.0	5	3	3	3	3	2	3.2	42.35
6	4387.8	5	3	4	2	3	4	3.0	0.0
5	4432.9	0	0	0	0	0	0	0.0	
4	4471.8	15	12	15	14	12	11	13.9	4.0
7	4685.4	-	2	3	3	3	2	2.6	
3	4712.8	-	2	3	3	3	2	2.6	
6	4922.1	-	8	-	-	8	8	8.0	
2	5015.7	-	3	-	-	4	-	3.5	

6/69.4
11.6

④

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

S Orion B			
468	422		3.08
—	—	2	1.0
—	—	2	3.0 = 2.0
—	—	3	0
14	—	3	2.7
—	—	3	3.5 = 3.1
—	—	5	1.0 = 0.3
—	3	6	2.0
15	15	6	3.0
—	3	6	4.0 = 3.9
—	3	6	6.5
—	3	7	2.6 = 3.5
5	4	4	14.5
—	1	4	15.5
15	14	4	15.0
—	—	4	4.5
—	—	6	27.0
—	—	6	4.5
—	—	11.7	
—	3		

V. Orion -1.5t
no plate

In several plates, as C-805, C-979, C-801, C-1055, much of the ends of the spect are dim, hazy and ill defined. Here one is confronted with the problem of either omitting any entry for a line that is expected & not enter any value - of course not marking its value 0, or else of assuming or estimating a value based upon the intensities of other lines of the same series. That is - if a series has 3 lines, two of which are visible and the third, located in a poor region, is invisible - it will be safe to estimate a value for it - as otherwise, the other two line would have been absent show up & it is fair to assume that the third is present too.

32

Notes

B₂ Hyd 40
PGC 1277 2 Leporis M.
M-1.78
c 6394

PGC 1303
r Or.
-3.60
c 6565 c 386 dem
x 797F.
OK
Plate x 797F.
being lost
was given 2 Val.

an. B₂
4.66
15527

2.	3613.6	2	40	35	f - f	-	2	5.7	3	= 43	20
4	3819.2	25	3	35	f -	22	20				
3	3867.6	4	3	4	f -	5	5	3	5.0	48	4
2	3964.0	4	4	2	6	5	6	3	5.7		
6	4009.5	8	4	25	104	8	8				9
4	4026.4	19	4	14.0	23	22	25	207	237	21.0	18
3	4120.5	4	4	18	5	6	6	1+5			5
6	4144.0	10	5	33	16	15	13	5	1.5	1.5	8
6	4387.8	7	6	8	10	9	10	5.5			6
5	4437.9	3	6	10	4.0	0	1	6	14.2	9.7	10.6
4	4471.8	18	6	7	20	18	18	10			15
7	4685.4	2	6	8	6	0	0				2
3	4712.8	2	7	23	4	3	3				2
6	4922.1	8	6	40.5	10	9	10				10
2	5015.7	3	6	6.1	3	3	3				3

2	3613.6	3613.6	c 4321	B ₃ π 4 Or.	M = -2.60	c 2540	1650	2	-	20	burnt
4	3819.2	3819.2	-	25	20	2	-	5.5	4.8	2	4 = 3.5
3	3867.6	3867.6	-	3				3		4	
2	3964.0	3964.0	5	6	3	3		8.5	5.5	8	3. 2 = 4.3
6	4009.5	4009.5	12	12	4	22.5		5		20	4. 20 = 19.3
4	4026.4	4026.4	25	25	4	25.1	25.7	20		14	5 0 = 0.0
3	4120.5	4120.5	7	10	5	0	0			9	6 8 = 10.2
6	4144.0	4144.0	20	15	6	12		17.5	13.0	18	14 9 = 10.2
6	4387.8	4387.8	10	12		11.0		12.0		3	7 3 = 3.0
5	4437.9	4437.9	0	0						4	6 40.3 = 6.7
4	4471.8	4471.8	20	20						10	
7	4685.4	4685.4	0	3						3	
3	4712.8	4712.8	5	-						3	
6	4922.1	4922.1	15	-	12					3	
2	5015.7	5015.7	-	3	7	3.0	1.5			3	

Hyd = 50

B₃
1399 PGC. M
HP. 1047. -1.22
CG434 CG616 6210

FAINT
PLATE

2	$\frac{4}{3}$	3.5	-	2	$\frac{4}{3}$	3.5
3	0	3.5	-	3	0.0	2.7
	$\frac{5}{2}$		4	$\frac{6}{2}$		
4	20		10	4	22	
	$\frac{18}{15}$	18.0	20	$\frac{20}{14}$	= 19.	
	$\frac{53}{53}$		6	$\frac{14}{10}$		
5	3	3.0	8	5	0	0
			7	6	10	
6	9		0	8		
	$\frac{8}{6}$	11.0	14	7	= 10	
	$\frac{10}{10}$		2	$\frac{14}{5.0}$		
7	2		2	7	3	
	$\frac{2}{2}$		14	$\frac{3}{6.4}$		

O. Orions B₃ H. -1.81
C 16184

2	-	-
4	-	-
3	-	-
2	-	(7)
6	8	6
4	22	20
3	6	5
6	-	10
6	15	15
5	-	
4	20	21
7	-	2
3	-	3
6	-	(9)
2	-	(3)

2	$\frac{7}{3}$	5.0
3	$\frac{5}{3}$	4.0
4	-	
	$\frac{21}{20.5}$	210
5	(2)	(2.0)
6	$\frac{6}{15}$	
	$\frac{(9)}{30}$	= 10.8
(7)	(2)	= 2.0
	$\frac{6}{7.5}$	

20	2	$\frac{6}{3}$	4.5
(2)	3	$\frac{2}{3.5}$	3.3
6	4	20	
10		$\frac{25}{18}$	21.0
25		$\frac{6.3}{6.3}$	
5	5	0	0.0
14	6	10	
7		$\frac{14}{7}$	10.5
18		$\frac{11}{4.2}$	
(3)	7	3.0	
(3)		$\frac{423}{423}$	= 7.05
11			
(3)			

B₃ Helium lines
are weaker. Lines
are sharper - thinner.
Spectra not particu-
larly contrasty - make
estimate difficult
U.V. & I.R. regions par-
ticularly faint.

34

33 (hr. B3) Hya = 50
 mag = 5.52 $\text{Ab} 17 = -0.70$
 c 16332

2	3613.6	20	2	$\frac{6}{2} = 4.0$
4	3819.2	①	3	$\frac{1}{8} = 3.7$
3	3867.6	6	4	$\frac{20}{25} = 21.0$
2	3964.0	12	5	0. 0.
6	4009.5	25	6	$\frac{12}{10} = 11.0$
4	4026.4	8	7	$\frac{2.0}{6.9}$
3	4120.5	10		
6	4144.0	10		
6	4387.8	0		
5	4437.9	18		
4	4471.8	2		
7.	4685.4	2		
3	4712.8	12		
6	4922.1	②		
2	5015.7			

7 (hr. (365)^m B5 (M (-2.5V) Hya = 60
 c 6403 19462

⑩	→ 10
⊖	$\frac{2}{2} = 1.5$
⊕	
5	$\frac{3}{5} = 1.7$
15	
5	$\frac{4}{10} = 11.7$
7	
7	$\frac{10}{35}$
10	$\frac{5}{0} = 0.0$
-	$\frac{6}{7} = 6.2$
-	$\frac{7}{6} = 0.0$
6	$\frac{6}{25} = 0.0$
②	$\frac{7}{0} = 3.5$

36

NG.C - 6231

#22(B₀) Bo. M = -2.38#5 - Bo.
M = -1.88

#1348/13463 13167 13488 13231 13472 13477 13484 13267

 (2) { 5015
3965
3613
3447

 (3) { 4713
4120
3867

 4 - { 4472
4026
3819
3705

 5. { 5048
4438

 6 { 4922
4388
4144
4009

 7 H+ 4686
5411
4859.4

 8. { 4542.6
4338.7
4199.9
4100.1
4025.6
3968.5
3922.5

 9 { 3853
3187

faint faint faint faint faint faint f. l

 X505+ f
#4965 x (f)
X4400 (f)

100

Messier #3. (N.G.C. 5272)

7/15.

Position - $13^{\circ}37'06''$ $+28^{\circ}53'$ (1900 Ep)

Solon L. Bailey

Notes from H.A. 78. Chap. 1. Referred to 6792 (broken)

Messier 3. - remarkable - highly condensed - nearly symmetrical
 counted 1213 stars (590 in northern half, 623 southern) at Arequipa
 Visual mag. of cluster about 6.0 with 13" Boyden Ref. (for l. 1915").
 Phot on Mt. Wilson (Pritchey) 60" Reflector - 4 hr exp. - not less than
 30000 stars (includes estimated central area - where indiv. stars can
 not be counted - (HA 38. Ch I

E.C. Pickering disc^{1st} a variable in 1889 near centre of cluster. Later others
 were disc in other ~~var.~~ cluster. In 1893. at Arequipa a study of the phot.
 of dense clusters was begun. From table I. p. 2. we get the following.

N.G.C. # 5272. - 900 stars examined. - 10 plates used. Area ex. 1257° ¹³² ~~128~~ Var

found. Max dist of any var. from centre of cluster - ¹⁷ ~~22~~'. Area of circle
 that include all the var. 908. Prop of var. to # stars counted. 147

Ratio of # stars to one var. - Exposure required for satisfactory
 photo - 100 min.

As a rule glob. cluster centers so condensed, to make detailed study
 impossible

To obtain basis for deter. var. an artif sequence of 10 stars is
 made - brightest to faintest - Detection of var. slow & difficult.

- severe strain on eyes - stars coalesce - ~~not~~ exact compar. impos.

Usually, the duration of the max. is so small in compar with whole
 period - making noting of variability hard.

In observing variables in clusters - method of H.A. 26 p. 2. used -
 for comparison stars (see also 38. p. 12) Once sequence stars were adopted
 variables were compared with them - Grades were regarded as tenths of
 a magnitude as f3 09 3h. means that the variable was 3 grades fainter
 than f, = 69 + 3 grades > h - If f, = 11.18, g = 11.74 + h = 12.17. The var notation
 wd read. 11.48 - 11.74 - 11.87. Mean = 11.70 Residuals = ⁺22, ⁺04.17 ~~22.04~~

