THE ASTROPHYSICAL JOURNAL, 174:401–423, 1972 June 1

SECOND CATALOG OF EMISSION-LINE STARS OF THE ORION POPULATION*

G. H. HERBIG AND N. KAMESWARA RAO
Lick Observatory, Board of Studies in Astronomy and Astrophysics,
University of California, Santa Cruz
Received 1971 December 9

ABSTRACT

The catalog contains 323 emission-line stars of the Orion population that have been observed with slit spectrographs. Accurate positions are given for most objects, together with *UBV* data where available, spectral classification, emission-line intensity class, type of star, light range and classification of the light curve, nebula with which the star is associated, and remark or indication when the star is nebulous or double. The catalog is based upon all published information available to mid-1971, together with unpublished Lick data.

About 10 years ago, Herbig [105][1] published a list of 126 T Tauri stars and related objects brighter than $m_{pg} \sim 14.5$ for which slit spectroscopic information was available. Since that time there has been a substantial increase in the number of T Tauri stars and in the volume of observational data. Also, it is now much clearer than it was in 1962 that there are several kinds of other peculiar young stars whose organic association with nebulae is as genuine as that of the T Tauri class. Examples are the Be and Ae shell stars like RR Tau (Herbig [102]), unusual F-type objects like FU Ori (Herbig [107]) and BF Ori, and the flash variables.[2] All these stars we consider to be members of the Orion population, whose earlier definition in terms of objects between about $M_{pg} = +4$ and the main sequence should now be expanded to include the entire collection of pre–main-sequence stars of all luminosities, with and without emission lines, that are found largely in nebulae, young clusters, and associations.[3] The new catalog of this paper lists 323 stars that we regard as certain or probable members of the Orion population and for which slit spectrograms or equivalent information are available. No restriction is placed on apparent magnitude.

As a census of the Orion population, this catalog is systematically incomplete, and we caution against its use for statistical purposes without appropriate correction. The listing of conventional T Tauri stars should be fairly complete to about $m_{pg} = 14$ in the northern sky because the classification criteria are usually unambiguous given an adequate slit spectrogram. The Be and Ae stars that belong to the Orion population, on the other hand, are not very well defined spectroscopically. We have been very cautious in not listing here a number of such stars that may very well turn out to be pre–main-sequence objects—for example, XY Per. Furthermore, we have not included any luminous M-type stars, although a few (notably VY CMa) may be pre–main-sequence objects.

The Orion-type variables without line emission are, by definition, omitted from this catalog. These variables are actually more numerous than the T Tauri stars in those young clusters for which data are available. It is unlikely that line emission is absent in

* *Contributions from the Lick Observatory*, No. 355.

[1] Reference numbers in brackets refer to the list of citations following table 1.

[2] The rather formal distinction that is made between flash and flare variables is explained in Herbig (1966).

[3] The qualifier "largely" is used to cover the case of low-mass objects having long contraction times that now may be found far from their parent clouds.

TABLE 1

HRC no.	Star	Other designation	α(1900)	δ(1900)	ℓ	b	Mag.		Light curve class.
1n*	MacC H12		$00^h\ 01^m\ 50^s$	+65° 05' 13"	118.4	+ 3.2	16.23:v?	V	
2	LkHα 197		00 05 20.5	+58 16 43	117.7	- 3.6	17	pg	
3n	LkHα 198		00 06 10.3	+58 16 24	117.8	- 3.6	15	pg	
4	MacC H10	Blanco 9	00 07 34	+65 00 46	119.0	+ 3.0	14.72:v?	V	
5*	MacC H9	Blanco 10	00 08 08	+65 02 37	119.0	+ 3.0	14.96:v?	V	
6	LkHα 200		00 36.7	+61 23	121.9	- 0.9	14	pg	
7	LkHα 201		00 37.5	+61 05	122.0	- 1.2	14	pg	
8*	LkHα 262		02 50 27.4	+19 39 06	158.8	-34.0	15	pg	
9*	LkHα 263		02 50 27.8	+19 39 20	158.8	-34.0	16	pg	
10	LkHα 264		02 50 56.8	+19 41 22	158.9	-33.9	13	pg	
11n	LkHα 325		03 22.7	+30 23	158.7	-21.0	14	pg	
12	LkHα 270		03 23 06.8	+31 01 59	158.3	-20.4	14.5:	pg	
13	LkHα 271		03 23 11.3	+30 54 51	158.4	-20.5	14.0:	pg	
14n	LkHα 326		03 24.8	+30 13	159.2	-20.9	17?	pg	
15	LkHα 327		03 27.3	+30 50	159.2	-20.1	14	vis	
16	LkHα 328		03 27.8	+30 54	159.3	-19.9	16	vis	
17	LHα 92		03 38 10.2	+31 45 32	160.5	-17.9	16.5	pg	
18	LHα 97		03 38 28.8	+31 45 06	160.6	-17.8	18.0	pg	
19	LkHα 329		03 39 19.8	+32 07 07	160.5	-17.4	14.0	r	
20	LkHα 330		03 39 31.2	+32 05 23	160.5	-17.4	13	pg	
21	LkHα 272		03 42 28.2	+38 37 50	156.8	-12.0	14.5:	pg	
22	LkHα 273		03 42 38.8	+38 38 12	156.8	-12.0	14.0:	pg	
23n*	FM Tau	Haro 6-1	04 08 02.7	+27 57 34	168.2	-16.3	13.8-15.6	pg	II
24	FN Tau	Haro 6-2	04 08 03.1	+28 12 43	168.0	-16.2	14.8-16.3	pg	IV? s
25n*	CW Tau	MHα 259-3	04 08 06.2	+27 55 43	168.2	-16.3	13.6-15.8	pg	IV
26	FP Tau	MHα 259-23	04 08 40.1	+26 31 16	169.4	-17.2	15.0-15.6	pg	III
27	CX Tau	MHα 259-22	04 08 40.6	+26 33 00	169.4	-17.2	14.5-15.5	pg	II,III
28	CY Tau	MHα 259-5	04 11 22.0	+28 05 57	168.6	-15.7	13.4-15.4	pg	III
29*	V410 Tau	BD +28° 637	04 12 17	+28 13.2	168.7	-15.5	10.6-11.5	V	III?
30n*	DD Tau	MHα 259-6s	04 12 19.5	+28 01 47	168.8	-15.6	14.1-15.6	pg	III s
31n*	CZ Tau	MHα 259-6n	04 12 19.9	+28 02 17	168.8	-15.6	15.7-17.5	pg	s
32	BP Tau	MHα 259-7	04 13 01.8	+28 51 51	168.3	-14.9	10.7-13.3	pg	III s
33	DE Tau	MHα 259-8	04 15 44.5	+27 40 51	169.6	-15.3	13.8-14.8	pg	II ℓ
34n	RY Tau		04 15 44.8	+28 12 21	169.2	-14.9	9.3-12.3	pg	I,IV 1.5ℓ
35n*	T Tau		04 16 09.4	+19 17 52	176.2	-20.9	9.6-13.5	vis	I
36	DF Tau	MHα 259-11	04 20 56.9	+25 28 49	172.1	-16.0	10.7-15.0	pg	II s
37n*	DG Tau	MHα 259-10	04 20 57.7	+25 52 42	171.8	-15.7	11.5-14.9	pg	II s
38*	DH Tau	MHα 259-9 np	04 23 33.1	+26 19 46	171.9	-14.9	13.4:-15.1:	pg	II,III s
39*	DI Tau	MHα 259-9 sf	04 23 34.0	+26 19 37	171.9	-14.9	13.6:-15.8:	pg	II
40n*	LkHα 101		04 23.7	+35 04	165.4	- 9.0	17	pg	
41*	IQ Tau	LkHα 265	04 23 44.2	+25 53 34	172.2	-15.2	14.5-16	pg	
42*	UX Tau B		04 24 16.0	+18 00 41	178.6	-20.2	13	vis	
43*	UX Tau A		04 24 16.3	+18 00 41	178.6	-20.2	10.6-13.7	pg	I,II c
44	FX Tau	Haro 6-11	04 24 26.6	+24 13 38	173.7	-16.2	14.4-15.2	pg	s
45	DK Tau	MHα 259-12	04 24 37.1	+25 48 20	172.5	-15.1	11.9-15.1	pg	IV sf
46*	ZZ Tau		04 24 47.7	+24 29 19	173.5	-16.0	12.9-15.4	pg	III
47	LkHα 331		04 25 21.4	+23 57 54	174.0	-16.2	16.5:	pg	
48*	HK Tau	Haro 6-12	04 25 47.5	+24 11 22	173.9	-16.0	15.1-17.5	pg	I,II
49n*	HL Tau	Haro 6-14	04 25 50.7	+18 01 03	178.9	-20.0	15.4-16.4	pg	I
50n*	XZ Tau		04 25 52.3	+18 01 01	178.9	-20.0	11 -15.6	pg	III
51*	LkHα 266	SVS 1357	04 26 09.7	+18 08 43	178.8	-19.8	14.7-15.3†	pg	IV?
52*	UZ Tau f		04 26 35.9	+25 39 43	172.9	-14.9	9.2-15 †	pg	III 2.0+?c
53*	UZ Tau p						13	vis	
54	GG Tau	MHα 257-2	04 26 44.2	+17 18 51	179.6	-20.2	13.4-14.0	pg	II
55*	GH Tau	Haro 6-20	04 27 03.7	+23 56 49	174.3	-15.9	13.4-16.0	pg	II
56n*	GI Tau	Haro 6-21	04 27 31.0	+24 08 36	174.2	-15.7	13.7-16.4	pg	II
57n*	GK Tau	Haro 6-22	04 27 31.4	+24 08 25	174.2	-15.7	13.0-15.2	pg	IV
58	DL Tau	MHα 259-13	04 27 33.4	+25 07 57	173.4	-15.0	13.5-15.3	pg	IV s
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		(9)

TABLE 1

HRC no.	<V>	<B-V>	<U-B>	n	Mag., photo refs.	Spectral class	Type	Em. int.	Spectr. refs.	Chart ref.	Location
1n*	16.23:	+1.12		1	158		—	?		158	Cep IV
2						— eγ	—	2	102	102	Anon dark neb
3n						A:eα	h	1	102	102	Anon dark neb
4	14.72:	+1.51:	+0.52:		25,158	— eα	—	1	1	25,158	Cep IV
5*	14.96:	+1.28:	+0.72:		25,158	Geβ	t:	1-2	1,158	25,158	Cep IV
6						Ke	t:	1-2	102,105	102	NGC 225
7						— eα	—	1	102,105	102	NGC 225
8*						— e	t	3	1,105	1	Anon dark neb
9*						M(e)	m	2	1,105	1	Anon dark neb
10						—e	t	3-4	1,105	1	Anon dark neb
11n						K2eα	—	1	1	1	B 205
12						K2eα	—	1	1,105	1	NGC 1333, B 205
13						Ge	t	3	1,105	1	NGC 1333, B 205
14n						Geα	—	1	1	1	Near NGC 1333, B 205
15					73		t:	(4)	73	73	Tau-Aur, B1
16					73		t:	(3)	73	73	Tau-Aur, B1
17					95	K?eβ	—	1-2	1	95	IC 348, B4
18					95	— e	t:	2	1	95	IC 348, B4
19						—eα	—	1	1	1	IC 348
20						G2eα	—	1	1	1	IC 348
21						K2:eα	—	1	105	1	Near XY Per
22						— e	t	5u	1,105	1	Near XY Per
23n*					65,68,136	— e	t	3	1	83	Tau-Aur, B 209
24					65,68	K5:e	t	3	1	83	Tau-Aur, B 209
25n*	14.82	+1.32	+0.30	2	11,66,136,223	dK5e	t	3	133	133	Tau-Aur, B 209
26	13.82	+1.31	+0.90	2	66,136,210,223	dM2.5e	t	(2)	133	133	Tau-Aur
27	13.65	+1.51	+0.69	3	11,66,136,210,223	dM1.5e	t	(3)	133	133	Tau-Aur
28	13.58	+1.23	+0.04	3	11,66,136,191,210,223	dM2e	t	(2)	133,105	133	Tau-Aur, B7
29*	10.94v	+1.12	+0.84	73	176,181,182	dK5(e)	m	2	1,133	—	Tau-Aur, B7
30n*	14.55	+0.90	-0.64	1	11,66,136,223	dK6e	t	4u	215,133,104	133	Tau-Aur, B10, B7
31n*	15.26	+1.52	+0.59	2	66,136,223	dM2e	m	(2)	215,133,104	133	Tau-Aur, B10, B7
32	†11.97	+0.89	-0.18††	7	11,66,136,210,223,168,169	dK5e	t	4	133,31,105,142	133	Tau-Aur, near B7
33	13.05	+1.33	-0.10	3	11,136,210,223	dM1e	t	(3-4)	133,105	133	Tau-Aur
34n	†10.79v	+1.04	+0.56	30	11,43,46,168,169,210,244,247,248	G5e	t	2	132,93,98,101,103,105,32,41,140	103	Tau-Aur, B 214
35n*	†10.37	+1.24	+0.74††	21	3,43,57,72,168,169,210	K1e	t	2	132,74,206,90,93,98,101,245,140,142,41,156,105	—	Tau-Aur
36	†11.66v	+0.94	-0.22††	8	9,10,66,136,169,191,210,223	dM0e	t	4u	133,31,105,142,143	133	Tau-Aur
37n*	†11.62	+0.97	-0.34††	7	9,10,136,169,210,223	G:e	t	5	133,103,105,31,142,143,108	133	Tau-Aur, B 217
38*	13.63	+1.49	+0.47	3	9,66,136,210,223	dM0e	t	3	133,105	133	Tau-Aur, B 19
39*	12.77	+1.60	+1.36	5	9,66,136,210,223	dM0.5e	t	4u	133,105	133	Tau-Aur, B 19
40n*	†				40	F?eγ	?	2	97,111	97	NGC 1579
41*					126	M2e	t	2-3	105,1	126	Tau-Aur, B 218
42*						dM2e	m		132	11	Tau-Aur
43*	†10.96v	+1.09	+0.71††	3	11,132,169,210	dG5e	t	1-2	132,93,98,31,74,105	11,23	Tau-Aur
44					65,68	M4eα	m	1	1	83	Tau-Aur, B 18
45	12.23v	+1.34	+0.38	4	9,66,68,191,210,223	dM0e	m	(2-3)	133,105	133	Tau-Aur, near B 19
46*					9	M4:(e)	m	2	105,1	9	Tau-Aur, B 18
47						M4eα	m	1	1	1	Tau-Aur, B 18
48*					10,65,68	Ke	—	1-3*	1	83	Tau-Aur, B 18
49n*	†13.71v	+1.44	+0.25	3	11,169,210	— e	t	2	103,105,110,108	83	Tau-Aur
50n*	14.20	+1.48	+0.08††	2	11,210	— e	t	5	132,105,110,142	83	Tau-Aur
51*					11	K7e	—	2	105,1	11	Tau-Aur
52*						Me var	t	(2-4)	132,142,105	28	Tau-Aur, B 19
53*	†12.88	+1.24	-0.18††	3	131,169,210,187	dM3e	m	(2)	132,105	28	Tau-Aur, B 19
54	12.35	+1.40	+0.14	2	11,136,210,223	dK6e	t	(3-4)	133,105	133	Tau-Aur
55*					9,65,68	M2eα	m	1	105,1	83	Tau-Aur, B 18
56n*					6,9,65,68	K5e	t	3	105,1	83	Tau-Aur, B 18
57n*					6,9,65,68	K5(e)	t:	2	105,1	83	Tau-Aur, B 18
58	13.42v	+1.20	-0.39	4	9,68,136,210,223	G:e	t	5	133,105	133	Tau-Aur, near B 19
(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)

TABLE 1 (continued)

HRC no.	Star	Other designation	α(1900)	δ(1900)	ℓ	b	Mag.		Light curve class.
59	IS Tau	Haro 6-23	$04^h\ 27^m\ 46^s.6$	+26° 00' 48"	172.8	-14.4	15.9-17.0	pg	
60	HN Tau	Haro 6-24	04 27 52.3	+17 39 12	179.5	-19.8	13.9-15.0	pg	II,IV
61	CI Tau	MHα 259-20	04 27 52.8	+22 37 51	175.5	-16.6	13.8-15.9	pg	IV?
62	DM Tau	MHα 257-6	04 28 00.9	+17 57 31	179.2	-19.6	14.3-15.3	pg	III
63	AA Tau	MHα 259-17	04 28 51.8	+24 16 22	174.3	-15.4	12.5-16.1	pg	I-II
64*	HO Tau	Haro 6-27	04 29 21.7	+22 19 46	175.9	-16.6	15.2-17.2	pg	
65	DN Tau	MHα 259-18	04 29 24.3	+24 02 33	174.6	-15.4	13.2-14.7	pg	I-II
66n	HP Tau	LkHα 258	04 29 53.3	+22 42 00	175.7	-16.2	14.9-17.2	pg	I
67n*	DO Tau	MHα 259-15	04 32 20.2	+25 58 48	173.5	-13.7	12.4-16.5	pg	II,IV s
68*	VY Tau		04 33 17.8	+22 35 58	176.3	-15.7	9.0:-14.5:	pg	III 3.0:
69n*	LkHα 332		04 36 01.1	+25 11 40	174.7	-13.6	16.5:	pg	
70	DP Tau	MHα 259-19	04 36 31.3	+25 04 10	174.8	-13.6	13.7-15.4	pg	III
71	GO Tau	MHα 259-24	04 36 57	+25 08.8	174.8	-13.4	14.4-16.7	pg	III?
72	DQ Tau	MHα 257-7	04 41 07.3	+16 49 08	182.2	-17.9	14.0-15.0	pg	IV?
73	Haro 6-37		04 41 13.1	+16 51 47	182.2	-17.8	14.5:	pg	
74	DR Tau	MHα 257-8	04 41 20.5	+16 47 52	182.3	-17.8	13.4-14.7	pg	IV?
75*	DS Tau	MHα 259-2	04 41 30.0	+29 14 26	172.3	-10.0	12.1-13.6	pg	II-III c
76*	UY Aur		04 45 24.4	+30 37 00	171.8	- 8.5	11.6-14.0†	pg	— c
77	GM Aur	MHα 259-1	04 48 48.9	+30 12 15	172.6	- 8.2	13.1-13.9	pg	I-II
78n	AB Aur	HD 31293=MWC 93	04 49 23.1	+30 23 25	172.5	- 8.0	7.2- 8.0	pg	I
79n	SU Aur		04 49 36.6	+30 24 24	172.5	- 7.9	9.3-11.5	pg	I
80*	RW Aur		05 01 26.2	+30 16 07	174.2	- 6.0	9.6-13.6†	pg	II 0.5ℓc
81*	RW Aur B						12.7v	vis	III f
82	LkHα 333		05 02.0	-03 28	203.5	-24.7	16:	pg	
83	V534 Ori		05 15.5	-05 53	207.6	-22.9	12.5-13.5	pg	
84*	CO Ori	Haro 6-44	05 22 04.3	+11 20 33	192.8	-12.8	10.3-<13.0	pg	IV 2.0 sc
85*	GW Ori	MHα 265-2	05 23 33.3	+11 47 20	192.6	-12.2	10.1-11.5	pg	II s
86*	V649 Ori	MHα 265-3	05 23 48.9	+11 47 06	192.6	-12.2	11.8-12.4	V	
87*	V442 Ori	MHα 265-5	05 23 56.6	+12 51 32	191.7	-11.6	16.1-16.8	pg	
88*	V370 Ori	Haro 6-49	05 24 26.0	+12 08 24	192.4	-11.9	13.7-16.1	pg	II s
89*	GX Ori	MHα 265-6	05 24 26.0	+12 08 50	192.4	-11.9	14.0-15.3	pg	I-II
90	V447 Ori	Haro 6-53	05 24 59.3	+12 32 12	192.1	-11.6	14.0-15.9	pg	II s
91	V448 Ori	MHα 265-9	05 25 16.0	+12 03 59	192.6	-11.7	14.3-15.3	pg	III
92	V449 Ori		05 25 42.1	+11 20 57	193.2	-12.0	14.8-15.7	pg	
93	HI Ori	MHα 265-16	05 25 47.8	+12 05 10	192.6	-11.6	13.2-15.5	pg	IV s
94n	HK Ori	MHα 265-13	05 25 52.2	+12 04 38	192.6	-11.6	11.1-13.3	pg	IV? 3.0 s
95	V452 Ori	Haro 6-55	05 26 06.8	+12 25 51	192.4	-11.4	14.0-15.1	pg	— s
96	V453 Ori	Haro 6-56	05 26 12.4	+12 27 30	192.4	-11.4	14.8-16.0	pg	— s
97	San 1		05 27.2	-03 10	206.5	-19.0	13	pg	
98	HS Ori	P1066, Haro 4-46	05 28 05.7	-04 53 36	208.2	-19.6	14.8-<16.5	pg	IV f
99*	HT Ori	P1072	05 28 06.7	-06 11 19	209.4	-20.2	13.7-14.5	pg	I
100	V466 Ori	P1076, Haro 4-124	05 28 07.6	-05 30 42	208.8	-19.9	13.2-14.2	pg	
101	V384 Ori	Haro 4-168	05 28 16	-05 46.5	209.1	-20.0	14.0-15.1	r	III f
102	P1207	Haro 4-136	05 28 37.9	-05 37 45	209.0	-19.8	14.5-14.9	pg	
103	VX Ori	P1203, Haro 4-30	05 28 38	-04 47.5	208.2	-19.5	15.1-16.6	pg	IV
104*	VY Ori	P1218, Haro 4-71	05 28 40.3	-05 05 45	208.5	-19.6	14.9-16.1	pg	II f
105	San 2		05 28.8	-01 13	204.9	-17.7	14	pg	
106	VZ Ori	P1260, Haro 4-131	05 28 50.8	-05 35 00	208.9	-19.8	13.5-15.7	pg	III
107	V386 Ori		05 28 51	-05 35.3	208.9	-19.8	15.9-17.3	pg	III f
108	P1267	Haro 4-201	05 28 52.2	-06 08 36	209.5	-20.0	15.7	pg	
109	P1270		05 28 53.0	-06 01 23	209.4	-20.0	13.2	pg	
110	SU Ori	P1301, Haro 4-34	05 28 59.7	-04 51 59	208.3	-19.4	14.2-17.4	pg	I
111*	WX Ori	P1352, Haro 4-100	05 29 12.2	-05 17 53	208.7	-19.6	14.0-16.5	pg	I
112	P1397		05 29 20.8	-05 50 52	209.2	-19.8	13.7v	V	
113	P1404	KZP 100533	05 29 22.2	-05 40 52	209.1	-19.7	12.4-12.8	pg	
114	EZ Ori	P1409	05 29 23.1	-05 08 54	208.6	-19.4	12.1-14.1	pg	I
115	SW Ori	P1412	05 29 23	-06 40.3	210.0	-20.2	13.4-16.1	pg	(II)
116	IU Ori	P1519	05 29 40.7	-05 45 40	209.2	-19.7	9.6-11.1	pg	II
117	XX Ori	P1530, Haro 4-200	05 29 43.0	-06 09 38	209.6	-19.8	14.2-16.3	pg	I f
118	IX Ori	P1552, Haro 4-115	05 29 46.1	-05 26 45	208.9	-19.5	13.4-15.9	pg	II
119	YY Ori	P1617, Haro 4-196	05 29 54.1	-06 01 59	209.5	-19.8	13.5-15.5	pg	I f
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		(9)

TABLE 1 (continued)

HRC no.	<V>	<B-V>	<U-B>	n	Mag., photo refs.	Spectral class	Type	Em. int.	Spectr. refs.	Chart ref.	Location
59					7	— eα	—	1	1	7	Tau-Aur, B 19
60					8, 11	cont+e	t	4-5u	1	83	Tau-Aur
61	13.05	+1.23	-0.06	3	9, 65, 136, 210, 223	G:e	t	4	133, 105	133	Tau-Aur
62	13.93	+0.93	-0.34	3	11, 136, 210, 223	dK5e	t	(3)	133, 1	133	Tau-Aur
63	12.58v	+1.17	+0.07	4	9, 136, 146, 210, 223	dM0e	t	(3)	133, 105	133	Tau-Aur, B 18
64*					7	K-Me	—	2-3	1	83	Tau-Aur
65	12.50	+1.36	+0.66	3	9, 136, 191, 210, 223	dK6e	t	(3-4)	133, 105	133	Tau-Aur, B 18
66n					7, 9	— e	—	1-2?	103, 1	7	Tau-Aur
67n*	13.86v	+1.39	+0.17	2	9, 5, 66, 136, 210, 223	G:e	t	4u	133, 105	133	Tau-Aur, B 22
68*	†12.49	+0.87	-0.09	1	165, 166, 169	— e	?	4 pec	105, 165, 1	36	Tau-Aur
69n*						K5:e	—	2	1	1	Tau-Aur, B 22
70	13.98	+1.24	-0.43	1	66, 68, 136, 223	dM0e	t	(3)	133, 105	133	Tau-Aur, B 22
71	15.06	+1.15	-0.25	1	66, 68, 136, 223	dK5e	t	(3)	133, 1	133	Tau-Aur, B 22
72	13.63	+1.70	+0.97	2	136, 210, 223	dM0e	t	(3)	133, 105	133	Tau-Aur
73	14.54	+1.38	-0.34	1	210	— e	t	3-4	105, 1	83	Tau-Aur
74	13.38	+1.24	+0.00	2	136, 210, 223	dK5e	t	(4)	133, 105	133	Tau-Aur
75*	12.85	+1.17	+0.15	1	136, 191, 223	dK4e	t	(3)	133, 105	133	Tau-Aur
76*	†11.91	+1.05	-0.14††	1	136, 169	dG5:e	t	(3)	132, 105, 142	149	Tau-Aur
77					136	dK5e	t	(3)	133, 105	133, 136	Tau-Aur
78n	† 7.01	+0.14	+0.04	29	56, 57, 58, 248	B9e+shell	h	2	173, 207, 216, 102	102	Tau-Aur
79n	† 9.24	+0.89	+0.42	12	56, 149, 169, 243, 248	G2ne III	t	1	93, 94, 98, 102, 105, 32, 141	102	Tau-Aur
80*	†10.81	+0.71	-0.07††	*	1, 3, 39, 38, 71, 129, 138, 153, 168, 169, 179, 222	dG5?e	t	5	132, 88, 101, 32, 135, 141, 177, 52, 105		*
81*					51	K3:e	m	2	69, 71, 1		
82						— e	t:	2	1	1	NGC 1788
83					117, 251	— e	t	4u	1	117	Anon dark neb
84*	†10.56	+1.07	+0.64††	1	21, 57, 68, 169	Gpeα	t?	1	22, 49, 134, 105	83	B 225
85*	† 9.72	+0.99	+0.30††	4	57, 68, 136, 169, 180	dK3e	t	(2)	133, 32, 140, 105	133	B 225
86*	12.10v	+0.94	+0.55	—	64, 180	dK3e	t	(2-3)	133, 105	133	B 225
87*					68, 136	dM0e	t:	(3)	133, 105	133	B 30
88*					68	Geα	—	1	105	83	B 30
89*					68, 136	dK3e	m	(1)	133, 105	133	B 30
90					68	— e	t:	3:	105, 1	83	B 30
91					68, 136	dK4e	t	(1-2)	133, 105	133	B 30
92	15.04v	+1.16	+0.16	8	62, 48	— e	—	2	48, 1	61	——
93					68, 136	dK0e	t	(2-3)	133, 105	133, 102	B 30
94n	†11.72	+0.56	+0.25	2	43, 57, 68, 136	A4ep	h	2	133, 102, 41	133, 102	B 30
95					68	— eα	—	1	105	83	B 30
96					68	— e	t:	2	105, 1	83	B 30
97					205	K7e	t:	2	205, 1	205	Orion neb
98			**		189, 201, 202	— e	t	5u	82, 230	79	Orion neb
99*	12.87	+1.61	+1.50	1	189, 202, 233	g?M5	—	0	233, 1	189	Orion neb
100					145, 189	K3:e	t:	2	105	79	Orion neb
101					85, 199, 202	dK5, 7	m	1	80, 106	79	Orion neb
102					145, 189	K5eα	—	1:	1	79	Orion neb
103					189, 202	— e	t	u	232	189	Orion neb
104*	15.22	+0.79	-1.32**	1	81, 189, 202, 233	e	t	5u	229, 228, 230, 29	79	Orion neb
105					205	G:e	t	2-3	205, 1	205	Orion neb
106					24, 189	— e	t	3:	105, 1	79	Orion neb
107					85	K5-M0	—	0	80, 106	85	Orion neb
108	12.77	+1.80	+2.33	1	189, 233	e	t	u	232	189	Orion neb
109	12.11	+0.92	+0.68	1	189, 233	Geα	t:	1	105	189	Orion neb
110			*		189, 201, 234	— e §	t	2u	82, 105, 230, 234	79	Orion neb
111*	†14.33	+0.95	-0.21	5	24, 169, 189, 202	Ge	—	1?	105	79	Orion neb
112					26, 189	gM4-5	—	0	26	189	Orion neb
113	11.50	+0.84	+0.34	2	189, 233	G5:eα	—	1	105	189	Orion neb
114	†11.69	+0.86	+0.28††	14	24, 169, 170, 189, 233	F9:eV	t	1	91, 105	189	Orion neb
115					159, 189, 202	Geα	—	1	105	189	Orion neb
116	9.16	+1.14	+1.08	2	188, 211, 233	K2 III	—	0	99, 130	189	Orion neb
117	14.87	+1.01	-0.38	1	189, 201, 233	e §	t	2-3	228, 231, 234	189	Orion neb
118					24, 189	G-Ke	t	(4)	91, 82, 105	79	Orion neb
119	13.55v	+0.86	-0.39	4	189, 201, 233	G-Ke §	t	2	82, 105, 228, 229	79	Orion neb
(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)

TABLE 1 (continued)

HRC no.	Star	Other designation	α(1900)	δ(1900)	ℓ	b	Mag.		Light curve class.
120	YZ Ori	P1648, Haro 4-74	$05^h\ 29^m\ 57^s.5$	-05° 07' 28"	208.6	-19.3	14.5-16.6	pg	IV f
121*	P1649		05 29 57.8	-05 37 10	209.1	-19.6	11.5	pg	
122	KM Ori	P1659	05 30 01.2	-05 27 14	209.0	-19.5	12.3-13.8	pg	III
123	KN Ori	P1665, Haro 4-91	05 30 01.6	-05 15 34	208.8	-19.4	13.9-14.9	pg	I
124	KP Ori	P1668	05 30 01.7	-05 45 27	209.2	-19.6	14.7-16.3	pg	(II)
125	KR Ori	P1684	05 30 05.3	-05 27 02	209.0	-19.4	13.5-15.5	pg	II
126	LL Ori	P1746	05 30 10.9	-05 29 19	209.0	-19.4	12.0-13.7	pg	II
127	SY Ori	P1760, Haro 4-6	05 30 13.2	-04 31 39	208.1	-19.0	13.9-16.5	pg	I, IV f
128*	LN Ori	P1766	05 30 13.7	-05 36 43	209.1	-19.5	15.2-17.2	pg	(I)
129	V356 Ori	P1773	05 30 14.6	-05 33 58	209.1	-19.5	13.8-16.8	pg	I
130	AA Ori	P1787, Haro 4-180	05 30 16.5	-05 50 32	209.4	-19.6	13.8-15.9	pg	I
131	V486 Ori	P1811, Haro 4-170	05 30 18.4	-05 47 17	209.3	-19.6	14.7-15.2	pg	
132	P1817		05 30 18.9	-04 48 41	208.4	-19.1	12.2v?	pg	
133	LX Ori	P1828, Haro 4-150	05 30 18.9	-05 43 33	209.2	-19.5	13.1-14.1	pg	III
134	V488 Ori	P1827, Haro 4-128	05 30 19.1	-05 34 56	209.1	-19.4	13.6-14.4	pg	
135	AB Ori	P1848, Haro 4-169	05 30 20.2	-05 47 15	209.3	-19.6	13.8-16.5	pg	III
136	TT Ori	P1856	05 30 20.5	-04 49 42	208.4	-19.1	13.3-16.3	pg	III
137n	AD Ori	P1909	05 30 22.6	-05 26 33	209.0	-19.4	12.9:-15:	pg	I
138	P1931	Haro 4-193	05 30 24.3	-06 02 24	209.6	-19.6	14.8	pg	
139	P1946	Haro 4-8	05 30 25.9	-04 32 48	208.2	-19.0	15.0-15.8	pg	
140	AG Ori	P1977, Haro 4-137	05 30 27.4	-05 38 44	209.2	-19.4	13.4-16.0	pg	II
141	AI Ori	P2029, Haro 4-89	05 30 31.6	-05 15 03	208.8	-19.2	13.5-16.3	pg	II
142	NS Ori	P2039, Haro 4-198	05 30 32	-06 05.4	209.6	-19.6	15.2-17.6	pg	III f
143	AL Ori	P2066, Haro 4-51	05 30 35.0	-04 59 13	208.6	-19.1	14.5-16.7	pg	II
144	V360 Ori	P2084, Haro 4-84	05 30 36.6	-05 13 23	208.8	-19.2	13.8-14.7	pg	II
145	TW Ori	P2105, Haro 4-239	05 30 39	-06 49.3	210.3	-19.9	14.7-16.8	pg	II, III
146	AM Ori	P2111, Haro 4-111	05 30 40.4	-05 25 22	209.2	-19.3	14.0-15.6	pg	III
147	TV Ori	P2115, Haro 4-67	05 30 40.8	-05 05 10	208.7	-19.1	13.5-15.9	pg	II
148*	NY Ori	P2119	05 30 41	-05 16.4	208.9	-19.2	14.5-17.5	pg	III
149	BO Ori	P2152, Haro 4-5	05 30 46.1	-04 28 50	208.1	-18.8	13.5-15.7	pg	II
150	AN Ori	P2167	05 30 47.4	-05 32 07	209.1	-19.3	11.8-13.6	pg	II
151	V573 Ori	Haro 4-231	05 30 51	-06 38.7	210.2	-19.8	14.9-17.0	pg	
152	CE Ori	P2203, Haro 4-66	05 30 52	-05 05.5	208.7	-19.1	15.2-17.5	pg	IV
153	OT Ori	P2246, Haro 4-104	05 30 55.8	-05 20 22	209.0	-19.2	13.0-17.5	pg	III f
154n	T Ori	P2247, Haro 4-123	05 30 55.9	-05 32 28	209.2	-19.3	9.6-13.8	pg	I
155*	AR Ori	P2263, Haro 4-72	05 30 58.6	-05 08 07	208.8	-19.1	14.2-15.9	pg	II c
156	V390 Ori	P2282, Haro 4-61	05 31 04	-05 02.6	208.7	-19.0	15.3-17.5	pg	III f
157	AU Ori	P2285, Haro 4-189	05 31 04.2	-06 01 10	209.6	-19.5	14.8-<16.5	pg	II
158	V577 Ori	P2299, Haro 4-237	05 31 06	-06 46.7	210.3	-19.8	14.5-16.6	pg	IV
159	AV Ori	P2312, Haro 4-236	05 31 08	-06 46.4	210.3	-19.8	14.0-17.0	pg	II
160	PQ Ori		05 31 19	-02 14.8	206.1	-17.7	12.5-13.7	pg	
161	PU Ori	Haro 5-75	05 31 19	-00 46.0	203.4	-16.2	12.5-14.6	pg	
162	AZ Ori	P2368	05 31 21.8	-05 15 32	209.0	-19.1	13.1-16.3	pg	I
163*	Haro 4-125		05 31 32	-05 34.9	209.3	-19.2	16±	pg	
164n	V380 Ori	P2393, BD-6°1253	05 31 33.7	-06 46 25	210.4	-19.7	9.7-10.3	vis	
165	BD Ori	P2412	05 31 39.8	-06 23 06	210.0	-19.5	13.3-15.7	pg	I
166	BC Ori	P2421, Haro 4-119	05 31 42.6	-05 30 11	209.2	-19.1	15.0-<16.4	pg	II
167*	P2441		05 31 54.3	-04 29 24	208.3	-18.6	11.5	pg	
168	BE Ori	P2479, Haro 4-226	05 32 07.8	-06 37 08	210.3	-19.5	13.0-17.5	pg	IV?
169*	BF Ori	P2510, Haro 4-229	05 32 21.3	-06 38 41	210.4	-19.5	9.8-13.4	pg	I
170n	RR Tau	AS 103	05 33 17	+26 19.0	181.5	- 2.5	10.2-14.2	vis	IV
171	LkHα 206		05 33.4	+26 16	181.5	- 2.5	13.5:	vis	
172*	TX Ori	Haro 5-10	05 33 32	-02 48.1	206.9	-17.4	13.6-15.8	pg	— ℓ
173	TY Ori		05 33 34	-02 47.5	206.9	-17.4	14.8-15.8	pg	
174	Haro 7-1		05 33 44	-07 53.8	211.7	-19.8	14	pg	
175	Haro 7-5		05 34 22	-08 36.5	212.5	-19.9	15	pg	
176n	Haro 4-255		05 34.5	-07 29	211.4	-19.4	15	pg	
177	V510 Ori	San 4, Haro 5-27	05 34 38.4	-02 34 42	206.8	-17.1	13.8-15.7	pg	
178*	BH Ori	P2893	05 35 14	-06 19.4	210.4	-18.7	13.8-15.3	pg	IV
179	Haro 7-4		05 35 39	-08 10.4	212.2	-19.4	15	pg	
180	V614 Ori	Manova 13	05 36 06.9	+09 04 46	196.6	-11.0	14.6-15.9	pg	
181	DL Ori	San 5, Haro 7-3	05 36 37	-08 08.7	212.2	-19.2	12 -15	pg	
182n	Haro 7-2	San 6	05 37 02	-08 03.9	212.3	-19.1	13	pg	
183	V625 Ori	Manova 16	05 37 52.2	+09 03 18	196.8	-10.7	13.6-16.0	pg	II s
184	V630 Ori	Manova 22	05 38 48.4	+09 08 18	196.9	-10.4	14.3-15.8	pg	IV
185	V631 Ori	Manova 24	05 39 13.0	+08 54 21	197.1	-10.5	14.3-15.6	pg	II
186n	FU Ori		05 39 54.0	+09 01 40	197.1	-10.2	9.7-16.5	pg	Pec
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		(9)

TABLE 1 (continued)

HRC no.	<V>	<B-V>	<U-B>	n	Mag., photo refs.	Spectral class	Type	Em. int.	Spectr. refs.	Chart ref.	Location
120					24, 81, 184, 201 202	cont:+e	t	2	91	79	Orion neb
121*	10.28	+1.03	+0.90	3	189, 233	K0-2 III, IV	—	0?	151, 212, 233	189	Orion neb
122					189	—	—	1?	105	189	Orion neb
123					24, 189	—	—	1?	105	189	Orion neb
124			*		24, 189		t	u	232	189	Orion neb
125					189, 199	K0±e	t	(3)	31, 91, 105, 130	189	Orion neb
126	11.66	+1.08	††	1	189, 233	K0:e	t	3?	31, 105, 130	189	Orion neb
127					189, 201 202	— §	t	2-3	82 105, 230	79	Orion neb
128*					189	—	—	1?	91	189	Orion neb
129					24, 189, 199	K0-2 IV, V	—	(2?)	91, 105	189	Orion neb
130					189	K0:eα	—	1	91, 105	79	Orion neb
131					145, 189	Keα	—	1	1	79	Orion neb
132	11.06	+0.99	+0.49	1	189, 233	K3	—	0	1	189	Orion neb
133					189	G:e	—	2	105	79	Orion neb
134					145, 189	— e	—	2-3?	105, 1	79	Orion neb
135					24, 189, 202	— e	t	3	105, 1	79	Orion neb
136					189	— eα	—	1	105, 1	189	Orion neb
137n					189	—	—	1?	91	189	Orion neb
138	13.62	+1.17	-0.80	1	189, 233	§	t	u	232	189	Orion neb
139					189, 202		t	u	232	79	Orion neb
140					24, 189	cont+e	t	(4)	91, 105	79	Orion neb
141					24, 189, 199, 202	K0:eα	—	1?	91, 105	79	Orion neb
142			*		189, 202	§	t	u	232	189	Orion neb
143	14.99	+1.27	+0.14	1	189, 202, 233		t	u	232	189	Orion neb
144	12.49	+1.31	+0.40	1	24, 189, 233	— e	t	3u	82, 105	79	Orion neb
145					159, 189, 202	— e	t	3	1	79	Orion neb
146					189, 199	cont+e	t	(4)	91, 105	79	Orion neb
147	12.92	+2.14	-0.45	1	24, 189, 202, 233	K0eα	—	1	130, 1	79	Orion neb
148*					189, 199	cont+e	t	3	91	189	Orion neb
149	14.02	+1.40	+0.70	2	189, 199, 233	K7:e	m?	2	79, 205, 1	79	Orion neb
150			††		189	K0-1(e) IV	m	1	31, 77, 91, 105, 130	189	Orion neb
151					159, 202	— e	—	2	1	79	Orion neb
152			**		189, 202	— e §	t	2-3u	82, 232	79	Orion neb
153					24, 189, 199, 201	K:(e)	m	2	105, 106	79	Orion neb
154n	†10.00	+0.41	+0.41	1	57, 189, 233	A3:eα+shell	h	1	77, 79, 102, 130	102	Orion neb
155*					24, 189, 199	— e	t	(4)	91, 105	79	Orion neb
156					85, 199	K3:eα	m?	2?	106	85	Orion neb
157					189, 202	cont+e	t	4u	82, 232	79	Orion neb
158					159, 202	K0:e	—	1-2	1	79	Orion neb
159					159, 202	— e	t:	2	1	79	Orion neb
160					163	F0	—	0?	1	163	Orion east
161					50, 163	F8:(e)	—	2	105, 1	163, 84	Orion east
162	13.56	+1.54	+1.50	1	24, 189, 202, 233	K3-5 IV, V	—	(1-2)	91, 105	189	Orion neb
163*							t	2-3	1	79	Orion neb
164n	†10.37	+0.53	-0.15††	6	43, 57, 58, 168, 169	A1:e	t	4-5	74, 89, 32, 178, 102, 105	102	NGC 1999
165					159, 189	Keα	—	1	105	189	Orion neb
166			*		24, 189	cont+e	t	4u	82, 232	79	Orion neb
167*	†10.76	+0.69	+0.19	2	169, 170, 189, 233	F5:eα	—	1	105, 233	189	Orion neb
168					159, 189, 202	K0±eα	—	1	105	79	Orion neb
169*	10.66	+0.39	+0.42	3	1, 189, 202	A-Fpeα	h	1	1	79	Orion neb
170n	†12.25v	+0.69	+0.37	5	57, 102	B8-9e+shell	h	1-2	94, 102	102	Anon dark neb
171					102	Keα	—	1	102, 105	102	Anon dark neb
172*					50, 84, 200	K2:eα	t:	1-2	1	200	Orion east
173					200	K0:	—	0	1	200	Orion east
174						K5e	—	1-2?	1	1	Orion neb
175						dM5	m	1	1	1	Orion neb
176n						— e	t	2-3	1	79	Orion neb
177					50, 148, 154	cont+e	t	3	1, 205	50, 205	Orion east
178*					189, 202	K3	—	0	1	189	Orion neb
179						K:e	t:	2	1	1	Orion neb
180					67, 68	K5:e	t:	2	1	161	B 35
181					148	cont+e	t	4u	1, 205	205	Orion neb
182n					205	G-Ke	t:	2	1, 205	205	Orion neb
183					67, 68, 184	— e	t	2-3	1, 105	161	B 35
184					67, 68	Geα	—	1	1	161	B 35
185					67, 68	K5:e	t	3	1	161	B 35
186n	† 8.95	+1.37	+0.98††	7	43, 57, 107, 169, 224	F2:p I-II	h	1-2	107, 41	107	B 35
(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)

TABLE 1 (continued)

HRC no.	Star	Other designation	α(1900)	δ(1900)	ℓ	b	Mag.		Light curve class.
187	LkHα 314		$05^h\ 42^m\ 06^s.4$	+00° 06' 53"	205.3	-14.2	15v	pg	
188	LkHα 334		05 48 30	+01 36.9	204.8	-12.0	15	pg	
189	LkHα 335		05 48 47	+01 42.8	204.7	-11.9	16	pg	
190n	LkHα 336		05 49 08	+01 41.7	204.8	-11.9	16	pg	
191	LkHα 337		05 49 26	+01 28.3	205.0	-11.9	14	pg	
192n	HD 250550	MWC 789	05 56 13.0	+16 30 56	192.6	- 3.0	9.7	pg	
193n	LkHα 208		06 01 57.0	+18 40 10	191.4	- 0.8	13.5	pv	
194	LkHα 209		06 02 15.9	+18 39 13	191.5	- 0.7	13	pg	
195	Bretz 3		06 02.6	+18 09	192.0	- 0.9	15±	pg	
196n	LkHα 338		06 05 54.2	-06 11 35	213.9	-11.8	17	pg	
197n	LkHα 339		06 06 01.6	-06 13 25	213.9	-11.8	15	pg	
198n	Bretz 4		06 07.9	-06 12	214.1	-11.4	17±	pg	
199n*	MWC 137		06 13.0	+15 19	195.6	- 0.1	11.2	vis	
200n	LkHα 340		06 24 48.5	+10 35 49	201.2	+ 0.2	13±	pg	
201	LkHα 341		06 25 18.0	+10 37 15	201.2	+ 0.3	13±	pg	
202n	VY Mon	G-G 392	06 25 35.1	+10 30 13	201.3	+ 0.3	13.7-17.4	pg	III
203	LkHα 274		06 25 38.2	+10 30 12	201.3	+ 0.3	14	pg	
204	LkHα 342		06 25 58.0	+10 36 44	201.3	+ 0.4	16	pg	
205	LkHα 343		06 26 33.5	+10 29 34	201.5	+ 0.5	15	pg	
206	LkHα 344		06 26 33.9	+10 40 43	201.3	+ 0.6	17	pg	
207n*	R Mon		06 33 42	+08 49.5	203.8	+ 1.3	11-14	pg	IV 2.5 ℓ
208	KV Mon	LHα 3	06 34 12	+09 51.7	202.9	+ 1.9	14.5-17.0	pg	I
209*	G-G 405		06 34.2	+09 05	203.6	+ 1.5	13	pg	
210	LL Mon	LHα 11	06 34 56	+09 56.4	202.9	+ 2.0	14.9-17.9	pg	IV
211	PT Mon	LHα 14	06 35 02	+09 55.1	202.9	+ 2.1	15.2-18.1	pg	III s?
212	LM Mon	LHα 17	06 35 07	+09 56.6	202.9	+ 2.1	14.8-16.7	pg	
213	NW Mon	LHα 18, W 77	06 35 10	+09 40.6	203.2	+ 2.0	14.6-16.1	pg	
214	LP Mon	LHα 20, W 78	06 35 11	+09 56.6	202.9	+ 2.1	14.8-16.8	pg	
215	LHα 21		06 35 11	+09 59.8	202.9	+ 2.1	14.4	pg	
216	NX Mon	LHα 22, W 79	06 35 11	+09 39.5	203.2	+ 2.0	14.5-16.7	pg	
217	W 84		06 35 12	+09 39.2	203.2	+ 2.0	12.0	V	
218	LQ Mon	LHα 24, W 89	06 35 13	+09 52.6	203.0	+ 2.1	15.0-18.0	pg	
219	LHα 25	W 90	06 35 15	+09 53.5	203.0	+ 2.1	13.1v?	pg	
220	LR Mon	LHα 27, W 96	06 35 17	+09 55.1	203.0	+ 2.1	14.0-15.8	pg	
221	LT Mon	LHα 30, W 105	06 35 20	+09 42.4	203.2	+ 2.0	14.6-16.8	pg	I
222*	W 108		06 35 23	+09 50.4	203.1	+ 2.1	11.9	V	
223	V419 Mon	LHα 35, W 115	06 35 24	+09 39.0	203.2	+ 2.0	14.5-15.5	pg	
224	V347 Mon	LHα 37	06 35 24	+09 54.9	203.0	+ 2.1	15.4-17.9	pg	
225	LU Mon	LHα 41, W 126	06 35 27	+09 43.4	203.2	+ 2.0	14.6-16.7	pg	
226	IO Mon	LHα 43, W 133	06 35 29	+09 36.4	203.3	+ 2.0	14.0-15.9	pg	I
227n	IP Mon	LHα 47, W 139	06 35 31	+09 38.2	203.2	+ 2.0	13.9-15.4	pg	I-II
228	LY Mon	LHα 49	06 35 35	+09 30.5	203.4	+ 2.0	15.3-17.5	pg	
229	LX Mon	LHα 51, W 161	06 35 35	+09 53.9	203.0	+ 2.2	14.5-17.5	pg	— ℓ
230	SS Mon	LHα 52	06 35 35.3	+10 32 15	202.5	+ 2.5	13.3-15.8	pg	
231	V360 Mon	LHα 53, W 164	06 35 36	+09 42.0	203.2	+ 2.1	13.7-14.7	pg	
232*	V426 Mon	LHα 54	06 35 37	+09 33.1	203.3	+ 2.0	14.3-15.0	pg	
233	V363 Mon	LHα 59, W 183	06 35 43	+09 32.1	203.4	+ 2.0	15.4-16.7	pg	
234	MM Mon	LHα 60, W 184	06 35 43	+09 58.3	203.0	+ 2.2	13.8-15.4	pg	— ℓ
235*	LHα 61		06 35 43	+09 31.8	203.4	+ 2.0	15.0	pg	
236	V365 Mon	LHα 62	06 35 44	+09 31.7	203.4	+ 2.0	14.8-16.2	pg	I
237	V432 Mon	LHα 68, W 199	06 35 49	+09 39.5	203.3	+ 2.1	14.9-16.0	pg	
238*	MO Mon	LHα 72, W 217	06 36 02	+09 32.6	203.4	+ 2.1	13.9-15.4	pg	
239	OW Mon	LHα 73	06 36 05	+10 14.7	202.8	+ 2.4	14.6-15.9	pg	
240	OY Mon	LHα 77	06 36 10	+09 46.1	203.2	+ 2.2	14.0-16.0	pg	
241	MQ Mon	LHα 83	06 36 38.7	+09 47 04	203.2	+ 2.3	14.8-16.1	pg	— ℓ
242	PY Mon	LHα 84	06 37 01.8	+09 15 12	203.8	+ 2.2	13.9-15.8	pg	
243n	Z CMa		06 59 02.0	-11 24 16	224.6	- 2.6	8.9-11.4	pg	II,III
244	LHα 332-20		10 56 29	-76 29.5	296.6	-15.6	12.1-12.4	pg	
245	CPD-76°652	LHα 332-17	11 04 34	-77 05.8	297.3	-15.9	10.6	V	
246n	HD 97048	LHα 332-16	11 05 15.1	-77 06 43	297.4	-15.9	8.4	V	
247	LHα 332-21		11 09 17	-76 11.5	297.2	-15.0	11.35-11.6	pg	
248n	CoD-33°10685		15 38.8	-33 58	339.2	+16.1	10.5±	r	
249	LHα 450-6		15 40.3	-34 12	339.3	+15.7	13.8-14.5	pg	III
250	CoD-35°10525		15 42.7	-35 21	338.9	+14.5	10.0±	r	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		(9)

TABLE 1 (continued)

HRC no.	<V>	<B-V>	<U-B>	n	Mag., photo refs.	Spectral class	Type	Em. int.	Spectr. refs.	Chart ref.	Location
187					113	— e	t	2-3	113	113	NGC 2068
188						K0:e	t:	2	1	1	Orion east
189						K2:e	t:	2	1	1	Orion east
190n						— e	—	2	1	1	Orion east
191						— e	t	4	1	1	Orion east
192n	†				57	B9eq	h	2	102	102	Anon dark neb
193n	†12.74	+0.47	+0.31	1	43, 57, 58	B5-9e+shell	h	1-2	102, 41	102	Ced 62
194					102	K0±eγ	—	2	102, 105	102	Anon dark neb
195						— e	t	3u	1	1, 33	Anon dark neb
196n						—	—	1	1	1	NGC 2183/85
197n						Be	—	1	1	1	NGC 2183/85
198n						— e	t	2-3	1	1, 33	NGC 2183/85
199n*						cont+e	?	2	1, 173	1	Anon
200n						cont	—	1	1	1	IC 446
201						—	—	1	1	1	IC 446
202n					118, 160	Geα	t:	1	104, 105	59, 160	IC 446
203					105	Ge	t:	2	105	1	IC 446
204						K-Meα	m	1	1	1	IC 446
205						—	—	1	1	1	IC 446
206						—	—	1	1	1	IC 446
207n*	†11.68v	+0.62	-0.19††	7	43, 151, 155, 168, 169	—	?	2-3	41, 47, 75, 105, 109, 132, 142, 155, 156	109	NGC 2261
208	#14.63	+1.42	+0.20	—	12, 147, 203, 236	—	—	1	96	96	NGC 2264
209*					105	G8e	t:	3	105	59	Anon dark neb
210			*		147, 193, 203, 238	—	t:	2	82, 96	96	NGC 2264
211	#16.94	+0.62	*	—	12, 193, 203, 238	—	t	3	82, 96	96	NGC 2264
212	#15.28v	+1.56	-0.39	—	12, 193, 203, 238	—	—	1-2?	96	96	NGC 2264
213	14.51	+1.18	+0.89	4	193, 203, 225, 237	Me	—	1-2?	96	96	NGC 2264
214	15.40	+1.23	-0.42	1	193, 203, 225, 238	—	t:	2-3	96	96	NGC 2264
215	#13.49	+1.16	+0.32	—	12, 236	G-Keα	—	1	96	96	NGC 2264
216	15.92	+0.50	-1.02**	4	193, 203, 225, 237	—	t	4u	82, 96, 30, 115, 127, 232	96	NGC 2264
217	12.01	+0.66	+0.09	1	225	G0eα	—		249	225	NGC 2264
218	16.34	+1.05	-0.59	1	193, 203, 225, 238	—	—	1-2?	96	96	NGC 2264
219	†13.04v?	+0.18	-0.01	3	193, 225, 236	B8pe+shell	h	2	96, 102, 213, 225	96	NGC 2264
220	14.08	+1.10	+1.23	1	193, 203, 225, 236	—	—	1-2?	96	96	NGC 2264
221	14.94	+0.89	-0.28	4	225, 236	—	t	u	229, 232	96	NGC 2264
222*	11.87	+0.55	+0.06	1	225	G0 III, IV (p?)	—	1	225, 249	225	NGC 2264
223	14.38	+1.02	+0.59	4	193, 203, 225, 237	—	—	2	96	96	NGC 2264
224	#16.55	>+1.04		—	12, 193, 203, 238	—	t	3	96	96	NGC 2264
225	15.03	+1.15	-0.04	3	193, 225, 236	—	t	3-4u	96, 232	96	NGC 2264
226	13.77	+1.08	+0.78	4	193, 203, 225, 237	G5-K0eα	—	1	96	96	NGC 2264
227n	13.25	+1.29	+0.82	4	120, 193, 203, 225, 237	—	t:	2	96, 104, 105, 229	96	NGC 2264
228	#15.46	+1.02	-0.52	—	12, 193, 203, 220, 238	—	t:	2	82, 96	96	NGC 2264
229	14.96	+0.67	-0.61	1	193, 220, 225, 236	— §	t	u	232	96	NGC 2264
230	#13.40	+1.30	+0.94	—	12, 193, 238	Keα	—	1	96, 105	96	NGC 2264
231	13.29	+0.80	+0.30	4	193, 203, 225, 236	G5eα	—	1	96, 105	96	NGC 2264
232*					193	G-Ke	t	3u	82, 96, 105	96	NGC 2264
233	15.22	+0.97	+0.66	1	193, 203, 225, 238	—	t:	2-3	96	96	NGC 2264
234	14.14	+1.00	-0.01	1	193, 203, 220, 225, 237	— §	t	2u	96, 232	96	NGC 2264
235*	#12.98	+1.62	+0.04	—	12, 96	—	t	3u	82, 96, 232	96	NGC 2264
236	#13.89	+1.78		—	12, 193, 203	—	—	2:	96	96	NGC 2264
237	15.00	+1.09	+0.29	3	193, 203, 225, 237	—	t	2-3	96	96	NGC 2264
238*	13.54	+1.22	-0.16	1	193, 203, 225, 237	— §	t	2u	96, 228, 229	96	NGC 2264
239	#14.51	+1.45	+0.38	—	12, 193, 236	—	—	2	96	96	NGC 2264
240	#13.38	+1.53	+0.31	—	12, 193, 236	G:e	t	3u	82, 96	96	NGC 2264
241	#14.56	+1.32	+0.42	—	12, 193, 203, 236	—	—	1-2?	96	96	NGC 2264
242	#13.48	+1.19	+0.28	—	12, 193, 238	—	—	1-2?	96	96	NGC 2264
243n	† 8.90	+1.05	+1.68		2a, 54a, 57, 58, 145a, 41	eq	h	1-2	102, 171a, 215a, 215b	102	Anon dark neb
244	11.3			—	87, 124	K0e	—		87	124, 1	Anon
245	10.60	+1.18			87	G1Iep	—		87	1	dark neb
246n	8.44	+0.36		—	87	A0eα	h?	1	87	124, 1	near
247	10.94	+1.11			87, 124	G8e	t:	(3)	23, 87	1	ε Cha
248n					86	Geα	—	1	104	219a	B 228
249					86, 105	M0-1eα	m	1-2	105	219a	B 228
250	†				86, 169	cont+e	t	2-3	105	219a	B 228
(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)

TABLE 1 (continued)

HRC no.	Star	Other designation	α(1900)	δ(1900)	ℓ	b	Mag.		Light curve class.
251	RU Lup		$15^h\ 50^m07^s$	-37° 31!8	338.6	+11.9	9.6-13.4	pg	II 0.6 ℓ
252*	RY Lup		15 52 43	-40 04.9	337.3	+ 9.6	9.6-13.0	pg	I 0.6 s
253	EX Lup		15 56 20	-40 01.7	337.9	+ 9.2	11.4-13.5	pg	III 2.4 s
254*	AS 205		16 05.8	-18 23	355.2	+23.3	12.0	V	
255	Do-Ar 9		16 12 59.8	-23 01 52	352.8	+18.9	13	pg	
256	Haro 1-1		16 15 28.1	-25 58 07	350.9	+16.5	13.0v?	vis	
257*	Haro 1-4		16 19 10.9	-23 05 23	353.7	+17.8	12.7	vis	
258*	V852 Oph	S-R 22	16 19 21.7	-24 15 55	352.8	+17.0	14.5-15	pg	
259*	S-R 4		16 19 53.9	-24 07 03	353.0	+17.0	13v?	pg	
260	Do-Ar 22		16 20 18.5	-23 29 39	353.6	+17.4	13	pg	
261	Haro 1-8		16 20 47.8	-23 01 14	354.0	+17.6	14.1v?	vis	
262n*	S-R 24	Haro 1-7 A, B	16 20 55.0	-24 31 59	352.9	+16.6	15: + 15:	pg	
263	S-R 12		16 21 16.2	-24 28 06	353.0	+16.6	13.5:	pg	
264	S-R 9		16 21 37.8	-24 08 33	353.3	+16.7	12.5:	pg	
265	S-R 10		16 21 52.8	-24 12 49	353.3	+16.6	15v?	pg	
266	V853 Oph	S-R 13	16 22 42.4	-24 14 56	353.4	+16.5	12.5-14.0	pg	
267n*	Haro 1-14		16 25 02.3	-23 51 29	354.0	+16.3	14.5v?	vis	
268	Haro 1-16		16 25 30.3	-24 14 37	353.8	+16.0	14.4	vis	
269	Do-Ar 58		16 28 23.8	-24 01 08	354.4	+15.6	13	pg	
270n*	V1121 Oph	AS 209	16 43.6	-14 13	004.8	+19.0	11.2-11.7	V	
271*	AK Sco		16 48 02	-36 43.4	347.4	+ 4.2	8.7-11.7	pg	II
272	IX Oph		17 03 33	-27 09.2	357.0	+ 7.5	11.8-12.7	pg	
273	KK Oph	AS 220, THα 27-3	17 03 54	-27 07.7	357.1	+ 7.4	11.9-12.7	pg	
274	LkHα 345		17 04.6	-27 32	356.8	+ 7.1	13	pg	
275	LkHα 346	THα 27-4	17 04.9	-27 17	357.1	+ 7.2	15±	pg	
276	LkHα 347	THα 27-6	17 06.0	-27 13	357.3	+ 7.0	15	pg	
277	LkHα 122		17 55.9	-22 52	007.1	- 0.1	16	pg	
278	V1752 Sgr	LkHα 104	17 56 46	-24 20.9	005.9	- 1.0	15.8-18.0:	pg	
279	LkHα 102		17 56.8	-24 18	006.0	- 1.0	15.0:	pg	
280	SV Sgr	LkHα 109	17 57 49.7	-24 25 42	006.0	- 1.2	13.5-16.5	pg	I, III 3.6
281	LkHα 118		17 59.7	-24 16	006.3	- 1.5	12	pg	
282n	VV Ser	Ir-Ch 21	18 23 40.8	+00 04 51	030.5	+ 5.1	10 -<13	pg	
283*	MWC 300		18 24 04.1	-06 08 31	025.0	+ 2.1	10.0	pg	
284n*	AS 310		18 28 02.2	-05 02 34	026.4	+ 1.8	10	r	
285	LkHα 348		18 28.1	-00 31	031.4	+ 4.3	16	pg	
286*	S CrA		18 54 25	-37 05.3	359.9	-17.7	10.7-13.2	vis	IV 0.8
287n*	TY CrA		18 54 56	-37 00.9	000.0	-17.8	8.9-12.1	vis	I
288n*	R CrA		18 55 09	-37 05.6	359.9	-17.8	9.9-14.1	vis	IV 1.5
289*	DG CrA		18 55 09	-37 32.0	359.5	-18.0	13.1-15.3	pg	
290n	T CrA		18 55 14	-37 06.4	359.9	-17.9	11.7-14.5	vis	
291	VV CrA		18 56 22	-37 21.2	359.8	-18.2	13.0-<17.0	pg	I?
292n*	AS 353	Ir-Ch 34	19 15.8	+10 51	046.0	- 1.3	11.5	r	
293n	LHα 483-41		19 22.4	+23 42	058.1	+ 3.5	13	pg	
294	V536 Aql		19 34 12	+10 16.6	047.8	- 5.6	12.6-15.3	pg	II, III?
295	LkHα 228		20 21.4	+42 10	080.3	+ 2.7	14	pg	
296	LkHα 149	S 7813	20 47 33	+44 01.3	084.7	- 0.1	16.0-17.2	pg	
297*	V751 Cyg	LkHα 170	20 48 41	+43 56.8	084.7	+ 0.1	13.8-16.3	pg	I
298	LkHα 172		20 48 55	+43 54.5	084.7	+ 0.1	16.0:	pg	
299	V521 Cyg	LkHα 188	20 54 49	+43 30.0	085.1	- 1.2	14.3-16.6	pg	
300*	V1057 Cyg	LkHα 190	20 55 19	+43 52.2	085.4	- 1.0	10.0-16.5	B, pg	Pec
301	LkHα 191		20 55 30	+43 33.7	085.2	- 1.3	14	pg	
302n	V1331 Cyg	LkHα 120	20 57.9	+49 58	090.3	+ 2.7	11.8-12.2	V	
303n*	LkHα 321	G-G 2-2	20 58.6	+49 28	090.0	+ 2.2	14	pg	
304	FU Cep	LkHα 427, Perrine B	21 00 30	+67 45.2	104.0	+14.2	17.2-18.2	pg	II, III
305n	LkHα 324		21 00.7	+49 51	090.5	+ 2.3	13	pg	
306*	FV Cep	LkHα 275	21 01 04	+68 02.7	104.3	+14.3	14.7-17.4	pg	I, II s
307*	EH Cep	LkHα 276	21 02 13	+67 35.6	104.0	+13.9	12.6-15.9	pg	I?
308n*	LkHα 349		21 34.2	+56 49.6	099.0	+ 3.7	13.3	V	
309n	LkHα 234		21 40.8	+65 39	105.4	+ 9.9	13	pg	
310n*	BD+46°3471	AS 477, W6	21 48 44	+46 45.3	094.2	- 5.4	9.9-10.2	V	
311n	LkHα 245	W 46	21 49 39	+46 44.6	094.4	- 5.5	16.5:	pg	
312	LkHα 257	W 76	21 50 27	+46 43.3	094.5	- 5.6	13.5:	pg	
313n	LkHα 233		22 30.3	+40 08	096.7	-15.2	14.5:	pg	
314	LkHα 350		22 45 18.0	+61 39 25	109.2	+ 2.6	16	pg	
315*	DI Cep		22 52 06	+58 08.0	108.4	- 0.9	11.9-13.5	pg	II
316*	AS 501	MHα 73-59	22 53.6	+58 15	108.6	- 0.9	10.5	pg	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		(9)

TABLE 1 (continued)

HRC no.	<V>	<B-V>	<U-B>	n	Mag., photo refs.	Spectral class	Type	Em int.	Spectr. refs.	Chart ref.	Location
251	†				17, 19, 57, 123, 125, 146	cont+e	t	5	132, 105, 140	19	Anon dark neb
252*					118, 123, 125	G0eα V	t	1	94	20	Anon dark neb
253					18, 164, 240	cont+e	t	2-3	92, 164, 105	164	Anon dark neb
254*	12.05v	+1.19	-0.04††	6	44, 1	cont+e	t	4	44, 105, 142, 143, 144	1	Anon dark neb
255						G	—	1	1	45	B 42
256					1, 114	cont+e	t	4u	1	1, 114	Near B 42
257*					1, 114	— e	—	2	1	1, 114	B 42
258*					78, 146	cont+e	t	3	214, 1	214	B 42
259*	†				1, 169	K5e	t	(4)	214, 105	214	B 42
260						F5:	—	1	1	45	B 42
261					1, 114	Ke	—	2	1	1, 114	B 42
262n*					105	— e	—	1	78, 105	214	B 42
263						Me	t	(2)	214, 78, 105	214	B 42
264	†				169	K2-5e	t	2	214, 105	214	B 42
265					1	—	t	(4)	214	214	B 42
266					214	Ke	t	(3)	214, 105	214	B42, 44
267n*					1, 114	Ke	—	2	1	1, 114	B 42
268					114	K2e	t	3	1	1, 114	B 44
269						G	—	1	1	45	B 44
270n*	†11.48v	+1.23	-0.04††	17	1, 169, 247, 248	cont+e*	t	4u	2, 105, 140, 143, 183	248	Anon dark neb
271*					118, 123, 125, 219	F5 V	t:	1	94	20	
272					217	Fpe	—	2	105	218	B 59
273	†12.3				219b, 217	B-Aeβ	h	1	102	218	B 59
274						— e	—	2	1	1	B 59
275	†13.7				1, 219b	— e	—	1-2	1	219b	B 59
276	†14.4				1, 219b	— e	t	3-4	1	219b	B 59
277					99	G-Keα	—	1	99	99	NGC 6514
278					99, 192, 226	—	—	1?	99	99	NGC 6523
279					99	— e	—	2	99	99	NGC 6523
280	13.63	+0.76	+0.83	1	99, 192, 226, 219	K0±e	t?	2?	99, 105	99	NGC 6523
281					99	Gpe	—	2	99, 105	99	NGC 6523
282n					54, 150, 186, 197	A2eβ	h?	2	102	128	Anon dark neb
283*	11.60	+1.01	-0.15	4	1	eq	?	—	1, 102, 172	1	Anon dark neb
284n*						B-Ae	?	1-2	1	1	——
285						— e	—	2	1	1	Anon dark neb
286*	†11.35	+0.78		—	14, 17, 170, 239	cont+e	t	(4-5)	132, 31, 105	239	Anon dark neb
287n*	† 9.43	+0.42		—	15, 16, 55, 170	B9(e)	h?	1var?	1, 23	—	NGC 6726-7
288n*	†10.74	+0.56	+0.10	—	13, 17, 55, 57, 169, 170, 209	F0±pe	h	2	132, 76, 74, 102, 105, 171	132	NGC 6729
289*					221	—	—	0	1	221	Anon dark neb
290n	†11.67	+0.84	+0.32	—	14, 17, 55, 57, 169, 170, 209	F0eα	h	1	132, 102, 105	132	NGC 6729
291					55, 139, 157	— e	t	2:	94, 105	139	Anon dark neb
292n*					175	pec	t	3	108, 175, 1	128	Anon dark neb
293n					87	F5:	—	1	1	1	Anon dark neb
294					116, 198	— e	t	3-4	94, 105	121	B 142
295					102	G0: eα	—	1	102, 105	102	NGC 6914b
296					241	K±e	t	4	100	100	IC 5070
297*	14.03	+0.25	-0.75	1	100, 162, 242	cont+e	?	2	1, 100, 105	100	IC 5070
298					241	Ge	—	2	100	100	IC 5070
299					119	K0eα	—	1	100, 105	100	NGC 7000
300*	9.50	+1.21	+0.58	1	167, 235, 241, 79a	*	t, h	*	100, 112, 235	100	NGC 7000
301					241	K0eβ	—	2	100, 105	100	NGC 7000
302n	†11.96	+1.03	+0.42	18	248, 168, 169	cont+eq	t?	4	105, 140	140	Anon dark neb
303n*						pec	t:	2	1	60	Anon dark neb
304					190, 204	—	—	1	1	204	NGC 7023
305n						Geβ	—	1-2	1	1	Anon dark neb
306*					204	— e	—	2-3	105	204	NGC 7023
307*					204	G2eα	—	1-2	105	204	NGC 7023
308n*	13.32	+1.79	+1.55	3	43	F6-F8eα	—	1	41, 42, 1	42	IC 1396
309n	11.90	+0.80	+0.03	1	196	Aeβ	h?	2	102	102	NGC 7129
310n*	10.11	+0.41	+0.15	5	196, 227	A0e+shell	h	2	175, 102	227	IC 5146
311n	15.22	+1.46	+0.51	2	227	— e	—	1-2	1	103	IC 5146
312	13.23	+0.68	+0.62	—	227	B-Aeα	h	1	102, 103	103	IC 5146
313n	13.82v?	+0.88	+0.72	2	43	A7eα	h	1	41, 102	102	Anon dark neb
314						—	—	1	1	1	Cep III
315*					137	dK3e	t	3	133, 105	137	Anon dark neb
316*					175	— e	?	2	175, 1	1	Anon dark neb
(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)

TABLE 1 (continued)

HRC no.	Star	Other designation	α(1900)	δ(1900)	ℓ	b	Mag.	Light curve class.
317n	MWC 1080		$23^h\ 12.^m9$	+60° 18'	111.7	+ 0.0	13.0: pg	
318*	BM And		23 32.8	+47 51	110.5	-12.7	12.4-14.6 pg	-0.3?
319	MacC H3	Blanco 1	23 49 30	+66 20.9	117.4	+ 4.6	14.5v? V	
320	MacC H19	Blanco 2	23 52 33	+64 13.4	117.2	+ 2.5	14.6v V	
321n	LkHα 259	MacC H4	23 53 39	+65 52.8	117.7	+ 4.1	14.67: V	
322*	MacC H5	Blanco 4	23 54 17	+65 49.8	117.7	+ 4.0	15.8v V	
323	MacC H18	Blanco 6	23 57 06	+64 20.9	117.7	+ 2.5	14.2v V	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

REMARKS TO TABLE 1

1. MacC H12. The infrared Ca II triplet probably is in emission.

5. MacC H9. The infrared Ca II triplet probably is bright. The star is in, but does not illuminate the nebula Ced 1.

8,9. LkHα 262, 263. These two stars are separated about 15" in 20°.

23,25. FM Tau and CW Tau, together with HD 283447 (K2), lie within an oval loop of faint nebulosity having axes about 7' x 13'.

29. V410 Tau. The spectral type quoted was observed by Mosidze during a flare.

30,31. DD, CZ Tau. These stars are separated 31" in 13°.

35. T Tau. There is emission nebulosity very near the star [90], while NGC 1555 is an arc of reflection nebulosity about 40" away. An account of the more recent history of the variable nebulae near T Tau is in A.S.P. Leaflet no. 293 (Sept. 1953). The polarization of T Tau has been discussed by Serkowski [208].

37. DG Tau. The spectrum is shown in [108].

38,39. DH, DI Tau. The two stars are separated 16" in 125°. The two spectra are shown in [108].

40. LkHα 101. This is the illuminating star of NGC 1579, and the infrared source IRC+40091.

41. IQ Tau. A mag.-17 star is at 10" in 301°.

42,43. UX Tau. B is 5" from A in 270°. The photometry includes both stars.

46. ZZ Tau. Only H, K have been observed in emission.

48. HK Tau. Probably this star is MHα 259-16. The emission-line intensity is variable.

49,50. HL, XZ Tau. HL is 23" from XZ in 273°; it was formerly called XZ Tau B. It is enveloped in a very small, bright nebula that was discovered visually at the 120-inch [110]. In XZ, Ca I λ4226 is strong in absorption and other late-type features are visible against a strong continuum. The corresponding spectral type is late K. The two spectra are shown in [108] but there the identifications as XZ Tau A and B should be interchanged. The correct identification is shown in [110], Fig. 2.

51. LkHα 266. There is another star of about the same brightness at about 2" in 180°. The emission lines originate in A, but the spectral type is for the combined light.

52,53. UZ Tau. The separation is 3".7 in 271°. The photometry includes both stars.

55. GH Tau. A 12-mag. star is at 22" in 15°.

56,57. GI, GK Tau. These two stars are separated 13" in 329°. At very low dispersion, only bright H, K can be seen in GK. At 100 Å/mm, however, the Balmer lines and He I λλ4026, 4471 can also be seen (as well as H, K) in both stars.

64. HO Tau. There is a faint star at about 8" in 110°.

67. DO Tau. Both DO and another star 1".5 e are involved in bright nebulosity.

68. VY Tau. This is a very peculiar variant of the T Tauri-type spectrum, having only very weak, bright Balmer lines but an intense display of low-excitation lines, especially of Fe I. An investigation of this spectrum is under way.

69. LkHα 332. The M-type star to the sw is involved in red nebulosity; it has no emission in the photographic region.

75. DS Tau. There is a dF0 star of m_{pg} = 13.7 at 4" in 288° that is included in the photoelectric observations.

76. UY Aur. There is a mag. 12 companion at 0".8 in 212°.

80. RW Aur. The star is in a region of minor, spotty obscuration about 3° from the heavy Tau-Aur clouds. B is at 1".2 in 254°. The UBV values given are the mean of 68 nights observations.

83. V534 Ori. The star lies in a dark cloud whose e and n edges are luminous.

TABLE 1 (continued)

HRC no.	<V>	<B-V>	<U-B>	n	Mag., photo refs.	Spectral class	Type	Em. int.	Spectr. refs.	Chart ref.	Location
317n	11.84v	+1.38	+0.01	2	43	eq	?	—	102, 41	102	Anon dark neb
318*	†	+1.22			57, 70	F8:eα	t	1	94, 105, 4	4, 122	Anon dark neb
319	14.50	+1.09	-0.15	11	158	— e	t:	3	1	25, 158	Cep IV
320	14.62:	+1.38:	-0.69:	2	158	— e	t	4	1	25, 158	Cep IV
321n	14.67:	+1.96		—	158	—	—	1	25, 104	25, 158	Cep IV
322*	15.80:	+1.75:		11	158			—	158	25, 158	Cep IV
323	14.21:	+1.29:	+0.02:	3	158	—	—	1	1	25, 158	Cep IV
(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)

REMARKS TO TABLE 1 (continued)

84. CO Ori. There is a companion of about mag. 13 at 1" in 280°.

85. GW Ori. The type quoted is Joy's. Zappala [249] has assigned type G5e from a 16 Å/mm spectrogram of the absorption spectrum in the photographic region.

86. V649 Ori. At the 120-inch coude in 1962, the star was discovered to have a companion about 2 mag. fainter at 2" in 0°.

87. V442 Ori. The suspected variable SVS 1096 is at about 20" in 73°.

88, 89. GX Ori. With respect to GX, V370 Ori is at 26" in 185°; Haro 6-48 (m_{pg} = 17) is at 24" in 302°; Haro 6-50 (m_{pg} = 18) is at 47" in 123°.

92. V449 Ori. This variable was regarded as a contact binary by Götz [62], but as a T Tau star by Eggen [48]. The spectrum supports the latter classification.

99. HT Ori. This star may be only an ordinary variable M giant seen through the Orion Nebula.

104. VY Ori. There is a faint companion at about 15" in 135°.

111. WX Ori. We have assumed that the observations of P 1352 in [169] refer to WX Ori.

121. P 1649. This object may not be related to the T Tau stars.

128. LN Ori. Hα is listed as in emission in [189], but we have not been able to confirm.

148. NY Ori. This star is 5" se of BD-5° 1328; it is the "Anon." of [91].

155. AR Ori. There is a companion 2" distant in about 240°.

163. Haro 4-125. Blanco [26, Table 4] identified his star 17 as Brun 1009 and Haro 4-125, but Brun 1009 lies 2' se of 4-125. The T Tau-type emission lines in the photographic region of 4-125 were discovered by P. D. Jose at McDonald Observatory in 1948.

167. P 2441. Mendoza [170] gave the type as G3 Ve.

169. BF Ori. The absorption spectrum is very peculiar. On a 16 Å/mm coude plate, many of the lines of the ionized metals are double or strongly asymmetric. The only emission in the photographic region is a bright core in K. The UBV data are from unpublished Lick observations made by B. Paczynski in 1962-63.

172. TX Ori. Ca II H, K are in emission with variable intensity.

178. BH Ori. The star is included here on the basis of Parenago's [189] suspicion that Hα is bright. No line emission is apparent on a 1967 low-dispersion spectrogram of the photographic region.

199. MWC 137. This star may not be a member of the Orion population. Hα is extraordinarily strong in emission, and is flanked by narrow [N II] lines. Diffuse bright lines of He I, Fe II, and possibly Si II are present. The interstellar lines are very strong. The star is surrounded by an irregular ring of nebulosity, and has a number of close companions.

207. R Mon. This semi-stellar object is at the apex of NGC 2261, Hubble's Variable Nebula. The AGK2 position is 6s e, 1!9 n of that given here.

209. G-G 405. There is a 16-mag. companion at about 4" in 150°.

222. W 108. The emission at Hα was discovered by Zappala [249].

232. V426 Mon. LHα 56, m_{pg} = 17.0, is 6" distant in 113°.

235. LHα 61. The star LHα 62, m_{pg} = 15.5, is 7" distant in 135°.

238. MO Mon. According to Walker [228, 229], the stronger features of a late-type (G-K?) absorption spectrum can be seen against the smooth continuum.

252. RY Lup. No emission lines had previously been reported in this star. A 120-inch coude plate of 1971 June 29 shows Hα in emission with a narrow central reversal. Li I λ6707 is present in absorption.

254. AS 205. This star was discovered at the 120-inch to be a close double. On 1971 June 29, the total $m_{vis} \approx 13$ and the northern star was about 0.5 mag.the fainter.The separation is about 1" in 20°. A reproduction of the (combined) spectrum is in [108]. The UBV data quoted were obtained by J. Smak in 1961-62.

257. Haro 1-4. This star is in the bright reflection nebulosity around ρ Oph.

258, 259. V852 Oph, S-R 4. Both stars are in the reflection nebulosity surrounding HD 147889.

262. S-R 24. Hα is in emission in both stars. The components are approximately equal in brightness, with separation 6" in 160°.

267. Haro 1-14. The fainter component of a double: the brighter star is type K3.

270. V1121 Oph. The UBV data are from unpublished observations by J. Smak in 1961-62. In the blue, the spectrum is essentially continuous under the emission lines, but an absorption spectrum is visible in the red, to which Zappala [249] has assigned an approximate type of K0. The Li I λ6707 line is strong.

271. AK Sco. No line emission had previously been reported in this star. A 120-inch coude spectrogram of 1971 June 29, however, shows Hα in emission with a deep reversal; V>R. Li I λ6707 was present in absorption. The polarization has been discussed by Serkowski [208].

283. MWC 300. The spectrum in the photographic region has been discussed in [102] and [172]. A 120-inch coude plate of the red-yellow region obtained in 1970 shows bright Hα without P Cyg structure, and narrow emission lines of He I, [O I], [S II], [S III], [N II], and Si II. The 4 UBV observations in 1963 by B. Paczynski show a progressive variation of 0.15 mag. in V over 72 days. The star lies in a heavily obscured region, but may not be an Orion population object.

284. AS 310. This star is involved in intricate bright nebulosity. It is in a somewhat obscured region, but may not be an Orion population object. Hα and the red [S II], [N II], and [O I] lines are in emission in the stellar spectrum, but the nebulosity may contribute.

286. S CrA. There is a companion (m_v about 13.5) at 1" in 135°-140°.

287. TY CrA. Together with HD 176386 (type A0), TY CrA illuminates the reflection nebula NGC 6726-27. The type of TY CrA is B9, with no emission in the photographic region. A 120-inch coude plate of 1971 June 30 shows no emission at Hα,but there is a very sharp, deep absorption core superimposed centrally on the normal Hα contour. HD 176386, observed on the same date, shows a normal Hα. Three Lick 75 Å/mm spectrograms of TY CrA obtained in 1946 give a mean velocity of -30 ±4 km/sec, with no suggestion of variation. Thus they give no support to the idea that TY CrA is an eclipsing variable. The polarization of both stars and of the nebula has been measured by Serkowski [209].

288. R CrA. This star illuminates the variable nebula NGC 6729. As in the similar object R Mon/NGC 2261, there has been observed in the nebula a set of narrow, deep Balmer absorption lines that have been compared [76, 171] to those of an A5 supergiant. In both cases, these are probably transient shell absorptions originating near the illuminating star and subsequently scattered off the nebulosity [109]. The polarization of R CrA has been discussed by Serkowski [209].

289. DG CrA. This star is listed as "eα" in the GCVS, 3rd ed., but no Hα emission was noted in the star by Miss Parsamian [185] or by Herbig on the Tonantzintla objective-prism plates. A weak Lick low-dispersion spectrogram of the photographic region obtained in 1948 showed no bright lines.

292. AS 353. Lick spectrograms of 1963 and 1964 showed a T Tau-type spectrum, rather like that exhibited by R Mon on occasion. Emission lines of H and Ca II are most prominent, and the usual bright lines of Fe II, Fe I, Ti II, Si I, ...are present, including the fluorescent Fe I $\lambda\lambda$4063, 4132. There are strong, deep shortward shell absorptions at the H, Ca II, and ultraviolet Ti II. AS 353 has a companion about 2 mag. fainter at 6" in 175°, and there is a rather bright Herbig-Haro Object 24" distant in 286°. A reproduction of the spectrum of AS 353 appears in [108].

297. V751 Cyg. It is not yet settled whether this star is a peculiar member of the Orion population of NGC 7000-IC 5070 or is a hot subluminous variable in the foreground. A 100 Å/mm spectrogram obtained 1963 Aug. 14 at the 120-inch extends the earlier [100] description: the spectrum is very nearly continuous, with very weak, hazy Balmer emission lines to H8. No He I or He II lines are present. No interstellar Ca II lines are visible, so the reddening cannot be large.

300. V1057 Cyg. This remarkable object, apparently an ordinary T Tau star of $m_{pg} \approx 16$ up to 1969,in that year abruptly brightened to V≈9. In 1957, the star had a T Tau like spectrum of emission-line intensity 4-5. At maximum in 1971, it was a peculiar A or F type with Hα and the infrared Ca II lines in emission. The event was very reminiscent of the flare-up of FU Ori in 1936-37.

303. LkHα 321. The ne of a pair of stars about 30" apart. At low dispersion, only the K line can be seen in emission in the photographic region. A G-type absorption spectrum is present.

306. FV Cep. This star is listed as LkHα 513 in [204].

307. LkHα 276. The only bright lines that are detectable on a 100 Å/mm plate of the photographic region taken on 1962 Nov. 4 are rather strong emission cores in H, K.

308. LkHα 349. The spectral type quoted is Dibai's; the spectrum appears continuous on two low-dispersion Crossley spectrograms.

310. BD +46° 3471. There are two faint companions about 5" distant to the ne and sw [227].

315. DI Cep. The spectral type given is Joy's. An excellent 100 Å/mm Lick plate of 1962 shows the absorption spectrum well, but it is so confused by emission lines that a more precise classification would be difficult.

316. AS 501. It is not at all certain that this object is related to the T Tau stars. The spectral type is M, having Hα very strong in emission with some structure.

318. BM And. The earlier classification of F8 is confirmed on a much better 100 Å/mm plate of 1962 Nov. 4. Weak central emission cores are also seen in H, K. The UBV observations quoted for BM And in [43] must refer to another star.

322. MacC H5. The infrared Ca II triplet may be bright. The Hα emission was discovered independently at Lick.

REFERENCES

1. Present investigation.
2. Anderson, L., and Kuhi, L. V. 1969, Non-Periodic Phenomena in Variable Stars, ed. L. Detre, p. 93.
2a. Ahnert, P. 1950, Mitt. Ver. Sterne, No. 127.
3. Aveni, A. F. 1966, Ap.J., 144, 666.
4. Aveni, A. F., and Hunter, J. H. 1969, A.J., 74, 1021.
5. Badalian, H. S. 1960, Astr. Cirk. Acad. Sci. U.S.S.R., No. 211, 29.
6. _____. 1960, ibid., No. 217, 9.
7. _____. 1961, ibid., No. 224, 22.
8. _____. 1962, ibid., No. 228, 21.
9. Badalian, H. S. 1962, Soobsč. Bjurakan Obs., No. 31, 57.
10. _____. 1964, ibid., No. 36, 71.
11. Badalian, H. S., and Erastova, L. K. 1964, Soobsč. Bjurakan Obs., No. 36, 55.
12. _____. 1967, ibid., No. 38, 1.
13. Bateson, F. M. 1937, Circ. R.A.S. New Zealand, Var. Star Sec., No. 17.
14. _____. 1950, ibid., No. 50.
15. _____. 1952, ibid., No. 56.
16. _____. 1963, ibid., No. 111.
17. _____. 1970, ibid., No. 147.
18. Bateson, F. M., and Jones, A.F. 1957, Circ. R.A.S. New Zealand, Var. Star Sec., No. 79.
19. _____. 1960, ibid., No. 102.
20. Bateson, F. M., and Jones, A. F. 1960, Charts of Southern Stars, Ser. II.
21. Beyer, M. 1937, A.N., 263, 33.
22. Bidelman, W. P. 1954, Ap.J. Suppl. 1, 210.
23. Bidelman, W. P. 1969, private communication.
24. Blaghikh, A., and Maffei, P. 1968, Mem. Soc. Astr. Ital., 39, 137.
25. Blanco, V. M. 1962, Pub. A.S.P., 74, 330.
26. Blanco, V. M. 1963, Ap.J., 137, 513.
27. Blanco, V. M., and Williams, A. D. 1958, A.J., 63, 382.
28. Bohlin, K. 1923, A.N., 218, 203.
29. Böhm, K. H. 1957, Zs.f.Ap., 43, 245.
30. Böhm, K. H. 1958, Mem. Soc. Roy. Sci. Liège, 4th Ser. , 18, 271.
31. Bonsack, W. K. 1961, Ap.J., 133, 340.
32. Bonsack, W. K., and Greenstein, J. L. 1960, Ap.J., 131, 83.
33. Bretz, M. C. 1968, private communication.
34. Broglia, P., and Lenouvel, F. 1960, Mem. Soc. Astr. Ital., 30, 199.
35. Brun, A. 1935, Pub. Obs. Lyon, 1, No. 12.
36. Brun, A. 1937, Bull. A.F.O.E.V., 6, 89.
37. Cannon, A. J., and Mayall, M. W. 1949, Harv. Ann., 112.
38. Chugainov, P. F. 1965, Izv. Krim. Ap. Obs., 34, 86.
39. Chugainov, P. F., and Zaitseva, G. V. 1962, Peremennye Zvezdy, 14, 148.
40. Cohen, M., and Dewhirst, D. W. 1970, Nature, 228, 1077.
41. Dibai, E. A. 1969, Astrofizika, 5, 249.
42. Dibai, E. A. 1969, Sov. Astr. — AJ, 12, 448.
43. Dibai, E. A., and Zaitseva, G. V. 1968, Astr. Cirk.Acad. Sci.U.S.S.R., No. 481, 7.
44. Dolidze, M. V. 1960, Astr. Cirk. Acad. Sci.U.S.S.R., No. 214, 17.
45. Dolidze, M. V., and Arakelyan, M. A. 1959, Sov. Astr. — AJ, 3, 434.
46. Dragomiretskia, B. A., and Tsessevich, V. 1971, I.B.V.S., No. 546.
47. Duncan, J. C. 1956, Pub. A.S.P., 68, 517.
48. Eggen, O. J. 1967, Mem. Roy. Astr. Soc., 70, pt. 4, 111.
49. Elvey, C. T., and Babcock, H. W. 1943, Ap.J., 97, 412.
50. Fedorovich, V. P. 1960, Peremennye Zveydy, 13, 166.
51. Fürtig, W., and Wenzel, W. 1963, Die Sterne, 40, 35.
52. Gahm, G. F. 1970, Ap.J., 160, 1117.

53. Gahm, G. F., and Winnberg, A. 1971, Astr. and Ap., 13, 489.
54. Gaposchkin, C. P. 1950, Harv. Ann., 115, 24.
54a. _____. 1952, ibid., 118, 21.
55. Gaposchkin, S. 1937, Harv. Ann., 105, No. 27.
56. _____. 1952, ibid., 118, 126.
57. Geisel, S. L. 1970, Ap.J. (Letters), 161, L105.
58. Gillett, F. C., and Stein, W. A. 1971, Ap.J., 164, 77.
59. González, G., and González, G. 1956, Bol. Obs. Tonantzintla y Tacubaya, 14, 30.
60. _____. 1956, ibid., 15, 16.
61. Götz, W. 1957, Mitt. Ver. Sterne, No. 292.
62. Götz, W. 1958, Veröff. Sternw. Sonneberg, 4, 245.
63. Götz, W. 1958, Mitt. Ver. Sterne, No. 359.
64. _____. 1958, ibid., No. 360.
65. _____. 1958, ibid., No. 361.
66. _____. 1958, ibid., No. 362.
67. _____. 1959, ibid., No. 415.
68. Götz, W. 1961, Veröff. Sternw. Sonneberg, 5, 91.
69. Götz, W. 1967, Die Sterne, 43, 26.
70. Götz, W., Hauth, H., and Hoffmeister, C. 1957, Veröff. Sternw. Sonneberg, 4, 2.
71. Götz, W., and Wenzel, W. 1967, Mitt. Ver. Sterne, 4, 71.
72. _____. 1970, ibid., 5, 142.
73. Grasdalen, G. L., Kuhi, L. V., and Harlan, E. A. 1971, preprint.
74. Greenstein, J. L. 1948, Centennial Symposium (Harvard Monogram No. 7), p. 27.
75. Greenstein, J. L. 1949, Ap.J., 107, 375.
76. Greenstein, J. L., and Aller, L. H. 1947, Pub. A.S.P., 59, 139.
77. Greenstein, J. L., and Struve, O. 1946, Pub. A.S.P., 58, 366.
78. Haro, G. 1949, A.J., 54, 188.
79. Haro, G. 1953, Ap.J., 117, 73.
79a. Haro, G. 1971, I.B.V.S., No. 565.
80. Haro, G., and Chavira, E. 1955, Bol. Obs. Tonantzintla y Tacubaya, 12, 1.
81. Haro, G., and Chavira, E. 1965, Vistas in Astronomy, ed. A. Beer and K. A. Strand, p. 8, 89.
82. Haro, G., and Herbig, G. H. 1955, Bol. Obs. Tonantzintla y Tacubaya, 12, 33.
83. Haro, G., Iriarte, B., and Chavira, E. 1953, Bol. Obs. Tonantzintla y Tacubaya, 8, 3.
84. Haro, G., and Moreno, A. 1953, Bol. Obs. Tonantzintla y Tacubaya, 7, 11.
85. Haro, G., and Terrazas, L. R. 1954, Bol. Obs. Tonantzintla y Tacubaya, 10.
86. Henize, K. G. 1954, Ap.J., 119, 459.
87. Henize, K. G. 1963, A.J., 68, 280; and unpublished material kindly furnished by Dr. Henize.
88. Herbig, G. H. 1945, Pub. A.S.P., 57, 166.
89. _____. 1946, ibid., 58, 163.
90. Herbig, G. H. 1950, Ap.J., 111, 11.
91. _____. ibid., 111, 15.
92. Herbig, G. H. 1950, Pub. A.S.P., 62, 211.
93. Herbig, G. H. 1952, J.R.A.S. Canada, 46, 222.
94. Herbig, G. H. 1954, Trans. I.A.U., 8, 805.
95. Herbig, G. H. 1954, Pub. A.S.P., 66, 19.
96. Herbig, G. H. 1954, Ap.J., 119, 483.
97. Herbig, G. H. 1956, Pub. A.S.P., 68, 353.
98. Herbig, G. H. 1957, Ap.J., 125, 612.
99. _____. ibid., 125, 654.
100. _____. ibid., 128, 259.
101. Herbig, G. H. 1958, Mem. Soc. Roy. Sci. Liège, 4th Ser., 18, 251.
102. Herbig, G. H. 1960, Ap.J. Suppl., 4, 337.
103. Herbig, G. H. 1960, Ap.J., 131, 516.

104. Herbig, G. H. 1961, Ap.J., 133, 337.
105. Herbig, G. H. 1962, Advances in Astronomy and Astrophysics, ed. Z. Kopal, 1, 47.
106. Herbig, G. H. 1963, Ap.J., 135, 736.
107. Herbig, G. H. 1966, Vistas in Astronomy, ed. A. Beer and K. A. Strand, 8, 109.
108. Herbig, G. H. 1967, Sci. Amer., 217, 202.
109. Herbig, G. H. 1968, Ap.J., 152, 439.
110. Herbig, G. H. 1969, Mem. Soc. Roy. Sci. Liège, 17, 353.
111. Herbig, G. H. 1971, Ap.J., 169, 537.
112. Herbig, G. H., and Harlan, E. A. 1971, I.B.V.S., No. 543.
113. Herbig, G. H., and Kuhi, L. V. 1963, Ap.J., 137, 398.
114. Hidajat, B. 1961, Contr. Bosscha Obs., No. 11.
115. Hiltner, W. A., and Iriarte, B. 1958, Ap.J., 127, 510.
116. Himpel, K. 1944, Beob. Zirk., 26, 13.
117. Hoffmeister, C. 1944, A.N., 274, 176; Mitt. Ver. Sterne, No. 1, 282.
118. Hoffmeister, C. 1949, A.N., 278, 30.
119. Hoffmeister, C. 1949, Veröff. Sternw. Sonneberg, 1, 174, 306; Mitt. Ver. Sterne, No. 310.
120. Hoffmeister, C. 1952, Mitt. Ver. Sterne, No. 154.
121. _____. 1957, ibid., No. 279.
122. _____. 1957, ibid., No. 312.
123. Hoffmeister, C. 1958, Veröff. Sternw. Sonneberg, 3, 333.
124. Hoffmeister, C. 1962, Zs.f. Ap., 55, 290.
125. Hoffmeister, C. 1965, Veröff. Sternw. Sonneberg, 6, 3.
126. Hoffmeister, C. 1967, A.N., 289, 205.
127. Hunger, K., and Kron, G. E. 1957, Pub. A.S.P., 67, 347.
128. Iriarte, B., and Chavira, E. 1956, Bol. Obs. Tonantzintla y Tacubaya, 14, 31.
129. Ishchenko, I. M. 1964, Peremennye Zvezdy, 15, 143.
130. Johnson, H. M. 1965, Ap.J., 142, 964.
131. Joy, A. H. 1942, Pub. A.S.P., 54, 33.
132. Joy, A. H. 1945, Ap.J., 102, 168.
133. _____. 1949, ibid., 110, 424.
134. Joy, A. H., and Wilson, R. E. 1949, Ap.J., 109, 231.
135. Kharadze, E. K., and Bartaya, R. A. 1962, Bull. Obs. Abastumani, 30, 3.
136. Kholopov, P. N. 1951, Peremennye Zvezdy, 8, 83.
137. _____. 1953, ibid., 9, 157.
138. _____. 1956, ibid., 10, 390.
139. Knox-Shaw, H. 1920, Helwan Obs. Bull. No. 20.
140. Kuhi, L. V. 1964, Ap.J., 140, 1409.
141. _____. 1966, ibid., 143, 991.
142. Kuhi, L. V. 1968, Interstellar Ionized Hydrogen, ed. Y. Terzian, p. 13.
143. Kuhi, L. V. 1969, Low Luminosity Stars, ed. S. S. Kumar, p. 149.
144. Kuhi, L. V. 1970, Mem. Soc. Roy. Sci. Liège, 19, 295.
145. Kukarkin, B. V. 1957, Astr. Cirk. Acad. Sci. U.S.S.R., No. 177, 16.
145a. Kukarkin, B. V., et al. 1948, G.C.V.S.
146. Kukarkin, B. V., et al. 1951, G.C.V.S. Suppl., No. 3.
147. Kukarkin, B. V., et al. 1956, G.C.V.S. Suppl., No. 7.
148. Kukarkin, B. V., et al. 1969, G.C.V.S.
149. Kurochkin, N. E. 1952, Peremennye Zvezdy, 8, 352.
150. _____. 1957, ibid., 11, 462.
151. Lallemand, A., Duchesne, M., and Walker, M. F. 1960, Pub. A.S.P., 72, 268.
152. Lampland, C., and Ashbrook, J. 1949, A.J., 54, 91.
153. Lenouvel, F. 1957, J. d'Obs., 40, 37.
154. Levitt, H. S. 1906, Harv. Circ. No. 107.
155. Low, F. J., and Smith, B. J. 1966, Nature, 212, 675.

156. Low, F. J., Johnson, H. L.,Kleinmann, D. E., Latham, A. S., and Geisel, S. L. 1970, Ap.J., 160, 531.
157. Luyten, W. J. 1927, Harv. Bull., Nos. 844, 847.
158. MacConnell, D. J. 1968, Ap.J. Suppl., 16, 275.
159. Maffei, P. 1963, Mem. Soc. Astr. Ital., 34, 57.
160. _____. 1968, ibid., 37, 459.
161. Manova, G. A. 1959, Sov. Astr. — AJ, 3, 188.
162. Martynov, D. 1957, Peremennye Zvezdy, 11, 170.
163. McKnelly, R. D. 1949, A.J., 55, 6.
164. McLaughlin, D. B. 1946, A.J., 52, 109.
165. Meinunger, L. 1969, Mitt. Ver. Sterne, 5, 47.
166. _____. 1971, ibid., 5, 173.
167. Meinunger, L., and Wenzel, W. 1971, Mitt. Ver. Sterne, 5, 170.
168. Mendoza, E. E. 1966, Ap.J., 143, 1010.
169. _____. 1968, ibid., Ap.J., 151, 977.
170. Mendoza, E. E. 1970, Mem. Soc. Roy. Sci. Liège, 19, 319.
171. Mendoza, E. E., Jaschek, M., and Jaschek, C. 1969, Bol. Tonantzintla y Tacubaya, 5, 107.
171a. Merrill, P. W. 1927, Ap.J., 65, 291.
172. Merrill, P. W., and Bowen, I. S. 1951, Pub. A.S.P., 63, 295.
173. Merrill, P. W., and Burwell, C. G. 1938, Ap.J., 77, 103.
174. _____. 1943, ibid., 98, 153.
175. _____. 1950, ibid., 112, 72.
176. Metreveli, M. 1966, Astr. Cirk. Acad. Sci. U.S.S.R., No. 352, 4.
177. Mirzoyan, Z. V., and Kazarian, E. S. 1965, Astrofizika, 1, 213.
178. Morgan, W. W., and Sharpless, S. 1946, Ap.J., 103, 249.
179. Mosidze, L. N. 1962, Bull. Obs. Abastumani, 30, 32.
180. Mosidze, L. N. 1967, Peremennye Zvezdy, 16, 149.
181. Mosidze, L. N. 1968, Astr. Cirk. Acad. Sci. U.S.S.R., No. 476, 6.
182. Mosidze, L. N. 1970, Bull. Obs. Abastumani, 39, 21.
183. Nassau, J. J., and Stephenson, C. B. 1961, Pub. A.S.P.,73, 224.
184. Ponomareva, G. A. 1960, Astr. Cirk. Acad. Sci. U.S.S.R., No. 210, 18.
185. Parsamian, E. A. 1971, Soobsč. Bjurakan Obs., No. 43, 6.
186. Parenago, P. 1931, Peremennye Zvezdy, 3, 110.
187. _____. 1934, ibid., 4, 228.
188. _____. 1952, ibid., 9, 89.
189. Parenago, P. 1954, Publ. Sternberg Astr. Inst., No. 25.
190. Perrine, C. D. 1902, Lick Obs. Bull., 1, 187.
191. Petit, M. 1958, Contr. Asiago, No. 95, 29.
192. _____. 1958, ibid., No. 98.
193. _____. 1961, ibid., No. 119.
196. Racine, R. 1968, A.J., 73, 233.
197. Reinmuth, K. 1925, A.N., 225, 386.
198. Rohlfs, E. 1949, Veröff. Sternw. Sonneberg, 1, No. 3.
199. Rosino, L. 1956, Mem. Soc. Astr. Ital., 27, 335.
200. Rosino, L. 1960, Contr. Asiago, No. 109.
201. Rosino, L. 1969, Low Luminosity Stars, ed. S. S. Kumar, p. 181.
202. Rosino, L., and Cian, A. 1962, Contr. Asiago, No. 125.
203. Rosino, L., Grubissich, C., and Maffei, P. 1957, Contr. Asiago, No. 82.
204. Rosino, L., and Romano, G. 1962, Contr. Asiago, No. 127.
205. Sanduleak, N. 1971, Pub. A.S.P., 83, 95.
206. Sanford, R. F. 1947, Pub. A.S.P., 59, 134.
207. Sanford, R. F., and Merrill, P. W. 1958, Pub. A.S.P., 70, 602.
208. Serkowski, K. 1969, Ap.J. (Letters), 156, L55.
209. _____. 1969, ibid., 158, L107.

210. Smak, J. 1964, Ap.J., 139, 1095.
211. Soloviev, A. V., and Erleksova, G. E. 1962, Bull. Astr. Inst. Tedzhik, U.S.S.R., No. 34.
212. Strand, K. A. 1957, Ap.J., 128, 15.
213. Strom, K. M., Strom, S. E., and Yost, J. 1971, Ap.J., 165, 479.
214. Struve, O., and Rudkjøbing, M. 1949, Ap.J., 109, 92.
215. Struve, O., and Swings, P. 1948, Pub. A.S.P., 60, 61.
215a. Swings, P., and Struve, O. 1940, Ap.J., 91, 576.
215b. _____. 1942, ibid., 96, 258.
216. _____. 1943, ibid., 98, 91.
217. Swope, H. H. 1928, Harv. Bull., No. 857.
218. _____. 1932, ibid., No. 887.
219. Swope, H. H. 1949, Harv. Ann., 109, 1.
219a. The, Pik-Sin. 1962, Contr. Bosscha Obs., No. 15.
219b. _____. 1964, ibid., No. 27.
220. Uranova, T. A. 1958, Publ. Sternberg Astr. Inst., No. 29, 71.
221. Van Gent, H. 1933, B.A.N., 7, 21.
222. Vardanian, R. A. 1969, Soobsč. Bjurakan Obs., No. 40, 63.
223. Varsavsky, C. M. 1960, Ap.J., 132, 354.
224. Wachmann, A. A. 1954, Zs.f.Ap., 35, 74.
225. Walker, M. F. 1956, Ap.J. Suppl., 2, 365.
226. _____. 1957, ibid., 125, 636.
227. _____. 1959, ibid., 130, 57.
228. Walker, M. F. 1961, C.R., 253, 283 and Roy. Obs. Bull. No. 82, E70.
229. Walker, M. F. 1962, Advances in Electronics and Electron Physics, 16, 341.
230. Walker, M. F. 1963, A.J., 68, 298.
231. Walker, M. F. 1963, Pub. A.S.P., 75, 420.
232. Walker, M. F. 1966, Stellar Evolution, ed. R. F. Stein and A. G. W. Cameron, p. 405.
233. Walker, M. F. 1969, Ap.J., 155, 447.
234. Walker, M. F. 1969, Non-Periodic Phenomena in Variable Stars, ed. L. Detre, p. 103.
235. Welin, G. 1971, Astr. and Ap., 12, 312.
236. Wenzel, W. 1955, Mitt. Ver. Sterne, No. 190.
237. _____. 1955, ibid., No. 193.
238. _____. 1955, ibid., No. 212.
239. _____. 1956, ibid., Nos. 219 and 220.
240. _____. 1956, ibid., No. 241.
241. _____. 1963, ibid., No. 730.
242. _____. 1963, ibid., Nos. 754 and 755.
243. Wenzel, W. 1969, Non-Periodic Phenomena in Variable Stars, ed. L. Detre, p. 61.
244. Wenzel, W. 1970, Mitt. Ver. Sterne, 5, 117.
245. Weston, E. B., and Aller, L. H. 1955, Mem. Soc. Roy. Sci. Liège, 4th Ser., 15, 251.
246. Wilson, W. J., Barrett, A. H., and Moran, J. M. 1970, Ap.J., 160, 543.
247. Zaitseva, G. 1967, Astr. Cirk. Acad. Sci. U.S.S.R., No. 442.
248. Zaitseva, G. 1968, Peremennye Zvezdy, 16, 435.
249. Zappala, R. R. 1971, thesis, University of California, Santa Cruz.
250. Zessevich, V. P., and Dragomirezkaya, B. A. 1967, Sky and Tel., 34, 366.
251. Ziener, R. 1964, Mitt. Ver. Sterne, 2, 80.

DESCRIPTION OF TABLE 1

Col. 1	*HRC No.*	It is suggested that a star always be referred to by the designation given in col. (2). The running HRC number of cols. (1) and (10) is only an internal convenience for purposes of this catalog. n: The star illuminates or excites bright nebulosity. *: There is a remark following the table.
2, 3	*Star, Other designation*	The identifications other than those in the standard variable star system have the following meanings: AS: Mount Wilson catalog of "Additional Stars whose Spectra have a Bright Hα Line" [175]. Blanco: [25]. Bretz: [33]. Do-Ar: Dolidze and Arakelian [45]. G-G: González and González; if a single number, [59], but [60] if hyphenated. Haro: These are stars discovered in various Tonantzintla Hα surveys by Haro and his collaborators. Because the numbers begin anew in each list, in [105] a system of prefixes was instituted to distinguish stars in the various papers. The lists referenced in the present catalog are: Haro 1-: Sco-Oph [78]; 4-: Orion Nebula [79]; 5-: IC 434 region [84]; 6-: Tau-Aur-Ori [83]; 7-: Unpublished (these objects were found marked on the original objective-prism plates during a visit by Herbig to Tonantzintla in 1961; the numbers have been assigned arbitrarily). Other investigators, such as Götz and Badalian, have used the designation "T-" for stars from these lists. Ir-Ch: Iriarte and Chavira [128]. LHα, LkHα: LHα was used as a prefix for the first 100 stars published from the Lick Hα survey, but for numbers 101 and higher, LkHα had to be introduced to avoid conflict with K. G. Henize's southern Hα discoveries. These latter carry a hyphenated number (e.g., LHα 483-41, as in the MHα system), so there is no danger of confusion. MacC: MacConnell [158]. Manova: [161]. MHα: Mount Wilson Hα survey: the examples given in the present catalog are usually discoveries by Joy [133]. MWC: Mount Wilson catalog of B and A stars having Hα in emission [173, 174]. P: Parenago's catalog of stars in the Orion Nebula [189]. San: Sanduleak [205]. S-R: Struve and Rudkjøbing [214]. THα: Bosscha Hα survey by The [219a]. W: numbers assigned by Walker to stars in young clusters [225, 226, 227].
4, 5	*α(1900), δ(1900)*	Those positions expressed to $0^s.1$, $1''$ have been measured expressly for this catalog, except in the cases of a number of brighter stars taken from the astrometric literature. These new positions were determined at our request by Mr. C. A. Wirtanen on plates of the Lick 20-inch proper-motion program. Positions given to lesser accuracy have usually been taken from the GCVS or the original publications.
6, 7	*l, b*	Galactic coordinates expressed on the 1958 system of galactic coordinates, formerly l^{II}, b^{II}.
8	*Magnitude*	In the case of variable stars, where the range given differs from that in GCVS 3, we obtained the tabulated values by review of the published observations. :, the magnitude given is uncertain, but probably by less than 0.5 mag. ±, the value is very uncertain, by more than 0.5 mag. †, no allowance has been made for the contribution of an unresolved companion. v, the star is variable. The type of magnitude quoted is indicated by the usual abbreviations: *V* is on the Johnson system, *r* is a red magnitude, and "pg" and "vis" are the conventional photographic and visual magnitudes.

DESCRIPTION OF TABLE 1—*Continued*

9	*Light curve classification*	The system is that of Parenago [189], as extended slightly by Herbig [105]: I: the variable is more frequently bright than faint. II: the variable most frequently has the mean brightness. III: the variable is more frequently faint than bright. IV: the variable shows no preference for any level in its range. The following designations mean: c: there is an unresolved companion that may contribute. f: very rapid flashes (or flares) have been observed. s: rapid activity has been observed; i.e., significant changes take place within 1–2 days. l: the variations are slow. In a number of well-studied stars, there is a tendency for some kind of cyclic activity to persist in the light curve. In such cases, the number quoted following the Parenago class is the logarithm of a characteristic time interval in days over which the star has been observed to undergo a major change in light, and to recover.
11, 12, 13	*Mean values of V, $B-V$, and $U-B$*	Special symbols: † before $\langle V\rangle$, indicates that infrared and/or red magnitudes are also available. References are given in col. (15). # before $\langle V\rangle$, indicates that the colors in cols. (12) and (13) are $\langle B\rangle - \langle V\rangle$ and $\langle U\rangle - \langle B\rangle$, not $\langle B-V\rangle$ and $\langle U-B\rangle$. : the data are uncertain. v following $\langle V\rangle$, indicates that variations of more than 0.5 mag have been observed in V. The values quoted in cols. (11), (12), and (13) are the straight means. †† following $\langle U-B\rangle$, indicates that scanner colors are also available [142]. * following $\langle U-B\rangle$, indicates that an ultraviolet excess is present [82]. ** following $\langle U-B\rangle$, indicates that a large ultraviolet excess is present [82].
14		n is the number of individual observations included in the means of cols. (11), (12), and (13).
15	*Magnitude, photometric references*	Literature sources from which these data have been drawn, or which contain other information. A *1* indicates that unpublished Lick observations have been used.
16	*Spectral classification*	The spectral types quoted are on the conventional Mount Wilson (prefix *g* or *d*) or MK systems. Note the following distinction: III–IV means a luminosity class *between* III and IV, while III, IV means *either* III or IV. The following symbols are also used: e, the Balmer lines (and possibly others) are in emission. (e), only Ca II emission is observed in the photographic region. :, the type is uncertain by a few tenths of a class. Cont., the spectrum is seen clearly to be continuous (although a few veiled absorption lines may be present in some cases). —, the spectrum *appears* to be continuous, without absorption lines, on an unwidened spectrogram of 430 Å mm^{-1} dispersion. This is, however, a very coarse classification, made at low resolution. It is entitled to much less weight than the specific classification as "Cont." In many cases an absorption spectrum might be detectable on a better spectrogram. §, Walker [232] has observed longward absorption components at the Balmer (and in some cases the Ca II) emission lines.
17	*Type*	This rough specification of the type of star is provided for those who do not care to examine the references in detail, yet who wish to isolate certain specific varieties of Orion population stars. This classification represents our judgment as to the nature of the star, on the following system: t, certainly or very probably a T Tauri star. t:, presumed or possible T Tauri star on the basis of low-dispersion material.

DESCRIPTION OF TABLE 1—*Continued*

9	*Type—Cont.*	h, a hot member (usually of types B or A) of the Orion population. m, a late-type Orion population star of low to moderate luminosity. Usually only the Balmer lines and Ca II H,K are in emission, sometimes variable in intensity. He I emission lines are common. The equivalent width of Hα in these objects is abnormally high, but in the photographic region it is difficult spectroscopically to distinguish these stars from ordinary Me dwarfs. However, if the absolute magnitude or color is anomalous, or the infrared Ca II triplet is bright, or other emission lines appear, or the absorption lines are diffuse, then it is clear that it is not an ordinary dMe star. In a sequence of objects arranged in order of emission-line strength, these stars would blend smoothly into the weak-emission-line T Tauri stars. ?, peculiar object. —, information inadequate for a decision.
18	*Emission line intensity*	This system of describing the general intensity of the emission spectrum (relative to the continuum) as seen on unwidened slit spectrograms of low dispersion was devised by Herbig (1962): 0, no emission lines are observed. 1, emission is present only at Hα; no bright lines are detectable in the photographic region. 1–2, only Ca II H,K or only Hβ is seen in emission. 2, weak line emission is present in the photographic region. 3, moderately strong hydrogen and Ca II emission is present, together with, in some cases, a few other faint bright lines. 4, very strong hydrogen and Ca II emission lines are seen, together with a number of other weaker lines. 5, an advanced T Tauri-type spectrum: as class 4 but with a stronger emission spectrum of the lines of Fe I, Fe II, etc. u, indicates that an abnormally strong ultraviolet continuum is present on the spectrograms. If the intensity class is in parentheses, it means that we have not seen the original plates and have had to depend on a published description or reproduction. It should be realized that the relative intensity of the emission lines in T Tauri stars changes as the stars vary in light; usually, the bright lines are stronger with respect to the continuum near maximum light. Therefore, the "emission line intensity" class is not a constant for a given star, but depends upon the phase at which our spectrogram was obtained.
19	*Spectroscopic references*	Literature sources from which the data in cols. (16) and (17) have been derived, or which contain other spectroscopic information. Much of the information in col. (16) depends to some degree on Lick material, but the latter is not referenced (by a *1*) unless it is the only source.
20	*Chart references*	The reference is to a published identification chart of the field, if one exists. For 49 stars for which no chart has been published, we provide identification in figs. 1–8 (plates 2–9) of this catalog. These stars are identified by a *1* in col. (20).
21	*Location*	This provides identification of the dark cloud, association, cluster, or nebula in which the star is located. *B*-numbers refer to Barnard's catalog of dark nebulae; *Ced*, to Cederblad's catalog of bright diffuse nebulae in *Lund. Medd.*, ser II., No. 119, 1946; *Orion east* is the very large cloud north and east of the Orion Nebula, which encompasses the Barnard Loop, IC 434, NGC 2024, and NGC 2068–71.

these stars: probably the Hα emission is merely below the threshold of the objective-prism surveys. There is good reason to suspect that at least some of these stars may in fact have very strong Ca II H,K emission cores, and in this respect constitute a link between the T Tauri stars in the nebulae and the young stars of the general field that show strong Ca II emission. Unfortunately, adequate objective-prism surveys of the nebulae at the K-line for these stars have not yet been made. A very few examples,

PLATE 2

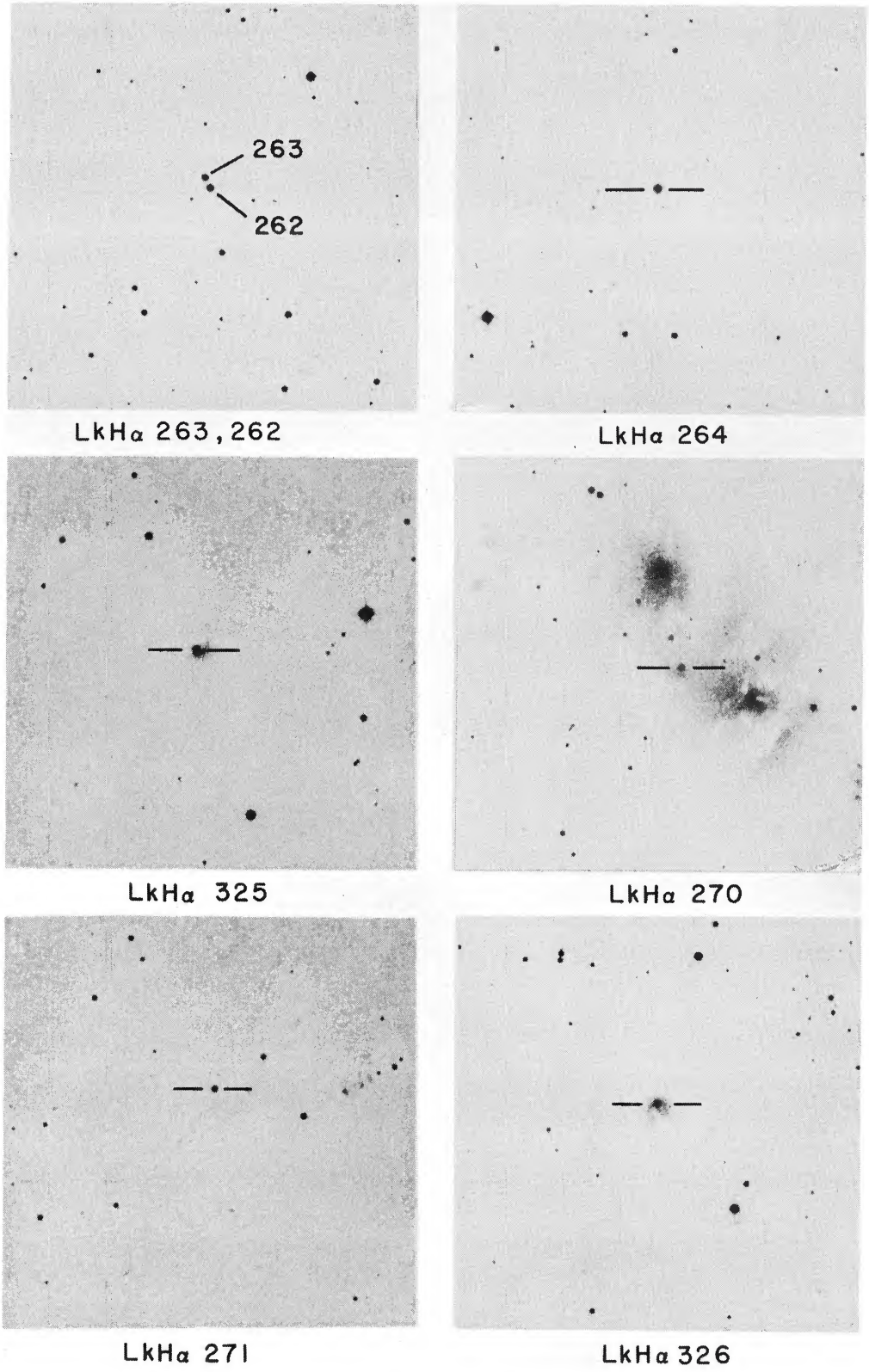

FIG. 1.—Identification charts for LkHα 263, 262, 264, 325, 270, 271, and 326. They are reproduced, by permission, from the red photographs of the Palomar Observatory Sky Survey. The areas shown are 9′ × 9′, and have north at the top and east to the left.

HERBIG AND RAO (*see* page 422)

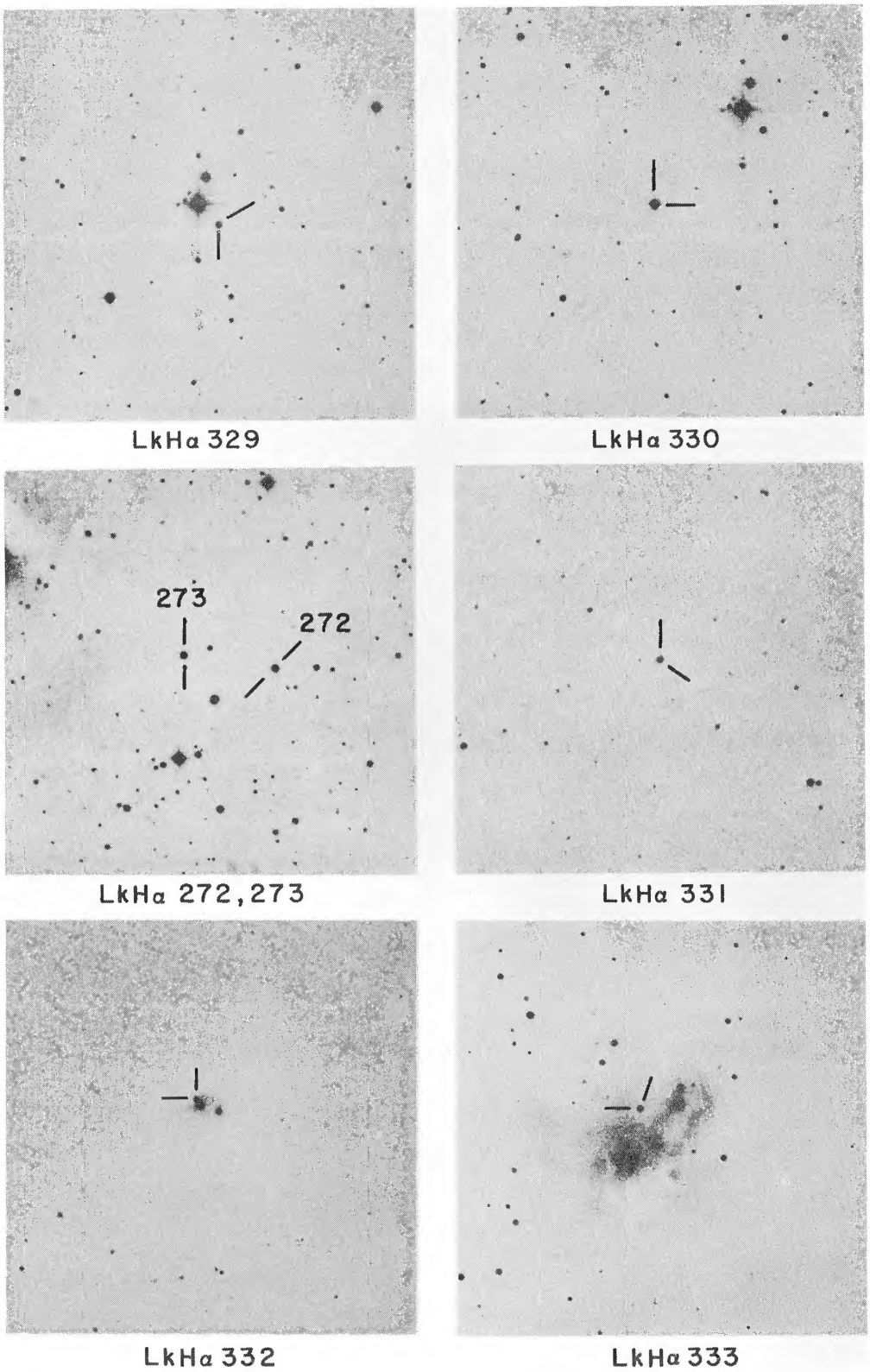

FIG. 2.—Identification charts for LkHα 329, 330, 272, 273, 331, 332, and 333; orientation and scale are as in fig. 1.

HERBIG AND RAO (*see* page 422)

PLATE 4

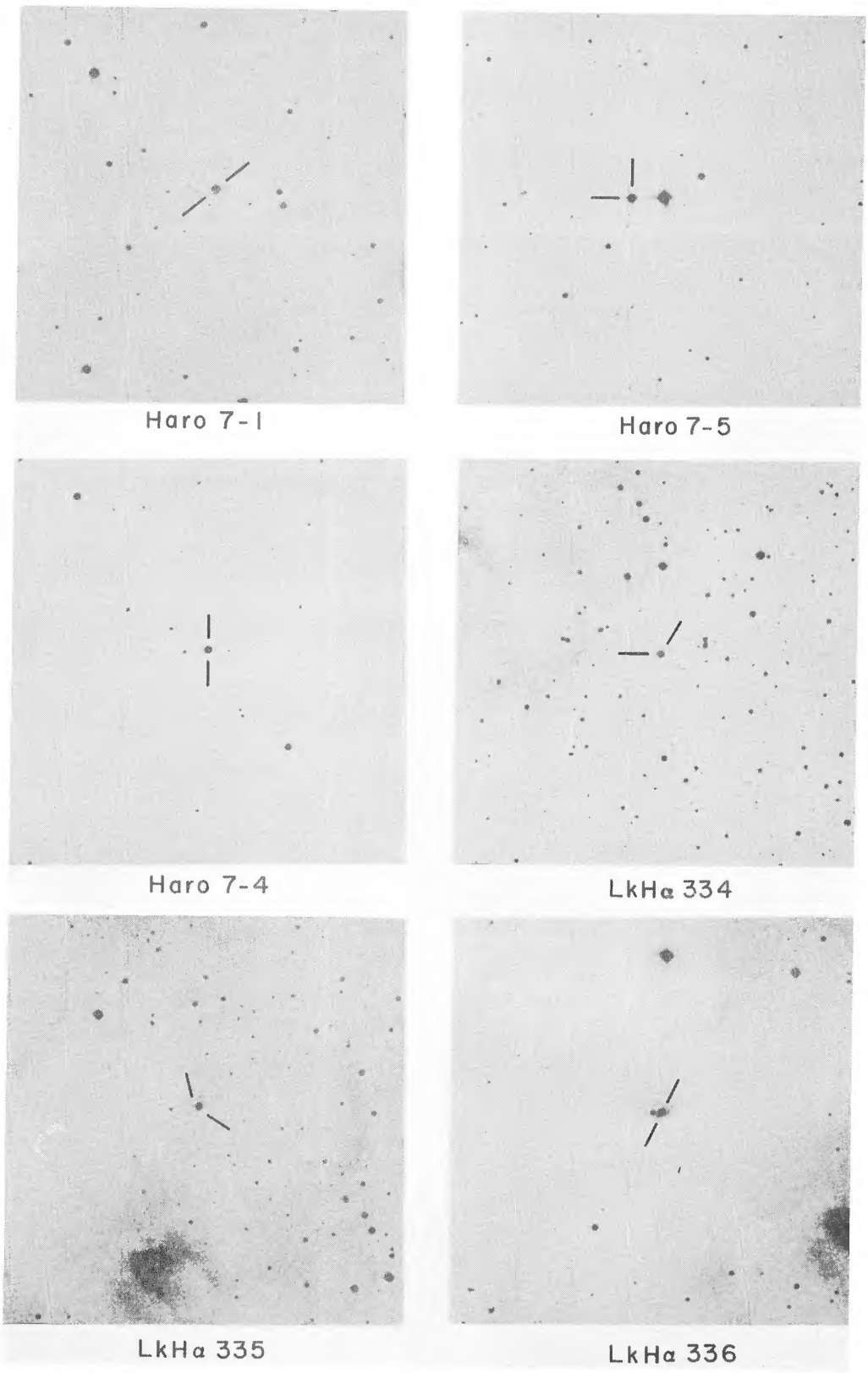

FIG. 3.—Identification charts for Haro 7-1, 7-5, 7-4, and LkHα 334, 335, and 336; orientation and scale are as in fig. 1.

HERBIG AND RAO (*see* page 422)

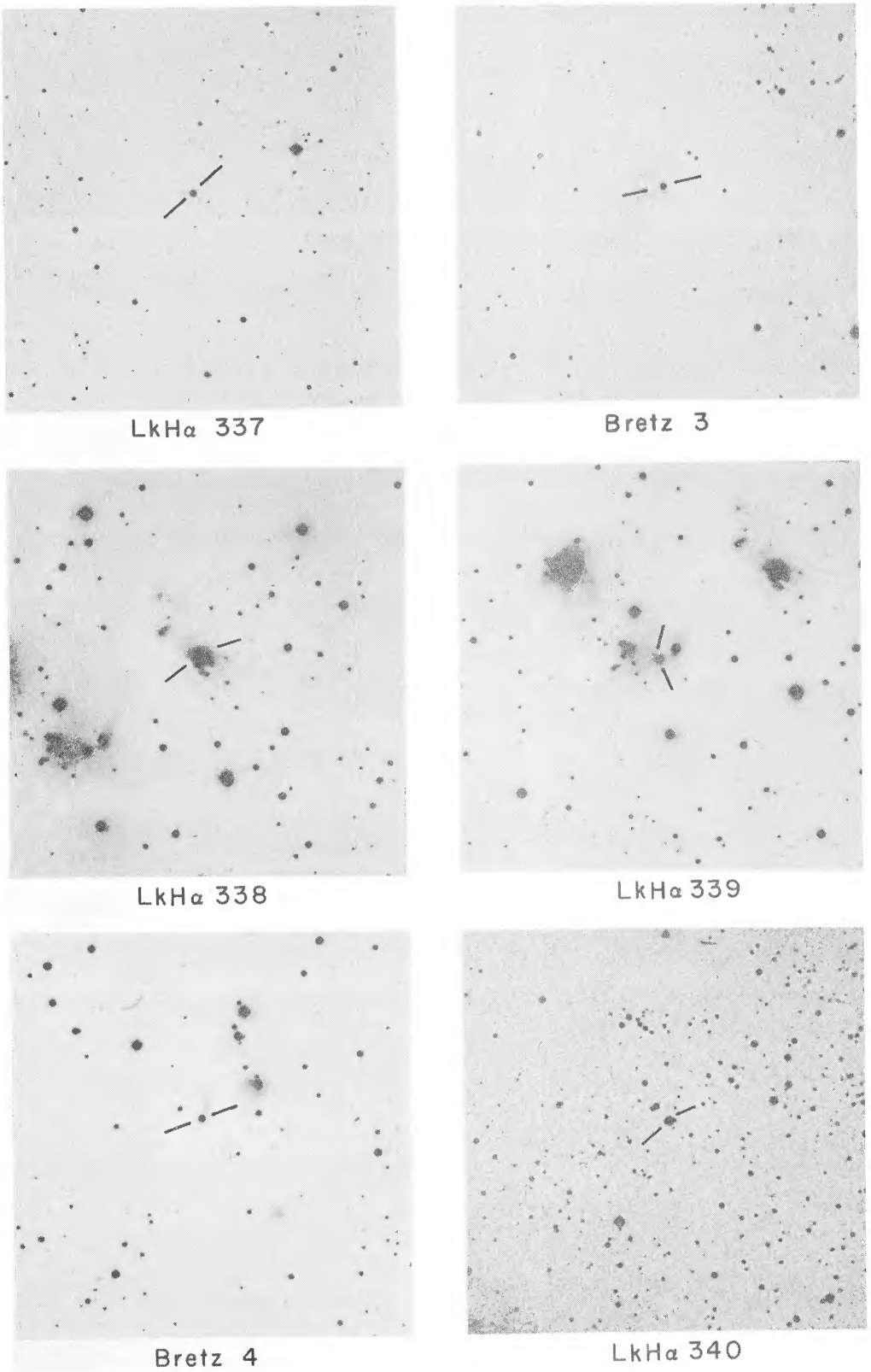

FIG. 4.—Identification charts for LkHα 337, 338, 339, 340, Bretz 3, and Bretz 4; orientation and scale are as in fig. 1.

HERBIG AND RAO (*see* page 422)

PLATE 6

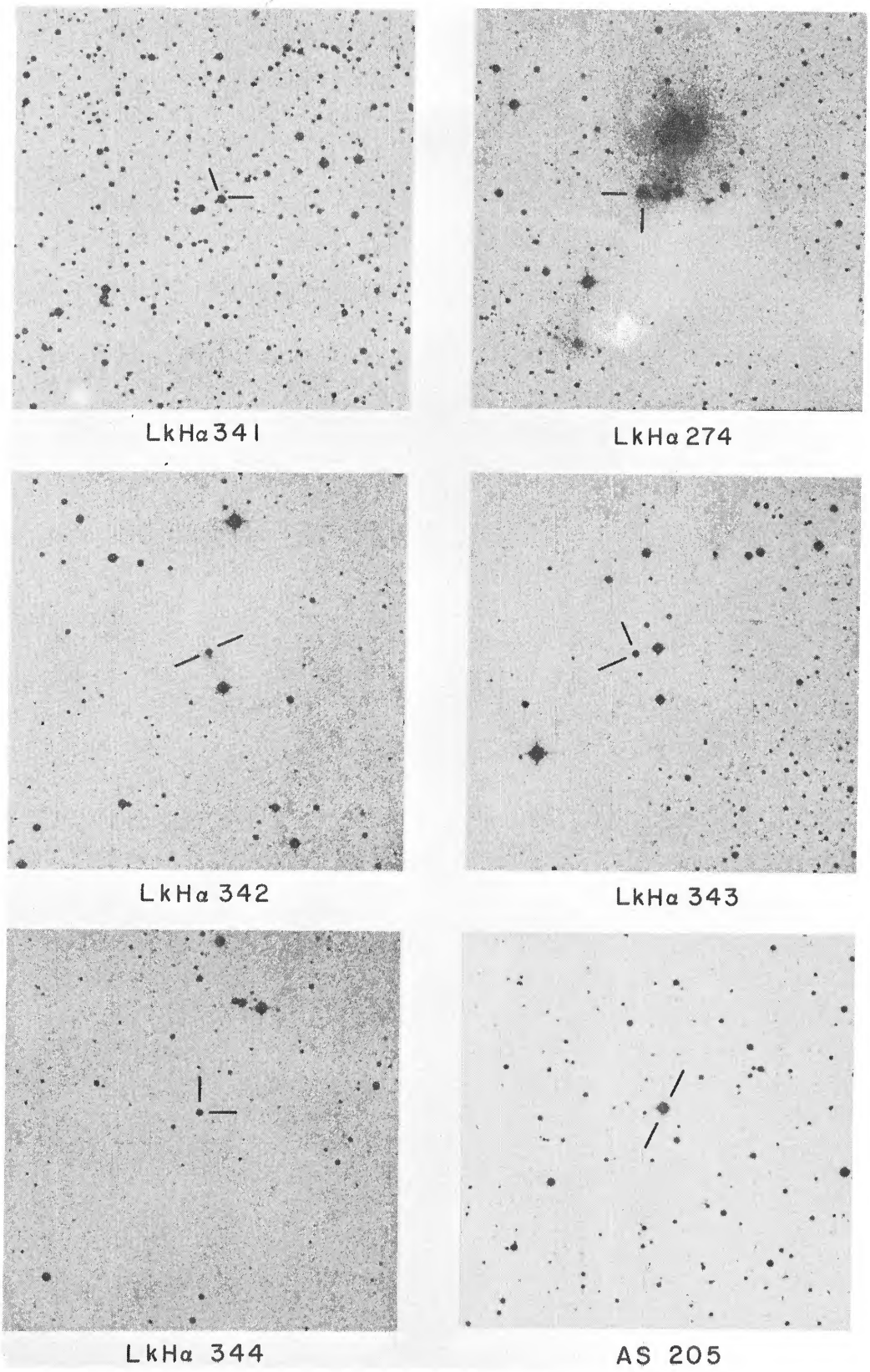

FIG. 5.—Identification charts for LkHα 341, 274, 342, 343, 344, and AS 205; orientation and scale are as in fig. 1.

HERBIG AND RAO (*see* page 422)

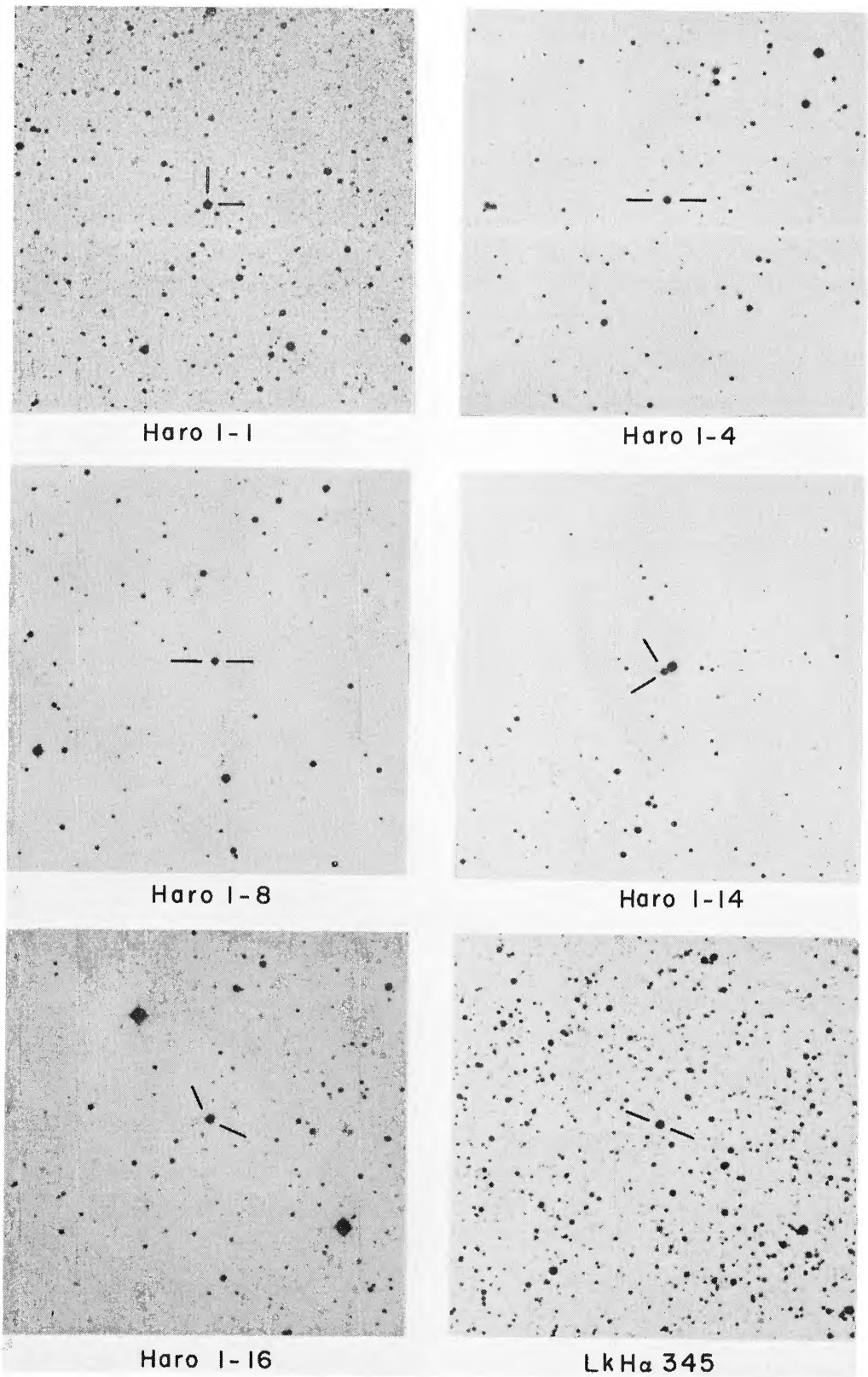

FIG. 6.—Identification charts for Haro 1-1, 1-4, 1-8, 1-14, 1-16, and LkHα 345; orientation and scale are as in fig. 1.

HERBIG AND RAO (*see* page 422)

PLATE 8

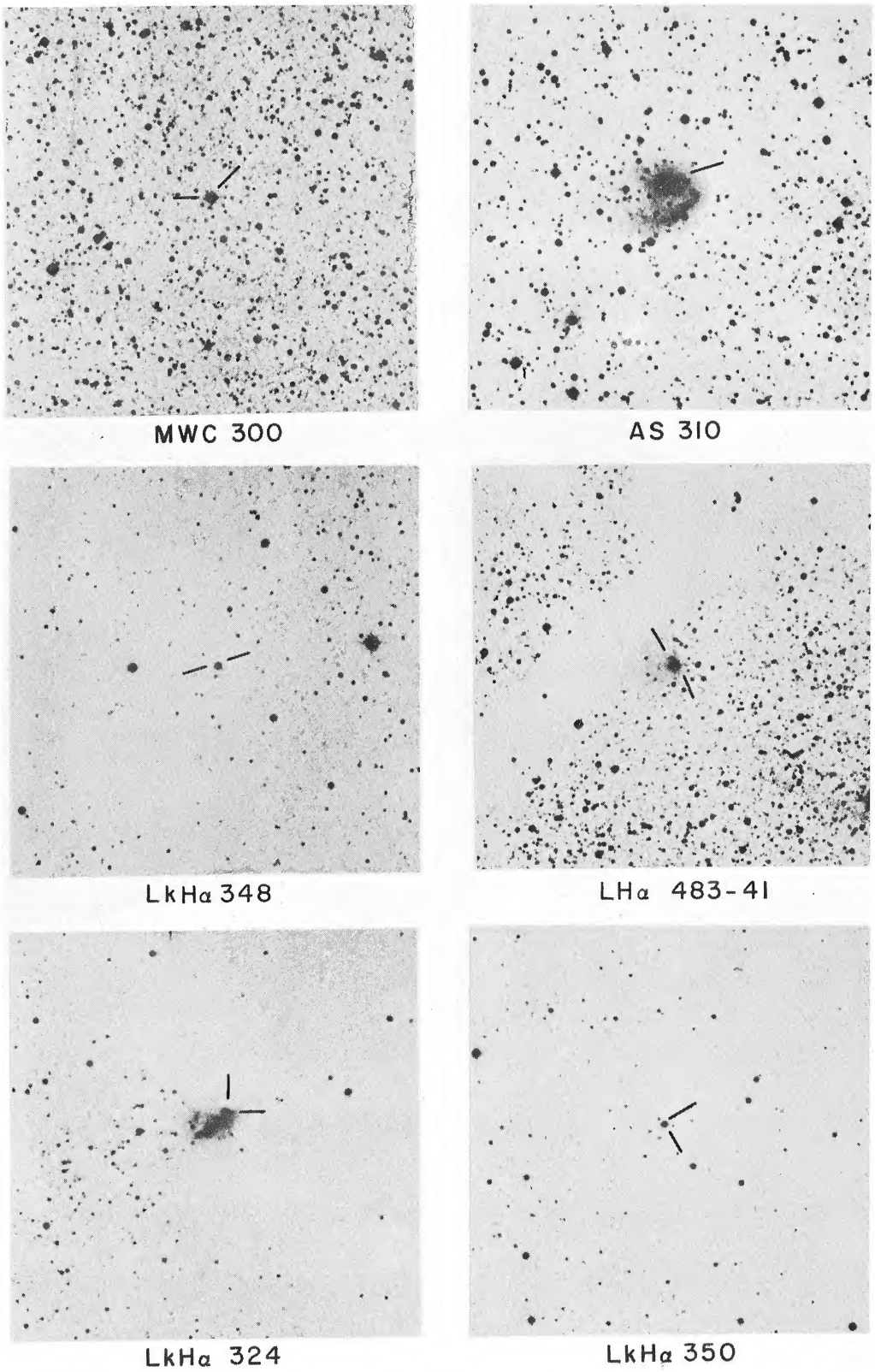

FIG. 7.—Identification charts for MWC 300, AS 310, LkHα 348, 324, 350, LHα 483-41; orientation and scale are as in fig. 1.

HERBIG AND RAO (*see* page 422)

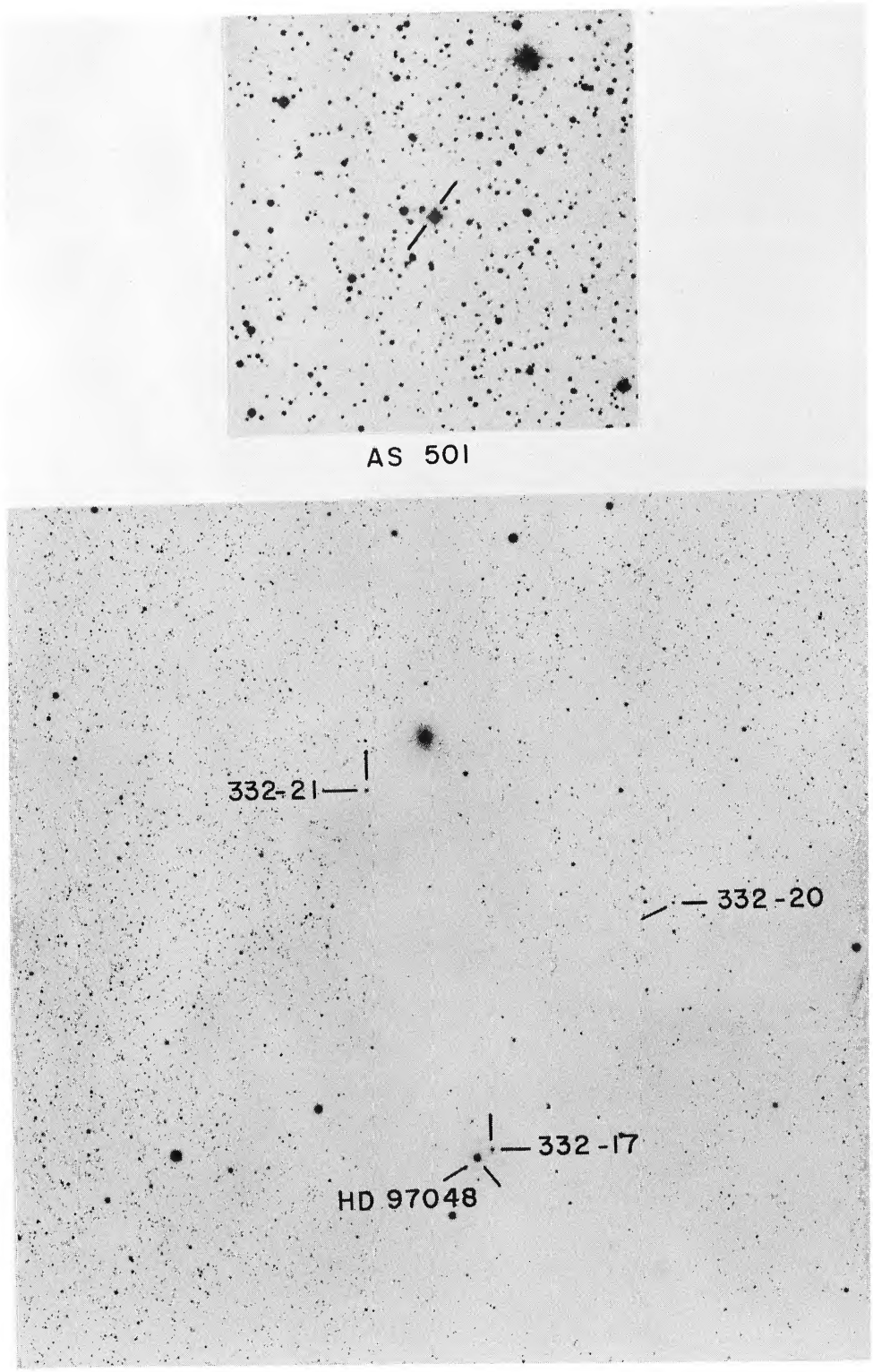

FIG. 8.—The identification chart for AS 501 has the same orientation and scale as in fig. 1. The large photograph covers 2° × 2°, and was obtained (in blue light) by Dr. A. Klemola with the 20-inch (51 cm) Yale-Columbia Astrograph. North is at the top and east to the left.

HERBIG AND RAO (*see* page 422)

such as V410 Tau and VY Tau, have found their way into the present catalog through special circumstances.

A large number of emission-Hα stars, most of which must be Orion population objects, have been found in objective-prism surveys of dark clouds and young associations. Because of their general faintness and sheer numbers, only a minority have been observed with slit spectrographs, and hence it is only that fraction which appears in the present catalog. Lists of the fields that have been thus surveyed, together with other information, are given in a series of reports by Herbig (1962, 1965, 1967), and Sawyer-Hogg (1970).

We wish to acknowledge our indebtedness to numerous colleagues for assistance and unpublished information, and most particularly to G. Haro, K. G. Henize, A. Klemola, and C. A. Wirtanen.

REFERENCES

(other than those following table 1)

Herbig, G. H. 1962, *Trans. I.A.U.*, **11A**, 275.
———. 1965, *ibid.*, **12A**, 395.
———. 1966, *ibid.*, **12B**, 455.
———. 1967, *ibid.*, **13A**, 562.
Sawyer-Hogg, H. B. 1970, *Trans. I.A.U.*, **14A**, 296.