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PHOTOGRAPHIC INFRARED OBSERVATIONS OF PLANETARY NEBULAE

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RESUMEN

Se presentan los resultados de una revisión de 740 nebulosas planetarias en placas espectrales tomadas en el infrarrojo cercano. Confirmamos la eliminación de 48 objetos por ser estrellas tardías encontradas anteriormente por otros autores, y se eliminan por primera vez 20 mas por la misma razón. Adicionalmente se presentan otras 122 supuestas NP que no muestran H-alfa en emisión en placas rojas.

ABSTRACT

We present the results of an inspection of 740 planetary nebulae on spectrum plates taken in the near infrared. We confirm the elimination of 48 objects as late-type stars discovered previously by other authors, and we eliminate 20 more for the first time on the same basis. Additionally, we present another 122 supposed PN which do not show H-alpha emission on our red plates.

Key words: **PLANETARY NEBULAE – STARS-LATE-TYPE**

I. INTRODUCTION

In their Introduction to the *Catalogue of Galactic Planetary Nebulae* (CGPN), Perek and Kohoutek (1967) mentioned the near certainty that, with the acquisition of more detailed observations, a number of objects included in the CGPN would, in fact, be found to be something other than PN. That this is indeed the case was first established by Webster (1966) using intermediate-band photometry, and a number of others have published lists of erroneously-designated PN; the major lists of this type are those of Sanduleak (1976) and of Allen (1974, 1979). The CGPN objects most subject to suspicion are those discovered on yellow-red objective-prism plates where they show H-alpha in emission with little or no continuum and which are unresolved on large-scale photographs. Several kinds of late-type stars may show H-alpha in emission and, if the continuum is weak enough, may have erroneously been included among the PN; examples are the symbiotic stars, long-period variables near maximum light, Me dwarfs, and even faint, *non-emission* M and S stars most of the continuum of which is just below the plate limit but leaving the rather sharp band heads at 6545 or 6474 Å, respectively, to be mistaken for H-alpha emission (see discussion in Coyne and MacConnell 1983). Allen and Fosbury (1975) suggested using objective-prism plates in the near infrared to eliminate late-type stars from the CGPN, and that is the subject of this paper.

II. OBSERVATIONAL MATERIAL

The 61/91/213-cm Curtis Schmidt telescope at CTIO was used several years ago to obtain deep infrared plates of low dispersion along the southern galactic plane. The emulsion used was IN behind an RG 690 filter; most of the plates were ammonia-sensitized and exposed one hour, but on some fields 30-minute, unsensitized plates were all that was available. All exposures were unwidened; the dispersion at the A-band is approximately 3400 A/mm and was produced by reversing the 6- and 4-degree prisms. The limit is about $m_{ir} = 12$ for the deep plates. The sky coverage is approximately 200° through the galactic center to 65° in longitude and ±6° in latitude. Also available were other CTIO Schmidt plates in the yellow-red spectral region used for the survey described in MacConnell (1978). These plates are IIaF+ RG 590 with a dispersion of 420 A/mm at H-alpha and were widened an average of 0.3 mm; their use for this project was primarily that of confirming identification especially in those cases where there is no finding chart available or in crowded fields. Using the red fluxes of several true PN as calibration, the limiting R magnitude for these plates was found to be about 12.5 mag/ circle l′diameter.

III. SURVEY RESULTS

A total of 740 supposed PN which fall in the area covered by the plates was examined on the IN plates.

The PN were taken from the CGPN and from Sanduleak (1976), Weinberger (1977), Kohoutek (1978), and Allen (1979). They were located on the plates by generating for each plate an overlay using a plotter program written by Dr. C.B. Stephenson; I am grateful to Dr. Stephenson and the staff of the Warner and Swasey Observatory for use of the plotter and program. Identification was made with the published finding charts when available and by superposing the F and N plates to look for a red continuum on the N plate in the position of H-alpha emission on the F plate.

Somewhat over 70% of the PN examined show H-alpha emission (often with 6584 Å emission of [N II] if not too diffuse) with little or no continuum on the F and N plates. This is what is expected for true PN where the central star is very faint but which may have a faint Paschen continuum which is detectable on the N plates. Of course, faint emission-line stars of non-late type and emission nebulae of non-PN type cannot be eliminated by examination on these plates. The objects of interest here are the nearly 30% which either i) have a late-type continuum at the PN position or ii) do not show H-alpha emission on the F plates. Tables 1 and 2 present those objects of the first group subdivided into M stars with H-alpha emission and M stars without H-alpha emission on the F plates. The first column gives the name in the nomenclature system of the CGPN, and an asterisk indicates that the star is from one of the post-CGPN lists mentioned in the previous paragraph. The second column gives the number in the discovery paper as taken from the CGPN or more recent listing. The column headed 'Sanduleak' gives the classification of Sanduleak (1976) on blue- and yellow/red-sensitive plates; an 'N' in this and the following columns indicates that the object was searched for but not detected, and a dash '–' means that the object was not reported. The reader is referred to the introduction to Sanduleak's paper for the explanation of the other symbols in this column. The column headed 'Allen' contains the classification of Allen and co-workers: Allen (1974), Allen and Glass (1974), Allen and Fosbury (1975), and Allen (1979, 1982), and that labelled 'Webster' gives the classification of Webster (1966, 1969). The last column of each table gives the classification based on the N plate with the M stars broken into three divi-

TABLE 1

M STARS WITH Hα EMISSION

Design.	Source	α 1950	δ	Sanduleak	Allen	Webster	2° IN plate; comments
266+0°1	Ve 22	08h57.m51	-45°23.'8	fspn	-	-	early M (?)
*	Wr 16-51	09 31.64	-46 21.3	Se?	-	-	S or M sg suspect
280-2°1	He 2-38	09 53.07	-57 04.7	symb?	M symb	PN	late M
302-0°1	He 2-87	12 42.81	-62 44.1	X	M symb	doubtful	prob. early M
305-0°1	He 2-91	13 06.87	-62 55.5	X	pec. Be	doubtful	early M; NSV 6112
305+3°1*	St 2-22	13 11.37	-58 35.9	fspn	-	-	mid M
309+0°2*	Wr16-137	13 46.74	-61 34.0	N	-	-	M sg suspect
*	Wr16-145	14 05.33	-56 50.3	star?	-	-	mid M; prob. V710 Cen (Mira)
325+4°2	He 2-127	15 21.17	-51 39.3	Z	M7 symb	PN	mid M
327-2°1	He 2-142	15 56.00	-55 47.0	VLE	-	doubtful	mid M
332+1°1*	Wr16-202	16 03.25	-49 18.6	fspn	-	-	early M (?)
327-4°1	He 2-147	16 09.93	-56 51.9	-	M8 symb	doubtful	v. late M
*	Wr16-214	16 15.69	-50 30.6	Mep?	-	-	M sg suspect
338+5°2	He 2-156	16 17.65	-42 16.8	Be!	star	doubtful	mid M
342+5°1	He 2-173	16 32.98	-39 45.6	X	M symb	possible	mid M
331-5°1	PC 11	16 33.63	-55 36.4	pec,prob.not	star	not PN	early M (?); HD 149427
339+0°1	He 2-176	16 37.91	-45 07.3	X	M7 symb	doubtful	mid M
339+0°2	He 2-179	16 39.62	-45 55.1	X	star	doubtful	M sg suspect
351+3°1	H 2-2	17 04.07	-34 01.3	Z	M6 symb	-	mid M; V455 Sco=AS 217; symb. (Henize)
352+3°2	H 1-8	17 08.95	-32 34.2	X	M4 symb	-	late M; NSV 8271=AS 221; not PN (Henize)
354+4°2	H 2-5	17 12.08	-31 30.7	X	M symb	-	mid M
355+4°1*	Sa 3-43	17 14.73	-29 58.6	fspn	-	-	early M (?)
356+4°3	Th 3-7	17 17.9	-29 19	N	M symb	-	late M
357+3°3	Th 3-17	17 24.35	-29 00.4	fspn	M3 symb	-	late M
358+3°5	Th 3-18	17 25.28	-28 36.2	ft. Hα only	M2 symb	-	mid M
357+2°3	Th 3-20	17 25.91	-29 41.0	"	symb	-	prob. mid M
358+2°3	Th 3-29	17 29.29	-29 03.0	fspn	VLE	-	mid M
6+7°1	M 1-21	17 31.34	-19 07.4	Z	M2 symb	-	mid M
8+3°2	Th 4-4	17 47.5	-19 52	star?	-	-	mid M
358-2°2	Bl 3-6	17 49.71	-31 18.7	fspn	N	-	late M
359-2°4	M3 -46	17 51.86	-31 11.9	fspn	-	-	mid M
7+1°2	M3 -18	17 54.26	-21 41.2	Z*	M5 symb	-	late M; V2416 Sgr; prob. symb. (Herbig)
2-3°1	Apl-8	18 01.33	-28 21.8	Be!	M0 symb	-	mid M - v. faint
3-4°1	Apl-10	18 07.58	-27 58.5	Z	M5 symb	-	mid M; AS 281; prob. symb. (Herbig)
3-4°6	Apl-11	18 07.86	-28 33.4	X	M symb	-	mid M; AS 282 = V2506 Sgr
2-5°1	He2-370	18 11.37	-29 50.3	Z?	M2 symb	-	early M; AS 293 = V2756 Sgr; prob symb. (Herbig
1-6°1	CnMy 17	18 12.19	-30 32.9	Z?	M3 symb	-	mid M; HDE 319167; unclass. (Herbig)
9-2°1	He2-374	18 12.51	-21 36.4	Z?+M?	M symb	-	mid to late M
7-3°2*	St2-128	18 14.73	-24 03.8	fspn	-	-	" " " M
10-3°1	He2-396	18 20.48	-21 54.7	X	star	-	mid M; V 3811 Sgr
29-2°1	Pe2-16	18 51.52	-04 42.7	ft.Hα only	M5 symb	-	" M
32-3°1	K3-18	18 57.97	-02 16.2	fspn	-	-	" M
49+0°1+	K4-23	19 16.30	+14 54.4	-	symb?	-	late M
48-0°1+	K4-24	19 18.94	+14 00.4	-	M7	-	late M
55-1°2+	K3-44	19 38.68	+18 37.8	-	symb?	-	late M-v. faint
60+0°1+	K4-32	19 40.02	+24 23.1	-	symb?	-	late M at pos. but id. uncertain
57-2°1+	K4-35	19 46.69	+19 59.3	-	symb?	-	" " " " " "
64+0°1+	K3-47	19 48.40	+28 03.8	-	M10e	-	late M; AA Vul (M6.5)
62-1°1+	K4-40	19 52.14	+24 50.0	-	M6	-	mid to late M

+ no IIaF plate available

TABLE 2

M STARS WITHOUT Hα EMISSION

Design.	Source	α 1950	δ	Sanduleak	Allen	2° IN plate; comments
266+2°1	Pe 2-3	09h08m.43	-44°12'.2	doubtful	star	mid M
*	Wr 16-60	09 46.82	-59 18.0	Me?	-	late M; prob.SV Car (Mira)
*	Wr 16-73	10 33.79	-60 23.3	star?	-	2 early Ms nearby; no chart
292-3°1*	St 2-14	11 08.45	-63 26.9	fspn	-	late M nearby; no chart
309+6°1*	Ste 2	13 35.70	-55 51.8	-	-	mid M
310+2°1*	Ste 3	13 50.00	-58 42.9	-	-	mid M
359+2°2	Ap 1-5	17 30.00	-28 19.4	N	-	late M nearby; chart inadequate
359+1°2	Th 3-36	17 36.2	-28 46	N	M	mid M
358-0°1	Bl 3-5	17 39.10	-30 25.6	N	early M	early M; reddened
357-1°1*	Wr 16-298	17 40.90	-32 00.5	N	N	late M nearby; no chart
358-1°2*	Wr 16-312	17 47.05	-30 56.7	fspn	symb	several Ms nearby; no chart
358-3°2	H2 -30	17 52.95	-32 37.2	N	-	several Ms nearby
*	Wr 16-358	18 00.40	-34 53.2	Mep?	-	several M stars nearby
3 - 3°1*	Sa 3-119	18 03.35	-27 44.8	fspn	-	no chart; brt. early M nearby
28-4°2	Th 1-1	18 56.2	-05 26	N	-	brt. mid M; close pair?
43+1°1	K4-13	19 01.82	+10 06.3	-	-	mid M
35-2°1	K4-14	19 02.12	+01 17.8	-	-	mid M
37-2°1	Ap 3-1	19 08.09	+02 44.6	-	star	mid M
37-3°1	K4-18	19 09.63	+02 32.9	-	star	late M

sions: early, middle, and late. A somewhat finer subdivision is probably possible but is not necessary for the purposes of this paper. In this last column 'Henize' and 'Herbig' are the references Henize (1967) and Herbig (1969). The entry 'NSV' for two stars in Table 1 refers to the "New Catalogue of Suspected Variable Stars" (Kholopov 1982). A glance at Tables 1 and 2 is sufficient to show that most of the objects have been eliminated as PN previously; 20 are eliminated here for the first time.

Table 3 presents 122 objects of group ii) defined above. The column headings are the same as for Table 2 with the exception that a column for the angular size has been added. Most of these objects show no detectable continuum on the N plate, and the few exceptions are given in the last column. This table is very similar to Table 3 of Sanduleak (1976) "Undetected objects previously classified as planetary nebulae" and is composed of true PN and other galactic nebulae whose surface brightness is too low to register on our plates of proto-PNs, and of stars with variable H-alpha emission for the unresolved ('st') objects; almost one-half (57) are in common with Table 3 of Sanduleak. There are a further 24 unresolved objects in Table 2 which are suspected of being non-PN for the first time here. However, the following unresolved objects in Table 2 are in conflict with the classification of Sanduleak and/or of Allen: 233 –0 1, 246+ 2 1, 356+ 5 1, 355+ 2 3, 355+ 2 2, 356+ 3 1, 359+ 4 1, 358+ 2 2*, 356+ 1 2, 359+ 2 1, 358+ 1 4*, 356 – 0 1*, 359+ 1 1*, 351 – 4 1, 0 – 2 2, 0 – 2 3, 1 – 2 1, 2 – 11, 2 – 3 6, 4 – 5 2, and 21 – 0 2. Sanduleak has called 15 of these faint, suspected PN, 2 of them confirmed PN, and he finds no H-alpha emission on his plates for 4 of them (those with asterisks above), whereas Allen calls six confirmed PN and one a symbiotic star. The reasons for these differences are presumably a) my plates lack sufficient depth to show the emission, and b) variability of emission (which would imply non-PN nature).

IV. SOME REMARKS ON INDIVIDUAL PN

In what follows we comment on some individual PN which do not fall into the categories mentioned above.

309 – 4 2 = NGC 5315: This has been confirmed as a PN by Sanduleak (1976); the central star is a WC6 which is in Table IX of van der Hucht *et al.* (1981). This type is confirmed on my plates.

320 – 1 1 = Wr 16-172 = Weinberger 141 and Wr 16-173: These are listed as two distinct objects, 73 arcsec apart, in Table XVI of Wray (1966), but there is reason to believe that they refer to one star only which is a Wolf-Rayet of type C. Sanduleak (1976) states that Wr 16-173 is a WR which is identical to LSS 3333 (Stephenson and Sanduleak 1971), but he is unable to detect Wr 16-172. The WR nature of Wr 16-173 is confirmed on my plates, but I do not find a separate star in the position of Wr 16-172. Instead, it is clear from the scale and dispersion of the plates used by Wray that he interpreted the 6750 Å C II and C III emission of the WC star as H-alpha emission of a second, non-existent object.

Wr 16 – 206: Sanduleak calls this WR?, and my plates confirm its nature as a WR star. It is no. 73 in van der Hucht *et al.* (1981).

358 – 2 5: This is listed as a newly discovered PN by Allen (1979). On my F plate there is very weak H-alpha emission, and the N plate shows the weak spectrum of what might be a WC6 star; its infrared spectrum is similar to but fainter than that of 359+ 1 2 above.

358+ 3 3: This PN was not detected by Sanduleak but was confirmed by Allen (1979), and it shows very faint H-alpha emission only on my F plate with nothing detected on the N plate. However, in the same paper Allen lists another PN (Al 2-C in Table IV) at the same position as that of 358+ 3 3, and his finding chart indicates the same object as given in the CGPN finding chart. I conclude that there is only one object at this position and that Al 2-C = 358+ 3 10 is identical with 358+ 3 3.

358 – 1 1: Neither Sanduleak nor Allen detects this

TABLE 3

OBJECTS NOT DETECTED ON F PLATES

Design.	Source	α 1950	δ	Dimensions arcsec	Sanduleak	Comments
216-4°1*	We 1-5	06h39m11	-04°59.7	16x14	-	
208+1°1*	K 4-50	06 44.42	+04 40.6	st	-	
221-4°1	A 17	06 46.20	-09 29.0	30x50	N	
216-0°1	A 18	06 53.73	-02 49.2	80x70	N	
223-2°1	K1-18	07 00.93	-10 30.6	80	N	
219+1°1	K1-9	07 04.79	-05 05.2	50x30	N	
234-6°1	K2-3	07 04.82	-21 57.5	75x55	N	
229-2°1	K1-10	07 10.33	-16 00.6	85x45	N	
225-0°1*	We2-37	07 13.77	-10 47.6	30x27	-	
224+1°1*	We 1-6	07 15.06	-10 05.2	62	-	
242-6°1*	Wr16-2	07 22.25	-28 53.6	st	N	
233-0°1*	Sa3-5	07 26.04	-17 50.6	st?	fspn	
244-4°1*	Wr17-7	07 35.40	-30 00.8	st	-	
235+1°1	V-V 1-7	07 39.02	-18 52.3	180x270	refl.neb.?	
245-3°1*	Wr 16-5	07 39.62	-29 52.2	st	N	
246-4°1*	Wr 16-6	07 40.03	-31 39.3	st	N	
249-5°1	A 23	07 41.45	-34 38.0	54	N	Note 1
248-4°1*	Wr 16-7	07 44.88	-33 18.4	st	N	
243-0°1*	Wr 17-8	07 47.62	-27 28.0	st	-	
236+3°1	K1-12	07 47.98	-19 10.5	38x36	-	
251-3°1*	Wr 17-10	07 54.27	-35 34.1	st	-	
251-1°1*	K1-21	08 02.33	-34 07.5	35x22	-	
246+2°1*	Wr 16-13	08 06.52	-27 32.4	st	fspn	
250+0°1	A 26	08 07.06	-32 31.4	36x32	N	
*	Wr 16-15	08 09.87	-35 12.3	st	nova	CP Pup (nova)
251+0°1*	Wr 17-15	08 12.62	-33 37.7	st	-	
251+1°1*	Wr 17-17	08 13.92	-33 06.6	st	-	
252+4°1	K 1-1	08 29.86	-31 55.9	50x40	N	Note 3
259+0°1	He 2-11	08 35.28	-39 15.9	65	diff.neb?	diff. neb. (Henize 1967)
263+0°1*	K2-15	08 46.85	-42 42.6	large	HII reg?	
266+1 1	Pe 2-1	09 02.40	-44 21.0	st	N	
266+2°2	Pe 2-2	09 07.20	-44 05.0	st	N	Note 3
274-0°1*	ESO	09 29.70	-51 54.0	24x24	-	
277-3°2*	Wr 17-31	09 29.90	-56 04.4	115x105	fspn	RCW 44; no. 2 in van den Bergh, et al. (1973)
279-3°2*	Wr 17-35	09 39.31	-56 44.4	40x30	fspn	no. 3 in van den Bergh, et al. (1973)
280-2°2*	ESO	09 51.35	-57 11.3	large	-	
285-1°1*	Pe 2-5	10 26.74	-58 48.0	st?	N	
289-1°1	He 2-57	10 54.0	-61 11	<25	fspn	
288+0°2*	ESO	10 57.60	-58 45.0	large	-	
292+1°3*	Wr 16-93	11 28.50	-59 00.5	st	N	
294-0°1	He 2-72	11 39.3	-62 12	70	conf.pn	
295+6°1*	Wr 16-102	11 53.75	-55 16.3	st	N	
*	Wr 16-109	12 17.22	-62 38.7	st	diff ?	RCW 88; radio source
300-3°1*	ESO	12 27.53	+65 57.8	18x18	-	
302-5°1*	CeGI 14	12 40.29	-67 56.3	st?	-	
304+5°2*	Wr 16-122	12 57.68	-56 37.5	36x36	N	
307+1°1*	Wr 16-129	13 22.86	-60 59.7	st	N	
308-1°1*	ESO	13 37.55	-64 00.5	large	-	
309+1°1*	BRABCMS 5	13 40.57	-60 34.6	85x60	-	
311+2°2*	SchuWe 2	13 52.3	-59 08	90x45	-	
310-3°1*	Wr 16-143	13 56.56	-65 11.0	st	N	
314-0°1*	Wr 16-155	14 29.28	-60 41.8	st?	N	
317+3°1*	BRABCMS 6	14 37.97	-56 02.3	40x50	N	
*	Wr 16-166	15 03.26	-57 36.8	diff	diff?	
318-3°1*	ESO	15 04.65	-61 32.6	42x42	-	
325+4°3*	Wr 16-179	15 21.07	-51 26.0	st	N	
319-4°1*	ESO	15 23.22	-62 20.7	24x18	-	
330+5°1*	Lo 9	15 38.67	-47 31.2	116x95	-	
328+1°1*	Lo 10	15 45.77	-52 21.4	12	-	
329+1°1*	Wr 16-191	15 47.94	-51 22.5	60	-	ARO 532; radio source
329+1°2*	BRABCMS 7	15 51.08	-51 13.7	105x95	-	
326-3°1*	Wr 16-197	15 55.74	-57 21.4	st	N	
333-0°1*	Wr 16-216	16 17.16	-49 54.4	st?	N	
347+3°1	Vd 1-7	16 54.1	-37 02	st	N	
343-1°1	Vdl-9	17 02.0	-43 52	diff?	N	
356+5°1	Th 3-3	17 14.1	-28 56	st	fspn	
355+3°1	Th 3-5	17 15.8	-30 51	st	N	
354+2°1	Th 3-8	17 19.62	-32 11.3	st	N	Note 2
352+0°2*	Wr 16-269	17 21.18	-34 39.2	diff?	N	
355+2°3	Th 3-11	17 21.20	-31 40.6	st	fspn	Note 2
355+2°2	Th 3-10	17 21.46	-30 49.3	st	fspn	
356+3°1	Th 3-12	17 21.91	-29 42.6	st	fspn	
359+4°1	Th 3-14	17 22.61	-26 55.2	st	fspn	
358+4°2	Th 3-15	17 23.8	-27 41	st	N	
357+2°1	Ap 1-1	17 25.62	-29 03.0	st	N	Allen: N
357+2°2	Ap 1-2	17 25.94	-29 10.8	st?	N	Allen: N
356+1°1	Th 3-21	17 26.8	-30 35	st	N	Allen: N
358+2°2	Th 3-23	17 27.2	-29 08	st	N	Allen: conf. pn
357+2°7	Th 3-24	17 27.6	-30 15	st	N	Allen: N
356+1°2	Th 3-55	17 27.75	-30 58.9	st	fspn	Note 3; Allen:conf. pn
358+2°1	Ap 1-3	17 28.08	-28 22.0	st	N	Allen: N
359+3°4*	Wr 17-88	17 28.96	-27 56.2	st?	N	Note 1; Allen: N
359+3°3	Ap 1-4	17 29.02	-27 02.6	st	N	Note 3
349-3°1	H2-14	17 29.39	-39 50.3	?	-	Note 1
359+2°1	Th 3-30	17 30.56	-28 05.3	st	fspn	Note 3; Allen: K5 symb
359+2°4	Th 3-32	17 32.11	-28 05.1	st	N	Note 3; Allen: Be
349-4°1*	Lo 16	17 32.17	-40 10.1	83	-	
358+1°4	Bl B	17 33.8	-29 38	st	N	Allen: conf. pn
356-0°1	Th 3-34	17 34.48	-32 13.6	st	N	Note 1; Allen:conf. pn
359+1°1	Th 3-35	17 35.5	-28 41	st	N	Allen: conf. pn
354-2°1*	Wr 16-295	17 37.28	-34 29.0	st	N	
*	Wr 17-96	17 38.38	-30 05.2	st	star?	
351-4°1	Wr 16-302	17 41.79	-38 16.2	st	fspn	
5+3°1	Pe 1-9	17 42.58	-23 01.3	?	fspn	Notes 1, 2
1+0°1	Bl 3-2	17 42.84	-26 57.0	st	star?	Allen: N
0-0°2	Bl 3-22	17 43.86	-28 59.9	st	ft.HII reg	RCW 139?; Allen: N
356-2°1	H2-21	17 44.14	-32 49.0	st	N	Allen: N
1-0°2	Bl 3-3	17 46.38	-27 45.4	st	N	Allen: N
1-0°3	Bl 3-19	17 48.65	-27 47.0	st	N	Note 3; Allen: Be
7+2°1	Th 4-8	17 49.70	-21 14.0	st	N	
6+2°4	Pe 2-10	17 50.61	-21 58.1	st	N	
14+6°1	K 2-5	17 51.60	-12 47.7	st?	N	
0-2°2	Bl 3-10	17 52.13	-29 57.2	st	conf. pn	Allen: conf. pn
0-2°3	H2-32	17 53.21	-29 37.7	st	fspn	
1-2°1	H2-34	17 55.30	-28 33.5	st	fspn	
2-1°1	Pe 2-11	17 55.37	-27 36.9	st	fspn	
2-3°6	H2-39	18 04.9	-28 24	st	conf. pn	
18+4°1	M3-52	18 07.67	-10 29.8	st	N	
5-3°2	H2-42	18 09.25	-26 33.8	st	N	
4-5°6	He2-376	18 12.62	-27 54.8	st	fspn	
20-0°1	A 45	18 27.5	-11 39	v.large	N	

TABLE 3 (CONTINUED)

Design.	Source	α 1950	δ	Dimensions arcsec	Sanduleak	Comments
21-0°2	M3-55	18 30.48	-10 17.4	st	fspn	
25-0°1	Pel-14	18 39.44	+06 43.9	st	N	
21-3°1*	Wel-7	18 41.32	-12 16.1	17x17	-	
34+1°1	K4-6	18 45.79	+01 39.7	st	-	Note 3
27-3°1	A 49	18 50.8	-06 33	40x35	N	
25-4°2	I 1295	18 51.89	-08 54.5	110x85	N	
38+2°1	YM 16	18 52.50	+05 58.8	350x265	-	
42+1°1	K4-11	19 01.17	+08 40.0	st	-	wk. cont., late type? Allen: symb?
34-2°1	K4-15	19 02.35	+00 15.9	st	-	Note 1
42-1°1	K4-20	19 11.10	+07 22.9	st	-	
50-1°1	K4-28	19 27.99	+14 41.1	st	-	

1: identity uncertain

2: CGPN chart correct?

3: faint, non-late continuum

PN, but there is perhaps very faint H-alpha emission on my F plate with nothing detected on the N plate. However, similar to the case above, Allen lists a new PN (A1 2-L = 358 – 1 3) at the same position as that of 358 – 1 1, and his finding chart indicates the same object as given in the CGPN chart. This object is also Wr 17-98, and we conclude that there is one faint PN at this position.

358 – 2 1: Sanduleak did not detect this PN, but Allen confirms it as a PN. However, the CGPN chart indicates the wrong object and, unfortunately, the discovery paper contains no chart. At the position marked on the CGPN chart, I detect only a stellar continuum on the F and N plates, but there is a faint H-alpha emission object located 12 mm left and 6 mm above the lower right-hand corner of their chart; this object coincides with A1 2-P of Allen, and its position is identical with that in the CGPN. I conclude that there is only one PN in this field and that it is marked correctly on Allen's chart.

1 – 1 4: This PN is not in the CGPN but is given this designation in Weinberger (1977). It was discovered by Sanduleak and called a faint, suspected PN by him, and Allen confirms it as a PN. There is no published finding chart. My F plate shows faint, diffuse H-alpha emission at this position, and the N plate shows several non-late continua. Allen claims to find a new PN (A1 2-S = 1 –1 5) whose position is the same as that of 1–1 4, but I conclude that there is only one PN at this position as identified in Allen's finding chart.

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