A CATALOGUE OF GALACTIC SUPERNOVA REMNANTS

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At this conference results have been presented on a number of individual galactic supernova remnants, but many others remain unstudied. It therefore seemed worthwhile to present a catalogue of all presently known SNR's in the Galaxy. Objects of which the true nature is not yet well established have, as far as possible, been omitted. Remnants which have been detected at optical wavelengths are marked by an asterisk in Table 1. Data on the optical identifications are from van den Bergh (1978), supplemented by recent results of Zealey, Elliot and Malin (1979), Reich, Kallas and Steube (1979), Downes, Pauls and Salter (1980), van den Bergh (1981) and Reich and Braunsfurth (1981). Also marked in the table are supernova remnants that have been detected in x-rays. These x-ray identifications are from miscellaneous sources.

Of the 135 supernova remnants in the catalogue 40 have been seen optically and 33 have been observed in x-rays. The distribution of supernova remnants in galactic longitude is shown in Fig. 1. Neither the optical nor the x-ray remnants exhibit the sharp peak towards the galactic centre that is shown by the radio supernova remnants. The reason for this is, of course, that optical remnants can only be seen if they are relatively nearby and suffer low absorption. Furthermore many distant x-ray remnants are too faint to be observed with currently available instrumentation.

J. Danziger and P. Gorenstein (eds.), Supernova Remnants and their X-Ray Emission, 597–604.

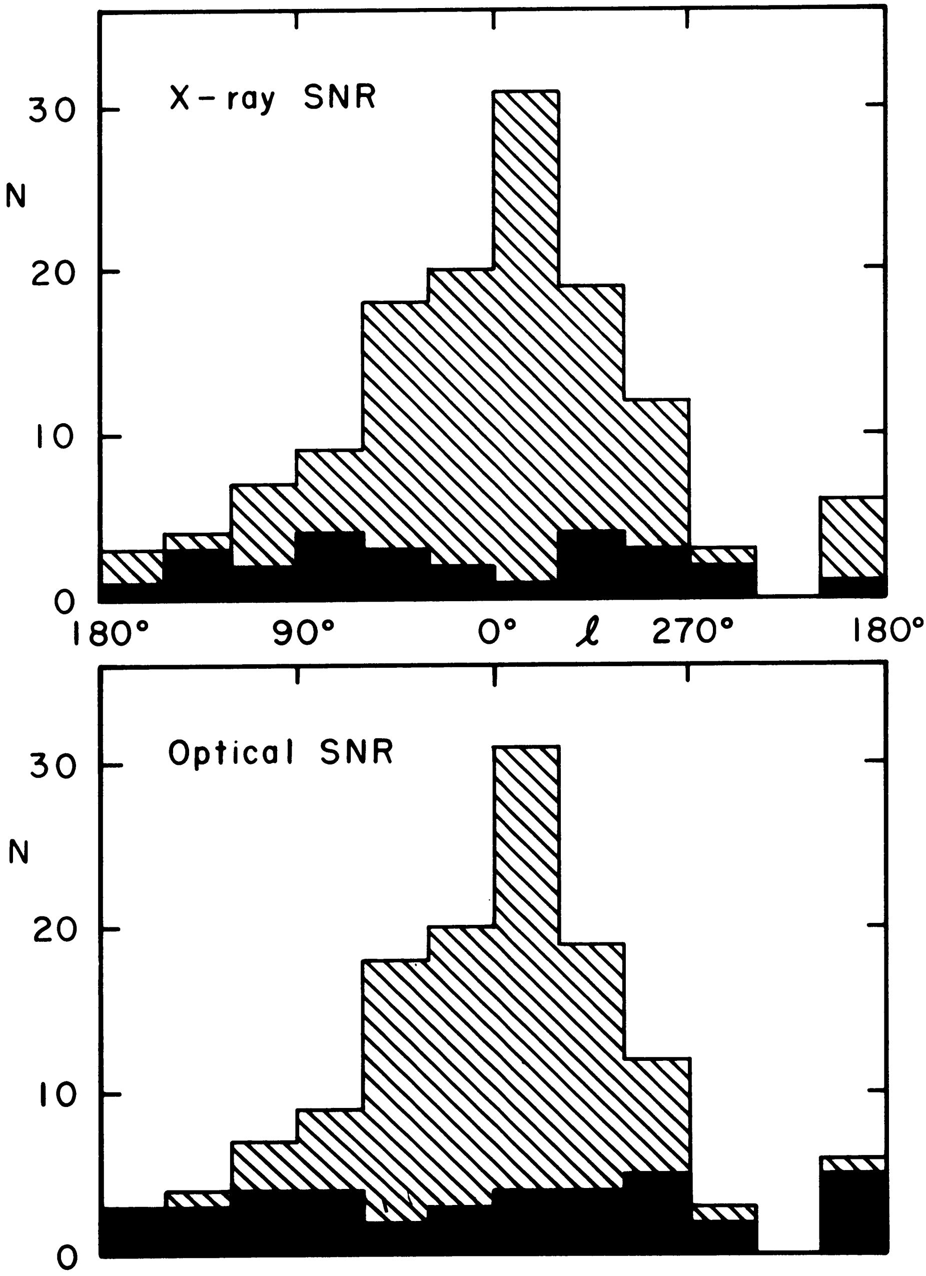

Fig. 1. Distribution in galactic longitude of radio supernova remnants compared with that of x-ray remnants (upper panel) and optically visible remnants (lower panel).

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TABLE 1

CATALOGUE OF GALACTIC SUPERNOVA REMNANTS

Designation	Name	α (1950)	δ	Optical Remnant	X-ray Source
G 0.0 − 0.0	Sgr A (East)	$17^h42^m37^s$	−28° 59'	−	−
G 4.5 + 6.8	Kepler SNR	17 27 41	−21 27	*	*
G 5.3 − 1.1	Milne 56	17 58 30	−24 50	*	−
G 6.4 − 0.1	W 28	17 57 36	−23 25	*	*
G 7.7 − 3.7		18 14 15	−24 05	−	−
G 10.0 − 0.3		18 05 42	−20 25	−	−
G 11.2 − 0.3		18 08 31	−19 26	−	−
G 11.4 − 0.0		18 07 37	−19 04	−	−
G 12.0 − 0.1		18 09 16	−18 38	−	−
G 15.9 + 0.2		18 15 50	−15 02	−	−
G 18.8 + 0.3	Kes 67	18 21 00	−12 25	−	−
G 21.5 + 0.9		18 30 47	−10 36	−	*
G 21.8 − 0.6	Kes 69	18 30 05	−10 09	−	−
G 22.7 − 0.2		18 30 35	−09 13	−	−
G 23.3 − 0.3	W41	18 31 40	−08 51	−	−
G 23.6 + 0.3		18 30 25	−08 14	−	−
G 24.7 + 0.6		18 31 30	−07 08	−	−
G 24.7 − 0.6		18 35 30	−07 36	−	−
G 27.4 + 0.0	Kes 73	18 38 36	−04 59	−	−
G 29.7 − 0.2	Kes 75	18 43 48	−03 02	−	*
G 31.9 + 0.0	3C391 = Kes 77	18 46 47	−00 59	−	
G 32.0 − 4.9	3C396.1	19 04 30	−03 06	−	−
G 33.2 − 0.6		18 54 34	−00 06	−	−
G 33.7 + 0.0	Kes 79	18 50 04	+00 36	−	−
G 34.6 − 0.5	W44	18 53 35	+01 17	−	*
G 35.6 − 0.4		18 55 18	+02 05	−	−
G 39.2 − 0.3	3C396	19 01 35	+05 22	−	−
G 39.7 − 2.0	W50	19 09 15	+05 12	*	*
G 40.5 − 0.5		19 04 38	+06 25	−	−
G 41.1 − 0.3	3C397	19 05 08	+07 04	−	−
G 41.9 − 4.1	PKS 1920 + 06	19 20 00	+06 00	−	−
G 43.3 − 0.2	W49B	19 08 43	+09 01	−	*
G 46.8 − 0.3		19 15 45	+12 04	−	−
G 47.6 + 6.1	CTB63	18 54 00	+15 45	−	−
G 49.2 − 0.5	W51	19 21 30	+13 57	−	−
G 53.6 − 2.2	3C400.2	19 36 30	+17 08	*	−
G 54.4 − 0.3		19 31 00	+18 55	−	−
G 55.7 + 3.4		19 19 40	+21 37	−	−
G 65.3 + 5.7	S91 + S94	19 31 00	+31 10	*	*
G 65.7 + 1.2		19 50 05	+29 17	−	−
G 68.8 + 2.6	CTB 80	19 51 03	+32 45	*	*

TABLE 1 (continued)

Designation	Name	α(1950)	δ	Optical Remnant	X-ray Source
G 74.3 − 8.5	Cygnus Loop	$20^h49^m30^s$	+30° 45'	*	*
G 74.9 + 1.2	CTB 87	20 14 05	+37 04	−	*
G 78.2 + 2.1		20 19 25	+40 18	*	*
G 82.2 + 5.3	W63	20 17 23	+45 24	−	−
G 84.2 − 0.8		20 51 35	+43 15	−	−
G 89.0 + 4.7	HB21	20 43 20	+50 29	−	−
G 93.3 + 6.9		20 50 55	+55 10	−	−
G 93.6 − 0.2	CTB 104A	21 26 50	+50 33	−	−
G 94.0 + 1.0	3C434.1	21 23 30	+51 40	−	−
G109.2 − 1.0	CTB 109	22 59 51	+58 39	*	*
G111.7 − 2.1	Cas A	23 21 10	+58 32	*	*
G114.3 + 0.3		23 24 45	+61 38	−	−
G116.5 + 1.1		23 51 17	+62 58	−	−
G116.9 + 0.2	CTB 1	23 56 45	+62 10	*	−
G119.5 + 9.8	CTA 1	00 04 18	+72 04	*	*
G120.1 + 1.4	Tycho SNR	00 22 33	+63 52	*	*
G126.2 + 1.6		01 18 16	+64 01	*	−
G127.1 + 0.5		01 27 00	+62 58	−	−
G130.7 + 3.1	3C58	02 01 53	+64 35	*	*
G132.7 + 1.3	HB 3	02 14 00	+62 18	*	*
G160.4 + 2.8	HB 9	04 57 00	+46 36	*	*
G166.1 + 4.4	OA 184	05 15 38	+41 46	*	−
G166.3 + 2.5	VRO 42.05.01	05 23 21	+43 00	*	−
G180.3 − 1.7	S147	05 36 45	+27 44	*	−
G184.6 − 5.8	Crab	05 31 31	+21 59	*	*
G189.0 + 3.0	IC 443	06 14 06	+22 37	*	*
G193.3 − 1.5	PKS 0607 + 17	06 05 50	+16 40	−	−
G205.6 − 0.1	Monoceros	06 35 00	+06 30	*	−
G206.9 + 2.3	PKS 0646 + 06	06 46 00	+06 30	*	−
G260.4 − 3.4	Pup A	08 20 30	−42 50	*	*
G261.9 + 5.5	PKS 0902 − 38	09 02 22	−38 29	−	−
G263.4 − 3.0	Vela XYZ	08 32 00	−45 00	*	*
G284.2 − 1.7	MSH 10 53	10 16 06	−58 37	*	−
G287.8 − 0.5		10 45 00	−59 23	−	−
G290.1 − 0.8	MSH 11 − 61A	11 00 52	−60 37	*	−
G291.0 − 0.1	MSH 11 − 62	11 09 49	−60 22	−	−
G292.0 + 1.8	MSH 11 − 54	11 22 22	−58 59	*	*
G293.8 + 0.6		11 33 05	−60 36	−	−
G296.1 − 0.7		11 48 15	−62 27	*	*
G296.5 + 10.0	PKS 1209 − 52	12 07 00	−52 07	*	*
G296.8 − 0.3		11 55 48	−62 18	−	−
G298.5 − 0.3		12 09 58	−62 36	−	−
G298.6 + 0.0		12 11 18	−62 18	−	−

TABLE 1 (continued)

Designation	Name	α(1950)δ		Optical Remnant	X-ray Source
G299.0 + 0.2		$12^h15^m05^s$	-62° 08'	-	-
G302.3 + 0.7		12 42 54	-61 51	-	-
G304.6 + 0.1	Kes 17	13 02 35	-62 26	-	-
G308.7 + 0.0		13 38 05	-62 01	-	-
G309.2 - 0.6		13 43 00	-62 36	-	-
G309.8 + 0.0		13 47 03	-61 50	-	-
G311.5 + 0.0		14 01 58	-61 43	-	-
G315.4 - 0.3		14 32 00	-60 22	-	*
G315.4 - 2.3	RCW 86	14 39 08	-62 15	*	-
G316.3 - 0.0	MSH 14 - 57	14 37 43	-59 47	-	-
G320.3 - 1.2	MSH 15 - 52	15 10 00	-58 57	*	*
G321.9 - 0.3		15 16 45	-57 23	-	-
G322.3 - 1.2	Kes 24	15 23 05	-57 56	-	-
G323.5 + 0.1		15 25 05	-56 12	-	-
G326.3 - 1.8	MSH 15 - 56	15 48 50	-56 00	*	-
G327.1 - 1.1		15 50 35	-54 58	-	*
G327.4 - 0.4	Kes 27	15 44 54	-53 39	-	*
G327.6 + 14.5	SN 1006	14 59 30	-41 45	*	*
G328.0 + 0.3		15 49 33	-53 19	-	-
G328.4 + 0.2	MSH 15 - 57	15 51 45	-53 08	-	-
G330.0 + 15.0	Lupus Loop	15 09 00	-39 00	-	*
G330.2 + 1.0		15 57 20	-51 25	-	-
G332.0 + 0.2		16 09 23	-50 49	-	-
G332.4 + 0.1	MSH 16 - 51	16 11 38	-50 32	-	-
G332.4 - 0.4	RCW 103	16 13 54	-50 56	*	*
G335.2 + 0.1		16 23 50	-48 36	-	-
G336.7 + 0.5		16 28 30	-47 13	-	-
G337.0 - 0.1	CTB 33	16 32 08	-47 30	-	-
G337.2 - 0.7		16 35 45	-47 44	-	-
G337.3 + 1.0	Kes 40	16 29 05	-46 29	-	-
G337.8 - 0.1	Kes 41	16 35 15	-46 53	-	-
G338.2 + 0.4		16 34 40	-46 16	*	-
G338.3 - 0.1		16 37 25	-46 27	-	-
G338.5 + 0.1		16 37 20	-46 12	-	-
G339.2 - 0.4		16 43 00	-44 34	*	-
G340.4 + 0.4		16 43 00	-44 34	-	-
G340.6 + 0.3		16 44 05	-44 30	-	-
G341.9 - 0.3	MSH 16 - 48	16 51 20	-43 54	-	-
G342.1 + 0.1	Kes 45	16 50 11	-43 30	*	-
G343.2 - 5.6		17 20 00	-46 00	-	-
G344.7 - 0.1		17 00 15	-41 37	-	-
G346.6 - 0.2		17 06 45	-40 06	-	-
G348.5 + 0.1	CTB 37A	17 11 12	-38 26	-	-

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TABLE 1 (continued)

Designation	Name	α(1950)δ		Optical Remnant	X-ray Source
G348.7 + 0.3	CTB 37B	$17^h10^m45^s$	-38° 06'	-	-
G349.7 + 0.2		17 14 37	-37 23	-	-
G350.0 - 1.8		17 23 45	-38 20	-	-
G350.1 - 0.3		17 17 40	-37 24	-	-
G351.2 + 0.1		17 19 00	-36 09	-	-
G352.7 - 0.1		17 24 20	-35 05	-	-
G355.9 - 2.5		17 42 30	-33 43	-	-
G357.7 - 0.1	MSH 17 - 39	17 37 04	-30 56	-	-

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DISCUSSION

DENNEFELD: Has the most recent analysis of proper motions provided a probable date of explosion different from the one you derived in 1976?

VAN DEN BERGH: In Kamper and van den Bergh (1976) we obtained an explosion date $T_0 = 1657 \pm 3$, compared to $T_0 = 1658 \pm 3$ derived in the present paper.

KIRSHNER: Do you have any comment on the possible observation by Flamsteed?

VAN DEN BERGH: Our present observations show a deceleration coefficient $k = 0.0010 \pm 0.0019$ (m.e.) yr^{-1}, in which it was assumed that $a = -kv$. With this value we cannot yet exclude the possibility that Flamsteed observed Cas A.

JONES: Is it not reasonable to assume that the apparent lack of deceleration of the fast knots is due to their just having enountered the reverse shock? The knots would then be encountering previously shocked ejecta which would be expected to be hydrogen-poor; and the knots would not have had time to decelerate appreciably. In response to a previous question about deceleration you said there wasn't any which "wasn't surprising because one sees no hydrogen emission from the gas that would decelerate the knots".

VAN DEN BERGH: The best data on deceleration of knots comes from the fast-moving knots in the "jet". These lie well outside the main SNR shell so that they would be exposed to hydrogen-rich interstellar matter, yet no hydrogen contamination is seen in their spectra.

BEGELMAN: What is your best guess for the total mass of material that is radiating at optical wavelengths at any one time in the fast-moving knots?

VAN DEN BERGH: The total mass of the optical knots is only a fraction of a solar mass. An estimate of this mass is given in Peimbert and van den Bergh (1971).

TENORIO-TAGLE: Do you have any further information on the jets?

VAN DEN BERGH: I have the impression that the knots in the jet are on average fainter now than they were 25 years ago. Photometric observations are, however, required to confirm this.

TUFFS: Two points: (1) I should like to point out that the small cluster of QSF's is outside the plateau edge of the radio remnant which is very well defined in the S.S.W. Maybe we have to reconsider our conventional interpretation that the plateau edge represents a shock front. (2) I have a new, accurate proper motion for the radio knot Bell 38 which is coincident with the QSF "Feature A". This proper motion is μ_x =

+0.01 ± 0.01 arc sec per year, μ_y = -0.11 ± 0.01 arc sec per year. This is significantly different from the optical proper motion of this feature, and I would like to suggest that this discrepancy is due to the fact that although the radio knot is < 1" in size, the optical feature is clearly resolved. Thus we are measuring different emission regions, and there seems no reason why the proper motions should agree, bearing in mind the interpretation of the QSF's as pre-existing circumstellar material. The random component of the motion of this radio knot cannot be due to morphological changes within the radio knot.

VAN DEN BERGH: (1) Yes, (2) Maybe.

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