

tronomers and the beginning of the investigations to understand what these objects were using spectrometers and photography.

### A Brief History of Deep-Sky Object Catalogs

Starting in the late 18<sup>th</sup> century and through the 19<sup>th</sup> astronomers endeavored to catalog the objects in the sky and start to try and make sense of them with classifications. Many, if not most astronomers spent their nights discovering non-stellar objects and measuring their positions as best they could. This began with Charles Messier of France and was done in earnest by William Hershel. The eventual result was the *New General Catalog* (NGC) which was compiled by Dreyer. Dreyer compiled all the observations of numerous astronomers, including the

Herschels in the single catalog. The NGC actually contains objects observed by the ancient Greeks. As might be expected the catalog was obsolete the moment it was published in 1888. Astronomers kept finding more objects because new telescopes were being built or objects were previously overlooked and astrophotography was making in-roads into observatories, including Chamberlin. These new objects were added by Dreyer to a list called the Index Catalog or IC list. The NGC list consists of 7840 nonstellar objects. The first Index Catalog, or IC I, was published in 1895 and contained 1520 objects. A second Index Catalog (IC II) was published in 1908 containing an additional 3866 objects. Clearly astronomers had been busy after the NGC was published, since they added almost 5400 new objects in less than 20 years!

During the 20<sup>th</sup> century some astronomers recognized many errors in the NGC catalog and some confusion of objects in the IC I and IC II. Attempts were made to clean-up the catalogs. The confusion has continued for a hundred years. The most recent study of re-compiling the NGC and IC lists is being carried out under a project called, the "NGC/IC Project" headed by Caltech astronomer, Dr. Harold Corwin with researchers in the US, Germany, and France (<http://www.ngcic.org/>). This new project and in particular the work by Steinicke of the NCG/IC Project, allows us to study the history of the astronomers that contributed to the NGC and IC catalogs. Their work allows us a new appreciation of the work that was done and to credit the observatories and astronomers with the antique telescopes.

### List of Nebula Discovered at Chamberlin Observatory, University Park, Colorado

\*using the title of Dr. Howe's published list of discoveries in the Minutes and Notes of the Royal Astronomical Society No. 58, 1898.

IC	CON	Rec	t (20 00)	Dec	l	Bmag	Vmag	SB	a	b	PA	Type	PGC	ID1	ID2	ID3	Howe	Rem arks
1557	CET	35	34.4-2	52	33	15.8	15	12.4	0.5	0.2	135	S	2130	MCG -40	NPM1G -03.0033		Howe	
1564	PSC	39	5.2 6	1	16	14.8	14	13.1	1	0.5	83	SBbc	2342	UGC 399	MCG 1-2-44	ZWG 409.53	Howe	
1567	PSC	39	26.2 6	44	3	14.4	13.4	13.5	1	1	E	E	2372	IC 1565	UGC 410	MCG 1-2-47	Howe	ZWG 409.57, DRCG 2-31
1592	PSC	53	27.1 5	46	11	15.1	14.2	13.7	1	0.7	165	S?	3139	UGC 543	ZWG 410.15		Howe	
1598	PSC	54	41.7 5	46	27	15	14.1	13.2	1	0.5	2	Sa	3217	UGC 553	MCG 1-3-7	MK 962	Howe	ZWG 410.16, NPM1G +05.0035
1602	CET	55	51.8 -9	59	7	15.3	14.3	13.4	0.7	0.6	174	E	3306	MCG -52	NPM1G -10.0031		Howe	
1607	CET	58	48.9 0	65	14	14.5	13.6	13.2	0.9	0.9	S?	S?	3512	UGC 611	MCG 0-3-47	ZWG 384.51	Howe	
1693	CET	24	2.3 -1	39	25	16.2	15.2	12.6	0.5	0.2	162	SO	7940	DRG 6 7-20	ZH 32		Howe	12W 6 = * superimposed
1696	CET	24	52.4 -1	37	2	14.6	13.6	13.3	0.9	0.8	10	E	5231	UGC 973	MCG 0-4-122	ZWG 385.113	Howe	DRG 6 7-18
1705	CET	26	44.8 -3	30	6	14.5	13.5	13.1	0.9	0.7	3	E	5377	MCG -53			Howe	
1741	CET	51	56.7 -16	47	15	15.1	14.2	12.8	0.8	0.4	171	SO-a	6900	MCG -31	NPM1G -17.0066		Howe	
1745	CET	52	59 -16	40	9	16.2	15.4	13.2	0.5	0.3	130	S	174317	NPM1G -16.0071			Howe	
1758	CET	56	52.5 -16	32	30	16	15	12.6	0.6	0.2	45	SO	170024				Howe	
1818	CET	34	7.1 -11	2	25	15.4	14.4	13	0.5	0.5	E	E	970700	NPM1G -11.0094			Howe	
1839	ARI	44	43 15	14	22	15.1	14.3	13.4	1	0.5	97	Sbc	10394	UGC 2220	MCG 2-8-1	ZWG 440.2	Howe	
1853	ERI	48	4.3 -13	59	36	15	14.2	13.2	1.1	0.4	91	Sb	10595	MCG -16	IRAS02457-1410		Howe	
1866	ERI	54	52.9 -15	39	10	15	14	13.8	1.1	0.7	90	E-SO	10992	MCG -85	NPM1G -15.0153		Howe	
1880	ERI	6	28.4 -9	43	50	14	13	13.7	1.6	1.1	30	E-SO	11656	MCG -59	NPM1G -09.0144		Howe	
1892	ERI	8	27.2 -23	3	20	13.8	12.9	13.6	1.9	1.1	10	SB/P	11750	ESO 480-36	MCG -4-8-30	UGCA 55	Howe	ARP 332, VV 260, VV 337
1897	ERI	10	45.9 -10	47	44	14.9	14.1	12.4	0.5	0.5	S?	S?	11866	MCG -20	NPM1G -10.0125	IRAS03083-1059	Howe	
1975	ERI	39	3.5 -15	29	59	15.6	14.8	12	0.3	0.3	P	P	3080474	NPM1G -15.0197			Howe	
2045	ERI	14	36 -13	10	30	14.8	13.8	13.5	1	0.7	125	E	14722	MCG -40	NPM1G -13.0170		Howe	
2063	ERI	22	40.2 -15	39	40	15	14.2	12.2	0.6	0.3	0	S	908152	MCG -20			Howe	
2064	ERI	23	26.7 -15	41	7	15.8	14.8	12.9	0.4	0.4	E	E	1462226	NPM1G -15.0228			Howe	
2080	ERI	31	52.1 -5	45	25	15.8	14.8	12.9	0.5	0.4	SO	SO	15426	IRA S04294-0051			Howe	
2132	LEP	32	28.6 -13	55	36	14.5	13.6	13.6	1.5	0.8	177	Sa	17415	MCG -19	IRAS05301-1357		Howe	
2151	LEP	62	36.8 -17	47	15	14.2	13.4	13.6	1.5	0.9	99	SBbc	18040	ESO 555-8	MCG -3-15-24	IRAS05504-1747	Howe	
2163	CMA	16	28 -21	22	35	12.4	11.7	12.9	3	1.2	98	Sbc	18751	ESO 566-9	MCG -4-15-21	UGCA 125	Howe	
2311	PUP	18	45.9 -25	22	12	12.5	11.5	12.1	1.3	1.3	E	E	23304	ESO 495-2	MCG -4-20-7	CGMW 2-3182	Howe	
2375	PUP	26	19.6 -13	18	11	14.5	13.7	13.3	1.9	0.4	83	Sb	23672	MCG -38	IRAS08240-1308		Howe	
2377	PUP	26	26 -13	18	25	14.5	13.6	12.1	0.7	0.4	36	SB0-a	23681	MCG -39			Howe	
2379	PUP	26	27.7 -13	17	36	14.6	13.7	13	1	0.6	144	Sa	23683	MCG -40			Howe	
2403	HYA	46	9.3 -15	21	24	15.5	14.7	12.7	0.6	0.3	120	S	90089	IRA S08438-1510			Howe	
2437	HYA	5	33.1 -19	12	26	13.9	12.9	13.7	1.8	1.1	123	E-SO	25518	ESO 564-21	MCG -3-23-20	NPM1G -19.0276	Howe	
2482	HYA	26	59.2 -12	6	30	12.5	11.5	13	2.3	1.6	145	E	26796	MCG -51	NPM1G -11.0235		Howe	
2593	HYA	36	15.9 -12	43	31	15.8	15	12.5	0.4	0.3	90	S	155439	NPM1G -12.0327			Howe	
2623	CRT	3	50.9 -20	5	35	14.4	13.4	12.5	0.8	0.5	70	E	33418	ESO 569-33	MCG -3-28-34	NPM1G -19.0356	Howe	
2668	CRT	15	32.1 -14	10	17	14.6	13.7	13.6	1.3	0.8	140	Sa	34333	MCG -46	IRAS11130-1353		Howe	
3799	CRV	48	59.5 -14	23	55	14.4	13.7	13.2	2.4	0.3	30	Scd	43313	MCG -46	FGC 1502		Howe	
3819	CRV	50	16.3 -14	22	48	16.4	15.4	12.4	0.3	0.2	90	E	925330	NPM1G -14.0474			Howe	
3822	CRV	50	22.6 -14	19	21	15.8	15.1	12.6	1.2	0.1	33	Sc	43443	MCG -54			Howe	
3824	CRV	50	30.5 -14	25	31	15.6	14.6	12.6	0.5	0.3	0	E	170210	NPM1G -14.0475			Howe	
3825	CRV	50	37.1 -14	31	11	16	15.2	12	0.3	0.2	5	Sc					Howe	
3827	CRV	50	51.8 -14	29	30	14.1	13.4	12.6	0.8	0.7	60	Sc	43487	IC 3838	MCG -2-33-21	IRAS12482-1413	Howe	
4329	CRV	49	19.3 -30	18	36	13.9	13	12.3	1.4	0.4	45	SO-a	49051	ESO 445-50	MCG -5-33-21	IRAS13464-3003	Howe	
4401	VIR	19	25.1 -4	29	24	15.1	14.2	13.7	1.4	0.5	21	SBa	51173	MCG -52			Howe	
4708	DRA	13	46.1 61	9	25	15.4	14.4	11.6	0.3	0.3	C	C	61605	ZWG 301.24			Howe	
4772	LYR	39	56.4 40	1	37	14.9	13.9	11.4	0.4	0.3	0	C	62217	MCG 7-38-14	ZWG 228.20	NPM1G +39.049	Howe	
5088	CAP	9	26.7 -22	52	41	14.5	13.6	13.8	1.2	1.1	SO-a	SO-a	66219	ESO 530-10	NPM1G -23.0021	AM 2106-230	Howe	
5122	CAP	39	45.8 -22	24	22	15.8	14.8	12.8	0.6	0.3	45	SO	67123	ESO 531-14	AM 2137-225	NPM1G -22.0347	Howe	
5124	CAP	39	55.2 -22	25	36	16.4	15.5	11.9	0.4	0.1	129	SO-a	67127	ESO 531-16	AM 2137-225		Howe	
5178	AQR	12	33.2 -22	57	16	14.7	13.8	13.5	1.1	0.8	88	SB+c?	68287	ESO 532-31	MCG -4-52-22		Howe	
5278	AQR	0	15.9 -8	10	43	15.8	15.2	14.3	1.2	0.4	85	Sd	70232	MCG -73			Howe	
5310	AQR	20	47.7 -22	8	56	15.8	14.8	13.4	0.5	0.5	E	E	71146	ESO 605-1	NPM1G -22.0398		Howe	
5319	PEG	24	48.9 13	59	49	16.1	15.1	12.6	0.3	0.3	E	E	1446384	NPM1G +13.0568			Howe	
5334	AQR	34	36.4 -4	32	2	14.1	13.3	13.2	1.8	0.6	127	Sb	71784	MCG -69			Howe	
5341	PEG	38	26.7 26	59	8	15.7	14.7	12.2	0.3	0.3	E-SO	E-SO	71981	MCG 4-65-35	ZWG 476.87	NPM1G +26.0537	Howe	DRG 6 37-58
5342	PEG	38	38.7 27	0	43	15.6	14.6	12.1	0.3	0.3	E	E	71984	MCG 4-65-39	ZWG 476.94	NPM1G +26.0539	Howe	DRG 6 37-55
5345	AQR	39	32.3 -22	24	48	14.5	13.7	12.8	0.8	0.6	153	Sbc	72040	ESO 536-16	MCG -4-55-20	IRAS23569-2241	Howe	
5349	SCL	46	22.8 -28	0	18	15.2	14.2	12.2	0.9	0.2	20	SO	72358	ESO 471-11	MCG -5-56-5	DRCG 54-80	Howe	
5385	PSC	6	23 0	4	36						14.0567	NF					Howe	

