PUBLICATIONS OF
THE DAVID DUNLAP OBSERVATORY
UNIVERSITY OF TORONTO

VOLUME 1 NUMBER 20

A BIBLIOGRAPHY OF INDIVIDUAL GLOBULAR CLUSTERS

BY

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1947
THE UNIVERSITY OF TORONTO PRESS
TORONTO, CANADA

PLATE XXXII

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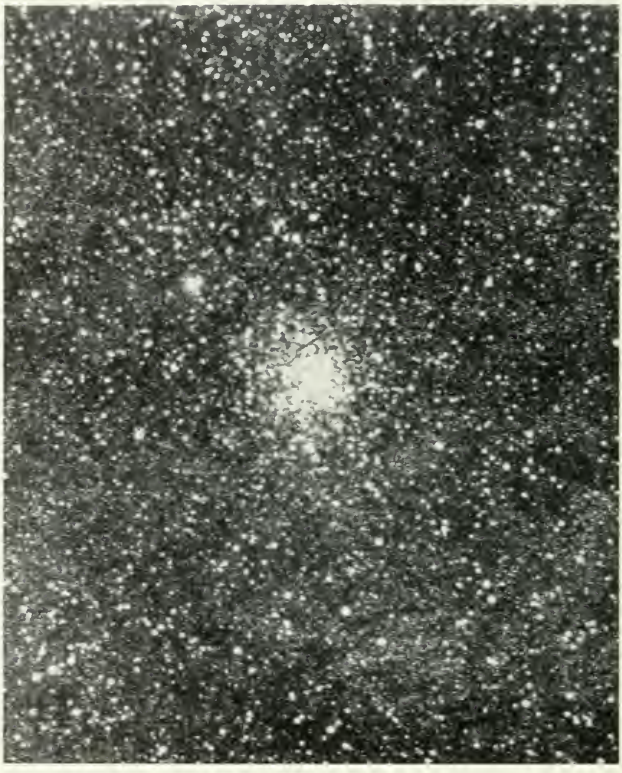

W

The cluster NGC 6838, Messier 71, long thought to be a galactic cluster, but now considered in the globular category. The photograph is from a plate with one hour exposure by D.K. Norris with the 74-inch David Dunlap reflector, June 21, 1947. Scale, 1 mm = 14′.7.

A BIBLIOGRAPHY OF INDIVIDUAL GLOBULAR CLUSTERS

By Helen B. Sawyer

(With Plate XXXII)

Advertisement.—Whoever attempts the enlargement of the bounds of knowledge in any particular branch of science, in justice to himself, the public, and previous laborers in the same field, should make himself familiar with all that has been previously published on the subject. But information of this kind is so widely dispersed through the journals and transactions of learned societies of all parts of the civilized world, that index catalogues or references to authorities are of the utmost importance to the investigator.—*Joseph Henry, Secretary, Smithsonian Institute*, Washington, 1877.

I. Purpose and Development of Work

In this bibliography an attempt is made to list under the cluster concerned, all research papers containing information on individual globular clusters. The purpose is to enable any astronomer to find out what work has been done on a specific cluster, thus saving time and avoiding duplication of research. Globular clusters, with a large range in linear diameter, absolute magnitude, and numbers of variable stars are being treated more and more as individual systems.

Only clusters thought to belong directly to our own galaxy are included, and only clusters considered globular at present. A few minutes of studying the bibliography will show the type of information available on the cluster. A few hours of reading the original sources indicated in this work will give the reader all the published facts about the object. For only a few clusters, notably Messier 13 in Hercules and Messier 3 in Canes Venatici, is the literature voluminous and unwieldy.

For over twenty years I have maintained a card catalogue of references to globular cluster literature. This catalogue is a necessary complement to the 2000 globular cluster photographs which have now been accumulated at the David Dunlap Observatory on about one-half of the known globular clusters. One result of this catalogue was the publication by the writer in 1939 of *A Catalogue of 1116 Variable Stars in Globular Clusters* (Dunlap Publication,

no. 4). This paper gives a list of references to variable stars in these clusters. (A second edition of this catalogue is in preparation at present). But at the time this work was published it was felt that a complete bibliography of individual clusters would be of great use to an astronomer concerned with globular clusters. It is good for an astronomer working on variables in a cluster, or radial velocities, or space reddening, to be able to find out speedily what other data about the cluster are known.

In the globular cluster literature of the present century little attention is paid to the earlier references, that is, those up until the later nineteenth century. References to globular clusters of a century ago are buried beneath an enormous amount of literature on all kinds of nebulous objects, and in nebular catalogues. There is a confusion of numbering too, before the New General Catalogue, so that each cluster may be referred to by any one of several numbers.

As far as possible, the writer has read over this entire mass of literature, back to the time of Hevelius and Halley, and segregated all pertinent material from it. Over 800 individual references in about 125 different serial publications have been listed and surveyed. The bibliography is essentially complete up to the disruption of communications in Canada at the beginning of the last war. Most literature published up to the end of 1938 was safely received and has been included, together with as much as possible of the literature of the past eight years. Disruption of foreign communications occurred in Canada in 1939; some material was received through the United States during the ensuing two years.

The substance of earlier bibliographies has been incorporated in the present work, as well as many references not in any existing bibliography. Of course the Astronomischer Jahresbericht has been used for many years as a basis for references. For earlier bibliographies some use has been made of the list of papers on nebulae by Knobel, Monthly Notices, vol. 36, p. 377, 1876. This list does not give much clue to the character of many of the references, but the subject was rediscussed by Holden, who published a very comprehensive reference work, with comments, in Smithsonian Miscellaneous Collections, no. 311, 1877 (from which our foreword is taken). A more recent bibliography was published by Bigourdan in 1917, in Paris Annales, Observations 1907. A comprehensive biblio-

graphy was published by Shapley in *Star Clusters*, 1930, and supplemented in 1935 by Miss Mohr with later references in Harvard Circular, no. 402.

Reference should here be made to several of the longer works on clusters which cannot be adequately dealt with in this bibliography because of the extensive material they contain, and which any serious worker in the field of globular clusters should consult. Readers are certainly familiar with the volume *Star Clusters* by Shapley, 1930, and his article *Stellar Clusters* in the Handbuch der Astrophysik, vol. V, 2, 1933, where most of the important information on clusters is gathered into a concise form. In ten Bruggencate's monograph *Sternhaufen*, 1927, emphasis is placed particularly on the theoretical side of clusters. In the final volume of the extensive series *Observations de nébuleuses et d'amas stellaires* by Bigourdan, in Paris Annales, Observations, several hundred pages are devoted to the development of the study of nebulae and clusters. For the objects in Messier's catalogue readers should consult the long series by Flammarion in the Bulletin de la Société Astronomique de France, 1917-21, where a complete historical account of each cluster is given. Messier's original descriptions are reprinted, along with Flammarion's drawings and photographs of the objects. Early twentieth century catalogues of globular clusters are those of Bailey, 1908 and 1918, Hinks 1911, Shapley 1918 and 1919, Charlier 1918, and Lundmark 1920.

For convenience and the avoidance of repetition of references, the bibliography has been divided into two sections. All papers referring to individual globular clusters are listed in the first section. The important papers dealing principally with one cluster are listed by date, author and title directly under that cluster. These comprise the main body of the work in Section A. But many papers, such as the catalogues mentioned above, list attributes of several or many clusters. Reference to these works is made in Section A by date and author under each cluster concerned. Section B is a complete list of these references in their entirety, arranged chronologically.

Of the more than 800 references studied for this bibliography, about 700 were available in the scientific libraries around Toronto, which include those of the David Dunlap Observatory and Royal Astronomical Society of Canada, the University of Toronto, the

Royal Canadian Institute, and the Meteorological Service of Canada. About fifty more papers were obtained from other Canadian libraries, those of the Dominion Observatory, Ottawa, McGill University, and the University of Alberta. Fifty others were borrowed from United States libraries, chiefly from the Harvard Observatory and the University of Michigan. I am indebted to librarians Miss Slater and Miss Wales of the University of Toronto, Miss Hanley of the Harvard Observatory, and Mr. Gauthier of the Dominion Observatory for aid in obtaining some of the references.

I am especially indebted to Miss Edna Fuller, Miss Ruth Northcott and my husband, Dr. F. S. Hogg, all of the David Dunlap Observatory, for assistance at various stages of the work; to Mrs. R. E. Williamson for preparation of the final manuscript for the printer; and above all to Dr. Harlow Shapley for his inspiration for my two decades of work on star clusters.

I began this work with the realization that it was beyond the limits of human frailty to make it one hundred per cent complete and correct. I have striven to make the bibliography as correct and complete as circumstances would permit, and will welcome any corrections or additions of important papers which may be included in later lists.

II. A Catalogue of Globular Star Clusters

For the convenience of the reader, certain of the material indicated in the bibliography has been assimilated into a table of information on globular clusters. Table I lists all clusters at present on the globular list for our own galaxy. The clusters are arranged by NGC number, which does not always correspond to right ascension for 1950. Successive columns give the NGC number, the right ascension and declination for 1950, and the constellation in which the cluster is located as determined from the I.A.U. Atlas. The galactic longitude and latitude have been computed for 1900 on the basis of the Harvard Pole $12^h\,40^m$, $+\,28°$, with the help of Ohlsson's tables, Lund Annals, no. 3, 1932. The concentration class for most clusters is that assigned by Shapley and Sawyer in 1927. The angular diameters are partly by Mowbray, 1946, and partly by Shapley and Sayer, 1935. The integrated photographic magnitude is, when possible, by Christie, 1940; or by Sawyer and Shapley, 1927, reduced to the same system. The spectral type and radial velocity in

kilometres a second are by Mayall, 1946; the number of variables according to Sawyer, 1939, with some more recent adjustments. The magnitudes of bright stars and variables are from the most recent reliable published observations to be found under each cluster. The color excess is by Stebbins and Whitford, 1936. The modulus from variables in the next to the last column of the table is uncorrected for absorption, and the reader may apply the correction which seems to him best to fit the case. Many of the blanks in the table will be filled during the coming months from studies of the David Dunlap plates.

(*a*) It is interesting to note from this catalogue the distribution of globular clusters by constellation. The 99 globular clusters are found in only 37 of the constellations. Somewhat surprisingly, the largest number of globular clusters is found in the constellation of Ophiuchus, which has 20. The second largest total, 17, is as one would expect, in Sagittarius; Scorpio is third with 8. No other constellation has more than 3. Six constellations have 3 each, 7 have 2, and 22 have one. The distribution by constellation is as follows:

Ophiuchus 20, Sagittarius 17, Scorpio 8, 3 each in Coma Berenices, Lupus, Hercules, Ara, Pavo, and Aquarius; 2 each in Toucan, Musca, Hydra, Centaurus, Apus, Serpens, Delphinus; one cluster each in Sculptor, Horologium, Mensa, Columba, Lepus, Puppis, Lynx, Carina, Vela, Canes Venatici, Bootes, Virgo, Libra, Norma, Corona Austrina, Telescopium, Scutum, Aquila, Lyra, Sagitta, Pegasus, Capricornus.

The heaviest concentration of known globular clusters is definitely in the region of Ophiuchus-Sagittarius, rather than in the more commonly mentioned one of Sagittarius-Scorpio.

(*b*) A feature of the main section of the bibliography is that for each cluster I have tried to indicate the date of the first recorded observation. This is the first observation of the object in the sky; I have not attempted to indicate when the object was first correctly assigned to the globular category. Even at the present day the proper classification of some objects is still doubtful.

It is interesting then to note the astronomers who first observed these objects in the sky. The man who leads all others in the discovery of globular clusters is Sir William Herschel, who found exactly one-third of the clusters accepted as globular today.

TABLE I. Catalogue of 99 Globular Clusters

NGC	R.A. 1950	Dec.	Const.	l 1900	b	Conc.	Diam.	Mag.	Sp.	R.V.	Vars.	25 B.S.	Mod.	Var. Col.E.
	h m	° ′		°	°		′							
104	00 21.9	−72 21	Tucn	272	−45	III	56	4.5	—	—	8	13.44	—	—
288	00 50.2	−26 52	Scul	154	−88	X	12.4	8.96	—	—	2	14.80	—	0.00
362	01 00.6	−71 07	Tucn	268	−47	III	17.7	8.0	—	—	11	14.12	15.5	—
1261	03 10.9	−55 25	Horo	236	−52	II	4.0	9.5	—	—	—	—	—	—
1841	04 52.5	−84 05	Mens	264	−30	—	2.4	12.2	—	—	—	—	—	—
1851	05 12.4	−40 05	Colm	211	−34	II	11.5	7.72	dF5	+291	3	—	—	—
1904	05 22.2	−24 34	Leps	195	−28	V	7.8	8.39	dF3	+231	5	15.29	—	—
2298	06 47.2	−35 57	Pupp	213	−15	VI	4.2	10.48	F8	+ 64	6	—	—	—
2419	07 34.8	+39 00	Lync	148	+27	II	6.2	11.51	F5	+ 14	36	17.84	19.21	−.15
2808	09 10.9	−64 39	Cari	250	−11	I	18.8	7 8	—	—	4	14.9	—	—
3201	10 15.5	−46 09	Velr	215	+09	X	29.3	8.8	—	—	76	—	15.08	—
1147	12 07.6	+18 49	Coma	224	+78	VI:	4.1	11.01	A5	+191	4	16.58	16.52	+.02
1372	12 23.0	−72 24	Musc	268	−10	XII	19.8	9.1	—	—	8	—	—	—
1590	12 36.8	−26 29	Hyda	268	+37	X	9.8	9.12	A6	−116	28	14.80	15.90	—
1833	12 56.0	−70 36	Musc	271	−08	VIII	12.7	8.5	—	—	11	—	15.65	—
5024	13 10.5	+18 26	Coma	306	+79	V	14.4	8.68	A8n	−112	42	15.07	16.45	.00
5053	13 13.9	+17 57	Coma	308	+78	XI	8.9	10.9	—	—	10	15.6	16.2	—
5139	13 23.8	−47 03	Cent	277	+15	VIII	65.4	5.1	—	—	168	—	14.65	—
5272	13 39.9	+28 38	C Ven	07	+77	VI	18.6	7.21	dF2	−150	186	14.23	15.43	+.05
5286	13 43.0	−51 07	Cent	280	+10	V	13.6	9.5	—	—	0	—	—	—
5466	14 03.2	+28 46	Boot	08	+72	XII	9.2	10.39	—	—	18	15.72	16.16	+.05
5634	14 27.0	−05 45	Virg	311	+48	IV	3.7	10.8	F4	− 63	7	16.32	16.91	+.02
5694	14 36.7	−26 19	Hyda	299	+29	VII	2.2	10.87	A9	−187	0	16.79	—	+.02
4499	14 52.7	−82 02	Apus	275	−21	XI	6.2	11.6	—	—	—	—	—	—
5824	15 00.9	−32 53	Lupi	300	+21	I	3.7	10.08	dF5	− 58	—	—	—	+.05

REMARKS—This table does not include the globular clusters now considered to be associated with the Magellanic Clouds, Fornax Cluster, or other external galaxies.
NGC 6235 and 6535 are dropped from this catalogue, though information on them is included in Section A.

ADDED IN PROOF—R. J. Trumpler considers NGC 2682 [M 67] to be a globular cluster.

TABLE I—*Continued*

NGC	R.A. 1950 h m	Dec. ° ′	Const.	l 1900 °	b °	Conc.	Diam. ′	Mag.	Sp.	R.V.	Vars.	25 B.S.	Mod. Var.	Col. E.
5897	15 14.5	−20 50	Libr	311	+29	XI	8.7	9.61	—	—	—	15.15	—	+.05
5904	15 16.0	+02 16	Serp	332	+46	V	19.9	7.04	dF7	+ 45	97	13.97	15.03	+.05
5927	15 24.4	−50 29	Lupi	294	+04	VIII	12.0	9.7	—	—	—	—	—	—
5946	15 31.8	−50 30	Norm	295	+03	IX	2.6	11.0	—	—	—	—	—	—
5986	15 42.8	−37 37	Lupi	305	+13	VII	6.0	8.72	G0	+ 2	1	—	—	+.10
6093	16 14.1	−22 52	Scor	321	+18	II	5.1	8.39	dF4	+ 18	7	14.88	16.05	+.10
6101	16 20.0	−72 06	Apus	285	−17	X	14.6	10.2	—	—	—	—	—	—
6121	16 20.6	−26 24	Scor	319	+15	IX	22.8	7.41	—	—	43	13.11	13.97	+.22
6139	16 24.3	−38 44	Scor	310	+06	II	2.6	10.4	—	—	—	—	—	+.39
6144	16 24.2	−25 56	Scor	320	+14	XI	6.2	10.85	—	—	—	15.76	—	+.15
6171	16 29.7	−12 57	Ophi	331	+22	X	7.8	10.10	G2	−147	24	15.5	16.01	+.44
6205	16 39.9	+36 33	Herc	26	+40	V	23.2	6.78	dF2	−228	15	13.75	14.8	+.08
6218	16 44.6	−01 52	Ophi	343	+25	IX	12.2	7.95	F7	+ 36	1	13.97	15.0	+.13
6229	16 45.6	+47 37	Herc	40	+39	IV:	3.8	10.26	dF6	−150	21	16.18	17.53	+.07
6254	16 54.5	−04 02	Ophi	343	+22	VII	12.2	7.64	G0	+ 73	2	14.06	15.0	+.19
6266	16 58.1	−30 03	Ophi	321	+06	IV	6.3	8.16	dF6	− 81	26	15.87	16.40	+.27
6273	16 59.5	−26 11	Ophi	325	+08	VIII	5.3	8.29	dF2	+102	4	14.80	—	+.20
6284	17 01.5	−24 41	Ophi	326	+09	IX:	2.7	10.61	G1	+ 22	6	16.06	—	+.13
6287	17 02.1	−22 38	Ophi	328	+10	VII	2.7	11.24	—	—	3	16.08	—	+.34
6293	17 07.1	−26 30	Ophi	325	+07	IV	3.5	9.38	A9	− 73	5	15.39	—	+.12
6304	17 11.4	−29 24	Ophi	324	+04	VI	3.8	9.82	G3	− 98	—	—	—	+.44
6316	17 13.4	−28 05	Ophi	325	+04	III	2.4	10.10	—	—	—	—	—	+.39
6325	17 15.0	−23 42	Ophi	329	+07	IV:	1.6	12.66	—	—	—	—	—	+.40
6333	17 16.2	−18 28	Ophi	333	+09	VIII	5.5	8.92	F1	+224	1	15.61	—	+.24
6341	17 15.6	+43 12	Herc	35	+34	IV	12.2	7.30	A5n	−118	16	—	—	−.02

TABLE I—*Continued*

NGC	R.A. 1950	Dec.	Const.	l 1900	b	Conc.	Diam.	Mag.	Sp.	R.V.	Vars.	25 B.S.	Mod.	Var. Col.	E.
	h m	° ′		°	°		′								
6342	17 18.2	−19 32	Ophi	333	+08	IV	1.3	11.35	—	—	—	—	—		+.44
6352	17 21.6	−48 26	Arae	309	−08	XI:	8.9	9.1	—	—	—	—	—		—
6355	17 20.9	−26 19	Ophi	327	+04	—	1:	9.6	—	—	—	—	—		—
6356	17 20.7	−17 46	Ophi	334	+09	II	3.5	9.68	gG2	+ 31	—	17.16	—		+.32
6362	17 26.6	−67 01	Arae	293	−18	X	8.5	8.3	—	—	17	—	—		—
6366	17 25.1	−05 02	Ophi	346	+15	XI	5.8	12.1	—	—	2	15.78	16.2		+.55
6388	17 32.6	−44 43	Scor	313	−08	III	6.8	8.7	—	—	—	—	—		—
6397	17 36.8	−53 39	Arae	306	−13	IX	19:	7.3	—	—	2	12.61	—		—
6401	17 35.6	−23 53	Ophi	331	+03	—	1	—	—	—	—	—	—		—
6402	17 35.0	−03 13	Ophi	349	+13	VIII	6.7	9.44	G0	−131	72	15.44	16.85		+.32
6426	17 42.4	+03 12	Ophi	356	+15	IX	2.2	12.33	—	—	10	—	—		+.20
—	17 45.7	−60 45	Pavo	300	−17	—	0.5	15.1	—	—	—	—	—		—
6440	17 45.9	−20 21	Sgtr	335	+02	V	1.7	12.05	G3	−133	—	—	—		+.76
6441	17 46.8	−37 02	Scor	321	−06	III	3.0	8.93	G4	− 70	—	—	—		+.37
6453	17 48.0	−34 37	Scor	323	−05	IV	3.6:	11.4	—	—	—	—	—		+.30
6496	17 55.5	−44 15	Scor	316	−11	XII	12.7	10.3	—	—	—	—	—		—
6517	17 59.1	−08 57	Ophi	347	+05	IV	1.0	12.90	—	—	—	—	—		+.64
6522	18 00.4	−30 02	Sgtr	329	−05	VI	1.5	10.40	—	—	—	—	—		+.37
6528	18 01.6	−30 04	Sgtr	328	−06	V	1.2	11.04	—	—	—	—	—		+.50
6539	18 02.1	−07 35	Serp	349	+05	X	3.5	12.39	—	—	1	—	—		+.82
6541	18 04.4	−43 44	Cor A	317	−12	III	23 2	7.9	—	—	1	13 35	—		—
6544	18 04.3	−25 01	Sgtr	334	−04	—	1:	—	G1	− 12	—	—	—		—
6553	18 06.3	−25 56	Sgtr	333	−04	XI	3 2	10.20	—	—	0	—	—		+.74
6569	18 10.4	−31 50	Sgtr	328	−08	VIII	2.2	10.63	—	—	—	—	—		+.39
6584	18 14.6	−52 14	Tele	310	−18	VIII	9.7	9.4	—	—	0	—	—		—

TABLE I—*Continued*

NGC	R.A. 1950	Dec.	Const.	l 1900	b	Conc.	Diam.	Mag.	Sp.	R.V.	Vars.	25 B.S.	Mod. Var.	Col. E.
	h m	° ′		°	°		′							
6624	18 20.5	−30 23	Sgtr	330	−09	VI	2.7	9.53	G4	+ 69	—	—	—	+.25
6626	18 21.5	−24 54	Sgtr	335	−07	IV	15.0	8.48	G0	+ 1	9	14.87	—	+.29
6637	18 28.1	−32 23	Sgtr	329	−12	V	3.8	8.94	G5	+ 95	—	—	—	+.34
6638	18 27.9	−25 32	Sgtr	336	−09	VI	2.2	10.24	G3	− 14	—	16.22	—	+.24
6652	18 32.5	−33 02	Sgtr	329	−13	VI:	2.3	9.86	G3	−124	—	—	—	+.22
6656	18 33.3	−23 58	Sgtr	337	−09	VII	17.0	6.48	F6	−148	25	12.93	14.17	+.19
6681	18 40.0	−32 21	Sgtr	330	−14	V	4.1	8.95	G2	+198	—	—	—	+.07
6684	18 44.1	−65 14	Pavo	297	−25	—	—	—	—	—	—	—	—	—
6712	18 50.3	−08 47	Scut	353	−06	IX:	4.2	9.98	G4	−131	4	16.10	—	+.32
6715	18 52.0	−30 32	Sgtr	333	−16	III	5.5	8.74	F7	+107	—	—	—	+.15
6723	18 56.2	−36 42	Sgtr	328	−19	VII	7.5	7.75	G3	− 3	19	14.20	15.33	+.03
6752	19 06.4	−60 04	Pavo	304	−27	VI	41.9	7.2	—	—	1	13.26	—	—
6760	19 08.6	+00 57	Aql	04	−05	IX:	2.4	11.25	—	—	2	—	—	+.64
6779	19 14.6	+30 05	Lyra	30	+08	X	5.0	9.55	F5	−154	11	15.31	16.3	+.07
6809	19 36.9	−31 03	Sgtr	337	−25	XI	14.8	7.08	—	—	2	13.58	—	−.02
6838	19 51.5	+18 39	Sge	24	−06	—	6.1	—	gG5	− 80	—	—	—	—
6864	20 03.2	−22 04	Sgtr	348	−27	I	4.6	9.50	G1	−222	11	17.06	—	+.15
6934	20 31.7	+07 14	Dlph	20	−20	VIII	6.2	10.01	F9	−360	51	15.78	16.67	+.07
6981	20 50.7	−12 44	Aqr	03	−34	IX	5.1	10.24	G2	−255	31	15.86	16.80	+.07
7006	20 59.1	+16 00	Dlph	32	−20	I	2.2	11.45	F1	−348	20	17.1	18.6	+.02
7078	21 27.6	+11 57	Peg	33	−28	IV	12.3	7.33	dF0	−114	66	14.31	15.63	+.00
7089	21 30.9	−01 03	Aqr	22	−37	II	11.7	7.30	dF0	− 3	17	14.61	15.7	+.03
7099	21 37.5	−23 25	Cap	355	−48	V	8.9	8.58	A7n	−164	3	14.63	—	−.05
7492	23 05.7	−15 54	Aqr	22	−65	XII	4.3	12.33	—	—	9	16.82	—	− 20

He found 33, while his nearest competitor, James Dunlop, who worked in the southern hemisphere, found 21. Messier found 14, Méchain and John Herschel 5 each, Lacaille 4, and no other observer found more than two. Table II lists the globular clusters by NGC number according to their discoverer.

TABLE II

DISCOVERERS OF GLOBULAR CLUSTERS

WILLIAM HERSCHEL: 288, 2419, 4147, 5053, 5466, 5634, 5694, 5897, 6144, 6229, 6284, 6287, 6293, 6304, 6316, 6342, 6355, 6356, 6401, 6426, 6440, 6517, 6522, 6528, 6544, 6553, 6569, 6624, 6638, 6712, 6934, 7006, 7492.

JAMES DUNLOP: 362, 1261, 1851, 2298, 2808, 3201, 4372, 5286, 5927, 5986, 6101, 6139, 6352, 6362, 6388, 6441, 6496, 6584, 6652, 6723, 6752.

CHARLES MESSIER: 4590, 5272, 6218, 6254, 6266, 6273, 6333, 6402, 6626, 6637, 6681, 6715, 6779, 7099.

PIERRE MÉCHAIN: 1904, 6093, 6171, 6864, 6981.

JOHN HERSCHEL: 1841, 5946, 6325, 6453, 6684.

ABBÉ DE LACAILLE: 104, 4833, 6397, 6809.

HALLEY, 5139, 6205; HEVELIUS OR IHLE, 6656; KIRCH, 5904; MARALDI, 7078, 7089; DE CHÉSEAUX, 6121; KÖHLER, 6838; BODE, 5024, 6341; CACCIATORE, 6541; BRORSON, 6539; HIND, 6760; WINNECKE, 6366; BARNARD, 5824; STEWART, IC 4499; SHAPLEY, one unnumbered.

I have made every effort to assign the discovery to the correct observer, but will be pleased to receive any corrections. A paper by the writer discussing the development of nebular catalogues in the eighteenth century, with special reference to Messier and Méchain, and the publication of a long overlooked letter by the latter, is to be found in Dunlap Comm., no. 14, 1947.

(*c*) It is interesting to compare the totals of variables as listed in this catalogue of globular clusters with those in the catalogue of variables in David Dunlap Publication no. 4, 1939. The total of 1116 variables known at that time has grown to 1294 now, an increase of 178 variables. But whereas in 1939, 60 globulars had been searched for variables, the number now has increased to only 62. Actually three more clusters have been examined, but one on the earlier list, NGC 6535, has now been dropped from the globular category. Since the globular clusters now being searched for variables are increasingly difficult objects, further progress will be slow. The writer has in her possession data on other clusters which will be published when completed.

III. Instructions for Use of Bibliography

All references to individual globular clusters are listed in Section A where the clusters are arranged by NGC number, with Messier's number indicated in parenthesis. The Right Ascension and Declination are for 1950; the galactic coordinates are for 1900.

Under each cluster are listed by date, author and title all principal papers on that cluster. Many important references to individual clusters are lost in works on another cluster or subject; every attempt has been made to include these stray bits of information. Numerous papers intercompare clusters, and these are listed under each cluster so compared.

Papers which involve several or more clusters are usually listed under each cluster concerned by date and author only. The complete reference list for these items will be found in Section B. There was no iron-clad rule as to whether papers mentioning a few clusters should be listed by title under each cluster, but in general Section B is a list of catalogues and works providing observational data on many clusters. Since the New General Catalogue number by Dreyer, 1888, is used for each cluster, there is no additional reference to this catalogue by individual cluster.

The first date and name reference under NGC 104, 47 Tucanae, is 1755 Lacaille. If the reader will turn to Section B, he can read the title of the paper as well as the printed source. For some of the early catalogues, notably those of Lacaille, the Herschels and Dunlop, the catalogue number of the object follows the name of the author. When photographs or drawings accompany the paper this is usually, but not always, indicated. Certain clusters, such as Messier 13, have had too many photographs published for all to be included, but I have attempted to indicate sources where photographs of the less well-known clusters can be found.

Many of the longer and more important references in Section B have been indexed with lettered sub-divisions. Early in the work it appeared that to list a cluster as being included in a given reference was not always enough. For example, a reference may contain one list of clusters which the writer of the paper considered globular, and another list considered as non-globular. Simply to index both lists in the same way would be quite misleading. For these papers, then, I have made as many lettered subdivisions as seemed necessary to serve as an information guide to the material contained

therein. For some of the longer works this has been a rather difficult procedure. For Shapley's *Star Clusters* and his article *Stellar Clusters* in the Handbuch der Astrophysik, which provide such a comprehensive summary of information, only material not previously published by the same author has been indexed.

In cases where the same author has published more than one paper in a given year, these are differentiated by an italicized Roman numeral following the year. A long series of papers forming an obvious whole, such as that of Bigourdan, has been indexed under the first year of the series with a dash following the date, i.e., 1891— Bigourdan. Certain volumes which appeared in several editions such as Webb, *Celestial Objects for Common Telescopes*, have been indexed under the date of the edition which I used, with a cross reference to the date of the first edition. The titles of Shapley's two series, *Studies of Color and Magnitude in Stellar Clusters*, in Mt. Wilson Communications, and *Studies of Magnitudes in Star Clusters*, in Mt. Wilson Contributions, have been condensed simply to *Studies*. Readers will find convenient access to the papers of three famous astronomers in the collected volumes of their work, as follows: *The Scientific Papers of Sir William Herschel*, 2 vols., London, 1912; *The Scientific Papers of William Parsons, Third Earl of Rosce,* London, 1926; *The Scientific Papers of Sir William Huggins*, London, 1909.

The abbreviations employed have been selected to combine minimum printing space with maximum ease of identification for the reader. Certain abbreviations, such as M.N., A.N., etc., are so well-known in astronomical literature as to cause no confusion. Abbreviations for other periodicals have been constructed in accordance with principles from the I.A.U. Transactions, vol. III, pp. 19-39, 1928, in conjunction with the Union List of Serials. The latter list has been used extensively in locating the whereabouts on this continent of many of the rarer volumes.

In general the word Observatory has been omitted from the abbreviation, and taken as understood. Where publications are from academies or societies, however, this is always indicated. For most publications the abbreviation has been chosen for ease of locating the reference in the Union List; that is, the place of publication appears first, followed by the series, such as bulletin, circular, etc. We might note that the publication Comptes Rendus is to be

found under Académie des Sciences, Paris; and Connaissance des Temps under France, Bureau des Longitudes.

The numbers of the catalogue of Messier and Méchain were assigned in order of discovery. Since these numbers are in frequent use to-day, the following table is given for convenience in locating these clusters by NGC numbers in this bibliography.

IDENTIFICATION OF MESSIER-MÉCHAIN WITH NGC NUMBERS

Messier	NGC	Messier	NGC	Messier	NGC
2	7089	19	6273	69	6637
3	5272	22	6656	70	6681
4	6121	28	6626	71	6838
5	5904	30	7099	72	6981
9	6333	53	5024	75	6864
10	6254	54	6715	79	1904
12	6218	55	6809	80	6093
13	6205	56	6779	92	6341
14	6402	62	6266	107	6171
15	7078	68	4590		

It is impossible in such a long work as this bibliography to print a summary of each reference. On each card in my catalogue, however, I have written a summary of the reference. For less readily obtainable papers I will be glad to supply any astronomer with further information from my card catalogue.

Richmond Hill, Ontario
June 30, 1947.

SECTION A.

NGC 104 (47 Tucanae) a 00^h 21^m.9, δ — 72° 21′ l 272°, b — 45°

1755 Lacaille, Abbé de. First observation.

1891 Bailey, S. I. A catalogue of 7922 southern stars observed with the meridian photometer during the years 1889-91. *Harv. Ann.*, v. 34, p. 108.

1894 Pickering, E. C. Variable stars near 47 Tucanae. *A.N.*, v. 135, p. 129.

1897 Pickering, E. C. Distribution of stars in clusters. *Harv. Ann.*, v. 26, p. 213 (with plate).

1898 Williams, A. S. A catalogue of the magnitudes of 1081 stars lying between −30° Dec. and the South Pole (1885-6). London.

1901 Holetschek, J. Ueber den Helligkeitseindruck von Sternhaufen. *Vienna, K. Ak. Wiss. Math-natur. Kl. Sitz.* 110, abth. II a, pp. 1253-97.

1903 Bailey, S. I., and Pickering, E. C. Observations with the meridian photometer during the years 1899-1902. *Harv. Ann.*, v. 46, p. 5.

1908 Pickering, E. C. Revised Harvard Photometry. *Harv. Ann.*, v. 50, p.19.

1911 Plummer, H. C. On the problem of distribution in globular star clusters. *M.N.*, v. 71, pp. 460-70.

1915 Bailey, S. I. Globular clusters: distribution of stars. *Harv. Ann.*, v. 76, no. 4.

1915 Wood, H. E. Observations of comet 1915a (Mellish) *Union Circ.*, no. 31, p. 239. (Colour of 47 Tucanae).

1923 Shapley, H. Globular cluster containing long period variables. *Harv. Bull.*, no. 783.

1925 Paraskevopoulos, D. W. Integrated magnitude of 47 Tucanae. *Harv. Bull.*, no. 824.

1925 Strömgren, E. Om bevaegelses mulighederne i stjernehobe. *Nord. A. Tids.*, v. 6, pp. 21-28.

1935 Perrine, C. D. Report of Observatorio Nacional Argentino, 1934-1935. *Am. A. S. Pub.*, v. 8, p. 162. (Four spectrograms taken).

1939 Globular Cluster, 47 Tucanae. Cover, *The Telescope*, v. 6, p. 5.

1940 Ekenberg, B. Estimates of the total magnitudes of ξ Tucanae, ω Centauri, M 6 and M 7. *Lund. Medd.*, ser. 1, no. 156.

1941 Shapley, H. Galactic studies, XII. The giant globular cluster 47 Tucanae and its long period variables. *Nat. Acad. Sci. Proc.*, v. 27, p. 440. Harv. Repr. No. 228.

1942 47 Tucanae. Cover, *Sky and Telescope*. no. 9, p. 1.

1943 The Small Magellanic Cloud and 47 Tucanae. Cover, *Sky and Telescope*, no. 24, p. 1.

1755 Lacaille I 1, 1828 Dunlop 18 (fig. 1), 1847 J. Herschel 2322 (drawing), 1861 J. Herschel, 1862*IIc* Auwers, 1864 J. Herschel 52, 1867*ab* Chambers, 1868 Webb, 1881 Smyth and Chambers, 1882*ab* Flammarion, 1894 Gore, 1897, 1898*II* Pickering, 1902*abc* Bailey, 1903 Clerke, 1904*a* Webb, 1908 Bailey (plate), 1910 See (plates), 1911*a* Hinks, 1912 See (plate), 1913 Bailey, 1913*b* von Zeipel, 1914 Strömgren and Drachmann, 1915*I, II* Plummer, 1915 Melotte, 1915*ab* Bailey,

NGC 104 (Cont.)

1916 Jeans, 1918*c* Charlier, 1918*IIeg* Shapley, 1918*VI* Shapley, 1919*Ic*, *IIc* Shapley and Shapley, 1919*b* Shapley, 1920 Hoffmeister, 1920 Lous, 1920*a* Lundmark, 1922*II* Becker, 1923 Lundborg, 1923 von Zeipel, 1925 Larink, 1925 Nabokov, 1925*f* Doig, 1926*cf* Parvulesco, 1927*adh* ten Bruggencate, 1927 Sawyer and Shapley, 1927*c* Parvulesco, 1927*I*, *II* Shapley and Sawyer, 1929 Cannon, 1929*ab* Shapley and Sawyer, 1930 Heckmann and Siedentopf, 1930 *abfgknp* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1935 Shapley and Sayer, 1939*ab* Sawyer, 1941 de Kort, 1944 Shapley, 1945 Finlay-Freundlich, 1945 Sawyer, 1946*d* Mayall.

NGC 288 $\alpha\ 00^h\ 50^m.2$, $\delta - 26°\ 52'$ $l\ 154°$, $b - 88°$

1789 Herschel, W. First observation, 1785 Oct. 27.

1943 Oosterhoff, P. Th. A semi-regular variable in N.G.C. 288. *B.A.N.*, v. 9, pp. 397-9.

1789 W. Herschel VI 20, 1818*a* W. Herschel, 1833 J. Herschel 74, 1847 J. Herschel 2354, 1862II*a* Auwers, 1864 J. Herschel 162, 1891-*g* Bigourdan, 1881 Smyth and Chambers, 1904*a* Webb, 1915 Melotte, 1915*a*, 1918*b* Bailey, 1918*c* Charlier, 1918*IIbd* Shapley, 1919*IIc* Shapley and Shapley, 1920*a* Lundmark, 1923 Lundborg, 1926 Doig, 1926*f* Parvulesco, 1927*a* ten Bruggencate, 1927 Sawyer and Shapley, 1927*I*, *II* Shapley and Sawyer, 1928 van Rhijn, 1929*ab* Shapley and Sawyer, 1930*afn* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1935 Shapley and Sayer, 1936*a* Stebbins and Whitford, 1936 Duryea, 1939*a* Sawyer, 1940 Christie, 1941 de Kort, 1941 Copeland, 1944 Shapley, 1945 Sawyer, 1946*d* Mayall, 1946*ab* Mowbray.

NGC 362 $\alpha\ 01^h\ 00^m.6$, $\delta\ -71°\ 07'$ $l\ 268°$, $b - 47°$

1828 Dunlop, J. First observation.

1915 Bailey, S. I. Globular clusters; distribution of stars. *Harv. Ann.*, v. 76, no. 4.

1927 Heckmann, O. P. ten Bruggencate, Sternhaufen. *A. G. Viert.*, v. 62, pp. 180-191. (Analysis).

1931 Sawyer, H. B. The periods of thirty-six variable stars in four globular clusters. (Abs.) *Am. A. S. Pub.*, v. 7, p. 35.

1932 Sawyer, H. B. Periods and light curves of thirty two variable stars in the globular clusters N.G.C. 362, 6121, and 6397. *Harv. Circ.*, no. 366.

1932 Sawyer, H. B. Periods and light curves of twenty two variable stars in the northern border of the Small Magellanic Cloud. (Plate). *Harv. Circ.*, no. 374. (Abs.) Variable stars in the northern edge of the Small Magellanic Cloud. *Am. A. S. Pub.*, v. 7, p. 100.

1935 Greenstein, J. L. Two non-cluster type variables in Messier 3. *Harv. Bull.*, no. 901, p. 14. (Comparison of variables).

1943 The Small Magellanic Cloud and 47 Tucanae. Cover, *Sky and Telescope*, no. 24, p. 1.

1828 Dunlop 62 (fig. 3), 1847 J. Herschel 2375, 1864 J. Herschel 193, 1867*a* Chambers, 1882*b* Flammarion, 1895, 1897, 1898*II* Pickering, 1902*abc* Bailey, 1904*a* Webb, 1908 Bailey, 1911*a* Hinks, 1913, 1915*ab* Bailey, 1915*I* Plummer, 1915 Melotte, 1916 Jeans, 1918*c* Charlier, 1918*IIe* Shapley, 1919*Ic*, *IIc* Shapley and Shapley, 1920 Hoffmeister, 1920*a* Lundmark, 1923 Lundborg, 1925 Nabokov, 1925*f* Doig, 1926*f* Parvulesco, 1927*dh* ten Bruggencate, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*ab* Shapley and Sawyer, 1929 Cannon,

NGC 362 (Cont.)

1930*afkn* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1932*ab*, 1935*a* Sawyer, 1935 Shapley and Sayer, 1939*ab* Sawyer, 1941 de Kort, 1942*a* Sawyer, 1943*a* Oosterhoff, 1944 Shapley, 1944*II*, 1945 Sawyer, 1946*d* Mayall.

NGC 1261 $\alpha\ 03^h\ 10^m.9$, $\delta\ -55°\ 25'$ $l\ 236°$, $b\ -52°$

1828 Dunlop, J. First observation.

1828 Dunlop 337, 1847 J. Herschel 2517, 1864 J. Herschel 666, 1908 Bailey, 1911*a* Hinks, 1915 Melotte, 1915*a* Bailey, 1918*c* Charlier, 1918*IIe* Shapley, 1919*IIc* Shapley and Shapley, 1920*a* Lundmark, 1923 Lundborg, 1926*f* Parvulesco, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*b* Shapley and Sawyer, 1929 Cannon, 1930*an* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1941 de Kort, 1944 Shapley, 1945 Sawyer, 1946*d* Mayall.

NGC 1841 $\alpha\ 04^h\ 52^m.5$, $\delta\ -84°\ 05'$ $l\ 264°$ $b\ -30°$

1847 Herschel, J. First observation, 1836 Jan. 19.

1940 Shapley, H., and Paraskevopoulos, J. S. Southern clusters and galaxies. *Harv. Bull.*, no. 914. (New globular cluster).

1847 J. Herschel 2788, 1861 J. Herschel 1052, 1946*d* Mayall.

NGC 1851 $\alpha\ 05^h\ 12^m.4$, $\delta\ -40°\ 05'$ $l\ 211°$, $b\ -34°$

1828 Dunlop, J. First observation.

1924 Slipher, V. M. The radial velocity of additional globular star clusters. *Pop. Astr.*, v. 32, p. 622.

1935 Perrine, C. D. Report of Observatorio Nacional Argentino, 1934-35. *Am. A. S. Pub.*, v. 8, p. 162. (Spectrogram of 51 hours exp.)

1828 Dunlop 508, 1847 J. Herschel 2777, 1864 J. Herschel 1061, 1867*a* Chambers, 1882*b* Flammarion, 1904*a* Webb, 1911*a* Hinks, 1915 Melotte, 1915*a*, 1918*b* Bailey, 1918*c* Charlier, 1918*IIe* Shapley, 1919*Ic*, *IIc* Shapley and Shapley, 1920*a* Lundmark, 1923 Lundborg, 1925 Nabokov, 1925 Strömberg, 1925*f* Doig, 1926*f* Parvulesco, 1927 Sawyer and Shapley, 1927*I*, *II* Shapley and Sawyer, 1928 Voûte, 1929 Cannon, 1929*b* Shapley and Sawyer, 1930*afknq* Shapley, 1931 Nabokov, 1932 Moore, 1932, 1933 van de Kamp, 1935*abd* Edmondson, 1935 Shiveshwarkar, 1935 Mineur, 1935 Shapley and Sayer, 1939*a* Sawyer, 1940 Christie, 1941 de Kort, 1941 Copeland, 1944 Shapley, 1945 Sawyer, 1946*ab* Mayall.

NGC 1904 (Messier 79) $\alpha\ 05^h\ 22^m.2$, $\delta\ -24°\ 34'$ $l\ 195°$, $b\ -28°$

1781 Méchain, P.F.A. First observation, 1780 Oct. 26, Dec. 17.

1899 Holetschek, J. Ueber den Helligkeitseindruck von Nebelflecken und Sternhaufen. *A. G. Viert.*, v. 33, p. 270.

1924 Slipher, V. M. The radial velocity of additional globular star clusters. *Pop. Astr.*, v. 32, p. 622.

1781 Méchain, 1783 Bode, 1784 Messier, 1814*c* W. Herschel, 1818*ac* W. Herschel, 1853 Laugier 7, 1856 d'Arrest, 1862*IIb* Auwers, 1862 Schönfeld, 1864 J. Herschel 1112, 1867 Vogel, 1881 Smyth and Chambers, 1882*b* Flammarion, 1888 Ginzel, 1897, 1898*II* Pickering, 1895*ab* Mönnichmeyer, 1902*abc* Bailey, 1902 Gore, 1904 Webb, 1904, 1907 Holetschek, 1908 Bailey, 1909 Perrine, 1909

NGC 1904 (Cont.)

Winnecke, 1910 Porter, 1911*a* Hinks, 1915 Melotte, 1915*a* Bailey, 1915 Kritzinger, 1917 Shapley and Davis, 1917*d* Flammarion, 1918*a* Bailey, 1918*c* Charlier, 1918*IIbd* Shapley, 1919*Ic*, *IIcd* Shapley and Shapley, 1920 Hoffmeister, 1920*a* Lundmark, 1920*b* Shapley, 1925 Nabokov, 1925 Strömberg, 1925*b*, 1926 Doig, 1926*f* Parvulesco, 1926*l* Vorontsov-Velyaminov, 1927*h* ten Bruggencate, 1927 Sawyer and Shapley, 1927*I*, *II* Shapley and Sawyer, 1928 van Rhijn, 1928 Voûte, 1929 Cannon, 1929*ab* Shapley and Sawyer, 1930*afknq* Shapley, 1931 Nabokov, 1932 Moore, 1932, 1933 van de Kamp, 1935*ab* Edmondson, 1935 Shiveshwarkar, 1935 Mineur, 1935 Shapley and Sayer, 1936 Duryea, 1937 Wilkens, 1939*a* Sawyer, 1940 Christie, 1941 de Kort, 1941 Copeland, 1946*ab* Mayall, 1946*ab* Mowbray.

NGC 2298 $\alpha\ 06^h\ 47^m.2$, $\delta\ -35°\ 57'$ $l\ 213°$, $b\ -15°$

1828 Dunlop, J. First observation.

1828 Dunlop 578, 1847 J. Herschel 3065, 1864 J. Herschel 1463, 1881 Smyth and Chambers, 1915 Melotte, 1915*a* Bailey, 1918*c* Charlier, 1918*IIe* Shapley, 1919*IIc* Shapley and Shapley, 1920*a* Lundmark, 1926*f* Parvulesco, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*b* Shapley and Sawyer, 1930*akno* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1935 Shapley and Sayer, 1939*a* Sawyer, 1940 Christie, 1941 de Kort, 1946*ab* Mayall, 1946*a* Mowbray.

NGC 2419 $\alpha\ 07^h\ 34^m.8$, $\delta\ +39°\ 00'$ $l\ 148°$, $b\ +27°$

1802 Herschel, William. First observation 1788 Dec. 31.

1922 Shapley, H. N.G.C. 2419. *Harv. Bull.*, no. 776; *Pop. Astr.*, v. 30, p. 590. (Discussion of Lampland's photograph).

1935 Baade, W. The globular cluster N.G.C. 2419. *Mt. W. Cont.*, no. 529; *Ap. J.*, v. 82, pp. 396-412. (Plate).

1936 Ein merkwürdiger Kugelsternhaufen. *Die Himmelswelt*, v. 46, pp. 152-3.

1937 v. Brunn, A. Der Kugelhaufen N.G.C. 2419. *Die Sterne*, v. 17, pp. 16-8.

1802 W. Herschel I 218, 1833 J. Herschel 457, 1856 d'Arrest, 1861 Earl of Rosse, 1862*IIa* Auwers, 1864 J. Herschel 1548, 1865*b* Rümker, 1874 Schultz, 1875 Schönfeld, 1880 Earl of Rosse, 1891-*h* Bigourdan, 1907 Holetschek, 1909 Winnecke, 1922*a* Shapley, 1925 Nabokov, 1926*f* Parvulesco, 1926 Reinmuth, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*b* Shapley and Sawyer, 1930*afkno* Shapley, 1930 Parenago, 1931 Nabokov, 1932, 1933 van de Kamp, 1933 Stebbins, 1934, 1935 Lundmark, 1935*ab* Edmondson, 1935 Shapley and Sayer, 1936*ab* Stebbins and Whitford, 1937 Mineur, 1939*a* Sawyer, 1940 Christie, 1941 de Kort, 1943 (fig. 50), 1944 Shapley, 1945 Sawyer, 1946*ab* Mayall, 1946*ab* Mowbray.

NGC 2808 $\alpha\ 09^h\ 10^m.9$, $\delta\ -64°\ 39'$ $l\ 250°$, $b\ -11°$

1828 Dunlop, J. First observation.

1898 Williams, A. S. A catalogue of the magnitudes of 1081 stars lying between −30° Dec. and the south pole. (1885-6). London.

1908 Pickering, E. C. Revised Harvard Photometry. *Harv. Ann.*, v. 50, p. 91.

1828 Dunlop 265, 1847 J. Herschel 3152, 1861 J. Herschel, 1864 J. Herschel 1793, 1881 Smyth and Chambers, 1904*a* Webb, 1908 Bailey, 1911*a* Hinks, 1912 Curtis, 1915 Melotte, 1915*a*, 1918*b* Bailey, 1918 Curtis, 1918*c* Charlier, 1918*IIe* Shapley, 1919*Ic*, *IIc* Shapley and Shapley, 1920*a* Lundmark, 1923 Lundborg, 1925 Nabokov, 1925*f* Doig, 1926*f* Parvulesco, 1927*h* ten Bruggencate, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*ab* Shapley and Sawyer, 1929 Cannon, 1930*akn* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1935 Shapley and Sayer, 1939*a* Sawyer, 1941 de Kort, 1946*d* Mayall.

NGC 3201 $\alpha\ 10^h\ 15^m.5,\ \delta - 46°\ 09'$ $l\ 245°, b + 09°$

1828 Dunlop, J. First observation.

1919 Woods, I. E. Variable stars in the cluster N.G.C. 3201. *Harv. Circ.*, no. 216.

1922 Bailey, S. I. Photographic work at Arequipa with the Bruce 24-inch refractor. N.G.C. 3201. *Harv. Circ.*, no. 234.

1940 Dowse, M. Twenty-five new variable stars in the globular cluster N.G.C. 3201. *Harv. Bull.*, no. 913, p. 17.

1941 Wright, F. W. Periods of fifty-nine variable stars in the globular cluster N.G.C. 3201. *Harv. Bull.*, no. 915.

1828 Dunlop 445, 1847 J. Herschel 3238, 1864 J. Herschel 2068, 1881 Smyth and Chambers, 1908 Bailey (plate), 1911*a* Hinks, 1915 Melotte, 1915*a*, 1918*a* Bailey, 1918*c* Charlier, 1918*IIe* Shapley, 1919*IIc* Shapley and Shapley, 1920*a* Lundmark, 1923 Lundborg, 1926*f* Parvulesco, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*ab* Shapley and Sawyer, 1930*afn* Shapley, 1932, 1933 van de Kamp, 1935 Shapley and Sayer, 1939*a* Sawyer, 1941 de Kort, 1941 Copeland, 1944*II* Sawyer, 1946*d* Mayall.

NGC 4147 $\alpha\ 12^h\ 07^m.6,\ \delta + 18°\ 49'$ $l\ 224°, b + 78°$

1786 Herschel, W. First observation, 1784 Mar. 14.

1917 Shapley, H. Descriptive notes relative to nine clusters. *A. S. P. Pub.*, v. 29, pp. 185-6.

1917 Davis, H. Five new variable stars in globular clusters. *A. S. P. Pub.*, v. 29, p. 260.

1930 Baade, W. Der kugelförmige Sternhaufen NGC 4147. *A. N.*, v. 239, pp. 353-8; *Hamb. Mitt.*, v. 7, no. 36, 1932.

1931 Baade, W. Schwache Haufenveränderliche in hohen galaktischen Breiten. (5 Veränderliche in der Umgebung des Kugelhaufens NGC 4147). *A. N.*, v. 244, pp. 153-8; *Hamb. Mitt.*, v. 7, no. 36, 1932.

1931 Vinter Hansen, J. M. Den kugelformede stjernehob NGC 4147. *Nord. A. Tids.*, v. 12, pp. 20-3.

1786 W. Herschel I 19, 1833 J. Herschel 1106, 1856 d'Arrest, 1861 Earl of Rosse, 1862*IIa* Auwers, 1862 Schönfeld, 1864 J. Herschel 2752, 1867 d'Arrest, 1874 Schultz, 1880 Earl of Rosse, 1881 Smyth and Chambers, 1882 Engelmann, 1886 d'Engelhardt, 1891-*i* Bigourdan, 1891 Kempf, 1895*ab* Mönnichmeyer, 1904 Webb, 1907 Holetschek, 1909 Perrine, 1909 Winnecke, 1911 Lorenz, 1912 Curtis, 1915 Melotte, 1915*a* Bailey, 1918 Curtis, 1918*c* Charlier, 1918*IIbdg*, *IVa*, *VI*, Shapley, 1919*IIcd* Shapley and Shapley, 1920*a* Lundmark, 1920*b* Shapley, 1923 Lundborg, 1923 Wirtz, 1923 von Zeipel, 1925 Nabokov, 1925*a* Doig, 1926*f* Parvulesco, 1926 Reinmuth, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*ab* Shapley and Sawyer, 1929 Cannon, 1930*afn* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1932*ab* Sawyer, 1933 Stebbins, 1934, 1935 Lundmark, 1935 Shapley and Sayer, 1936*ab* Stebbins and Whitford, 1939*a* Sawyer, 1940 Christie, 1941 de Kort, 1944 Shapley, 1945 Finlay-Freundlich, 1945 Sawyer, 1946*ab* Mayall, 1946*ab* Mowbray.

NGC 4372 $\alpha\ 12^h\ 23^m.0,\ \delta - 72°\ 24'$ $l\ 268°, b - 10°$

1828 Dunlop, J. First observation.

1828 Dunlop 67? (fig. 2), 1847 J. Herschel 3390, 1864 J. Herschel 2927, 1915 Melotte, 1915*a*, 1918*b* Bailey, 1918*c* Charlier, 1918*IIe*, *Vb* Shapley, 1919*Ic*, *IIbc* Shapley and Shapley, 1920*a* Lundmark, 1926*f* Parvulesco, 1927*ah* ten Bruggencate, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*b* Shapley and Sawyer, 1930*an* Shapley, 1935 Shapley and Sayer, 1939*a* Sawyer, 1946*d* Mayall.

NGC 4590 (Messier 68) α 12^h 36^m.8, δ − 26° 29′ l 268°, b + 37°

1780 Messier, C. First observation, 1780 Apr. 9.
1919 Shapley, H. Nineteen new variable stars. *A. S. P. Pub.*, v. 31, p. 226.
1920 Shapley, H. Studies. XV. A photometric analysis of the globular system Messier 68. *Mt. W. Cont.*, no. 175; *Ap. J.*, v. 51, pp. 49-61 (Plate).
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NGC 4833 α 12^h 56^m.0, δ − 70° 36′ l 271°, b − 08°

1755 Lacaille, Abbé de. First observation.
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NGC 5024 (Messier 53) α^n 13^h 10^m.5, δ + 18° 26′ l 306°, b + 79°

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NGC 5053 α $13^h\ 13^m.9$, $\delta + 17°\ 57'$ l 308°, $b + 78°$

1786 Herschel, W. First observation, 1784 Mar. 14.
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NGC 5053 (Cont.)

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NGC 5139 (ω Centauri) α 13^h 23^m.8, δ $-$ 47° 03′ l 277°, b + 15°

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NGC 5272 (Messier 3) α 13^{h} 39^{m}.9 δ + 28° 38′ l 7°, b + 77°

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NGC 5286 $\alpha\ 13^h\ 43^m.0,\ \delta\ -51°\ 07'$ $l\ 280°,\ b\ +10°$

1828 Dunlop, J. First observation.

1828 Dunlop 388, 1847 J. Herschel 3533, 1864 J. Herschel 3642, 1881 Smyth and Chambers, 1908 Bailey, 1911*a* Hinks, 1915 Melotte, 1915*a*, 1918*b* Bailey, 1918*c* Charlier, 1918*IIc* Shapley, 1919*Ic*, *IIc* Shapley and Shapley, 1920*a* Lundmark, 1923 Lundborg, 1925 Nabokov, 1926*f* Parvulesco, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*b* Shapley and Sawyer, 1929 Cannon, 1930*afn* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1935 Shapley and Sayer, 1939*a* Sawyer, 1941 de Kort, 1946*d* Mayall.

NGC 5466 $\alpha\ 14^h\ 03^m.2,\ \delta\ +28°\ 46'$ $l\ 8°,\ b\ +72°$

1786 Herschel, W. First observation, 1784 May 17.

1922 Hopmann, J. Der kugelförmige Sternhaufen NGC 5466. *A.N.*, v. 217, pp. 333-42.

NGC 5466 (Cont.)

1926 Baade, W. 5 isolierte Haufenveränderliche in der Umgebung des Kugelhaufens NGC 5466. *Hamb. Mitt.*, v. 6, no. 27.

1926 Baade, W. Der kugelförmige Sternhaufen NGC 5466. *Hamb. Mitt.*, v. 6, no. 27.

1927 Hopmann, J. Vergleich der Hamburger und Bonner Vermessungen des kugelförmigen Sternhaufens NGC 5466. *A. N.*, v. 229, p. 209.

1945 Sawyer, H. B. Light curves of the variable stars in the globular cluster NGC 5466. *Dunlap Pub.*, v. 1, no. 17. (Plate).

1786 W. Herschel VI 9, 1818*a* W. Herschel, 1833 J. Herschel 1746, 1856 d'Arrest, 1861 Earl of Rosse, 1862*IIa* Auwers, 1864 J. Herschel 3776, 1880 Earl of Rosse, 1891-*f* Bigourdan, 1904 Webb, 1904, 1907 Holetschek, 1915 Melotte, 1915 Kritzinger, 1918*ab* Charlier, 1918*IIf* Shapley, 1919*IIabcd* Shapley and Shapley, 1920*b* Shapley, 1925 Nabokov, 1925*a* Doig, 1926*f* Parvulesco, 1926 Reinmuth, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*ab* Shapley and Sawyer, 1930*afn* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1933 Stebbins, 1934, 1935 Lundmark, 1936*ab* Stebbins and Whitford, 1939*a* Sawyer, 1940 Christie, 1941 de Kort, 1941 Copeland, 1944 Shapley, 1945 Sawyer (plate), 1946*d* Mayall, 1946*ab* Mowbray.

NGC 5634 $\alpha\ 14^{h}\ 27^{m}.0$, $\delta\ -05°\ 45'$ $l\ 311°$, $b\ +48°$

1786 Herschel, W. First observation, 1785 Mar. 5.

1914 Worssell, W. M. The Wolf-Palisa Chart No. 76: nebulae and condensed clusters. *Union Circ.*, no. 20.

1945 Baade, W. The globular clusters NGC 5634 and NGC 6229. *Mt. W. Cont.*, no. 706; *Ap. J.*, v. 102, pp. 17-25. (Plate.)

1786 W. Herschel I 70, 1833 J. Herschel 1813, 1856, 1861 d'Arrest, 1861 Earl of Rosse, 1862*IIa* Auwers, 1862 Schönfeld, 1864 J. Herschel 3900, 1867 d'Arrest, 1867 Schmidt, 1867 Vogel, 1880 Earl of Rosse, 1881 Smyth and Chambers, 1882 Engelmann, 1882*b* Flammarion, 1886 d'Engelhardt, 1891-*f* Bigourdan, 1891 Kempf, 1893 Stone, 1895*ab* Mönnichmeyer, 1904 Webb, 1907 Holetschek, 1909 Perrine, 1909 Winnecke, 1910 Porter, 1915 Melotte, 1915*a* Bailey, 1918*c* Charlier, 1918*IIe* Shapley, 1919*IIcd* Shapley and Shapley, 1920*a* Lundmark, 1920*b* Shapley, 1923 Lundborg, 1923 Wirtz, 1925 Nabokov, 1925*e* Doig, 1926*f* Parvulesco, 1926 Reinmuth, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*b* Shapley and Sawyer, 1930*an* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1933 Stebbins, 1935 Shapley and Sayer, 1936*ab* Stebbins and Whitford, 1939*a* Sawyer, 1941 de Kort, 1944 Shapley, 1945 Sawyer, 1946*ab* Mayall, 1946*a* Mowbray.

NGC 5694 $\alpha\ 14^{h}\ 36^{m}.7$, $\delta\ -26°\ 19'$ $l\ 299°$, $b\ +29°$

1786 Herschel, W. First observation, 1784 May 22.

1932 Lampland, C. O., and Tombaugh, C. W. Object NGC 5694, a distant globular star cluster. *A. N.*, v. 246, pp. 171-2. See also *Obs.*, v. 55, p. 271.

1934 Baade, W. The distance of the globular cluster N.G.C. 5694. *A. S. P. Pub.*, v. 46, pp. 52-3.

1786 W. Herschel II 196, 1847 J. Herschel 3576, 1856 d'Arrest, 1862*IIa* Auwers, 1864 J. Herschel 3954, 1867 Schmidt, 1886 d'Engelhardt, 1891-*f* Bigourdan, 1893 Stone, 1910 Porter, 1936*ab* Stebbins and Whitford, 1939*a* Sawyer, 1940 Christie, 1941 de Kort, 1944 Shapley, 1945 Sawyer, 1946*abc* Mayall, 1946*ab* Mowbray.

IC 4499 $\alpha\ 14^h\ 52^m.7,\ \delta\ -82°\ 02'$ $l\ 275°, b\ -21°$

1908 Stewart, D. First observation, 1901. Nebulae discovered at the Harvard College Observatory. Table III. List of nebulae and clusters found by Delisle Stewart. *Harv. Ann.*, v. 60, pp. 156-72.

1908 Dreyer, 1915 Melotte, 1918*ab* Charlier, 1919*IIac* Shapley and Shapley, 1922*a* Shapley, 1926*f* Parvulesco, 1927 Sawyer and Shapley, 1927*I, II*, 1929*b* Shapley and Sawyer, 1930*an* Shapley, 1932, 1933 van de Kamp, 1941 de Kort, 1946*d* Mayall.

NGC 5824 $\alpha\ 15^h\ 00^m.9,\ \delta\ -32°\ 53'$ $l\ 300°, b\ +21°$

1884 Barnard, E. E. First observation. Erroneous description of a nebula. *Sid. Mess.*, v. 3, p. 189.

1926 Innes, R. The globular star-cluster NGC 5824. *Union Circ., no.* 66, p. 328.

1910 Porter, 1927*II*, 1929*b* Shapley and Sawyer, 1929 Cannon, 1930*an* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1935 Shapley and Sayer, 1936*a* Stebbins and Whitford, 1940 Christie, 1941 de Kort, 1946*ab* Mayall, 1946*a* Mowbray.

NGC 5897 $\alpha\ 15^h\ 14^m.5,\ \delta\ -20°\ 50'$ $l\ 311°, b\ +29°$

1786 Herschel, W. First observation, 1785 Mar. 10.

1912 Dreyer, J. L. E. Corrections to the New General Catalogue. *M. N.*, v. 73, p. 40.

1915 Knox Shaw, H. Note on the nebulae and star clusters shown on the Franklin-Adams plates. *M. N.*, v. 76, p. 105.

1786 W. Herschel VI 19, 1847 J. Herschel 3596, 1862*IIa* Auwers, 1864 J. Herschel 4075, 1881 Smyth and Chambers, 1891-*a* Bigourdan, 1904 Webb, 1904, 1907 Holetschek, 1915 Melotte, 1915*a* Bailey, 1915 Kritzinger, 1918*c* Charlier, 1918*IIe* Shapley, 1919*IIbcd* Shapley and Shapley, 1920*ab* Lundmark, 1920*b* Shapley, 1925 Nabokov, 1925*b* Doig, 1926*f* Parvulesco, 1927 Sawyer and Shapley, 1927 *I, II*, 1929*ab* Shapley and Sawyer, 1930*akn* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1935 Shapley and Sayer, 1936*ab* Stebbins and Whitford, 1937 Wilkens, 1940 Christie, 1941 de Kort, 1941 Copeland, 1944 Shapley, 1945 Sawyer, 1946*d* Mayall, 1946*ab* Mowbray.

NGC 5904 (Messier 5) $\alpha\ 15^h\ 16^m.0,\ \delta\ +02°\ 16'$ $l\ 332°, b\ +46°$

1702 Kirch, G. Discovery, 1702 May 5. Diary of Marie Margarethe Kirch. See Dreyer, *R. Irish Acad. Trans.*, v. 26, p. 397, 1878.

1771 Messier, C. Observation 1764, May 23. On chart of comet of 1763, *Mém.* 1774, p. 40.

1890 Common, A. A. Note on some variable stars near the cluster 5 M. *M. N.*, v. 50, p. 517.

1890 Packer, D. E. On a new variable star near the cluster 5 M Librae. *Sid. Mess.*, v. 9, p. 381; *Eng. Mech.*, v. 51, p. 378.

1890 Packer, D. E. New variable stars near the cluster 5 M Librae. *Sid. Mess.*, v. 10, p. 107.

1890 Packer, D. E. The variable stars (true and false) near 5 M Librae. *Eng. Mech.*, v. 52, p. 80.

1890 Fleming, W. P. Stars having peculiar spectra. (Contains note on Mr. Packer's variables near 5 M Librae). *Sid. Mess.*, v. 9, p. 380.

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1890 Fleming, W. P. Two new variable stars near the cluster 5 M Librae. *A. N.*, v. 125, p. 157.
1891 Common, A. A. Mr. Common's Observatory, Ealing. *M. N.*, v. 51, p. 226.
1894 Sprague, R. Star clusters. *Pop. Astr.*, v. 1, pp. 407-9.
1896 Pickering, E. C. The cluster Messier 5 Serpentis, NGC 5904. *A. N.*, v. 140, p. 285.
1897 Pickering, E. C. Measures of positions. *Harv. Ann.*, v. 26, pp. 226-48.
1898 Barnard, E. E. Note on some of the variable stars of the cluster Messier 5. *A. N.*, v. 147, p. 243.
1898 Bailey, S. I. Variable stars in clusters. *Am. A. S. Pub.*, v. 1, p. 49.
1898 Shilow, M. Positionen von 1041 Sternen des Sternhaufens 5 Messiers, aus photographisches Aufnahmen abgeleitet. *Acad. Imp. des Sci. St. Petersbourg, Bull.*, V ser., Bd. 8, No. 4.
1899 Bailey, S. I. The periods of the variable stars in the cluster Messier 5. *Ap. J.*, v. 10, p. 255; *Am. A. S. Pub.*, v. 1, p. 96.
1899 Bailey, S. I. Note on the relation between the visual and photographic light-curves of variable stars of short period. *Ap. J.* v. 10, pp. 261-5; *Am. A. S. Pub.*, v. 1, p. 97.
1899 Barnard, E. E. Variable stars in clusters. *Am. A. S. Pub.*, v. 1, p. 77; *Science*, n. s., v. 10, p. 789. (The cluster is referred to as M 13, but from internal evidence M 5 must be meant).
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1902 Barnard, E. E. On some of the variable stars in the cluster M 5 Librae. *Am. A. S. Pub.*, v. 1, p. 193; *Science*, n.s., v. 17, p. 330, 1903.
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1905 Bailey, S. I. Variable stars in the clusters Messier 3 and Messier 5. *Harv. Circ.*, no. 100.
1905 Bailey, S. I. Some variable star problems. *Am. A. S. Pub.*, v. 1, p. 234.
1908 Barnard, E. E. On the constancy of the period of the variable star, M 5 (Librae) No. 33. *Am. A. S. Pub.*, v. 1, p. 298.
1910 Barnard, E. E. On the period and light curve of the variable star no. 33, M 5 (Libra) and on the possible use of such a star as a time constant. *A. N.*, v. 184, p. 273.
1912 Barnard, E. E. The period of the variable star no. 33, M. 5 (Libra). *A. N.*, v. 191, pp. 439-42.
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1916 Bailey, S. I. Cluster variables with double maxima. *Harv. Circ.*, no. 193.
1916 Shapley, H. Studies. III. The colors of the brighter stars in four globular systems. *Mt. W. Comm.*, no. 34; *Nat. Acad. Sci. Proc.*, v. 2, p. 525.

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1917 Bailey, S. I. Variable stars in the cluster Messier 5. *Harv. Ann.*, v. 78, pt. 2, pp. 103-93 (Plate).
1917 Bailey, S. I. Note on the form of the light curve of variable stars of cluster type. (Abs.) *Pop. Astr.*, v. 25, p. 307.
1917 Eddington, A. S. Researches on globular clusters. *Obs.*, v. 40, pp. 394-401.
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1919 Barnard, E. E. On the change in the period of the variable star Bailey no. 33 in the cluster M 5. *Pop. Astr.*, v. 27, p. 522.
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1922 Barnard, E. E. On the change in the period of the variable star Bailey no. 33 in the cluster M 5. (Abs.) *Pop. Astr.*, v. 30, p. 548; *Am. A. S. Pub.*, v. 4, p. 351.
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1927 Shapley, H. The periods of seventy-three variables in Messier 5. *Harv. Bull.*, no. 851. See also summary, The periods of variable stars in M 5. *Obs.*, v. 50, p. 390, 1927.
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1931 Mineur, H. Mises au point d'astronomie stellaire. III. Céphéides et amas. *Soc. Astr. France, Bull.*, v. 45, p. 194.

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1932 Hogg, F. S. The distribution of light in six globular clusters. *A. J.*, v. 42, pp. 77-87.

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1771 Messier, 1777 Bode 29, 1780, 1784 Messier, 1800, 1814*c*, 1818*ab*, (1912) W. Herschel, 1833 J. Herschel 1916 (fig.), 1852 Secchi, 1853 Laugier 43, 1855, 1856 d'Arrest, 1861 Earl of Rosse, 1861 J. Herschel, 1862*I*, *IIb* Auwers, 1864 J. Herschel 4083, 1865 Auwers, 1867 Schmidt, 1867 Vogel, 1867 d'Arrest, 1867*ab* Chambers, 1868 Webb, 1880 Earl of Rosse, 1881 Smyth and Chambers (fig. 31), 1882 Engelmann, 1882*ab* Flammarion, 1888 Ginzel, 1890 d'Engelhardt, 1891-*a* Bigourdan, 1893 Roberts, 1894 Gore, 1895, 1897, 1898*I*, *II* Pickering, 1897 Barnard, 1895*ab* Mönnichmeyer, 1902*abc* Bailey, 1902 Gore, 1903 Clerke, 1904, 1907 Holetschek, 1908 Bailey (plate), 1908 Keeler (plate 52), 1909 Perrine, 1910 See (plate), 1911 Wirtz, 1911*a* Hinks, 1912 See (plate), 1913 Bailey, 1913 Fath, 1913 Chapman, 1914 Strömgren and Drachmann, 1915*I*, *II* Plummer, 1915 Melotte, 1915*a* Bailey, 1915 Kritzinger, 1916 Wilson, 1916 Shapley, 1917 Slipher, 1917 Shapley and Davis, 1917 Shapley, 1917*a* Flammarion, 1918 Curtis, 1918 Slipher, 1918*c* Charlier, 1918*Iabc*, *IIabd*, *III*, *Va* Shapley, 1919*a* Bailey, Leland, and Woods, 1919*b* Lundmark, 1919*Iac*, *IIcd* Shapley and Shapley, 1920 Hoffmeister, 1920 Hopmann (plate), 1920 Lous, 1920*abc* Lundmark, 1920*b* Shapley, 1922*I* Becker, 1922 Kostitzin, 1923 Lundborg, 1923 Wirtz, 1923 von Zeipel, 1924 Vogt, 1925 Larink, 1925 Nabokov, 1925 Strömberg, 1925*b*, 1926 Doig, 1926 Reinmuth, 1926 *acdef*, 1927*abc* Parvulesco (print), 1927*bh* ten Bruggencate, 1927 Kienle, 1927 Sawyer and Shapley, 1927 Lönnquist, 1927*I*, *II* Shapley and Sawyer, 1928 van Rhijn, 1928 Voûte, 1929 Cannon, 1929*ab* Shapley and Sawyer, 1930 Heckmann and Siedentopf, 1930*afghklmnq* Shapley, 1930 Parenago, 1931 Harrison, 1931 Nabokov, 1932 Bernheimer, 1932 Moore, 1932, 1933 van de Kamp, 1932*ab* Sawyer, 1933*a* Grosse, 1933 Stebbins, 1933 Vyssotsky and Williams, 1934, 1935 Lundmark, 1935*a* Baade, 1935*ab* Edmondson, 1935 Shiveshwarkar, 1935 Mineur, 1935*a* Sawyer, 1935 Shapley and Sayer, 1936 Duryea, 1936*ab* Stebbins and Whitford, 1937 Wilkens, 1939*b* Hachenberg, 1939*ab* Sawyer, 1939 Oosterhoff, 1940 Christie, 1941 de Kort, 1941 Copeland, 1942*a* Sawyer, 1943*a* Oosterhoff, 1944 Shapley, 1944*I*, 1945 Sawyer, 1945 Finlay-Freundlich, 1946*ab* Mayall, 1946*ab* Mowbray. [1904 Perrine, 1904 Webb].

NGC 5927 $\alpha\ 15^h\ 24^m.4$, $\delta\ -50°\ 29'$ $l\ 294°$, $b\ +04°$

1828 Dunlop, J. First observation.

1828 Dunlop 389, 1847 J. Herschel 3604, 1864 J. Herschel 4101, 1881 Smyth and Chambers, 1915 Melotte, 1915*a* Bailey, 1918*c* Charlier, 1919*Iac* Shapley and Shapley, 1920*a* Lundmark, 1926*f* Parvulesco, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*b* Shapley and Sawyer, 1930*an* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1935 Shapley and Sayer, 1941 de Kort, 1946*d* Mayall.

NGC 5946 α 15^h 31^m.8, δ − 50° 30′ l 295°, b + 03°

1847 Herschel, J. First observation, 1834 July 7.

1847 J. Herschel 3607, 1864 J. Herschel 4108, 1881 Smyth and Chambers, 1915 Melotte, 1915*a* Bailey, 1918*d* Charlier, 1919*IIac* Shapley and Shapley, 1922*a* Shapley, 1926*f* Parvulesco, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*b* Shapley and Sawyer, 1930*an* Shapley, 1931 Nabokov, 1946*d* Mayall.

NGC 5986 α 15^h 42^m.8, δ − 37° 37′ l 305°, b + 13°

1828 Dunlop, J. First observation.

1915 Bailey, S. I. Globular clusters: distribution of stars. *Harv. Ann.*, v. 76, no. 4.

1828 Dunlop 552, 1847 J. Herschel 3611, 1861 J. Herschel, 1864 J. Herschel 4132, 1881 Smyth and Chambers, 1897, 1898*II* Pickering, 1902*a*, 1908 Bailey, 1911*a* Hinks, 1915*I* Plummer, 1915 Melotte, 1915*ab* Bailey, 1918*c* Charlier, 1918*IIe* Shapley, 1919*Ic*, *IIc* Shapley and Shapley, 1920 Hoffmeister, 1920*a* Lundmark, 1923 Lundborg, 1925 Nabokov, 1926*f* Parvulesco, 1927*d* ten Bruggencate, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*b* Shapley and Sawyer, 1929 Cannon, 1930*afu* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1935 Shapley and Sayer, 1936*a* Stebbins and Whitford, 1939*a* Sawyer, 1940 Christie, 1941 de Kort, 1941 Copeland, 1946*ab* Mayall, 1946*a* Mowbray.

NGC 6093 (Messier 80) α 16^h 14^m.1, δ − 22° 52′ l 321°, b + 18°

1781 Méchain, P. F. A. First observation, 1781 Jan. 4, Jan. 27.

1785 Herschel, W. On the construction of the heavens. An opening in the heavens. *Roy. Soc. Phil. Trans.*, v. 75, pp. 213-66.

1860 Luther, E. Aus einem Schreiben des Herrn Prof. Luther, Directors der Sternwarte in Königsberg, an den Herausgeber. *A. N.*, v. 53, p. 293. (Auwers and Luther saw nova on May 21, mag. 6.5.).

1860 Pogson, N. Remarkable changes observed in the cluster 80 Messier. *M. N.*, v. 21, p. 32.

1860 Smyth, W. H. *Speculum Hartwellianum.* London, 1860. Pp. 265-71, and p. 104. 80 M. Scorpii. (Observations on R and S Scorpii).

1861 Schmidt, J. F. J. Über einen neuen veränderlichen Nebelstern. *A. N.*, v. 55, p. 93.

1862 Auwers, A. Verzeichniss der Örter von vierzig Nebelflecken, aus Beobachtungen am Königsberger Heliometer abgeleitet. *A. N.*, v. 58, p. 374. (Accurate position of nova).

1865 Schönfeld, E. Mittlere Oerter für 1855.0 von veränderlichen Sternen mit Einschluss derjenigen neuen Sterne, deren Positionen sich mit einiger Sicherheit bestimmen lassen. *A. N.*, v. 64, p. 169.

1867 Schmidt, J. F. J. Bemerkungen über Nebel und veränderliche Sterne. *A. N.*, v. 70, p. 250. (Positions of nova and variables).

1868 Schönfeld, E. Notiz über die Oerter der Veränderlichen R, S, T Scorpii. *A. N.*, v. 70, p. 333. (Positions).

1868 Schmidt, J. F. J. Ueber veränderliche Sterne, R, S, T Scorpii. *A. N.*, v. 72, p. 56.

1868 Schmidt, J. F. J. Bemerkungen über einige veränderliche Sterne. *A. N.*, v. 72, p. 141. (T Scorpii not seen since 1860).

NGC 6093 (Cont.)

1870 Schmidt, J. F. J. Beobachtungen von veränderlichen Sternen auf der Sternwarte zu Athen im Jahre 1870. *A. N.*, v. 77, p. 123. (T Scorpii not seen since 1860).

1877 Schmidt, J. F. J. Veränderliche Sterne, 1876. *A. N.*, v. 89, p. 159. (He observed this cluster at least a thousand times after 1860, but never saw T Scorpii again after June 1860).

1881 Smyth, W. H., and Chambers, G. F. *A cycle of celestial objects*. P. 452, figs. 32, 33. (Variable stars near 80 M Scorpii).

1886 Auwers, A. Aus einem Schreiben des Herrn Geheimrath Auwers an den Herausgeber betr. die Erklärung der s.g. neuen Sterne, und Beobachtungen der Nova Scorpii von 1860. *A. N.*, v. 114, p. 47. (Observations of the nova from Königsberg records, 1860).

1902 Baxendell, J. Notes on Pogson's observations of U Geminorum, T Scorpii, etc. *A. J.*, v. 22, p. 127. (The nova, or another variable, was seen in 1863.)

1922 Slipher, V. M. Further notes on spectrographic observations of nebulae and clusters. (Abs.) *Pop. Astr.*, v. 30, pp. 9-11.

1930 Shapley, H., and Sawyer, H. B. Variable stars in globular clusters. (Abs.) *Pop. Astr.*, v. 38, p. 408.

1938 Sawyer, H. B. The bright nova of 1860 in the globular cluster Messier 80, and its relation to supernovae. *R. A. S. C. Jour.*, v. 32, pp. 69-90; *Dunlap Comm.*, no. 1.

1942 Sawyer, H. B. Variable stars in the globular cluster Messier 80. *Dunlap Pub.*, v. 1, no. 12.

1781 Méchain, 1783 Bode 1784 Messier, 1814*c*, 1818*a* W. Herschel, 1847 J. Herschel 3624, 1855, 1856 d'Arrest, 1861 J. Herschel, 1862*I*, *IIb* Auwers, 1864 J. Herschel 4173, 1865 Auwers, 1867 Schmidt, 1867 Vogel, 1867*ab* Chambers, 1868 Webb, 1875 Schönfeld, 1880 Earl of Rosse, 1882 Engelmann, 1882*b* Flammarion, 1886 d'Engelhardt, 1886- Weinek and Gruss, 1891-*ck* Bigourdan, 1891 Kempf, 1895 Rümker, 1895*ab* Mönnichmeyer, 1898*II* Pickering, 1902*abc* Bailey, 1902 Gore, 1904 Webb, 1904, 1907 Holetschek, 1908 Bailey, 1909 Perrine, 1909 Winnecke, 1910 Porter, 1911 Wirtz, 1911*a* Hinks, 1912 Curtis, 1913 Fath, 1915 Melotte, 1915*a* Bailey, 1915 Kritzinger, 1917 Shapley and Davis, 1917 Pease and Shapley, 1917*d* Flammarion, 1918*a* Bailey, 1918 Curtis, 1918*c* Charlier, 1918-*IIbd* Shapley, 1919*Ic*, *IIcd* Shapley and Shapley, 1920 Hoffmeister, 1920*a* Lundmark, 1920*b* Shapley, 1922*I* Becker, 1923 Lundborg, 1925 Strömberg, 1925, 1926 Nabokov, 1925*d*, 1926 Doig, 1926*f* Parvulesco, 1926*II* Vorontsov-Velyaminov, 1927*h* ten Bruggencate, 1927 Sawyer and Shapley, 1927*I*, *II* Shapley and Sawyer, 1928 van Rhijn, 1928 Voûte, 1929 Cannon, 1929*ab* Shapley and Sawyer, 1929 Vorontsov-Velyaminov, 1930*afgnq* Shapley, 1931 Nabokov, 1932 Moore, 1932, 1933 van de Kamp, 1935*ab* Edmondson, 1935 Shiveshwarkar, 1935 Mineur, 1935 Shapley and Sayer, 1936 Duryea, 1936*ab* Stebbins and Whitford, 1937 Wilkens, 1939*a* Sawyer, 1940 Christie, 1941 de Kort, 1941 Copeland, 1946*abc* Mayall, 1946*ab* Mowbray.

NGC 6101 $\alpha\ 16^h\ 20^m.0,\ \delta\ -72°\ 06'$ $l\ 285°,\ b\ -17°$

1828 Dunlop, J. First observation.

1828 Dunlop 68, 1847 J. Herschel 3623, 1864 J. Herschel 4175, 1881 Smyth and Chambers, 1915 Melotte, 1915*a* Bailey, 1918*c* Charlier, 1918*IIe* Shapley, 1919*IIc* Shapley and Shapley, 1920*a* Lundmark, 1926*f* Parvulesco, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*b* Shapley and Sawyer, 1930*akn* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1935 Shapley and Sayer, 1941 de Kort, 1946*d* Mayall.

NGC 6121 (Messier 4) $\alpha\ 16^h\ 20^m.6$, $\delta\ -26°\ 24'$ $l\ 319°$, $b\ +15°$

1746 de Chéseaux, L. Discovery. Letter to French Academy. Published by Bigourdan, *Paris. Ann. Observations*, 1884, G8-10, pub. 1891; *Obs.*, 1907, E135-7, pub. 1917.

1771 Messier, C. Observation 1764 May 8.

1785 Herschel, W. On the construction of the heavens. *Roy. Soc. Phil. Trans.*, v. 75, pp. 213-66. An opening in the heavens.

1904 Pickering, E. C., and Leavitt, H. S. 105 new variable stars in Scorpius. *Harv. Circ.*, no. 90; *A. N.*, v. 167, p. 161.

1932 Sawyer, H. B. Periods and light curves of thirty two variable stars in the globular clusters N.G.C. 362, 6121, and 6397. *Harv. Circ.*, no. 366, pt. 2. (Plate). (Abs.) The periods of thirty-six variable stars in four globular clusters. *Am. A. S. Pub.*, v. 7, p. 35.

1932 Hogg, F. S., and Sawyer, H. B. A test of the constancy of light of the bright stars in Messier 4. *A. S. P. Pub.*, v. 44, p. 258.

1939 Greenstein, J. L. Magnitudes and colors in the globular cluster Messier 4. *Ap. J.*, v. 90, pp. 387-413 (plates).

1941 de Sitter, A. Note on variable stars in the globular cluster Messier 4. *Natuur. Tijds. Ned. Indie*, dl. 101, afl. 2, pp. 51-3.

1942 Sawyer, H. B. A semiregular variable in Messier 4. *R. A. S. C. Jour.*, v. 36, p. 213; *Dunlap Comm.*, no. 9.

1946 Lohmann, W. Die Verteilung von Riesen und Zwergen im Kugelförmigen Sternhaufen M 4. *Königstuhl-Heidelberg*, no. 47; *Z. f. Naturforschung*, v. 1, no. 11, 12.

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1755 Lacaille I 9, 1771 Messier, 1777 Bode 31, 1780, 1781 Messier, 1814*a*, 1818*a*, (1912) W. Herschel, 1855, 1856 d'Arrest, 1862*IIbc* Auwers, 1864 J. Herschel 1183, 1867*a* Chambers, 1881 Smyth and Chambers, 1882*b* Flammarion, 1891-*c* Bigourdan, 1902 Gore, 1904 Webb, 1904, 1907 Holetschek, 1908 Bailey (plate), 1911*a* Hinks, 1915 Melotte, 1915*a* Bailey, 1916 Wilson, 1916 Shapley, 1917 Shapley and Davis, 1917 Shapley, 1917*a* Flammarion, 1918*a* Bailey, 1918*c* Charlier, 1918*IIbd* Shapley, 1919*Iac*, *IIcd* Shapley and Shapley, 1920 Hoffmeister, 1920*a* Lundmark, 1920*b* Shapley, 1923 Lundborg, 1925 Nabokov, 1925*d*, 1926 Doig, 1926*II* Vorontsov-Velyaminov, 1926*f*, 1927*a* Parvulesco, 1927*h* ten Bruggencate, 1927 Sawyer and Shapley, 1927*I*, *II* Shapley and Sawyer, 1928 van Rhijn, 1929 Cannon, 1929*ab* Shapley and Sawyer, 1929 Vorontsov-Velyaminov, 1930 Parenago, 1930*afknp* Shapley, 1931 Nabokov, 1932 Bernheimer, 1932 Hogg, 1932, 1933 van de Kamp, 1932*ab* Sawyer, 1933 Stebbins, 1933 Vyssotsky and Williams, 1935 Shapley and Sayer, 1936 Duryea, 1936*ab* Stebbins and Whitford, 1937 Wilkens, 1939*ab* Sawyer, 1940 Christie, 1941 de Kort, 1941 Copeland, 1944*II* Sawyer, 1946*d* Mayall, 1946*ab* Mowbray.

NGC 6139 $\alpha\ 16^h\ 24^m.3$, $\delta\ -38°\ 44'$ $l\ 310°$, $b\ +06°$

1828 Dunlop. J. First observation.

1919 Hubble, E. Two new globular clusters. *Mt. W. Rep.*, no. 9, p. 233, according to *Harv. Bull.*, no. 776, 1922.

1828 Dunlop 536, 1847 J. Herschel 3628, 1864 J. Herschel 4189, 1881 Smyth and Chambers, 1922*a* Shapley, 1926*f* Parvulesco, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*b* Shapley and Sawyer, 1930*akn* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1936*a* Stebbins and Whitford, 1941 de Kort, 1946*d* Mayall.

NGC 6144 α 16^h 24^m.2, δ − 25° 56′ l 320°, b + 14°

1786 Herschel, W. First observation, 1784 May 22.

1786 W. Herschel VI 10, 1818*a* W. Herschel, 1847 J. Herschel 3629, 1862*IIa* Auwers, 1864 J. Herschel 4193, 1891-*c* Bigourdan, 1915 Melotte, 1918*ab* Charlier, 1918*IIe* Shapley, 1919*IIbc* Shapley and Shapley, 1920*a* Lundmark, 1926 Doig, 1926*f* Parvulesco, 1927 Sawyer and Shapley, 1927*I, II*, 1929*ab* Shapley and Sawyer, 1929 Vorontsov-Velyaminov, 1930 Parenago, 1930*akn* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1933 Stebbins, 1935 Shapley and Sayer, 1936*z* Stebbins and Whitford, 1940 Christie, 1941 de Kort, 1941 Copeland, 1946*d* Mayall, 1946*ab* Mowbray.

NGC 6171 (Messier 107) α 16^h 29^m.7, δ − 12° 57′ l 331°, b + 22°

1783 Méchain, P.F.A. First observation, 1782 April.

1802 Herschel, W. Independent observation, 1793 May 12.

1827 Harding. Beobachtungen und Nachrichten. *Berliner Jahrbuch*, p. 134. (Letter to Dr. Westphal with list of 8 nebulae).

1857 Winnecke, A. Notiz über Nebelflecke. *A. N.*, v. 45, pp. 247-50.

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1783 Méchain, 1802 W. Herschel VI 40, 1847 J. Herschel 3637, 1856 d'Arrest, 1861 J. Herschel, 1862*IIa* Auwers, 1862 Schönfeld, 1864 J. Herschel 4211, 1867 Vogel, 1867*a* Chambers, 1880 Earl of Rosse, 1881 Smyth and Chambers, 1882*b* Flammarion, 1890 d'Engelhardt, 1891-*c* Bigourdan, 1904 Webb, 1904, 1907 Holetschek, 1908 Bailey, 1909 Perrine, 1910 Porter, 1911 Wirtz, 1911*a* Hinks, 1912 Curtis, 1915 Melotte, 1915*a* Bailey, 1915 Kritzinger, 1918 Curtis, 1918*c* Charlier, 1918*IIe* Shapley, 1919*Ic, IIcd* Shapley and Shapley, 1920*a* Lundmark, 1920*b* Shapley, 1922*I* Becker, 1923 Wirtz, 1925 Nabokov, 1925*b* Doig, 1926*f* Parvulesco, 1926 Reinmuth, 1927*h* ten Bruggencate, 1927 Sawyer and Shapley, 1927*I, II*, 1929*ab* Shapley and Sawyer, 1929 Vorontsov-Velyaminov, 1930*an* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1935 Shapley and Sayer, 1936 Duryea, 1936*ab* Stebbins and Whitford, 1937 Wilkens, 1939*a* Sawyer, 1940 Christie, 1941 de Kort, 1941 Copeland, 1946*ab* Mayall, 1946*ab* Mowbray.

NGC 6205 (Messier 13) α 16^h 39^m.9, δ + 36° 33′ l 26°, b + 40°

1715 Halley, E. Discovery.

1716 Pound. Positions of nebulae in Hercules and Antinous for 1690, by Pound's observations; deduced by Halley, 1716. Bradley's miscellaneous works [Rigaud] p. iii "Memoirs of Bradley," 1832.

1771 Messier, C. Observation, 1764 June 1. On chart of comet of 1779, *Mém.* 1779.

1839 Bianchi, J. Schreiben des Herrn Bianchi, Directors der Sternwarte zu Modena, an den Herausgeber. *A. N.*, v. 16, pp. 371-4.

1843 Argelander, D. Fr. *Uranometria Nova*, p. 32, Berlin.

1844 von Humboldt, A. *Cosmos*. Milan 1851 edition, v. 3, p. 114. Amas d'étoiles.

1852-5 Secchi, P. A. Osservazioni delle Nebulose. *Memorie dell. Osservatorio del Collegio Romano*, pp. 93-4. (Drawing Tav. V., fig. 5).

NGC 6205 (Cont.)

1861 Rosse, Earl of. On the construction of specula of six-feet aperture, and a selection from the observations of nebulae made with them. Plate xxviii, fig. 33 drawing. *Roy. Soc. Phil. Trans.*, v. 151, pp. 681-745. (Dark lanes).
1866 Schultz, H. Historische Nötigen über Nebelflecke. *A. N.*, v. 67, p. 4.
1871 Vogel, H. Resultate spectralanalytischer Beobachtungen angestellt auf der Sternwarte zu Bothkamp. 2. Die Spectra einiger Nebelflecke, Sternhaufen u. des Cometen I. 1871. *A. N.*, v. 78, p. 245.
1872 Vogel, H. Spectra einiger Nebelflecken und Sternhaufen. *Bothkamp Beobachtungen* I, p. 56.
1876 Trouvelot, L. Drawings of the clusters in Hercules Messier 13 and 92. *Harv. Ann.*, v. 8, pt. 2, plate 25.
1881 Pickering, E. C., Searle, A., and Wendell, O. C. Observations with the meridian photometer during the years 1879-82. *Harv. Ann.*, v. 14, pt. 1, p. 214.
1887 Roberts, I. Photographs of the cluster M 13 Herculis. *M. N.*, v. 48, p. 30.
1887 Harrington, M. W. On the structure of 13 M Herculis. (Drawings). *A. J.*, v. 7, p. 156.
1891 Holden, E. S. Characteristic forms within the cluster in Hercules. *A. S. P. Pub.*, v. 3, p. 375.
1892 Scheiner, J. Der grossen Sternhaufen im Hercules Messier 13 nach Aufnahmen am Potsdamer photographischen Refractor. *K. Preuss. Ak. Wiss. Abhand.*, Abhang I, pp. 1-55. (Chart).
1893 Ranyard, A. C. What is a star cluster? *Knowledge*, v. 16, pp. 90-2, 109-11.
1893 Scheiner, J. Der grosse Sternhaufen im Hercules. *Himmel und Erde*, v. 6, pp. 105-14. (Drawings of nebulosities).
1893 Scheiner, J. Über die Liapunow'schen Messungen im Sternhaufen Messier 13. *A. N.*, v. 132, p. 203.
1894 Burnham, S. W. Seventeenth catalogue of new double stars discovered at the Lick Observatory. *Lick Pub.*, v. 2, pp. 215-6.
1894 Flammarion, C. L'amas d'Hercule. *L'Astronomie*, v. 13, pp. 361-71.
1894 Ranyard, A. C. What is a star cluster? *Knowledge*, v. 17, pp. 204-6 (Plates); p. 226. Photographs of the Milky Way and nebulae (Plate).
1894 Swift, L. Suggestions to amateurs: nebulae and clusters. *Pop. Astr.*, v. 1, pp. 369-71.
1895 See, T. J. J. On the theoretical possibility of determining the distances of star clusters, etc. *A. N.*, v. 139, p. 161.
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NGC 6205 (Cont.)

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1905 Ludendorff, H. Der grosze Sternhaufen im Herkules Messier 13. *Potsdam Pub.*, v. 15, no. 50, pp. 1-56 (Catalogue of 1118 stars).
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1913 Adams, W. S. The spectra of some individual stars in the Hercules cluster. *A. S. P. Pub.*, v. 25, p. 260.
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NGC 6205 (Cont.)

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1931 Schmidt, B. Ein lichtstarkes komafreies Spiegelsystem. *Hamb. Mitt.*, v. 7, no. 36. (Plate).

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NGC 6205 (Cont.)

1904 Perrine, 1904 Webb (photo), 1904, 1907 Holetschek, 1908 Bailey (plate), 1908 Keeler (plate 53), 1909 Perrine, 1910 See (plate), 1911 Fath, 1911*a* Hinks, 1912 See (plate), 1913*ab* von Zeipel, 1913 Chapman, 1913 Fath, 1914 Strömgren and Drachmann, 1915*I*, *II* Plummer (plate), 1915 Melotte, 1915*ab* Bailey, 1916 Wilson, 1916 Eddington, 1916, 1917 Shapley, 1917 Slipher, 1917 Shapley and Davis, 1917 Pease and Shapley, 1917*b* Flammarion, 1918*a* Bailey, 1918 Curtis, 1918 Slipher, 1918*c* Charlier, 1918*Iac*, *IIabd*, *III*, *IVc*, *Va*, *VI* Shapley, 1919*ab* Lundmark, 1919*Iac*, *IIcd* Shapley and Shapley, 1919*ab* Shapley (plate), 1920 Hoffmeister, 1920 Hopmann, 1920 Lous, 1920*abc* Lundmark, 1920*b* Shapley, 1922*I*, *II* Becker, 1922 Kostitzin, 1923 Lundborg, 1923 von Zeipel, 1924 ten Bruggencate, 1924*I*, *II* Silberstein, 1924 Vogt, 1925 Larink, 1925 Nabokov, 1925 Strömberg, 1925*b*, 1926 Doig, 1926 Reinmuth, 1926*I* Vorontsov-Velyaminov, 1926*abcdef*, 1927*abcd* Parvulesco, 1927*abcdeghi* ten Bruggencate (plate), 1927 Kienle, 1927 Sawyer and Shapley, 1927 Lönnquist, 1927*I*, *II* Shapley and Sawyer, 1928 van Rhijn, 1928 Voûte, 1929 Cannon, 1929*ab* Shapley and Sawyer, 1930 Heckmann and Siedentopf, 1930 Parenago, 1930*aefgknq*[1] Shapley, 1931 Harrison, 1931 Nabokov, 1932 Bernheimer, 1932 Moore, 1932, 1933 van de Kamp, 1932*b* Sawyer, 1933 Vyssotsky and Williams, 1934, 1935 Lundmark, 1935*abc* Edmondson, 1935 Shiveshwarkar, 1935 Mineur, 1935*a* Sawyer, 1935 Shapley and Sayer, 1936 Duryea, 1936*ab* Stebbins and Whitford, 1937 Wilkens, 1939*a* Hachenberg, 1939*ab* Sawyer, 1940 Christie, 1941 de Kort, 1941 Copeland, 1943 Cuffey, 1943, 1944 Shapley, 1945 Finlay-Freundlich, 1945 Sawyer, 1946*ab* Mayall, 1946*ab* Mowbray.

NGC 6218 (Messier 12) $\alpha\ 16^h\ 44^m.6$, $\delta\ -01°\ 52'$ $l\ 343°$, $b\ +25°$

1771 Messier, C. First observation, 1764 May 30. On second chart of comet of 1769, *Mém*, 1775, pl. IX.

1919 Sanford, R. F. Radial velocities of clusters. *Mt. W. Rep.*, no. 15, p. 250.

1925 Parvulesco, C. Sur la distribution des étoiles dans les amas globulaires M 9, M 10, M 12 et la théorie cinétique des gaz. *C.R.*, v. 181, pp. 500-2.

1929 Heckmann, O., and Siedentopf, H. Über die Struktur der kugelförmigen Sternhaufen. *Gött. Veröff.* no. 6; *Z.f. Phys.*, v. 54, p. 183.

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1938 Sawyer, H. B. The light curves of two variable stars in the globular clusters NGC 6218 and NGC 6254. *Dunlap Pub.*, v. 1, pp. 59-68.

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NGC 6218 (Cont.)

Shapley, 1922*I* Becker, 1923 Lundborg, 1923 Wirtz, 1925 Nabokov, 1925 Strömberg, 1925*b*, 1926 Doig, 1926 Nabokov, 1926 Reinmuth, 1926*II* Vorontsov-Velyaminov, 1926*df*, 1927*d* Parvulesco, 1927*g* ten Bruggencate, 1927 Kienle, 1927 Sawyer and Shapley, 1927*I*, *II* Shapley and Sawyer, 1928 van Rhijn, 1928 Voûte, 1929*ab* Shapley and Sawyer, 1929 Vorontsov-Velyaminov, 1930*anq* Shapley, 1931 Nabokov, 1932 Bernheimer, 1932 Moore, 1932, 1933 van de Kamp, 1933 Sawyer, 1933 Stebbins, 1933 Vyssotsky and Williams, 1935*abd* Edmondson, 1935 Shiveshwarkar, 1935 Mineur, 1935 Shapley and Sayer, 1936 Duryea, 1936*ab* Stebbins and Whitford, 1937 Wilkens, 1939*ab* Sawyer, 1940 Christie, 1941 de Kort, 1941 Copeland, 1944 Shapley, 1945 Sawyer, 1946*ab* Mayall, 1946*ab* Mowbray.

NGC 6229 $\alpha\ 16^h\ 45^m.6$, $\delta\ +47°\ 37'$ $l\ 40°$, $b\ +39°$

1789 Herschel, W. First observation 1785, May 12.

1839 Bianchi, J. Schreiben des Herrn *Bianchi*, Directors der Sternwarte zu Modena, an den Herausgeber. *A. N.*, v. 16, pp. 371-4.

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1881 Smyth, W. H., and Chambers, G. F. *A cycle of celestial objects*, p. 472. (Discussion of this cluster as a "prize comet" of 1819).

1917 Davis, H. Five new variable stars in globular clusters. *A. S. P. Pub.*, v. 29, p. 260.

1917 Shapley, H. Descriptive notes relative to nine clusters. *A. S. P. Pub.*, v. 29, p. 185.

1919 Lundmark, K., and Lindblad, B. Photographic effective wave-lengths of nebulae and clusters. Second paper. *Ap. J.*, v. 50, pp. 376-90.

1922 Slipher, V. M. Further notes on spectrographic observations of nebulae and clusters. (Abs.) *Pop. Astr.*, v. 30, pp. 9-11.

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1789 W. Herschel IV 50, 1856 d'Arrest, 1862*IIa* Auwers, 1862 Schönfeld, 1864 J. Herschel 4244, 1865*a* Rümker, 1866 Huggins, 1867 Schmidt, 1867 Vogel, 1867 d'Arrest, 1874 Schultz, 1876 Bredichin, 1877*a* Holden, 1878*a* Dreyer, 1880 Earl of Rosse, 1882 Engelmann, 1886 d'Engelhardt, 1891-*c* Bigourdan, 1891 Kempf, 1894 Loewy and Périgaud, 1895*ab* Mönnichmeyer, 1903 Merecki, 1904 Webb, 1904, 1907 Holetschek, 1908 Bailey, 1909 Perrine, 1911 Wirtz, 1911 Fath, 1911*a* Hinks, 1912 Curtis, 1915 Melotte, 1915*a* Bailey, 1917 Pease and Shapley, 1918 Curtis, 1918*c* Charlier, 1918*IIbdg* Shapley, 1919*IIcd* Shapley and Shapley, 1920*a* Lundmark, 1920*b* Shapley, 1922*I* Becker, 1923 Lundborg, 1924 Vogt, 1925 Nabokov, 1925 Strömberg, 1925*b* Doig, 1926*af* Parvulesco, 1926 Reinmuth, 1927 Sawyer and Shapley, 1927*I*, *II* Shapley and Sawyer, 1928 Voûte, 1929 Cannon, 1929*ab* Shapley and Sawyer, 1930*afnq* Shapley, 1931 Nabokov, 1932 Bernheimer, 1932 Moore, 1932, 1933 van de Kamp, 1934, 1935 Lundmark, 1935*ab* Edmondson, 1935 Shiveshwarkar, 1935 Mineur, 1935 Shapley and Sayer, 1936*ab* Stebbins and Whitford, 1937 Wilkens, 1939*a* Sawyer, 1940 Christie, 1941 de Kort, 1944 Shapley, 1945 Sawyer, 1946*abc* Mayall, 1946*ab* Mowbray.

NGC 6235 $\alpha\ 16^h\ 50^m.4,\ \delta\ -22°\ 06'$ $l\ 327°,\ b\ +12°$

1789 Herschel, W. First observation, 1786 May 26.

1915 Knox Shaw, H. Note on the nebulae and star clusters shown on the Franklin-Adams plates. *M. N.*, v. 76, pp. 106-7.

1946 Mayall, N. U. Says probably NOT a globular cluster.

1789 W. Herschel II 584, 1847 J. Herschel 3653, 1862*IIa* Auwers, 1864 J. Herschel 4246, 1867 Schmidt, 1886 d'Engelhardt, 1891-*c* Bigourdan, 1898*a* Howe, 1904, 1907 Holetschek, 1909 Winnecke, 1910 Porter, 1915 Melotte, 1918*IIeg* Shapley, 1919*IIcd* Shapley and Shapley, 1920*a* Lundmark, 1920*b* Shapley, 1926*f* Parvulesco, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*ab* Shapley and Sawyer, 1930*akn* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1935 Shapley and Sayer, 1936*abc* Stebbins and Whitford, 1940 Christie, 1941 de Kort, 1946*f* Mayall, 1946*a* Mowbray.

NGC 6254 (Messier 10) $\alpha\ 16^h\ 54^m.5,\ \delta\ -04°\ 02'$ $l\ 343°,\ b\ +22°$

1771 Messier, C. First observation, 1764 May 29. On second chart of comet of of 1769, *Mém.* 1775, pl. IX.

1917 Pease, F. G., and Shapley, H. Axes of symmetry in globular clusters. *Mt. W. Comm.*, no. 39; *Nat. Acad. Sci. Proc.*, v. 3, pp. 96-101.

1925 Parvulesco, C. Sur la distribution des étoiles dans les amas globulaires M 9, M 10, M 12 et la théorie cinétique des gaz. *C. R.*, v. 181, pp. 500-2.

1929 Heckmann, O., and Siedentopf, H. Über die Struktur der kugelförmigen Sternhaufen. *Gött. Veröff.* no. 6; *Z. f. Phys.*, v. 54, p. 183.

1931 Barnard, E. E. Micrometric measures of star clusters. *Yerkes Pub.*, v. 6, pp. 74-5.

1938 Sawyer, H. B. One hundred and thirty-two new variable stars in five globular clusters. *Dom. Ap. Pub.*, v. 7, no. 5.

1938 Sawyer, H. B. The light curves of two variable stars in the globular clusters NGC 6218 and NGC 6254. *Dunlap Pub.*, v. 1, pp. 59-68.

1771 Messier, 1777 Bode 33, 1780, 1784 Messier, 1800, 1818*ac*, (1912) W. Herschel, 1833 J. Herschel 1972, 1847 J. Herschel 3659, 1852 Secchi, 1853 Laugier 45, 1855, 1856 d'Arrest, 1861 Earl of Rosse, 1861 Schmidt, 1862*IIb* Auwers, 1864 J. Herschel 4256, 1866 Huggins, 1867 Schmidt, 1867 Vogel, 1867 d'Arrest, 1867*a* Chambers, 1880 Earl of Rosse, 1881 Smyth and Chambers, 1882*b* Flammarion, 1890 d'Engelhardt, 1891-*c* Bigourdan, 1891 Kempf, 1893 Roberts, 1897 Pickering, 1897 Barnard, 1902 Gore, 1904 Webb, 1904, 1907 Holetschek, 1908 Bailey, 1909 Perrine, 1911 Wirtz, 1911*a* Hinks, 1912 Curtis, 1913 Fath, 1915 Melotte, 1915*a* Bailey, 1915 Kritzinger, 1916 Wilson, 1917 Shapley and Davis, 1917 Pease and Shapley, 1917*b* Flammarion, 1918*b* Bailey, 1918 Curtis, 1918*c* Charlier, 1918*IIbd* Shapley, 1919*Iac*, *IIcd* Shapley and Shapley, 1920*a* Lundmark, 1920*b* Shapley, 1922*I* Becker, 1923 Lundborg, 1923 Wirtz, 1925, 1926 Nabokov, 1925*b*, 1926, Doig, 1926*df* Parvulesco, 1926 Reinmuth, 1926*II* Vorontsov-Velyaminov, 1927*g* ten Bruggencate, 1927 Sawyer and Shapley, 1927*d* Parvulesco, 1927*I*, *II* Shapley and Sawyer, 1928 van Rhijn, 1929 Cannon, 1929*ab* Shapley and Sawyer, 1929 Vorontsov-Velyaminov, 1930*an* Shapley, 1931 Nabokov, 1932 Bernheimer, 1932, 1933 van de Kamp, 1933 Sawyer, 1933 Stebbins, 1933 Vyssotsky and Williams, 1935*ab* Edmondson, 1935 Shapley and Sayer, 1936 Duryea, 1936*ab* Stebbins and Whitford, 1937 Wilkens, 1937 Mineur, 1939*ab* Sawyer, 1940 Christie, 1941 de Kort, 1941 Copeland, 1944 Shapley, 1945 Sawyer, 1916*ab* Mayall, 1946*ab* Mowbray.

NGC 6266 (Messier 62) $\alpha\ 16^h\ 58^m.1,\ \delta\ -30^\circ\ 03'$ $l\ 321^\circ,\ b\ +06^\circ$

1780 Messier, C. First observation, 1771 June 7. Position, June 4, 1779.

1898 Pickering, E. C. Variable stars in clusters. *Harv. Circ.*, no. 33; *A. N.*, v. 147, p. 347; *Ap.J.*, v. 8, p. 257. (Asymmetry).

1915 Bailey, S. I. Globular clusters: distribution of stars. *Harv. Ann.*, v. 76, no. 4.

1918 Shapley, H., and Davis, H. Note on the distribution of stars in the globular cluster Messier 5. *A. S. P. Pub.*, v. 30, pp. 164-5.

1922 Slipher, V. M. Further notes on spectrographic observations of nebulae and clusters. (Abs.) *Pop. Astr.*, v. 30, pp. 9-11.

1780 Messier, 1783 Bode, 1784 Messier, 1814*d*, 1818*a* W. Herschel, 1828 Dunlop 627, 1847 J. Herschel 3661 (drawing), 1856 d'Arrest, 1861 J. Herschel, 1862*IIb* Auwers, 1864 J. Herschel 4261, 1867 Schmidt, 1867*a* Chambers, 1881 Smyth and Chambers, 1882*b* Flammarion, 1886- Weinek and Gruss, 1891-*c* Bigourdan, 1897, 1898*II* Pickering, 1902*abc* Bailey, 1902 Gore, 1903 Clerke, 1904 Webb, 1904, 1907 Holetschek, 1908 Bailey, 1909 Perrine, 1909 Winnecke, 1910 See (plate,) 1910 Porter, 1911*a* Hinks, 1912 Curtis, 1913 Chapman, 1913, 1915*ab* Bailey, 1915*I* Plummer, 1915 Melotte, 1916 Jeans, 1917 Shapley and Davis, 1917*c* Flammarion, 1918 Curtis, 1918*c* Charlier, 1918*Ic*, *IIe*, *IVa*, *Vb* Shapley, 1919*Iabc*, *IIcd* Shapley and Shapley, 1920 Barnard, 1920 Hoffmeister, 1920 Lous, 1920*a* Lundmark, 1920*b* Shapley, 1923 Lundborg, 1925 Nabokov, 1925 Strömberg, 1925*d*, 1926 Doig, 1926*f* Parvulesco, 1927*adh* ten Bruggencate, 1927 Sawyer and Shapley, 1927*I*, *II* Shapley and Sawyer, 1928 Voûte, 1929 Cannon, 1929*ab* Shapley and Sawyer, 1929 Vorontsov-Velyaminov, 1930*abfklnq* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1932 Moore, 1933 Vyssotsky and Williams, 1935*ab* Edmondson, 1935 Shiveshwarkar, 1935 Mineur, 1935 Shapley and Sayer, 1936 Duryea, 1936*abc* Stebbins and Whitford, 1937 Wilkens, 1939*a* Sawyer, 1940 Christie, 1941 de Kort, 1941 Copeland, 1945 Finlay-Freundlich, 1946*abc* Mayall, 1946*ab* Mowbray.

NGC 6273 (Messier 19) $\alpha\ 16^h\ 59^m.5,\ \delta\ -26^\circ\ 11'$ $l\ 325^\circ,\ b\ +08^\circ$

1771 Messier, C. First observation, 1764 June 5.

1922 Slipher, V. M. Further notes on spectrographic observations of nebulae and clusters. (Abs.) *Pop. Astr.*, v. 30, pp. 9-11.

1943 Sawyer, H. B. New variable stars in four globular clusters in Ophiuchus. *Dunlap Pub.*, v. 1, no. 14 (plate). Investigations in four faint globular clusters in Ophiuchus. (Abs.) *Am. A. S. Pub.*, v. 10, p. 334. Summary, Federer, *Sky and Telescope*, v. 2, no. 21, p. 12.

1771 Messier, 1777 Bode 35, 1780, 1784 Messier, 1814*c*, 1818*ac* W. Herschel, 1833 J. Herschel 1975, 1847 J. Herschel 3663, 1855, 1856 d'Arrest, 1862*IIb* Auwers, 1864 J. Herschel 4264, 1867*a* Chambers, 1881 Smyth and Chambers, 1882*b* Flammarion, 1890 d'Engelhardt, 1891-*c* Bigourdan, 1894 Loewy and Périgaud, 1902 Gore, 1904 Webb, 1904, 1907 Holetschek, 1908 Bailey, 1909 Perrine, 1910 Porter, 1911*a* Hinks, 1915 Melotte, 1915*a* Bailey, 1917 Shapley and Davis, 1917*b* Flammarion, 1918*b* Bailey, 1918*c* Charlier, 1918*IIe* Shapley, 1919*Iabc*, *IIcd* Shapley and Shapley, 1920 Barnard, 1920 Lous, 1920*a* Lundmark, 1920*b* Shapley, 1922*II* Becker, 1923 Lundborg, 1923 von Zeipel, 1925 Nabokov, 1925 Strömberg, 1925*b*, 1926 Doig, 1926 Nabokov, 1926*f* Parvulesco, 1927*h* ten Bruggencate, 1927 Sawyer and Shapley, 1927*I*, *II* Shapley and Sawyer, 1928 Voûte, 1929 Cannon, 1929*b* Shapley and Sawyer, 1929 Vorontsov-Velyaminov, 1930 Parenago, 1930*abklnq* Shapley, 1931 Nabokov, 1932 Moore, 1932, 1933 van de Kamp, 1933 Vyssotsky and Williams, 1935*ab* Edmondson, 1935 Shiveshwarkar, 1935 Mineur, 1935 Shapley and Sayer, 1936 Duryea, 1936*abc* Stebbins and Whitford, 1937 Wilkens, 1940 Christie, 1941 de Kort, 1941 Copeland, 1945 Finlay-Freundlich, 1946*ab* Mayall, 1946*a* Mowbray.

NGC 6284 $\alpha\ 17^h\ 01^m.5,\ \delta\ -24^\circ\ 41'$ $l\ 326^\circ,\ b\ +09^\circ$

1786 Herschel, W. First observation, 1784 May 22.

1943 Sawyer, H. B. New variable stars in four globular clusters in Ophiuchus. *Dunlap Pub.*, v. 1, no. 14 (plate). (Abs.) Investigations in four faint globular clusters in Ophiuchus. *Am. A. S. Pub.*, v. 10, p. 334. Summary, Federer, *Sky and Telescope*, v. 2, no. 21, p. 12.

1786 W. Herschel VI 11, 1814*d*, 1818*a* W. Herschel, 1833 J. Herschel 1976, 1847 J. Herschel 3665, 1856 d'Arrest, 1862*IIa* Auwers, 1864 J. Herschel 4268, 1867 Schmidt, 1867 d'Arrest, 1875 Schönfeld, 1878*a* Dreyer, 1881 Smyth and Chambers, 1888 Ginzel, 1891-*c* Bigourdan, 1894 Loewy and Périgaud, 1898*a* Howe, 1907 Holetschek, 1908 Bailey, 1909 Perrine, 1910 Porter, 1911 Wirtz, 1911*a* Hinks, 1915 Melotte, 1915*a* Bailey, 1918*c* Charlier, 1918*IIe* Shapley, 1919*Ic*, *IIcd* Shapley and Shapley, 1920*a* Lundmark, 1920*b* Shapley, 1923 Lundborg, 1926 Doig, 1926*f* Parvulesco, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*b* Shapley and Sawyer, 1929 Cannon, 1929 Vorontsov-Velyaminov, 1930 Parenago, 1930*an* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1935 Shapley and Sayer, 1936*ac* Stebbins and Whitford, 1940 Christie, 1941 de Kort, 1946*ab* Mayall, 1946*a* Mowbray.

NGC 6287 $\alpha\ 17^h\ 02^m.1,\ \delta\ -22^\circ\ 38'$ $l\ 328^\circ,\ b\ +10^\circ$

1786 Herschel, W. First observation, 1784 May 21.

1943 Sawyer, H. B. New variable stars in four globular clusters in Ophiuchus. *Dunlap Pub.*, v. 1, no. 14 (plate). (Abs.) Investigations in four faint globular clusters in Ophiuchus. *Am. A. S. Pub.*, v. 10, p. 334. Summary, Federer, *Sky and Telescope*, v. 2, no. 21, p. 12.

1786 W. Herschel II 195, 1847 J. Herschel 3666, 1862*IIa* Auwers, 1864 J. Herschel 4269, 1867 Schmidt, 1881 Smyth and Chambers, 1890 d'Engelhardt, 1891-*c* Bigourdan, 1898*a* Howe, 1904, 1907 Holetschek, 1909 Perrine, 1910 Porter, 1911 Wirtz, 1912 Curtis, 1915 Melotte, 1915*a* Bailey, 1918 Curtis, 1918*c* Charlier, 1918*IIeg* Shapley, 1919*IIcd* Shapley and Shapley, 1920*b* Shapley, 1920*a* Lundmark, 1925, 1926 Nabokov, 1926*f* Parvulesco, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*b* Shapley and Sawyer, 1929 Vorontsov-Velyaminov, 1930 Parenago, 1930*an* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1935 Shapley and Sayer, 1936*abc* Stebbins and Whitford, 1940 Christie, 1941 de Kort, 1946*d* Mayall, 1946*a* Mowbray.

NGC 6293 $\alpha\ 17^h\ 07^m.1,\ \delta\ -26^\circ\ 30'$ $l\ 325^\circ,\ b\ +07^\circ$

1786 Herschel, W. First observation, 1784 May 24.

1915 Knox Shaw, H. Note on the nebulae and star clusters shown on the Franklin-Adams plates. *M. N.*, v. 76, p. 106.

1943 Sawyer, H. B. New variable stars in four globular clusters in Ophiuchus. *Dunlap Pub.*, v. 1, no. 14 (plate). (Abs.) Investigations in four faint globular clusters in Ophiuchus. *Am. A. S. Pub.*, v. 10, p. 334. Summary, Federer, *Sky and Telescope*, v. 2, no. 21, p. 12,

1786 W. Herschel VI 12, 1818*a* W. Herschel, 1833 J. Herschel 1977,1847 J. Herschel 3667, 1855, 1856 d'Arrest, 1862*IIa* Auwers, 1864 J. Herschel 4270, 1881 Smyth and Chambers, 1890 d'Engelhardt, 1891-*ck* Bigourdan, 1894 Loewy and Périgaud, 1907 Holetschek, 1908 Bailey, 1909 Perrine, 1909 Winnecke, 1910 Porter, 1911*a* Hinks, 1915 Melotte, 1915*a*, 1918*b* Bailey, 1918*c* Charlier, 1918*IIe* Shapley, 1919*Ic*, *IIcd* Shapley and Shapley, 1920 Barnard, 1920*a* Lundmark, 1920*b* Shapley, 1923 Lundborg, 1925, 1926 Nabokov, 1926 Doig,

NGC 6293 (Cont.)

1926*II* Vorontsov-Velyaminov, 1926*cf*, 1927*c* Parvulesco, 1927*h* ten Bruggencate, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*b* Shapley and Sawyer, 1929 Cannon, 1929 Vorontsov-Velyaminov, 1930 Parenago, 1930*afn* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1933 Stebbins, 1935 Shapley and Sayer, 1936*ac* Stebbins and Whitford, 1937 Wilkens, 1939*a* Sawyer, 1940 Christie, 1941 de Kort, 1941 Copeland, 1946*ab* Mayall, 1946*a* Mowbray.

NGC 6304 $\alpha\ 17^{h}\ 11^{m}.4,\ \delta\ -29^{\circ}\ 24'$ $l\ 324^{\circ},\ b\ +04^{\circ}$

1789 Herschel, W. First observation, 1786 April 30.

1789 W. Herschel I 147, 1814*e* W. Herschel, 1847 J. Herschel 3670, 1856 d'Arrest, 1862*IIa* Auwers, 1864 J. Herschel 4275, 1881 Smyth and Chambers, 1891-*c* Bigourdan, 1908 Bailey, 1909 Winnecke, 1910 Porter, 1911*a* Hinks, 1915 Melotte, 1915*a* Bailey, 1918*c* Charlier, 1918*IIe* Shapley, 1919*Ic*, *IIc* Shapley and Shapley, 1920 Barnard, 1920*a* Lundmark, 1926*f* Parvulesco, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*b* Shapley and Sawyer, 1929 Cannon, 1929 Vorontsov-Velyaminov, 1930*an* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1933 Stebbins, 1935 Shapley and Sayer, 1936*ac* Stebbins and Whitford, 1940 Christie, 1941 de Kort, 1946*ab* Mayall, 1916*a* Mowbray.

NGC 6316 $\alpha\ 17^{h}\ 13^{m}.4,\ \delta\ -28^{\circ}\ 05'$ $l\ 325^{\circ},\ b\ +04^{\circ}$

1786 Herschel, W. First observation, 1784 May 24.

1786 W. Herschel I 45, 1814*e* W. Herschel, 1847 J. Herschel 3671, 1856 d'Arrest, 1862*IIa* Auwers, 1864 J. Herschel 4279, 1867 d'Arrest, 1881 Smyth and Chambers, 1891-*c* Bigourdan, 1909 Perrine, 1910 Porter, 1915*a* Bailey, 1918*c* Charlier, 1918*IIe*, *IVa* Shapley, 1919*IIc* Shapley and Shapley, 1920*a* Lundmark, 1926*f* Parvulesco, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*b* Shapley and Sawyer, 1929 Cannon, 1929 Vorontsov-Velyaminov, 1930 Parenago, 1930*an* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1933 Stebbins, 1935 Shapley and Sayer, 1936*ac* Stebbins and Whitford, 1940 Christie, 1941 de Kort, 1946*d* Mayall, 1946*a* Mowbray.

NGC 6325 $\alpha\ 17^{h}\ 15^{m}.0,\ \delta\ -23^{\circ}\ 42'$ $l\ 329^{\circ},\ b\ +07^{\circ}$

1847 Herschel, J. First observation, 1835 May 24.

1931 van Maanen, A. Photographs of a few nebulae and clusters. *A. S. P. Pub.*, v. 43, pp. 351-2. Plate XIII.

1847 J. Herschel 3676, 1864 J. Herschel 4283, 1899 Howe, 1910 Porter, 1918 Curtis, 1929*b* Shapley and Sawyer, 1930*ano* Shapley, 1932, 1933 van de Kamp, 1933 Stebbins, 1935 Shapley and Sayer, 1936*abc* Stebbins and Whitford, 1940 Christie, 1941 de Kort, 1946*d* Mayall, 1946*a* Mowbray.

NGC 6333 (Messier 9) $\alpha\ 17^{h}\ 16^{m}.2,\ \delta\ -18^{\circ}\ 28'$ $l\ 333^{\circ},\ b\ +09^{\circ}$

1771 Messier, C. First observation, 1764 May 28.

1916 Shapley, H. A new variable star. *A. S. P. Pub.*, v. 28, p. 282.

1925 Parvulesco, C. Sur la distribution des étoiles dans les amas globulaires M 9, M 10, M 12 et la théorie cinétique des gaz. *C. R.*, v. 181, pp. 500-2.

1771 Messier, 1777 Bode 36, 1780, 1784 Messier, 1800, 1814*d*, 1818*a*, (1912) W. Herschel, 1833 J. Herschel 1979, 1847 J. Herschel 3677, 1852 Secchi, 1861 Earl of Rosse, 1862*IIb* Auwers, 1862 Schönfeld, 1864 J. Herschel 4287, 1867 Vogel, 1867 d'Arrest, 1867*a* Chambers, 1880 Earl of Rosse, 1881 Smyth and Chambers, 1882*b* Flammarion, 1886 d'Engelhardt, 1891-*c* Bigourdan, 1891 Kempf.

NGC 6333 (Cont.)

1894 Loewy and Périgaud, 1902 Gore, 1904 Webb, 1904, 1907 Holetschek, 1908 Bailey, 1909 Perrine, 1909 Winnecke, 1910 Porter, 1911*a* Hinks, 1912 Curtis, 1915 Melotte, 1915*a* Bailey, 1916 Shapley, 1917 Shapley and Davis, 1917 Shapley, 1917*b* Flammarion, 1918*b* Bailey, 1918*c* Charlier, 1918 Curtis, 1918 Slipher, 1918*IIbd*, *Va* Shapley, 1919*b* Lundmark, 1919*IIcd* Shapley and Shapley, 1920 Barnard, 1920*ac* Lundmark, 1920*b* Shapley, 1922*I* Becker, 1923 Lundborg, 1923 Wirtz, 1924*I*, *II* Silberstein, 1925 Strömberg, 1925*b*, 1926 Doig, 1925, 1926 Nabokov, 1926 Reinmuth, 1926*II* Vorontsov-Velyaminov, 1926*df*, 1927*ad* Parvulesco, 1927 Sawyer and Shapley, 1927*I*, *II* Shapley and Sawyer, 1928 van Rhijn, 1928 Voûte, 1929 Cannon, 1929*ab* Shapley and Sawyer, 1929 Vorontsov-Velyaminov, 1930*afnq* Shapley, 1931 Harrison, 1931 Nabokov, 1932 Moore, 1932, 1933 van de Kamp, 1933 Stebbins, 1935*abd* Edmondson, 1935 Shiveshwarkar, 1935 Mineur, 1935 Shapley and Sayer, 1936 Duryea, 1936*abc* Stebbins and Whitford, 1937 Wilkens, 1939*a* Sawyer, 1940 Christie, 1941 de Kort, 1941 Copeland, 1946*ab* Mayall, 1946*ab* Mowbray.

NGC 6341 (Messier 92) α 17^h 15^m.6, δ + 43° 12′ l 35°, b +34°

1779 Bode, J. E. First observation Dec. 27, 1777. *Berliner Jahrbuch für 1782*, p. 156.

1781 Messier, C. Observed by him, 1781 March 18.

1843 Argelander, D. Fr. *Uranometria Nova*, p. 33. Berlin.

1848 Butillon. Sur une nébuleuse et une étoile qui paraissent devoir fixer l'attention des astronomes. *C. R.*, v. 27, p. 112.

1848 Babinet. Remarques sur la note de M. Butillon relative à la nébuleuse no. 92 de Messier. *C. R.*, v. 27, p. 132.

1848 Butillon. Note de M. Butillon en réponse à la note de M. Babinet insérée dans le dernier numéro du Compte Rendu. *C. R.*, v. 27, p. 188.

1864 Huggins, W. On the spectra of some of the nebulae. *Roy. Soc. Phil. Trans.*, v. 154, pp. 437-44; *Phil. Mag.*, v. 31, p. 523; *Am. Jour. Sci.*, ser. 2, v. 40, p. 73 (1865).

1865 Schultz, H. Beobachtungen von Nebelflecken. *A. N.*, v. 65, pp. 297-300.

1865 Schultz, H. Schreiben des Herrn Dr. Herman Schultz an den Herausgeber. *A. N.*, v. 66, p. 47. (Correction to previous paper.)

1876 Trouvelot, L. Drawings of the clusters in Hercules. *Harv. Ann.*, v. 8, pt. 2, plate 25.

1887 Schultz, H. Mikrometrische Bestimmung einiger teleskopischen Sternhaufen. Supp. to *Svenska Ak. Proc.*, v. 12, I, no. 2, pp. 1-43. (Chart).

1894 Swift, L. Suggestions to amateurs: nebulae and clusters. *Pop Astr.*, v. 1, pp. 369-71.

1895 Bobrinskoy, N. (la Comtesse). Étude sur l'amas stellaire C. G. 4294 = M. 92. *Acad. des Sci. St. Petersbourg, Bull.*, ser. 5, v. 3, no. 2, pp. 163-72 (2 plates, one chart).

1899 Barnard, E. E. Triangulation of star clusters. *Am. A. S. Pub.*, v. 1, p. 77; *Science*, v. 10, p. 789.

1899 Holetschek, J. Ueber den Helligkeitseindruck von Nebelflecken und Sternhaufen. *A. G. Viert.*, v. 33, p. 270.

1902 Küstner, F. Bonn report. *A. G. Viert.*, v. 36, p. 85 (Mönnichmeyer's work).

1902 Barnard, E. E. Micrometrical measures of individual stars in the great globular clusters. *Am. A. S. Pub.*, v. 1, p. 193; *Science*, v. 17, p. 330, 1903.

NGC 6341 (Cont.)

1906 Bohlin, K. Der zweite Sternhaufen im Hercules, Messier 92. *Stockholm Pub.*, v. 8, p. 3.
1907 Bohlin, K. Ausmessung des zweite Sternhaufens im Hercules (Messier 92). *A. N.*, v. 174, p. 203.
1907 Barnard, E. E. On the motion of the stars in the cluster Messier 92. *A. N.*, v. 176, p. 17; p. 21, Second paper.
1909 Barnard, E. E. On the proper motion of some of the small stars in the dense cluster M 92 Herculis. *Am. A. S. Pub.*, v. 1, p. 323.
1909 Barnard, E. E. On the motion of some of the stars of Messier 92 (Hercules). *A. N.*, v. 182, p. 305; *Pop. Astr.*, v. 18, p. 3.
1916 Kohlman, A. F. Star clusters: some observations and comparisons. *Soc. Pract. Astr., Monthly Reg.*, v. 8, pp. 25-6.
1919 Lundmark, K., and Lindblad, B. Photographic effective wave-lengths of nebulae and clusters. Second paper. *Ap. J.*, v. 50, pp. 376-90.
1923 Hopmann, J. Über die kosmische Stellung der Kugelhaufen und Spiralnebel. *A. N.*, v. 218, pp. 97-110.
1924 Nabokov, M. La grandeur stéllaire intégrale d'amas et de nébuleuses. *Rus. A. J.*, v. 1 (1), pp. 115-18.
1925 Guthnick, P. Kugelhaufen, inbesondere über gemeinsam mit Herrn R. Prager begonnene Untersuchungen an M 3, M 13, M 15, und M 92. (Abs.) *Preuss. Ak. Wiss. Phys.-Math. Kl. Sitz.*, no. 28, p. 508.
1928 Balanowsky, J. Die Eigenbewegung des kugelförmigen Sternhaufens Messier 92 (N.G.C. 6341). *Poulk. Bull.*, v. 11, pp. 167-82; *C. R. Acad. U.S.S.R.*, v. 21, p. 364.
1930 de Sitter, A. A comparison of the angular dimensions of the globular clusters M 3 and M 13. *B. A. N.*, v. 5, pp. 207-9.
1930 Hopmann, J. Der kugelförmige Sternhaufen M 92 im Hercules. *Roma, Mem. Acad. Sci.*, ser. 2, v. 14, pp. 167-202.
1931 Barnard, E. E. Micrometric measures of star clusters. *Yerkes Pub.*, v. 6, pp. 76-81.
1932 Hogg, F. S. The distribution of light in six globular clusters. *A. J.*, v. 42, pp. 77-87.
1934 Schlesinger, F. Relative positions of 72 stars in the globular cluster Messier 92 ($17^h\ 14^m$, $+43^\circ\ 15'$, 1900). *A. J.*, v. 44, pp. 21-2.
1936 Lohmann, W. Die Verteilung des Lichtes in den kugelförmigen Sternhaufen M 5, M 15 und M 92. *Z. f. Ap.*, v. 12, no. 1, pp. 1-39.
1937 Guthnick, P. Berlin-Babelsberg report. *A. G. Viert.*, v. 72, p. 160.
1937 Nassau, J. J. Report of the Warner and Swasey observatory, 1936-1937. *Am. A. S. Pub.*, v. 9, p. 92.
1938 Nassau, J. J. A study of the globular cluster Messier 92. *Ap. J.*, v. 87, pp. 361-6; *Perkins Cont.*, no. 9.
1939 Hachenberg, O. Der Aufbau des kugelförmigen Sternhaufen Messier 92. *Z. f. Ap.*, v. 18, pp. 49-88.
1944 Oosterhoff, P. Th. The periods of the variables 8, 9, 11 and 12 in the globular cluster M 92. *B. A. N.*, v. 10, pp. 55-8.

NGC 6341 (Cont.)

1781 Méchain, 1783 Bode, 1784 Messier, 1801 Lalande 31544, 1814*c*, 1818*abc* W. Herschel, 1862*I*, *IIb* Auwers, 1862 Schönfeld, 1864*a* J. Herschel 4294, 1864 Rümker, 1865 Auwers, 1867 Schmidt, 1867 Vogel, 1867 d'Arrest, 1867*ab* Chambers, 1868 Webb, 1874 Schultz, 1876 Bredichin, 1880 Earl of Rosse, 1881 Smyth and Chambers (fig. 36), 1882 Engelmann, 1882*b* Flammarion, 1890 d'Engelhardt, 1891-*c* Bigourdan, 1893 Roberts, 1894 Loewy and Périgaud, 1894 Gore, 1897 Barnard, 1899 Rabourdin, 1902 Gore, 1904 Webb, 1904, 1907 Holetschek, 1908 Bailey, 1909 Perrine, 1911 Fath, 1911*a* Hinks, 1912 Curtis, 1913*b* von Zeipel, 1915 Melotte, 1915*a* Bailey, 1916 Wilson, 1917 Shapley and Davis, 1917 Pease and Shapley, 1917*d* Flammarion, 1918*b* Bailey, 1918 Curtis, 1918 Slipher, 1918*c* Charlier, 1918*IIbd*, *Va* Shapley, 1919*ab* Lundmark, 1919*Iac*, *IIcd* Shapley and Shapley, 1920*abc* Lundmark, 1920*b* Shapley, 1922*I* Becker, 1923 Lundborg, 1924*I*, *II* Silberstein, 1924 Vogt, 1925 Strömberg, 1925*b*, 1926 Doig, 1926*af* Parvulesco, 1926 Reinmuth, 1926*I* Vorontsov-Velyaminov, 1927*h* ten Bruggencate, 1927 Sawyer and Shapley, 1927*I*, *II* Shapley and Sawyer, 1928 van Rhijn, 1928 Voûte, 1929 Cannon, 1929*ab* Shapley and Sawyer, 1930 Heckmann and Siedentopf, 1930 *afknq* Shapley, 1931 Harrison, 1931 Nabokov, 1932 Bernheimer, 1932, 1933 van de Kamp, 1932 Moore, 1933 Vyssotsky and Williams, 1934, 1935 Lundmark, 1935*abc* Edmondson, 1935 Shiveshwarkar, 1935 Mineur, 1936*ab* Stebbins and Whitford, 1937 Wilkens, 1939*a* Sawyer, 1940 Christie, 1941 de Kort, 1941 Copeland, 1944 Shapley, 1944*II*, 1945 Sawyer, 1946*abc* Mayall, 1946*ab* Mowbray.

NGC 6342 $\alpha\ 17^{h}\ 18^{m}.2$, $\delta\ -19°\ 32'$ $l\ 333°$, $b\ +08°$

1789 Herschel, W. First observation, 1786 May 28.

1919 Hubble, E. (Two new globular clusters). *Mt. W. Rep.* no. 9, for 1919, p. 233, cited in *Harv. Bull.* no. 776, 1922.

1789 W. Herschel I 149, 1856 d'Arrest, 1862*IIa* Auwers, 1864 J. Herschel 4293, 1875 Schönfeld, 1891-*c* Bigourdan, 1907 Holetschek, 1909 Winnecke, 1910 Porter, 1922*a* Shapley, 1923 Wirtz, 1926*f* Parvulesco, 1926 Reinmuth, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*b* Shapley and Sawyer, 1930*ano* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1933 Stebbins, 1935 Shapley and Sayer, 1936*ac* Stebbins and Whitford, 1940 Christie, 1941 de Kort, 1946*d* Mayall, 1946*a* Mowbray.

NGC 6352 $\alpha\ 17^{h}\ 21^{m}.6$, $\delta\ -48°\ 26'$ $l\ 309°$, $b\ -08°$

1828 Dunlop, J. First observation.

1885 Barnard, E. E. Large nebula not in G.C. *Sid. Mess.*, v. 4, p. 223.

1828 Dunlop 417, 1908 Bailey, 1915 Melotte, 1918*IIe* Shapley, 1919*IIc* Shapley and Shapley, 1926*f* Parvulesco, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*b* Shapley and Sawyer, 1930*acn* Shapley, 1931 Collinder, 1931 Nabokov, 1935 Shapley and Sayer, 1946*d* Mayall.

NGC 6355 $\alpha\ 17^{h}\ 20^{m}.9$, $\delta\ -26°\ 19'$ $l\ 327°$, $b\ +04°$

1786 Herschel, W. First observation, 1784 May 24.

1946 Mayall, N. U. Cites this as a new globular cluster.

1786 W. Herschel I 46, 1847 J. Herschel 3681, 1862*IIa* Auwers, 1864 J. Herschel 4295, 1910 Porter, 1919*IIac* Shapley and Shapley, 1922*b* Shapley, 1926*f* Parvulesco, 1931 Collinder, 1946*de* Mayall.

NGC 6356 $\alpha\ 17^h\ 20^m.7,\ \delta\ -17^\circ\ 46'$ $l\ 334^\circ,\ b\ +09^\circ$

1786 Herschel, W. First observation, 1784 June 17.

1786 W. Herschel I 48, 1814*e* W. Herschel, 1847 J. Herschel 3683, 1856 d'Arrest, 1862 Schönfeld, 1862*IIa* Auwers, 1864 J. Herschel 4296, 1867 Schmidt, 1867 Vogel, 1867 d'Arrest, 1881 Smyth and Chambers, 1882 Engelmann, 1886 d'Engelhardt, 1888 Ginzel, 1891 Kempf, 1891-*c* Bigourdan, 1894 Loewy and Périgaud, 1895*ab* Mönnichmeyer, 1898*b* Howe, 1904, 1907 Holetschek, 1908 Bailey, 1909 Perrine, 1909 Winnecke, 1910 Porter, 1911*a* Hinks, 1912 Curtis, 1915 Melotte, 1915*a* Bailey, 1918 Curtis, 1918*c* Charlier, 1918*IIbd* Shapley ,1919*IIcd* Shapley and Shapley, 1920*a* Lundmark, 1920*b* Shapley, 1922*I* Becker, 1923 Lundborg, 1923 Wirtz, 1925, 1926 Nabokov, 1926*f* Parvulesco, 1926 Reinmuth, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*ab* Shapley and Sawyer, 1929 Cannon, 1929 Vorontsov-Velyaminov, 1930*akno* Shapley, 1931 Nabokov, 1933 Stebbins, 1935 Shapley and Sayer, 1936*abc* Stebbins and Whitford, 1937 Wilkens, 1940 Christie, 1941 de Kort, 1941 Copeland, 1945 Finlay-Freundlich, 1946*abc* Mayall, 1946*ab* Mowbray.

NGC 6362 $\alpha\ 17^h\ 26^m.6,\ \delta\ -67^\circ\ 01'$ $l\ 293^\circ,\ b\ -18^\circ$

1828 Dunlop, J. First observation.

1919 Woods, I. E. Variable stars in the cluster, N.G.C. 6362. *Harv. Circ.*, no. 217.

1922 Shapley, H. New faint cluster variable (near N.G.C. 6362). *Harv. Bull.*, no. 777.

1828 Dunlop 225, 1847 J. Herschel 3684, 1864 J. Herschel 4300, 1881 Smyth and Chambers, 1915 Melotte, 1915*a*, 1918*b* Bailey, 1918*c* Charlier, 1918*IIe* Shapley, 1919*Ic*, *IIc* Shapley and Shapley, 1920*a* Lundmark, 1926*f* Parvulesco, 1927*h* ten Bruggencate, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*b* Shapley and Sawyer, 1930*afkn* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1935 Shapley and Sayer, 1939*a* Sawyer, 1941 de Kort, 1946*d* Mayall.

NGC 6366 $\alpha\ 17^h\ 25^m.1,\ \delta\ -05^\circ\ 02'$ $l\ 346^\circ,\ b\ +15^\circ$

1862 Winnecke, A. First observation, 1860 April 12. See Auwers, 1862*IId*.

1928 Baade, W. Der Sternhaufen N.G.C. 5053. *Hamb. Mitt.*, v. 6, no. 29; *A. N.*, v. 232, p. 200. (Comparison).

1940 Sawyer, H. B. Twelve new variable stars in the globular clusters NGC 6205, NGC 6366, and NGC 6779. (Plate). *Dunlap Pub.*, v. 1, no. 5.

1862*IId* Auwers, 1864 J. Herschel 4301, 1867 d'Arrest, 1891-*c* Bigourdan, 1915 Melotte, 1918 Curtis, 1919*IIabc* Shapley and Shapley, 1926*f* Parvulesco, 1926 Reinmuth, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*b* Shapley and Sawyer, 1930*an* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1933 Stebbins, 1936*ab* Stebbins and Whitford, 1939*a* Sawyer, 1941 de Kort, 1946*d* Mayall, 1946*a* Mowbray.

NGC 6388 $\alpha\ 17^h\ 32^m.6,\ \delta\ -44^\circ\ 43'$ $l\ 313^\circ,\ b\ -08^\circ$

1828 Dunlop, J. First observation.

1828 Dunlop 457 (fig. 18), 1847 J. Herschel 3690, 1864 J. Herschel 4307, 1881 Smyth and Chambers, 1904*a* Webb, 1908 Bailey (plate), 1911*a* Hinks, 1915 Melotte, 1915*a* Bailey, 1918*c* Charlier, 1918*IIe* Shapley, 1919*IIc* Shapley and Shapley, 1920*a* Lundmark, 1923 Lundborg, 1925*f* Doig, 1926*f* Parvulesco, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*b* Shapley and Sawyer, 1929 Cannon, 1930*an* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1935 Shapley and Sayer, 1941 de Kort, 1941 Copeland, 1945 Finlay-Freundlich, 1946*d* Mayall.

NGC 6397 α 17^h 36^m.8, δ − 53° 39′ l 306°, b − 13°

1755 Lacaille, Abbé de. First observation.

1932 Sawyer, H. B. Periods and light curves of thirty-two variable stars in the globular clusters N.G.C. 362, 6121, and 6397. *Harv. Circ.*, no. 366. Pt. 3. (Abs.) The periods of thirty-six variable stars in four globular clusters. *Am. A. S. Pub.*, v. 7, p. 35, 1931.

1755 Lacaille III 11, 1828 Dunlop 366, 1847 J. Herschel 3692, 1861 J. Herschel, 1862*IIc* Auwers, 1864 J. Herschel 4311, 1867*a* Chambers, 1868 Webb, 1881 Smyth and Chambers, 1882*b* Flammarion, 1895, 1898*II* Pickering, 1902*abc*, 1908 Bailey, 1911*a* Hinks, 1915 Melotte, 1915*a*, 1918*a* Bailey, 1918*c* Charlier, 1918*IIe*, *Vb* Shapley, 1919*Ic*, *IIc* Shapley and Shapley, 1920 Hoffmeister, 1920*a* Lundmark, 1923 Lundborg, 1925 Nabokov, 1926*cf*, 1927*c* Parvulesco, 1927*h* ten Bruggencate, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*ab* Shapley and Sawyer, 1929 Cannon, 1930*afknp* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1932*b* Sawyer, 1935 Shapley and Sayer, 1939*ab* Sawyer, 1941 de Kort, 1946*d* Mayall.

NGC 6401 α 17^h 35^m.6, δ − 23° 53′ l 331°, b + 03°

1786 Herschel, W. First observation, 1784 May 21.

1919 *Mt. W. Rep.*, no 9, p. 233, mentions photo by Pease.

1946 Mayall, N. U. Cites this as a new globular cluster.

1786 W. Herschel I 44, 1833 J. Herschel 1982, 1847 J. Herschel 3697, 1862*IIa* Auwers, 1864 J. Herschel 4314, 1910 Porter, 1918 Curtis, 1946*de* Mayall, 1946*a* Mowbray.

NGC 6402 (Messier 14) α 17^h 35^m.0, δ − 03° 13′ l 349°, b + 13°

1771 Messier, C. First observation, 1764 June 1. On chart of comet of 1769, *Mém.*, 1775, pl. IX.

1827 Harding. Beobachtungen und Nachrichten. *Berliner Jahrbuch*, p. 134. (Letter to Dr. Westphal with list of nebulae).

1857 Winnecke, A. Notiz über Nebelflecke. *A. N.*, v. 45, pp. 247-50.

1917 Shapley, H. Descriptive notes relative to nine clusters. *A. S. P. Pub.*, v. 29, p. 185.

1937 Sawyer, H. B. Variable stars in the globular cluster N.G.C. 6402. *R. A. S. C. Jour.*, v. 31, pp. 57-9.

1938 Sawyer, H. B. One hundred and thirty-two new variable stars in five globular clusters. *Dom. Ap. Pub.*, v. 7, no. 5. (Plate).

1942 Scheuer, S. Some astronomical methods. *Sky and Telescope*, v. 1, no. 8, p. 9. (Photos).

1771 Messier, 1777 Bode 37, 1780, 1784 Messier, 1800, 1814*d*, 1818*a*, (1912) W. Herschel, 1833 J. Herschel 1983, 1847 J. Herschel 3698, 1861 J. Herschel, 1862 Schönfeld, 1862*IIb* Auwers, 1864 J. Herschel 4315, 1866 Huggins, 1867 Schmidt, 1867 d'Arrest, 1867*ab* Chambers, 1875 Schönfeld, 1878*b* Dreyer, 1880 Earl of Rosse, 1881 Smyth and Chambers, (fig. 37), 1882*ab* Flammarion, 1891-*c* Bigourdan, 1895 Mönnichmeyer, 1899 Roberts, 1902 Gore, 1904 Webb, 1904, 1907 Holetschek, 1908 Bailey, 1909 Perrine, 1909 Winnecke, 1910 See (plate), 1910 Porter, 1911*a* Hinks, 1912 Curtis, 1915 Melotte, 1915*a* Bailey, 1915 Kritzinger, 1916 Shapley, 1917 Shapley and Davis, 1917 Pease and Shapley, 1917 Shapley, 1917*b* Flammarion, 1918 Curtis, 1918*c* Charlier, 1918*IIbd* Shapley, 1919*Iac*, *IIcd* Shapley and Shapley, 1920*a* Lundmark, 1920*b* Shapley, 1922*I* Becker, 1923 Lundborg, 1923 Wirtz, 1925 Nabokov, 1925*b*, 1926 Doig, 1926

NGC 6402 (Cont.)

Nabokov, 1926 Reinmuth, 1926 *II* Vorontsov-Velyaminov, 1926*f*, 1927*a* Parvulesco, 1927 Sawyer and Shapley, 1927*h* ten Bruggencate, 1927*I*, *II* Shapley and Sawyer, 1928 van Rhijn, 1929*ab* Shapley and Sawyer, 1929 Vorontsov-Velyaminov, 1930 Parenago, 1930*abkn* Shapley, 1931 Nabokov, 1932 Bernheimer, 1932, 1933 van de Kamp, 1933 Sawyer, 1933 Stebbins, 1935*abd* Edmondson, 1935 Shapley and Sayer, 1936 Duryea, 1936*ab* Stebbins and Whitford, 1937 Wilkens, 1938, 1939*ab* Sawyer, 1940 Christie, 1941 de Kort, 1941 Copeland, 1942*a* Sawyer, 1946*ab* Mayall, 1946*ab* Mowbray.

NGC 6426 $\alpha\ 17^h\ 42^m.4$, $\delta\ +03°\ 12'$ $l\ 356°$, $b\ +15°$

1789 Herschel, W. First observation, 1786 June 3.

1876 Stéphan, E. Nébuleuses découvertes et observées à l'observatoire de Marseille. *C. R.*, v. 83, p. 328.

1789 W. Herschel II 587, 1862*IIa* Auwers, 1864 J. Herschel 4325, 1867 d'Arrest, 1878*c* Dreyer, 1891-*c* Bigourdan, 1909 Winnecke, 1918 Curtis, 1919*IIac* Shapley and Shapley, 1926*f* Parvulesco, 1926 Reinmuth, 1927 Sawyer and Shapley, 1927*I*, *II* 1929*b* Shapley and Sawyer, 1930*acfn* Shapley, 1931 Nabokov, 1933 Stebbins, 1934, 1935 Lundmark, 1936*ab* Stebbins and Whitford, 1939*a* Sawyer, 1940 Christie, 1941 de Kort, 1946*d* Mayall, 1946*a* Mowbray.

No Number $\alpha\ 17^h\ 45^m.7$, $\delta\ -60°\ 45'$ $l\ 300°$, $b\ -17°$

1936 Shapley, H. Five planetary nebulae and a globular cluster. *Harv. Bull.*, no. 902, p. 26. (Object appears as faint, remote globular cluster).

NGC 6440 $\alpha\ 17^h\ 45^m.9$, $\delta\ -20°\ 21'$ $l\ 335°$, $b\ +02°$

1789 Herschel, W. First observation, 1786 May 28.

1918 Curtis, H. D. A spiral nebula in the Milky Way. *A. S. P. Pub.*, v. 30, p. 161.

1931 van Maanen, A. Photographs of a few nebulae and clusters. *A. S. P. Pub.*, v. 43, pp. 351-2, Plate XIII.

1934 Humason, M. L. The radial velocities of three globular clusters. *A. S. P. Pub.*, v. 46, p. 357.

1937 Baade, W. Stellar photography in the red region of the spectrum. *Am. A.S. Pub.*, v. 9, p. 31; *I. A. U. Trans.*, v. 6, p. 452, 1938.

1789 W. Herschel I 150, 1833 J. Herschel 1985, 1862*IIa* Auwers, 1864 J. Herschel 4331, 1867 d'Arrest, 1874 Schönfeld, 1891-*c* Bigourdan, 1893 Stone, 1907 Holetschek, 1909 Winnecke, 1910 Porter, 1918 Curtis, 1919*IIac* Shapley and Shapley, 1926*f* Parvulesco, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*b* Shapley and Sawyer, 1930*akno* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1933 Stebbins, 1935*abd* Edmondson, 1935 Shiveshwarkar, 1935 Mineur, 1936*abc* Stebbins and Whitford, 1940 Christie, 1941 de Kort, 1946*ab* Mayall, 1946*a* Mowbray.

NGC 6441 $\alpha\ 17^h\ 46^m.8$, $\delta\ -37°\ 02'$ $l\ 321°$, $b\ -06°$

1828 Dunlop, J. First observation.

1828 Dunlop 557, 1847 J. Herschel 3705, 1864 J. Herschel 4332, 1881 Smyth and Chambers, 1908 Bailey, 1910 Porter, 1911*a* Hinks, 1915 Melotte, 1915*a* Bailey, 1918*c* Charlier, 1918*IIeg* Shapley, 1919*IIc* Shapley and Shapley, 1920*a* Lundmark, 1923 Lundborg, 1925 Nabokov, 1925*f* Doig, 1926*f* Parvulesco, 1927 Sawyer

NGC 6441 (Cont.)

and Shapley, 1927*I*, *II*, 1929*b* Shapley and Sawyer, 1929 Cannon, 1930*akn* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1933 Stebbins, 1935 Shapley and Sayer, 1936*ac* Stebbins and Whitford, 1940 Christie, 1941 de Kort, 1941 Copeland, 1946*ab* Mayall, 1946*a* Mowbray.

NGC 6453 $\alpha\ 17^h\ 48^m.0$, $\delta\ -34°\ 37'$ $l\ 323°$, $b\ -05°$

1847 Herschel, J. First observation, 1837 June 8.

1847 J. Herschel 3708, 1864 J. Herschel 4336, 1910 Porter, 1922*a* Shapley, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*b* Shapley and Sawyer, 1930*ano* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1933 Stebbins, 1935 Shapley and Sayer, 1936*ac* Stebbins and Whitford, 1941 de Kort, 1946*d* Mayall, 1946*a* Mowbray.

NGC 6496 $\alpha\ 17^h\ 55^m.5$, $\delta\ -44°\ 15'$ $l\ 316°$, $b\ -11°$

1828 Dunlop, J. First observation.

1828 Dunlop 460? (fig. 19), 1847 J. Herschel 3715, 1864 J. Herschel 4347, 1881 Smyth and Chambers, 1915 Melotte, 1918*ab* Charlier, 1918*IIf* Shapley, 1919*IIac* Shapley and Shapley, 1922*a* Shapley, 1926*f* Parvulesco, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*b* Shapley and Sawyer, 1930*an* Shapley, 1931*a* Collinder, 1932, 1933 van de Kamp, 1935 Shapley and Sayer, 1941 de Kort, 1941 Copeland, 1946*d* Mayall.

NGC 6517 $\alpha\ 17^h\ 59^m.1$, $\delta\ -08°\ 57'$ $l\ 347°$, $b\ +05°$

1786 Herschel, W. First observation, 1784 June 16.

1922 Shapley, H. N.G.C. 2419. *Harv. Bull.*, no. 776; *Pop. Astr.*, v. 30, p. 590.

1786 W. Herschel II 199, 1847 J. Herschel 3719, 1862*IIa* Auwers, 1864 J. Herschel 4357, 1866 Huggins, 1867 d'Arrest, 1874 Schönfeld, 1891-*c* Bigourdan, 1909 Winnecke, 1910 Porter, 1912 Curtis, 1915 Melotte, 1918 Curtis, 1919*IIac* Shapley and Shapley, 1923 Wirtz, 1925 Nabokov, 1926*f* Parvulesco, 1926 Reinmuth, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*b* Shapley and Sawyer, 1930*akno* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1933 Stebbins, 1936*ab* Stebbins and Whitford, 1940 Christie, 1941 de Kort, 1946*d* Mayall, 1946*a* Mowbray.

NGC 6522 $\alpha\ 18^h\ 00^m.4$, $\delta\ -30°\ 02'$ $l\ 329°$, $b\ -05°$

1786 Herschel, W. First observation, 1784 June 24.

1946 Baade, W. A search for the nucleus of our galaxy. *A.S.P. Pub.*, v. 58, pp. 249-52. (Distance of 6522).

1786 W. Herschel I 49, 1847 J. Herschel 3720, 1856 d'Arrest, 1862*IIa* Auwers, 1864 J. Herschel 4359, 1867 Schmidt, 1881 Smyth and Chambers, 1891-*c* Bigourdan, 1909 Perrine, 1910 Porter, 1915*a* Bailey, 1918*c* Charlier, 1920*a* Lundmark, 1929*b* Shapley and Sawyer, 1930*an* Shapley, 1932, 1933 van de Kamp, 1933 Stebbins, 1936*ac* Stebbins and Whitford, 1940 Christie, 1941 de Kort, 1946*d* Mayall, 1946*a* Mowbray.

NGC 6528 $\alpha\ 18^h\ 01^m.6$, $\delta\ -30°\ 04'$ $l\ 328°$, $b\ -06°$

1786 Herschel, W. First observation, 1784 June 24.

1786 W. Herschel II 200, 1847 J. Herschel 3723, 1862*IIa* Auwers, 1864*a* J. Herschel 4364, 1867 Schmidt, 1891-*c* Bigourdan, 1910 Porter, 1915*a* Bailey, 1918*c* Charlier, 1920 Barnard, 1920*a* Lundmark, 1929*b* Shapley and Sawyer, 1930*ano* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1933 Stebbins, 1936*ac* Stebbins and Whitford, 1940 Christie, 1941 de Kort, 1946*d* Mayall, 1946*a* Mowbray.

NGC 6535 α 18^h 01^m.3, δ − 00° 18′ l 355°, b + 09°

1852 Hind, J. R. New nebula. *M. N.*, v. 12, p. 208.

1946 Mayall, N. U. Says probably *not* a globular cluster.

1862*IId* Auwers, 1864 J. Herschel 4369, 1890 d'Engelhardt, 1891-*c* Bigourdan, 1909 Winnecke, 1910 Porter, 1915 Melotte, 1918*IIf* Shapley, 1919*IIac* Shapley and Shapley, 1926*f* Parvulesco, 1926 Reinmuth, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*ab* Shapley and Sawyer, 1930*acn* Shapley, 1931 Nabokov, 1933 Stebbins, 1936*ab* Stebbins and Whitford, 1939*a* Sawyer, 1941 de Kort, 1946*f* Mayall.

NGC 6539 α 18^{h}02^m.1, δ − 07° 35′ l 349°, b + 05°

1856 Brorson, T. Entdeckung und Beobachtungen von Herrn Observator Theodor Brorson. *Jahn's Unterh.*, p. 292.

1928 Baade, W. Der Sternhaufen NGC 5053. *Hamb. Mitt.*, v. 6, no. 29; *A. N.*, v. 232, p. 200. (Comparison).

1862*IId* Auwers, 1864 J. Herschel 4370, 1890 d'Engelhardt, 1891-*c* Bigourdan, 1909 Winnecke, 1910 Porter, 1911 Wirtz, 1915 Melotte, 1919*IIac* Shapley and Shapley, 1926*f* Parvulesco, 1926 Reinmuth, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*b* Shapley and Sawyer, 1930*acfn* Shapley, 1931 Nabokov, 1933 Stebbins, 1936*ab* Stebbins and Whitford, 1939*a* Sawyer, 1940 Christie, 1941 de Kort, 1946*d* Mayall, 1946*a* Mowbray.

NGC 6541 α 18^h 04^m.4, δ − 43° 44′ l 317°, b − 12°

1826 Cacciatore, N. First observation, 1826 Mar. 19. *Sull' origine del sistema solare*, p. 15. *Palermo*, 1826.

1826 Zach. *Correspondance Astronomique*, v. 14, p. 410. (On the new nebula).

1826 Olbers, W. Auszug aus einem Schreiben des Herrn Doctors und Ritters Olbers an den Herausgeber. *A. N.*, v. 5, p. 121. (Questions whether new nebula may be a comet).

1826 Cacciatore, N. Neuer Nebelflecke. *A. N.*, v. 5, p. 281. (Reprint of original article).

1827 von Biela, W. Schreiben des Herrn Hauptmanns und Ritters v. Biela an den Herausgeber. *A. N.*, v. 5, p. 425. (Position of new nebula).

1828 Olbers, W. Auszug aus einem Schreiben des Herrn Doctors und Ritters Olbers an den Herausgeber. *A. N.*, v. 7, p. 64.

1922 Woods, J. E. New variable in N.G.C. 6541. *Harv. Bull.*, no. 764; *Pop. Astr.*, v. 30, p. 174.

1922 Shapley, H. Neuer Veränderlicher 2, 1922, Coronae Australis in NGC 6541. *A. N.*, v. 215, p. 391.

1828 Dunlop 473, 1847 J. Herschel 3726, 1864*a* J. Herschel 4372, 1868 Webb, 1881 Smyth and Chambers, 1908 Bailey, 1911*a* Hinks, 1915 Melotte, 1915*a* Bailey, 1918*b* Bailey, 1918*c* Charlier, 1918*IIe* Shapley, 1919*Ic*, *IIc* Shapley and Shapley, 1920*a* Lundmark, 1925 Nabokov, 1926 Parvulesco, 1927*h* ten Bruggencate, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*ab* Shapley and Sawyer, 1929 Cannon, 1930*afn* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1935 Shapley and Sayer, 1939*a* Sawyer, 1941 de Kort, 1941 Copeland, 1946*d* Mayall.

NGC 6544 α 18^h 04^m.3, δ − 25° 01′ l 334°, b − 04°

1786 Herschel, W. First observation, 1784 May 22.

1946 Mayall, N. U. Cites this as a new globular cluster.

NGC 6544 (Cont.)

1786 W. Herschel II 197, 1833 J. Herschel 1994, 1862*IIa* Auwers, 1864 J. Herschel 4374, 1910 Porter, 1915 Melotte, 1922*b* Shapley, 1931 Collinder, 1946*abe* Mayall, 1946*a* Mowbray.

NGC 6553 α 18^h 06^m.3, δ − 25° 56′ l 333°, b − 04°

1786 Herschel, W. First observation, 1784 May 22.

1893 Spitaler, R. Beobachtungen von Nebelflecken. *A. N.*, v. 132, p. 375.

1937 Adams, W. S. Report of Mount Wilson Observatory, 1936-37. *Am.A.S. Pub.*, v. 9, p. 80.

1937 Baade, W. Stellar photography in the red region of the spectrum. *Am. A.S. Pub.*, v. 9, p. 31; *I. A. U. Trans.*, v. 6, p. 452, 1938.

1941 Photos by Baade. Bok and Bok, *The Milky Way*, p. 145. Harvard.

1786 W. Herschel IV 12, 1847 J. Herschel 3730, 1856 d'Arrest, 1862*IIa* Auwers, 1864 J. Herschel 4378, 1891-*d* Bigourdan, 1910 Porter, 1911 Wirtz, 1915 Melotte, 1915*a* Bailey, 1918*c* Charlier, 1919*IIac* Shapley and Shapley, 1920*a* Lundmark, 1926*cf*, 1927*c* Parvulesco, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*b* Shapley and Sawyer, 1929 Vorontsov-Velyaminov, 1930*afn* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1933 Stebbins, 1935 Shapley and Sayer, 1936*ac* Stebbins and Whitford, 1939*a* Sawyer, 1940 Christie, 1941 de Kort, 1946*d* Mayall, 1946*a* Mowbray.

NGC 6569 α 18^h 10^m.4, δ − 31° 50′ l 328°, b − 08°

1786 Herschel, W. First observation, 1784 July 13.

1786 W. Herschel II 201, 1828 Dunlop 619, 1847 J. Herschel 3736, 1862*IIa* Auwers, 1864 J. Herschel 4389, 1891-*d* Bigourdan, 1909 Perrine, 1910 Porter, 1912 Curtis, 1915 Melotte, 1915*a* Bailey, 1918 Curtis, 1918*c* Charlier, 1918*IIf* Shapley, 1919*IIac* Shapley and Shapley, 1920*a* Lundmark, 1926*f* Parvulesco, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*b* Shapley and Sawyer, 1929 Vorontsov-Velyaminov, 1930*an* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1933 Stebbins, 1936 Duryea, 1936*ac* Stebbins and Whitford, 1940 Christie, 1941 de Kort, 1946*d* Mayall, 1946*a* Mowbray.

NGC 6584 α 18^h 14^m.6, δ − 52° 14′ l 310°, b − 18°

1828 Dunlop, J. First observation.

1828 Dunlop 376, 1847 J. Herschel 3737, 1864 J. Herschel 4393, 1881 Smyth and Chambers, 1908 Bailey, 1911*a* Hinks, 1915 Melotte, 1915*a*, 1918*b* Bailey, 1918*c* Charlier, 1918*IIe* Shapley, 1919*Ic*, *IIc* Shapley and Shapley, 1920*a* Lundmark, 1926*f* Parvulesco, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*b* Shapley and Sawyer, 1930*afn* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1935 Shapley and Sayer, 1939*a* Sawyer, 1941 de Kort, 1946*d* Mayall.

NGC 6624 α 18^h 20^m.5, δ − 30° 23′ l 330°, b − 09°

1786 Herschel, W. First observation, 1784 June 24.

1786 W. Herschel I 50, 1847 J. Herschel 3742, 1862*IIa* Auwers, 1864 J. Herschel 4404, 1881 Smyth and Chambers, 1891-*d* Bigourdan, 1908 Bailey, 1909 Perrine, 1910 Porter, 1911*a* Hinks, 1912 Curtis, 1915 Melotte, 1915*a* Bailey, 1918 Curtis, 1918*c* Charlier, 1918*IIe* Shapley, 1919*IIc* Shapley and Shapley, 1920*a* Lundmark, 1923 Lundborg, 1926 Nabokov, 1926*f* Parvulesco, 1926*II* Vorontsov-Velyaminov, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*b* Shapley and Sawyer, 1929 Cannon, 1929 Vorontsov-Velyaminov, 1930 Parenago, 1930*an* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1936*ac* Stebbins and Whitford, 1940 Christie, 1941 de Kort, 1941 Copeland, 1946*ab* Mayall, 1946*a* Mowbray.

NGC 6626 (Messier 28) α 18^h 21^m.5, δ − 24° 54′ l 335°, b − 07°

1771 Messier, C. First observation, 1764 July 26.

1847 Laugier, E. Sur le mouvement propre de trois amas du Catalogue de Messier. *C. R.*, v. 24, p. 1021.

1771, 1780, 1784 Messier, (1912) W. Herschel, 1833 J. Herschel 2010, 1847 J. Herschel 3743, 1853 Laugier 46, 1856 d'Arrest, 1861 Schmidt, 1862 Schönfeld, 1862*IIb* Auwers, 1864 J. Herschel 4406, 1867 Schmidt, 1867 Vogel, 1867*a* Chambers, 1881 Smyth and Chambers, 1882*b* Flammarion, 1886- Weinek and Gruss, 1891-*dk* Bigourdan, 1895*ab* Mönnichmeyer, 1895, 1897, 1898*II* Pickering, 1902*abc* Bailey, 1902 Gore, 1904 Webb, 1904, 1907 Holetschek, 1908 Bailey, 1909 Perrine, 1910 Porter, 1911 Wirtz, 1911*a* Hinks, 1912 Curtis, 1915 Melotte, 1915*a* Bailey, 1917 Shapley and Davis, 1917*b* Flammarion, 1918*a* Bailey, 1918 Curtis, 1918 Slipher, 1918*c* Charlier, 1918*Ic*, *IIbd*, *Va* Shapley, 1919*b* Lundmark, 1919*Iac*, *IIcd* Shapley and Shapley, 1920 Hoffmeister, 1920*ac* Lundmark, 1920*b* Shapley, 1923 Lundborg, 1925 Nabokov, 1925 Strömberg, 1925*d* Doig, 1926 Nabokov, 1926*II* Vorontsov-Velyaminov, 1926*cf*, 1927*c* Parvulesco, 1927*k* ten Bruggencate, 1927 Sawyer and Shapley, 1927*I*, *II* Shapley and Sawyer, 1928 van Rhijn, 1928 Voûte, 1929 Cannon, 1929*ab* Shapley and Sawyer, 1929 Vorontsov-Velyaminov, 1930 Parenago, 1930*afkng* Shapley, 1931 Harrison, 1931 Nabokov, 1932, 1933 van de Kamp, 1932 Moore, 1933 Stebbins, 1933 Vyssotsky and Williams, 1935*ab* Edmondson, 1935 Shiveshwarkar, 1935 Mineur, 1935 Shapley and Sayer, 1936 Duryea, 1936*ac* Stebbins and Whitford, 1937 Wilkens, 1939*a* Sawyer, 1940 Christie, 1941 de Kort, 1941 Copeland, 1946*ab* Mayall, 1946*ab* Mowbray.

NGC 6637 (Messier 69) α 18^h 28^m.1, δ − 32° 23′ l 329°, b − 12°

1781 Messier, C. First observation, 1780 Aug. 31.

1781 Messier, 1783 Bode, 1784 Messier, 1814*e*, 1818*a* W. Herschel, 1828 Dunlop 613, 1862*IIb* Auwers, 1864*a* J. Herschel 4411, 1881 Smyth and Chambers, 1891-*d* Bigourdan, 1902 Gore, 1904*a* Webb, 1904, 1907 Holetschek, 1908 Bailey, 1909 Perrine, 1910 Porter, 1911*a* Hinks, 1912 Curtis, 1915 Melotte, 1915*a* Bailey, 1917 Shapley and Davis, 1917*d* Flammarion, 1918*b* Bailey, 1918 Curtis, 1918*c* Charlier, 1918*IIe* Shapley, 1919*IIcd* Shapley and Shapley, 1920*a* Lundmark, 1920*b* Shapley, 1923 Lundborg, 1925*f* Doig, 1925, 1926 Nabokov, 1926 Doig, 1926*f* Parvulesco, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*b* Shapley and Sawyer, 1929 Cannon, 1929 Vorontsov-Velyaminov, 1930*an* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1933 Stebbins, 1935 Shapley and Sayer, 1936*ac* Stebbins and Whitford, 1940 Christie, 1941 de Kort, 1941 Copeland, 1946*abc* Mayall, 1946*a* Mowbray.

NGC 6638 α 18^h 27^m.9, δ − 25° 32′ l 336°, b − 09°

1786 Herschel, W. First observation, 1784 July 12.

1893 Spitaler, R. Beobachtungen von Nebelflecken. *A. N.*, v. 132, p. 375.

1786 W. Herschel I 51, 1814*e* W. Herschel, 1847 J. Herschel 3748, 1855, 1856 d'Arrest, 1861 Schmidt, 1862 Schönfeld, 1862*IIa* Auwers, 1864 J. Herschel 4412, 1867 Schmidt, 1877*a* Holden, 1881 Smyth and Chambers, 1891-*d* Bigourdan, 1904, 1907 Holetschek, 1909 Perrine, 1909 Winnecke, 1910 Porter, 1918*c* Charlier, 1918*IIbd* Shapley, 1919*IIc* Shapley and Shapley, 1920*a* Lundmark, 1925, 1926 Nabokov, 1926 Doig, 1926*f* Parvulesco, 1926*II* Vorontsov-Velyaminov, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*ab* Shapley and Sawyer, 1929 Vorontsov-Velyaminov, 1930 Parenago, 1930*akn* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1933 Stebbins, 1935 Shapley and Sayer, 1936*ac* Stebbins and Whitford, 1937 Wilkens, 1940 Christie, 1941 de Kort, 1946*ab* Mayall, 1946*ab* Mowbray.

NGC 6652 α 18^h 32^m.5, δ − 33° 02′ *l* 329°, *b* − 13°

1828 Dunlop, J. First observation.

1828 Dunlop 607, 1847 J. Herschel 3752, 1864 J. Herschel 4421, 1867 Schmidt, 1881 Smyth and Chambers, 1908 Bailey, 1910 Porter, 1915 Melotte, 1915*a* Bailey, 1918*c* Charlier, 1918*IIe* Shapley, 1919*IIc* Shapley and Shapley, 1920*a* Lundmark, 1926*f* Parvulesco, 1927 Sawyer and Shapley, 1927*I, II*, 1929*b* Shapley and Sawyer, 1929 Cannon, 1930*akn* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1935 Shapley and Sayer, 1936*ac* Stebbins and Whitford, 1940 Christie, 1941 de Kort, 1941 Copeland, 1946*ab* Mayall, 1946*a* Mowbray.

NGC 6656 (Messier 22) α 18^h 33^m.3, δ − 23° 58′ *l* 337°, *b* − 09°

1682 Ihle, A. Discovery, Aug. 26, 1665. Kirch in *Ephemeriden*, Appendix. According to Smyth and Chambers, 1881, seen by Hevelius before 1665.

1759 LeGentil, G. H. J. J. B. Remarques sur les étoiles nébuleuses. *Acad. des Sci. Mém.*, pp. 453-71. (Drawing).

1771 Messier, C. Observation, 1764 June 5.

1866 Schultz, H. Historische Nötigen über Nebelflecke. *A. N.*, v. 67, p. 4.

1881 Smyth, W. H., and Chambers, G. F. *A cycle of celestial objects*, p. 532. Fig. 39. (Variation in brightness of star noted by LeGentil).

1918 Chevalier, A. Amas d'étoiles Messier 22 (N.G.C. 6656). *Zô-Sè Ann.*, v. 10, C, pp. 1-51. (Catalogue of 1019 stars).

1919 Shapley, H., and Duncan, J. C. The globular cluster Messier 22 (N.G.C. 6656). (Abs.) *Pop. Astr.*, v. 27, p. 100.

1920 Duncan, J. C. Bright nebulae and star clusters in Sagittarius and Scutum photographed with the 60-inch reflector. *Mt. W. Cont.*, no. 177; *Ap. J.*, v. 51, p. 4. (Plate).

1920 Bailey, S. I. Variable stars in M 22. (Abs.) *Pop. Astr.*, v. 28, pp. 518-9.

1923 Shapley, H. Five new variable stars. *Harv. Bull.*, no. 781.

1927 Shapley, H. The distance of Messier 22. *Harv. Bull.*, no. 848.

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1932 Hogg, F. S. The distribution of light in six globular clusters. *A. J.*, v. 42, pp. 77-87.

1944 Sawyer, H. B. Variable stars in the globular cluster Messier 22. *Dunlap Pub.*, v. 1, no. 15. (Abs.) Lengths of cluster-type periods in Messier 22 and other globular clusters. *A. J.*, v. 51, p. 70.

1715 Halley, 1746 de Chéseaux, 1755 Lacaille I 12, 1771 Messier, 1777 Bode 57, 1780, 1784 Messier, 1800, 1818*ac* W. Herschel, 1833 J. Herschel 2015, 1847 J. Herschel 3753, 1855, 1856 d'Arrest, 1861 J. Herschel, 1862*IIbc* Auwers, 1862 Schönfeld, 1864 J. Herschel 4424, 1867 Vogel, 1867*ab* Chambers, 1868 Webb, 1882*b* Flammarion, 1886 d'Engelhardt, 1891-*d* Bigourdan, 1895, 1897, 1898*II* Pickering, 1902*abc* Bailey, 1902 Gore, 1903 Clerke, 1904 Webb, 1904 Perrine, 1904, 1907 Holetschek, 1908 Bailey, 1909 Perrine, 1911 Fath, 1911*a* Hinks, 1912 Curtis, 1913 Chapman, 1915 Melotte, 1915*a* Bailey, 1916 Wilson, 1917 Shapley and Davis, 1917*b* Flammarion, 1918 Curtis, 1918*c* Charlier, 1918*Ic*, *IIabd*, *IVa*, *Vb* Shapley, 1919*Iabc*, *IIcd* Shapley and Shapley, 1919*ab* Shapley, 1920 Barnard, 1920 Hoffmeister, 1920 Lous, 1920*ab* Lundmark, 1920*b* Shapley,

NGC 6656 (Cont.)

1923 Lundborg, 1923 von Zeipel, 1925 Nabokov, 1925*d*, 1926 Doig, 1926 Nabokov, 1926 Vorontsov-Velyaminov, 1926*cef*, 1927*c* Parvulesco, 1927*ah* ten Bruggencate, 1927 Sawyer and Shapley, 1927 Lönnquist, 1927*I*, *II* Shapley and Sawyer, 1928 van Rhijn, 1929*ab* Shapley and Sawyer, 1929 Vorontsov-Velyaminov, 1930 Parenago, 1930*aefgjklnpr* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1932*ab* Sawyer, 1933 Stebbins, 1933 Vyssotsky and Williams (extrafocal plate), 1935*ab* Edmondson, 1935 Shapley and Sayer, 1936 Duryea, 1936*abc* Stebbins and Whitford, 1937 Wilkens, 1937 Mineur, 1939*ab* Sawyer, 1940 Christie, 1941 de Kort, 1941 Copeland, 1943 Shapley (fig. 126), 1944*II* Sawyer, 1945 Finlay-Freundlich, 1946*abc* Mayall, 1946*ab* Mowbray.

NGC 6681 (Messier 70) α 18^h 40^m.0, δ − 32° 21′ l 330°, b − 14°

1781 Messier, C. First observation, 1780 Aug. 31.

1781 Messier, 1783 Bode, 1784 Messier, 1828 Dunlop 614, 1847 J. Herschel 3756, 1862*IIb* Auwers, 1864*a* J. Herschel 4428, 1881 Smyth and Chambers, 1891-*d* Bigourdan, 1902 Gore, 1904*a* Webb, 1904, 1907 Holetschek, 1908 Bailey, 1909 Perrine, 1910 Porter, 1911*a* Hinks, 1912 Curtis, 1915 Melotte, 1915*a* Bailey, 1917 Shapley and Davis, 1918*b* Bailey, 1918 Curtis, 1918*c* Charlier, 1918*IIe* Shapley, 1919*Ic*, *IIcd* Shapley and Shapley, 1920*a* Lundmark, 1920*b* Shapley, 1925 Nabokov, 1925*f* Doig, 1926*f* Parvulesco, 1927*h* ten Bruggencate, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*b* Shapley and Sawyer, 1929 Vorontsov-Velyaminov, 1930*an* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1935 Shapley and Sayer, 1936*ac* Stebbins and Whitford, 1940 Christie, 1941 de Kort, 1941 Copeland, 1946*ab* Mayall, 1946*a* Mowbray.

NGC 6684 α 18^h 44^m.1, δ − 65° 14′ l 297°, b − 25°

1847 Herschel, J. First observation, 1836 Aug. 31.

1921 Innes, R. T. A. Nebulae and clusters (in the Melbourne zone). *Union Circ.*, no. 53, p. 103. (Says fine globular cluster).

1847 J. Herschel 3757, 1864 J. Herschel 4431, 1881 Smyth and Chambers, 1923 Lundborg.

NGC 6712 α 18^h 50^m.3, δ − 08° 47′ l 353°, b − 06°

1786 Herschel, W. First observation, 1784 June 16.

1917 Shapley, H. Descriptive notes relative to nine clusters. *A. S. P. Pub.*, v. 29, p. 186.

1917 Davis, H. Five new variable stars in globular clusters. *A. S. P. Pub.*, v. 29, p. 260.

1924 Cannon, A. J. Fifty-nine new variable stars. *Harv. Circ.*, no. 265. (Harv. Var. 3832).

1930 Harwood, M. A survey of the variable stars in the Scutum cloud; preliminary results. *Harv. Bull.*, no. 880, p. 14. (AP Scuti).

1943 Oosterhoff, P. Th. New observations and improved elements for twenty variable stars in or near the constellation Scutum. *B. A. N.*, v. 9, p. 411.

1786 W. Herschel I 47, 1847 J. Herschel 3762, 1855, 1856 d'Arrest, 1853 Laugier 47, 1862 Schönfeld, 1862*IIa* Auwers, 1864 J. Herschel 4441, 1866 Huggins, 1867 Vogel, 1867 d'Arrest, 1881 Smyth and Chambers, 1886- Weinek and Gruss, 1890 d'Engelhardt, 1891-*d* Bigourdan, 1903 Merecki, 1904 Webb, 1907 Holetschek, 1908 Bailey (plate), 1909 Perrine, 1910 Porter, 1911 Wirtz, 1911*a* Hinks, 1912 Curtis, 1915 Melotte, 1915*a* Bailey, 1915 Kritzinger, 1918 Curtis, 1918*c* Charlier,

NGC 6712 (Cont.)

1918*IIbd* Shapley, 1919*IIcd* Shapley and Shapley, 1920 Barnard, 1920*a* Lundmark, 1920*b* Shapley, 1922*I* Becker, 1923 Wirtz, 1925 Nabokov, 1925*d* Doig, 1926*f* Parvulesco, 1926 Reinmuth, 1927 Sawyer and Shapley, 1927*I*, *II* Shapley and Sawyer, 1928 van Rhijn, 1929*ab* Shapley and Sawyer, 1929 Vorontsov-Velyaminov, 1930 Parenago, 1930*acfn* Shapley, 1931 Nabokov, 1932 Bernheimer, 1933 Stebbins, 1936*ab* Stebbins and Whitford, 1937 Wilkens, 1939*a* Sawyer, 1940 Christie, 1941 de Kort, 1941 Copeland, 1942*a* Oosterhoff, 1943 Shapley (fig. 111), 1946*ab* Mayall, 1946*ab* Mowbray.

NGC 6715 (Messier 54) α 18^h 52^m.0, δ − 30° 32′ l 333°, b − 16°

1780 Messier, C. First observation, 1778 July 24.

1780 Messier, 1783 Bode, 1783 Messier, 1828 Dunlop 624, 1847 J. Herschel 3763, 1862*IIb* Auwers, 1864 J. Herschel 4442, 1881 Smyth and Chambers, 1882*b* Flammarion, 1891-*d* Bigourdan, 1902 Gore, 1904*a* Webb, 1908 Bailey, 1909 Perrine, 1910 Porter, 1911*a* Hinks, 1912 Curtis, 1915 Melotte, 1915*a* Bailey, 1917 Shapley and Davis, 1917*c* Flammarion, 1918 Curtis, 1918*c* Charlier, 1918*IIe* Shapley, 1919*Ic*, *IIc* Shapley and Shapley, 1920*a* Lundmark, 1923 Lundborg, 1925*f* Doig, 1925, 1926 Nabokov, 1926*f* Parvulesco, 1927*h* ten Bruggencate, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*b* Shapley and Sawyer, 1929 Cannon, 1929 Vorontsov-Velyaminov, 1930*an* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1935 Shapley and Sayer, 1936*a* Stebbins and Whitford, 1940 Christie, 1941 de Kort, 1941 Copeland, 1946*ab* Mayall, 1946*a* Mowbray.

NGC 6723 α 18^h 56^m.2, δ − 36° 42′ l 328°, b − 19°

1828 Dunlop, J. First observation.

1924 Bailey, S. I. Variable stars in the cluster N.G.C. 6723. *Harv. Circ.*, no. 266.

1932 van Gent, H. Provisional ephemerides of 63 new and 3 known variable stars in or near the constellation Corona Australis. *B. A. N.*, v. 6, pp. 163-84.

1933 van Gent, H. Discussion of 122, mostly new, variable stars in or near the constellation Corona Australis. *B. A. N.*, v. 7, p. 21.

1828 Dunlop 573, 1847 J. Herschel 3770, 1864 J. Herschel 4450, 1867 Schmidt, 1881 Smyth and Chambers, 1897, 1898*II* Pickering, 1902*abc*, 1908 Bailey, 1910 Porter, 1911*a* Hinks, 1915 Melotte, 1915*a*, 1918*a* Bailey, 1918*c* Charlier, 1918*Ic*, *IIe* Shapley, 1919*Ic*, *IIc* Shapley and Shapley, 1920 Hoffmeister, 1920*a* Lundmark, 1923 Lundborg, 1926*f* Parvulesco, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*ab* Shapley and Sawyer, 1929 Cannon, 1929 Vorontsov-Velyaminov, 1930*afn* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1932*a* Sawyer, 1935 Shapley and Sayer, 1936*a* Stebbins and Whitford, 1939*a* Sawyer, 1940 Christie, 1941 de Kort, 1941 Copeland, 1944*II* Sawyer, 1946*abc* Mayall, 1946*ab* Mowbray.

NGC 6752 α 19^h 06^m.4, δ − 60° 04′ l 304°, b − 27°

1828 Dunlop, J. First observation.

1828 Dunlop 295, 1847 J. Herschel 3778, 1861 J. Herschel, 1864 J. Herschel 4467, 1868 Webb, 1881 Smyth and Chambers, 1895, 1897, 1898*II* Pickering, 1902*a*, 1908 Bailey, 1911*a* Hinks, 1913 Chapman, 1915 Melotte, 1915*a* Bailey, 1918*c* Charlier, 1918*IIe* Shapley, 1919*Ic*, *IIc* Shapley and Shapley, 1920 Hoffmeister, 1920*a* Lundmark, 1926*f* Parvulesco, 1927*h* ten Bruggencate, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*ab* Shapley and Sawyer, 1929 Cannon, 1930*afn* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1935 Shapley and Sayer, 1939*a* Sawyer, 1941 de Kort, 1944 Shapley, 1945 Sawyer, 1946*d* Mayall.

NGC 6760 α 19^h 08^m.6, δ + 00° 57′ *l* 04°, *b* − 05°

1846 Hind, J. R. Discovery, Mar. 30, 1845. Ephemeris of Biela's Comet, 1845. *A. N.*, v. 23, no. 549, p. 356.

1914 Pease, F. G. The star cluster N.G.C. 6760. *A. S. P. Pub.*, v. 26, p. 204.

1931 van Maanen, A. Photographs of a few nebulae and clusters. *A. S. P. Pub.*, v. 43, pp. 351-2, Plate XIII.

1855, 1856 d'Arrest, 1861 Schmidt, 1862 Schönfeld, 1862*IId* Auwers, 1864 J. Herschel 4473, 1866 Huggins, 1867 Schmidt, 1867 Vogel, 1867 d'Arrest, 1874 Schultz, 1878*a* Dreyer, 1880 Earl of Rosse, 1881 Smyth and Chambers, 1882 Winlock and Pickering, 1886 d'Engelhardt, 1886- Weinek and Gruss, 1891-*d* Bigourdan, 1891 Kempf, 1907 Holetschek, 1909 Winnecke, 1912 Curtis, 1915 Melotte, 1918 Curtis, 1918*IIf* Shapley, 1919*IIacd* Shapley and Shapley, 1920*b* Shapley, 1923 Wirtz, 1926*f* Parvulesco, 1926 Reinmuth, 1927 Sawyer and Shapley, 1927*I, II*, 1929*b* Shapley and Sawyer, 1930 Parenago, 1930*acn* Shapley, 1931 Nabokov, 1932 Bernheimer, 1933 Stebbins, 1934, 1935 Lundmark, 1936*ab* Stebbins and Whitford, 1939*a* Sawyer, 1940 Christie, 1941 de Kort, 1946*d* Mayall, 1946*a* Mowbray.

NGC 6779 (Messier 56) α 19^h 14^m.6, δ + 30° 05′ *l* 30°, *b* + 08°

1780 Messier, C. First observation, 1779 Jan. 23. On map of comet of 1779.

1902 Küstner, F. Bonn report. *A. G. Viert.*, v. 36, p. 85. (Work of Mönnichmeyer).

1916 Kohlman, A. F. Star clusters: some observations and comparisons. *Soc. Prac. Astr., Monthly Reg.*, v. 8, pp. 25-6.

1917 Shapley, H. Descriptive notes relative to nine clusters. *A. S. P. Pub.*, v. 29, p. 186.

1917 Davis, H. A bright variable star in N.G.C. 6779 (Messier 56). *A. S. P. Pub.*, v. 29, p. 210.

1920 Shapley, H. Studies. XVII. Miscellaneous results. Pt. 1. Position co-ordinates of new variable stars. (Plate). *Mt. W. Cont.*, no. 190; *Ap. J.*, v. 52, p. 73.

1920 Küstner, F. Der kugelförmige Sternhaufen Messier 56. *Bonn Veröff.*, no. 14. 47 pp. (Catalogue of 532 stars).

1927 van Maanen, A. Investigations on proper motion. Twelfth paper. The proper motions and internal motions of Messier 2, 13, 56. *Mt. W. Cont.*, no. 338; *Ap. J.*, v. 66, pp. 89-112.

1927 van Maanen, A. The proper motions of the globular clusters Messier 13, 56, and 2, and their internal motions. *K. Ak. wetens. Amsterdam Verslag.*, v. 30, no. 6, pp. 680-4.

1929 Heckmann, O., and Siedentopf, H. Über die Struktur der kugelförmigen Sternhaufen. *Gött. Veröff.*, no. 6; *Z. f. Phys.*, v. 54, p. 183.

1940 Sawyer, H. B. Twelve new variable stars in the globular clusters NGC 6205, NGC 6366, and NGC 6779. *Dunlap Pub.*, v. 1, no. 5 (Plate).

1942 Sawyer, H. B. Some interesting variable stars in the globular cluster Messier 56. *Am. A. S. Pub.*, v. 10, p. 233.

1944 Rosino, L. Sull' ammasso globulare NGC 6779 = M 56. *Univ. Bologna Oss. Pub.*, v. IV, no. 7. 19 pp. (Plate). *Soc. Astr. Ital. Mem.* v. 16, no. 4.

NGC 6779 (Cont.)

1780 Messier, 1783 Bode, 1784 Messier, 1814*c*, 1818*a* W. Herschel, 1833 J. Herschel 2036, 1852 Secchi, 1855, 1856, 1861 d'Arrest, 1861 Earl of Rosse, 1862 Schönfeld, 1862*IIb* Auwers, 1864 J. Herschel 4485, 1865*b* Rümker, 1866 Huggins, 1867 Schmidt, 1867 Oppolzer, 1867 Vogel, 1867 d'Arrest, 1867*ab* Chambers, 1880 Earl of Rosse, 1881 Smyth and Chambers (fig. 43), 1882 Engelmann, 1882*ab* Flammarion, 1890 d'Engelhardt, 1891-*d* Bigourdan, 1891 Kempf, 1893 Roberts, 1895 Mönnichmeyer, 1899 Rabourdin, 1902 Gore, 1904 Webb, 1904, 1907 Holetschek, 1908 Bailey, 1909 Perrine, 1911*a* Hinks, 1912 Curtis, 1915 Melotte, 1915*a* Bailey, 1915 Kritzinger, 1917 Shapley and Davis, 1917 Pease and Shapley, 1917*c* Flammarion, 1918 Curtis, 1918*c* Charlier, 1918*IIbd* Shapley, 1919*Iac*, *IIcd* Shapley and Shapley, 1920*a* Lundmark, 1920*b* Shapley, 1922*I*, *II* Becker, 1923 Lundborg, 1923 Wirtz, 1924 Vogt, 1925*b*, 1926 Doig, 1926 Reinmuth, 1926*cf*, 1927*c* Parvulesco, 1927 Kienle, 1927*g* ten Bruggencate, 1927 Sawyer and Shapley, 1927*I*, *II* Shapley and Sawyer, 1928 van Rhijn, 1929*ab* Shapley and Sawyer, 1930 Heckmann and Siedentopf, 1930*afkn* Shapley, 1931 Nabokov, 1932 Bernheimer, 1932, 1933 van de Kamp, 1933 Stebbins, 1934, 1935 Lundmark, 1935*abcd* Edmondson, 1935 Shapley and Sayer, 1936 Duryea, 1936*ab* Stebbins and Whitford, 1937 Wilkens, 1937 Mineur, 1939*a* Sawyer, 1940 Christie, 1941 de Kort, 1941 Copeland, 1945 Finlay-Freundlich, 1946*ab* Mayall, 1946*ab* Mowbray.

NGC 6809 (Messier 55) α 19^h 36^m.9, δ − 31° 03′ *l* 337°, *b* − 25°

1755 Lacaille, Abbé de. First observation.

1783 Messier, C. Observed by him, 1778 July 24.

1915 Bailey, S. I. Globular clusters: distribution of stars. *Harv. Ann.*, v. 76, no. 4.

1925 Bailey, S. I. Eight new variable stars near N.G.C. 6809. *Harv. Bull.*, no. 813.

1925 Paraskevopoulos, J. S. Five new variable stars. *Harv. Bull.*, no. 813.

1755 Lacaille I 14, 1777 Bode 63, 1780 Messier, 1783 Bode, 1784 Messier, 1818*a* W. Herschel, 1828 Dunlop 620, 1847 J. Herschel 3798, 1856 d'Arrest, 1862*IIbc* Auwers, 1864 J. Herschel 4503, 1881 Smyth and Chambers, 1882*b* Flammarion, 1891-*d* Bigourdan, 1898*II* Pickering, 1902*abc* Bailey, 1902 Gore, 1904*a* Webb, 1908 Bailey, 1909 Perrine, 1911*a* Hinks, 1912 Curtis, 1915*I* Plummer, 1915 Melotte, 1915*ab* Bailey, 1916 Jeans, 1917 Shapley and Davis, 1917*c* Flammarion, 1918*a* Bailey, 1918 Curtis, 1918*c* Charlier, 1918*IIe* Shapley, 1919*Ic*, *IIc* Shapley and Shapley, 1920 Hoffmeister, 1920*a* Lundmark, 1923 Lundborg, 1925*f*, 1926 Doig, 1926*acf*, 1927*c* Parvulesco, 1927*dh* ten Bruggencate, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*ab* Shapley and Sawyer, 1930*afn* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1933 Stebbins, 1933 Vyssotsky and Williams, 1935 Shapley and Sayer, 1936*a* Stebbins and Whitford, 1939*a* Sawyer, 1940 Christie, 1941 de Kort, 1941 Copeland, 1943 (fig. 4), 1944 Shapley, 1945 Sawyer, 1946*d* Mayall, 1946*ab* Mowbray.

NGC 6838 (Messier 71) α 19^h 51^m.5, δ + 18° 39′ *l* 24°, *b* − 06°

1779 Köhler. Discovery. *Berliner Jahrbuch f. 1782*, p. 155.

1781 Méchain, P. F. A. Observation, 1780 June 28, Oct. 4. On chart of comet of 1779.

1917 Shapley, H. Descriptive notes relative to nine clusters. *A. S. P. Pub.*, v. 29, pp. 185-6.

NGC 6838 (Cont.)

1936 Krug, W. Photometrische Bearbeitung der galaktischen Sternhaufen M 71 und Harv. 20. (Plate). *Z. f. Ap.*, v. 13, pp. 205-14.
Summary by Hartwig, G. Photometrische Untersuchung dreier offener Sternhaufen. *Die Sterne*, v. 17, pp. 161-3.

1943 Cuffey, J. NGC 5053 and NGC 6838. *Ap. J.*, v. 98, pp. 49-53; *Kirkwood Pub.*, no. 6.

1946 Mayall, N. U. Cites this as a new globular cluster.

1781 Méchain, 1783 Bode, 1784 Messier, 1833 J. Herschel 2056, 1862*IIb* Auwers, 1864 J. Herschel 4520, 1867 d'Arrest, 1877*a* Holden, 1881 Smyth and Chambers, 1890 d'Engelhardt, 1902 Gore, 1904 Webb, 1909 Perrine, 1912 Curtis, 1915 Melotte, 1917 Shapley and Davis, 1917*d* Flammarion, 1918 Curtis, 1918*ab* Charlier, 1923 Lundborg, 1925*d* Doig, 1926*f* Parvulesco, 1926 Reinmuth, 1930*s* Shapley, 1931 Collinder, 1931 Nabokov, 1936 Duryea, 1946*abe* Mayall, 1946*a* Mowbray.

(References on this cluster are incomplete because of its recent inclusion in the list of globular clusters).

NGC 6864 (Messier 75) α 20^h 03^m.2, δ − 22° 04′ l 348°, b − 27°

1781 Méchain, P. F. A. First observation, 1780 August 27, Oct. 18.

1920 Shapley, H. Studies. XVII. Miscellaneous results. Pt. 1. Position co-ordinates of new variable stars. (Plate). *Mt. W. Cont.*, no. 190; *Ap. J.*, v. 52, p. 73.

1781 Méchain, 1783 Bode, 1784 Messier, 1814*d*, 1818*abcd* W. Herschel, 1833 J. Herschel 2064, 1855, 1856 d'Arrest, 1861 Earl of Rosse, 1862 Schönfeld, 1862*IIb* Auwers, 1864 J. Herschel 4543, 1867 Schmidt, 1867 Oppolzer, 1867 Vogel, 1867 d'Arrest, 1880 Earl of Rosse, 1881 Smyth and Chambers, 1882 Englemann, 1882*b* Flammarion, 1886-Weinek and Gruss, 1890 d'Engelhardt, 1891-*e* Bigourdan, 1895*ab* Mönnichmeyer, 1902 Gore, 1904 Webb, 1904, 1907 Holetschek, 1908 Bailey, 1909 Perrine, 1909 Winnecke, 1910 Porter, 1911*a* Hinks, 1915 Melotte, 1915*a* Bailey, 1917 Shapley and Davis, 1917*d* Flammarion, 1918 Curtis, 1918*c* Charlier, 1918*IIbdg* Shapley, 1919*IIcd* Shapley and Shapley, 1920*a* Lundmark, 1920*b* Shapley, 1922*I* Becker, 1923 von Zeipel, 1925*d*, 1926 Doig, 1926*acf*, 1927*c* Parvulesco, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*ab* Shapley and Sawyer, 1929 Cannon, 1930*afno* Shapley, 1931 Nabokov, 1933 Stebbins, 1935 Shapley and Sayer, 1936 Duryea, 1936*ab* Stebbins and Whitford, 1939*a* Sawyer, 1940 Christie, 1941 de Kort, 1941 Copeland, 1941 Shapley, 1945 Finlay-Freundlich, 1945 Sawyer, 1946*ab* Mayall, 1946*ab* Mowbray.

NGC 6934 α 20^h 31^m.7, δ + 07° 14′ l 20°, b − 20°

1789 Herschel, W. First observation, 1785 Sept. 24.

1819 Olbers, W. Beobachtungen und Nachrichten. *Berliner Jahrbuch für 1819*, p. 20.

1917 Shapley, H. Descriptive notes relative to nine clusters. *A. S. P. Pub.*, v. 29, p. 186.

1935 Sawyer, H. B. Variable stars in the globular cluster NGC 6934. *Am. A. S. Pub.*, v. 8, p. 149.

1937 Sawyer, H. B. Variable stars in the globular cluster N.G.C. 6402. *R. A. S. C. Jour.*, v. 31, p. 59. (Comparison).

1938 Sawyer, H. B. One hundred and thirty-two new variable stars in five globular clusters. *Dom. Ap. Pub.*, v. 7, no. 5. (Plate).

NGC 6934 (Cont.)

1789 W. Herschel I 103, 1833 J. Herschel 2081, 1856 d'Arrest, 1861 Earl of Rosse, 1862*I*, *IIa* Auwers, 1862 Schönfeld, 1864 J. Herschel 4585=4586, 1865 Auwers, 1866 Rümker, 1866 Huggins, 1867 Schmidt, 1867 Oppolzer, 1867 Vogel, 1867 d'Arrest, 1874 Schultz, 1876 Bredichin, 1878*a* Dreyer, 1880 Earl of Rosse, 1881 Smyth and Chambers, 1882 Engelmann, 1886- Weinek and Gruss, 1888 Ginzel, 1890 d'Engelhardt, 1891-*e* Bigourdan, 1891 Kempf, 1895*ab* Mönnichmeyer, 1904 Webb, 1904, 1907 Holetschek, 1909 Perrine, 1909 Winnecke, 1911 Fath, 1912 Curtis, 1915 Melotte, 1915*a* Bailey, 1915 Kritzinger, 1917 Pease and Shapley, 1918 Curtis, 1918 Slipher, 1918*c* Charlier, 1918*IIbd*, *Va* Shapley, 1919*b* Lundmark, 1919*IIcd* Shapley and Shapley, 1920*ac* Lundmark, 1920*b* Shapley, 1923 Lundborg, 1923 Wirtz, 1924*I*, *II* Silberstein, 1924 Vogt, 1925 Nabokov, 1925 Strömberg, 1925*a* Doig, 1926*af* Parvulesco, 1926 Reinmuth, 1927 Sawyer and Shapley, 1927*I*, *II* Shapley and Sawyer, 1928 van Rhijn, 1928 Voûte, 1929 Cannon, 1929*ab* Shapley and Sawyer, 1930*anq* Shapley, 1931 Harrison, 1931 Nabokov, 1932 Bernheimer, 1932 Moore, 1932, 1933 van de Kamp, 1933 Sawyer, 1933 Stebbins, 1934, 1935 Lundmark, 1935*ab* Edmondson, 1935 Shiveshwarkar, 1935 Mineur, 1936*ab* Stebbins and Whitford, 1939*a* Sawyer, 1940 Christie, 1941 de Kort, 1944 Shapley, 1945 Sawyer, 1946*ab* Mayall, 1946*ab* Mowbray.

NGC 6981 (Messier 72) $\alpha\ 20^{h}\ 50^{m}.7$, $\delta\ -12°\ 44'$ $l\ 03°$, $b\ -34°$

1781 Méchain, P. F. A. First observation, 1780 Aug. 29, Oct. 4.

1917 Davis, H. Five new variable stars in globular clusters. *A. S. P. Pub.*, v. 29, p. 260.

1920 Shapley, H. Studies. XVII: Miscellaneous results. Pt. 1. Position co-ordinates of new variable stars. (Plate). *Mt. W. Cont.*, no. 190; *Ap. J.*, v. 52, p. 73.

1920 Shapley, H., and Ritchie, M. Studies. XVIII. The periods and light-curves of 26 Cepheid variables in Messier 72. *Mt. W. Cont.*, no. 195; *Ap. J.*, v. 52, p. 232.

1931 Mineur, H. Mises au point d'astronomie stellaire. Céphéides et amas. *Soc. Astr. France, Bull.*, v. 45, p. 194.

1934 Humason, M. L. The radial velocities of three globular clusters. *A. S. P. Pub.*, v. 46, p. 357.

1781 Méchain, 1783 Bode, 1784 Messier, 1814*c* W. Herschel (drawing), 1818*a*, (1912) W. Herschel, 1833 J. Herschel 2090, 1855, 1856 d'Arrest, 1861 Earl of Rosse, 1862*I*, *IIb* Auwers, 1862 Schönfeld, 1864 J. Herschel 4608, 1865 Auwers, 1867 Schmidt, 1867 Vogel, 1867 d'Arrest, 1867*a* Chambers, 1880 Earl of Rosse, 1881 Smyth and Chambers, 1882 Engelmann, 1882*b* Flammarion, 1886- Weinek and Gruss, 1890 d'Engelhardt, 1891-*e* Bigourdan, 1895 Mönnichmeyer, 1898*b* Howe, 1902 Gore, 1904, 1907 Holetschek, 1909 Perrine, 1909 Winnecke, 1910 Porter, 1915 Melotte, 1915*a* Bailey, 1917 Shapley and Davis, 1917*d* Flammarion, 1918 Curtis, 1918*c* Charlier, 1918*IIbd* Shapley, 1919*IIcd* Shapley and Shapley, 1920*a* Lundmark, 1920*b* Shapley, 1923 Wirtz, 1926 Doig, 1926 Reinmuth, 1926*acf*, 1927*c* Parvulesco, 1927 Sawyer and Shapley, 1927*I*, *II* Shapley and Sawyer, 1928 van Rhijn, 1929*ab* Shapley and Sawyer, 1930*afn* Shapley, 1931 Nabokov, 1932 Bernheimer, 1932, 1933 van de Kamp, 1933*a* Sawyer, 1933 Stebbins, 1935*ab* Edmondson, 1935 Shiveshwarkar, 1935 Mineur, 1935 Shapley and Sayer, 1936 Duryea, 1936*ab* Stebbins and Whitford, 1939*a* Sawyer, 1940 Christie, 1941 de Kort, 1941 Copeland, 1944 Shapley, 1944*II* Sawyer, 1945 Sawyer, 1946*ab* Mayall, 1946*ab* Mowbray.

NGC 7006 $\alpha\ 20^h\ 59^m.1,\ \delta\ +16°\ 00'$ $l\ 32°,\ b\ -20°$

1786 Herschel, W. First observation, 1784 Aug. 21.

1920 Shapley, H. Studies. XVII. Miscellaneous results. Pt. 5. Note on the distant cluster N.G.C. 7006. *Mt. W. Cont.*, no. 190; *Ap. J.*, v. 52, p. 84.

1921 Shapley, H., and Mayberry, B. W. Studies. XIII. Variable stars in N.G.C. 7006. *Nat. Acad. Sci. Proc.*, v. 7, pp. 152-4.

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NGC 7078 (Messier 15) $\alpha\ 21^h\ 27^m.6,\ \delta\ +11°\ 57'$ $l\ 33°,\ b\ -28°$

1746 Maraldi, G. C. (Discovery of N.G.C. 7078, 1746 Sept. 7). Observations de la comète qui a paru au mois d'août 1746. *Acad. des Sci. Mém.*, p. 58.

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1915 Hertzsprung, E. Comparison between the distribution of energy in the spectrum of the integrated light of the globular cluster Messier 3 and of neighboring stars. *Ap. J.*, v. 41, pp. 10-15.
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1917 Pease, F. G., and Shapley, H. Axes of symmetry in globular clusters. *Mt. W. Comm.*, no. 39; *Nat. Acad. Sci. Proc.*, v. 3, pp. 96-101.
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NGC 7089 (Messier 2) α 21^h 30^m.9, δ − 01° 03′ l 22°, b − 37°

1746 Maraldi, G. C. (Discovery Sept. 11, 1746). Observations de la comète qui a paru au mois d'août 1746. *Acad. des Sci. Mém.*, pp. 55-62.

NGC 7089 (Cont.)

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1865 Huggins, W. On the spectrum of the great nebula in the swordhandle of Orion. *Roy. Soc. Proc.*, v. 14, p. 39; *M. N.*, v. 25, p. 155.
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1891 Common, A. A. Proceedings of observatories: Mr. Common's observatory, Ealing. *M. N.*, v. 51, p. 226.
1898 Chèvremont, A. Étoiles variables. *Soc. Astr. France, Bull.*, v. 12, p. 16.
1898 Chèvremont, A. Découverte d'une étoile variable dans l'amas Messier 2 du Verseau. *Soc. Astr. France, Bull.*, v. 12, p. 90.
1899 Holetschek, J. Ueber den Heiligkeitseindruck von Nebelflecken und Sternhaufen. *A. G. Viert.*, v. 33, p. 270.
1908 Perrine, C. D. Discovery of many small nebulae near some of the globular star clusters. *A. S. P. Pub.*, v. 20, p. 237.
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1927 van Maanen, A. Investigations on proper motion. Twelfth paper. The proper motions and internal motions of Messier 2, 13, 56. *Mt. W. Cont.*, no. 338; *Ap. J.*, v. 66, pp. 89-112.
1927 van Maanen, A. The proper motions of the globular clusters Messier 13, 56, and 2, and their internal motions. *K. Ak. wetens. Amsterdam. Verslag.*, v. 30, no. 6, pp. 680-4.
1928 ten Bruggencate, P. Bemerkungen über ellipsoidförmige Sternhaufen. *A. N.*, v. 232, p. 424.
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1934 Sawyer, H. B. Periods of variable stars in the globular cluster Messier 2. *Am. A. S. Pub.*, v. 8, p. 20.
1935 Sawyer, H. B. Periods and light curves of the variable stars in the globular cluster Messier 2. *Dom. Ap. Pub.*, v. 6, no. 14. (Plate).
1938 Sawyer, H. B. One hundred and thirty-two new variable stars in five globular clusters. *Dom. Ap. Pub.*, v. 7, no. 5.

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1771 Messier, 1777 Bode 70, 1780, 1784 Messier, 1801 Lalande 41928, 1800, 1814*c*, 1818*abcd*, (1912) W. Herschel, 1833 J. Herschel 2125 (drawing), 1852 Secchi, 1853 Laugier 52, 1855, 1856 d'Arrest, 1861 J. Herschel, 1861 Earl of Rosse, 1861 Schmidt, 1862*I*, *IIb* Auwers, 1862 Schönfeld, 1864 J. Herschel 4678, 1865 Auwers, 1866 Rümker, 1867 Schmidt, 1867 Vogel, 1867 d'Arrest, 1867*ab* Chambers, 1874 Schultz, 1876 Bredichin, 1877*a* Holden, 1880 Earl of Rosse, 1881 Smyth and Chambers (fig. 47), 1882 Winlock and Pickering, 1882 Engelmann, 1882*ab* Flammarion, 1886- Weinek and Gruss, 1890 d'Engelhardt, 1891-*e* Bigourdan, 1891 Kempf, 1894 Gore, 1895 Mönnichmeyer, 1895, 1897, 1898*II* Pickering, 1899 Roberts, 1902*abc* Bailey, 1902 Gore, 1904 Perrine, 1904 Webb, 1904, 1907 Holetschek, 1908 Bailey, 1909 Perrine, 1909 Winnecke, 1910 See (plate), 1910 Porter, 1911 Fath, 1911*a* Hinks, 1912 Curtis, 1913*a* von Zeipel, 1914 Strömgren and Drachmann, 1915*I*, *II* Plummer, 1915 Melotte, 1915*ab* Bailey, 1915 Kritzinger, 1916 Jeans, 1916 Wilson, 1916 Eddington, 1917 Shapley and Davis, 1917*a* Flammarion, 1918*a* Bailey, 1918 Curtis, 1918 Slipher, 1918*c* Charlier, 1918*Ic*, *IIabcd*, *III*, *Va* Shapley, 1919*b* Lundmark, 1919*Iac*, *IIcd* Shapley and Shapley, 1920 Hoffmeister, 1920*ac* Lundmark, 1920*b* Shapley, 1922*I* Becker, 1923 Lundborg, 1923 Wirtz, 1923 von Zeipel, 1925 Larink, 1925 Nabokov, 1925 Strömberg, 1925*a*, 1926 Doig, 1926 Reinmuth, 1926*adf* (plate), 1927*bd* (print) Parvulesco, 1927*dghi* ten Bruggencate, 1927 Sawyer and Shapley, 1927 Lönnquist, 1927*I*, *II* Shapley and Sawyer, 1928 van Rhijn, 1928 Voûte, 1929 Cannon, 1929*ab* Shapley and Sawyer, 1930*afgknq* Shapley, 1931 Harrison, 1931 Nabokov, 1932 Bernheimer, 1932 Moore, 1932, 1933 van de Kamp, 1932*b* Sawyer, 1933 Sawyer, 1933 Stebbins, 1933 Vyssotsky and Williams, 1935*abc* Edmondson, 1935 Shiveshwarkar, 1935 Mineur, 1935 Shapley and Sayer, 1936 Duryea, 1936*ab* Stebbins and Whitford, 1937 Wilkens, 1938 Sawyer, 1939*ab* Sawyer, 1940 Christie, 1941 de Kort, 1941 Copeland, 1942*a* Sawyer, 1944 Shapley, 1944*II* Sawyer, 1945 Finlay-Freundlich, 1945 Sawyer, 1946*ab* Mayall, 1946*ab* Mowbray.

NGC 7099 (Messier 30) α 21^h 37^m.5, δ − 23° 25′ *l* 355°, *b* − 48°

1771 Messier, C. First observation, 1764 Aug. 3. Indicated on map of Halley's comet 1759. *Acad. des Sci. Mém.*, 1760, p. 464, Plate II.

1856 Secchi, P. A. Descrizione del nuovo osservatorio del Collegio Romano, Plate IV, fig. 4. *Mem. dell. Oss. del Collegio Romano* 1852-55.

1891 Common, A. A. Mr. Common's observatory, Ealing. *M. N.*, v. 51, p. 226.

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1915 Bailey, S. I. Globular clusters: distribution of stars. *Harv. Ann.*, v. 76, no. 4.

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1771 Messier, 1777 Bode 68, 1780, 1784 Messier, 1814*a*, 1818*abc* W. Herschel, 1833 J. Herschel 2128 (drawing), 1847 J. Herschel 3878, 1855, 1856 d'Arrest, 1861 Earl of Rosse, 1861 Schmidt, 1862 Schönfeld, 1862*IIb* Auwers, 1864 J. Herschel 4687, 1867 Schmidt, 1867 Oppolzer, 1867 Vogel, 1867 d'Arrest, 1867*ab* Chambers, 1878*b* Dreyer, 1880 Earl of Rosse, 1881 Smyth and Chambers (fig. 48), 1882 Engelmann, 1882*ab* Flammarion, 1886- Weinek and Gruss, 1890 d'Engelhardt, 1891-*e* Bigourdan, 1891 Kempf, 1895 Rümker, 1895*ab* Mönnichmeyer, 1895, 1897, 1898*II* Pickering, 1898 Howe, 1902*abc* Bailey, 1902 Gore, 1904 Perrine, 1904 Webb, 1904, 1907 Holetschek, 1908 Bailey, 1909 Perrine, 1909 Winnecke, 1910 Porter, 1911*a* Hinks, 1912 Curtis, 1915*I* Plummer, 1915 Melotte, 1915*ab* Bailey, 1916 Jeans, 1916 Wilson, 1917 Shapley and Davis, 1917*b* Flam-

NGC 7099 (Cont.)

marion, 1918*a* Bailey, 1918 Curtis, 1918*c* Charlier, 1918*IIbd* Shapley, 1919*Ic*, *IIcd* Shapley and Shapley, 1920 Hoffmeister, 1920*a* Lundmark, 1920*b* Shapley, 1923 Lundborg, 1925 Nabokov, 1925 Strömberg, 1925*a*, 1926 Doig, 1926*af* Parvulesco, 1927*h* ten Bruggencate, 1927 Sawyer and Shapley, 1927*I*, *II* Shapley and Sawyer, 1928 van Rhijn, 1928 Voûte, 1929 Cannon, 1929*ab* Shapley and Sawyer, 1930*afnq* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1932 Moore, 1933 Stebbins, 1935*ab* Edmondson, 1935 Shiveshwarkar, 1935 Mineur, 1935 Shapley and Sayer, 1936 Duryea, 1936*ab* Stebbins and Whitford, 1937 Wilkens, 1939*a* Sawyer, 1940 Christie, 1941 de Kort, 1946*abc* Mayall, 1946*ab* Mowbray.

NGC 7492 α 23^h 05^m.7, δ − 15° 54′ *l* 22°, *b* − 65°

1789 Herschel, W. First observation, 1786 Sept. 20.

1920 Shapley, H. Studies. XVII. Miscellaneous results. Pt. 1. Position co-ordinates of new variable stars. (Plate). *Mt. W. Cont.*, no. 190; *Ap. J.*, v. 52, p. 73.

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1789 W. Herschel III 558, 1833 J. Herschel 2208, 1861 Earl of Rosse, 1862*IIa* Auwers, 1864 J. Herschel 4896, 1880 Earl of Rosse, 1891-*b* Bigourdan, 1898 Howe, 1912 Curtis, 1915 Melotte, 1918 Curtis, 1918*IIf*, *VI* Shapley, 1919*IIabc* Shapley and Shapley, 1926 Reinmuth, 1926*cf*, 1927*c* Parvulesco, 1927 Sawyer and Shapley, 1927*I*, *II*, 1929*ab* Shapley and Sawyer, 1930*afn* Shapley, 1931 Nabokov, 1932, 1933 van de Kamp, 1933 Stebbins, 1936 Duryea, 1936*ab* Stebbins and Whitford, 1939*a* Sawyer, 1940 Christie, 1941 de Kort, 1941 Copeland, 1944 Shapley, 1945 Sawyer, 1946*d* Mayall, 1946*ab* Mowbray.

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1690 Hevelius. Prodromus astronomiae. (Includes in his star catalogue 16 nebulae and clusters). Reprinted by Baily, *op. cit.*

1715 Halley, E. An account of several nebulae, or lucid spots, like clouds, lately discovered among the fixed stars, by help of the telescope. *Roy. Soc. Phil. Trans.*, v. 29, p. 390. Abridged, v. 4, pp. 224-5, 1721; reprint, Halley's list of nebulous objects, H. B. Sawyer Hogg, *R. A. S. C. Jour.*, v. 41, pp. 69-71, 1947.

1733 Derham, W. Observations of the appearances among the fix'd stars, called nebulous stars. *Roy. Soc. Phil. Trans.*, v. 38, p. 70; abridged v. 8, p. 132. (Catalogue of 16 nebulae from Hevelius' Prodromus). Reprint, H. Sawyer Hogg, R. A. S. C. Jour. v. 41, pp. 233-38.

1734 de Maupertuis. Sur les figures des corps célestes. *Acad. des Sci. Hist.*, pp. 78-81. (French translation of Derham's article and catalogue of nebulae from *Roy. Soc. Phil. Trans.*, v. 38).

1746 de Chéseaux, L. Letter in archives of French Academy, listing nebulae, published by Bigourdan, *Paris Ann., Observations 1884*, G 8, pub. 1891; *Observations 1907*, E 135, pub. 1917.

1755 Lacaille, Abbé de. Sur les étoiles nébuleuses du ciel austral. *Acad. des Sci. Hist. et Mém.*, p. 194. This catalogue is reprinted several times in *Conn. des Temps;* for 1783, p. 252; for 1784, p. 270; for 1787, p. 280.

1771 Messier, C. Catalogue des nébuleuses et des amas d'étoiles que l'on découvre parmi les étoiles fixes sur l'horizon de Paris. *Acad. des Sci. Mém.*, pp. 435-8. (Descriptions of 45 nebulae).

1777 Bode, J. E. Ueber einige neuentdeckte Nebelsterne und einem vollständigen Verzeichnisse der bisher bekannten. *Berliner Jahrbuch für 1779*, pt. 2, pp. 65-71. (List of 75 objects, including most of the first 45 nebulae of Messier, and the discoveries of Hevelius, Halley, Lacaille and Bode).

1780 Messier, C. Catalogue des nébuleuses et des amas d'étoiles observées à Paris, par M. Messier, à l'Observatoire de la Marine, hôtel de Clugni, rue des Mathurins. *Conn. des Temps pour 1783*, pp. 225-249. Reprinted in *Conn. des Temps* for 1784, pp. 227-254. (The first 68 nebulae of Messier's catalogue).

1781 Méchain, P. F. A.; Messier, C. Addition au Catalogue des nébuleuses et des amas d'étoiles de la Connoiss. des Temps de 1783, pag. 225 suiv. *Conn. des Temps pour 1784*, pp. 255-267. (Numbers 69 to 103).

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1784 Messier, C. Catalogue des nébuleuses et des amas d'étoiles observées à Paris. *Conn. des Temps pour 1787*, pp. 238-82. Pp. 238-63 give the first 68 nebulae as previously published. Pp. 264-82, Addition au Catalogue des Nébuleuses et des amas d'étoiles de M. Messier, inserée dans la *Conn. des Temps* de 1783, p. 225, et l'année 1784, p. 255ff. P. 277, List of three nebulae observed by Méchain only, 101, 2, 3.

1786 Herschel, W. Catalogue of one thousand new nebulae and clusters of stars. *Roy. Soc. Phil Trans.*, v. 76, 1786, pp. 457-99.

1789 Herschel, W. Catalogue of a second thousand of new nebulae and clusters of stars: with a few introductory remarks on the construction of the heavens. *Roy. Soc. Phil. Trans.*, v. 79, pp. 212-55.

1800 Herschel, W. On the power of penetrating into space by telescopes, with a determination of the extent of that power in natural vision and in telescopes of various sizes and constructions; illustrated by select observations. *Roy. Soc. Phil Trans.*, v. 90, pp. 49-85.

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