ANNALS

OF

THE ASTRONOMICAL OBSERVATORY OF HARVARD COLLEGE

HARLOW SHAPLEY, DIRECTOR

VOLUME 88, NO. 2

A SURVEY OF THE EXTERNAL GALAXIES BRIGHTER THAN THE THIRTEENTH MAGNITUDE

BY

HARLOW SHAPLEY AND ADELAIDE AMES

CAMBRIDGE, MASS.
PUBLISHED BY THE OBSERVATORY
1932

ANNALS OF HARVARD COLLEGE OBSERVATORY. VOL. 88, No. 2

A SURVEY OF THE EXTERNAL GALAXIES BRIGHTER THAN THE THIRTEENTH MAGNITUDE

BY HARLOW SHAPLEY AND ADELAIDE AMES

THE photometric catalogue of the brighter external galaxies here presented has been undertaken to provide a systematic census of the inner parts of the metagalactic system where heretofore no comprehensive photometry has been available. Such a catalogue of magnitudes and positions should give a suitable basis for a study of the uniformity of distribution of the galaxies, the clustering of the nearer systems, the relation of the apparent distribution to the obscuring clouds in low galactic latitude, and similar problems.

An extensive experience with the estimates of magnitudes of nebulous objects has shown us that useful and dependable results can be obtained from the photographic plates already existing in the Harvard sky patrol. The scale of the photographs is so small that the dimensions of most nebular objects are sufficiently stellar for practical intercomparisons; furthermore the fields covered by these plates are so large that each contains magnitude sequences of the Selected Areas, providing a set of reference standards on the International system. The exposure times of sixty to ninety minutes are suitable for the interval between the tenth and thirteenth magnitudes in which ninety eight per cent of the thousand brightest systems lie. Special series of small scale plates taken with out-of-focus images and measured with thermo-electric or photo-electric photometers would give but little better results for these objects except perhaps for the relatively few brighter than the eleventh magnitude or for those of great elongation or peculiar structure.

A summarized description of the catalogue, with illustrations of the distribution of the systems on the surface of the sky, is published in Harvard Bulletin 887, 1932.

1. *Collection of Material.* — The present catalogue contains a total of 1249 objects of which 1025 are brighter than the thirteenth magnitude and only 20 are brighter than the tenth magnitude. The distribution by magnitude intervals follows:

Magnitude	Number of Nebulae North	South	Total
]10.0	10	10	20
10.0–10.9	33	17	50
11.0–11.9	124	97	221
12.0–12.9	371	363	734
13.0–13.3	100	124	224
Total Numbers	638	611	1249

The approximate equality in number of bright systems in the northern and southern sky is noteworthy; when the division into hemispheres is later made on the basis of galactic latitude the well-known great inequality appears.

All but thirteen of the 1249 objects appearing in the catalogue were listed originally in the New General Catalogue (N.G.C.) and the two Index Catalogues. The standard catalogues are thus found to be as remarkably complete for the brighter external galaxies as for the globular and galactic clusters. The sources are as follows:

Original Source	Pg. Mag.]13.0	Pg. Mag. [12.9	Total Number
New General Catalogue	980	208	1188
Index Catalogues (I & II)	35	13	48
Small Magellanic Cloud	1		1
Large Magellanic Cloud	1		1
H.A., **72**, No. 2		1	1
H.A., **85**, No. 6	1	1	2
Reinmuth (Heid. Obs. Pub., **8**, No. 12)		1	1
Fath (Astr. Journ., **28**, No. 658)	1		1
New	6		6
Total Numbers	1025	224	1249

The general method of sorting out external nebulae brighter than the chosen limit of photographic brightness, the thirteenth magnitude, is as follows:

(*a*) Identification of every possible extragalactic object in the New General Catalogue on a large scale photograph in the Harvard collection, preferably on one with long exposure.

(*b*) Measurement of the total photographic magnitude, with reference to stars of standard magnitude sequences, on a plate of small scale and the dropping of those appearing to be fainter than magnitude 13.2. Magnitudes of the selected objects were estimated on two other small scale plates and the results combined to form the published means.

(*c*) Omission of known galactic and globular clusters as well as planetary and gaseous nebulae. The character of a number of doubtful objects was determined from spectrum plates; a few lying in the Milky Way were assumed to be galactic because of their positions.

(*d*) Omission of all objects, whether in the N.G.C. or in the Indices, which are parts of the Large and Small Magellanic Clouds. There is a single entry for each cloud in the present catalogue.

Various modifications of the general plan of selecting the objects for measurement have been made. In the original work on the extension of the Virgo (formerly called Coma-Virgo) cluster of galaxies (H.B. 880) an attempt was made to measure integrated photographic magnitudes for all the objects complete to the fourteenth magnitude in a region covering sixty degrees in declination and forty degrees in right ascension, centered at $12^h\ 30^m$ on the equator. Later it was decided that the limit had been lower than the quality of the plates warranted and the material was used only to the thirteenth magnitude. The experience gained from this survey and from the examination of occasional long-exposure Bruce plates in the northern hemisphere shows that the N.G.C. can be considered complete to the thirteenth magnitude. Many of its nebulae are of course much fainter.

After about twenty per cent of the sky had been examined and every possible extra-galactic N.G.C. object had been identified on a good quality, long-exposure photograph (chiefly plates of the A series, 1′ = 1 mm, and of the MC series, 1′.6 = 1 mm) it was found that Reinmuth's catalogue of the Herschel nebulae north of declination −20° (Heid. Obs. Publ., **9**, 1926) would be useful in eliminating at once some of the N.G.C. objects fainter than the desired limit. All nebulae described by him, therefore, as vF or eF, and also those called pF, cF, and F, if at the same time they were S, pS, or eS, were omitted in the rest of the sky covered by his catalogue.

To insure completeness for the southern hemisphere the objects listed in the two Index Catalogues were identified and their magnitudes estimated along with the N.G.C. nebulae. In addition, both the large and small-scale plates were watched for any other galaxies which might be brighter than the thirteenth magnitude. Five additional objects were thus identified which belonged to various short lists already published, and six new galaxies were found.

2. *The Catalogue.* — For each object in the catalogue the successive columns are the numbers from the N.G.C. or other published catalogues, the right ascension and the declination for 1950, the galactic coördinates (equinox of 1900), the integrated photographic magnitudes, the residuals, and the descriptive entry giving, whenever possible, the maximum and minimum diameter in minutes of arc, the type, and a reference to the source for the description.

The positions for the most part were taken directly from the New General Catalogue and reduced to 1950. No systematic attempt was made to check the correctness of these positions, but some outstanding errors were discovered in identifying the nebulae. Some corrections were taken from Reinmuth's Die Herschel-Nebel. The positions of the following objects have been changed from those given in the N.G.C.:

N.G.C.	1350	4342	5898	7713
	1518	4517	6769	7793
	1947	4782	6776	
	1961	4783	7582	

The galactic coördinates were read from a graph printed in the publications of the Dominion Astrophysical Observatory, **4**, No. 4, 1928.

3. *Comparison with Franklin-Adams Survey and Mount Wilson List.* — Nearly twenty years ago a systematic search for nebulae and clusters on the Franklin-Adams plates was made by J. A. Hardcastle (M.N., **84**, 698, 1914). The general uniformity of the Franklin-Adams series of plates and its frequent use by investigators of clusters and nebulae who desire a comprehensive and fairly uniform survey for the whole sky suggests that a detailed comparison of the Hardcastle and Harvard results would be of interest. This comparison has been made with an early draft of the present catalogue.

The Hardcastle list contains 785 N.G.C. and I.C. objects, divided roughly into different classes, but without magnitudes, diameters, or further descriptions. After eliminating the 103 which are recognized as clusters, diffuse or planetary nebulae, or parts of the Magellanic Clouds, 682 presumably external galaxies remain. Of these 462 had been incorporated among the systems listed as brighter than the thirteenth magnitude in the Harvard catalogue, and 147 among those at or slightly fainter than that limit. All of the 179 objects not appearing in the Harvard list were reëxamined and as a result six were added to the list. Only four of these, however, were brighter than the thirteenth magnitude (12.4, 12.8, 12.9, 12.9). For stars the Franklin-Adams plates reach fairly well below the fifteenth magnitude, but our examination shows that Hardcastle has identified less than one half of the external galaxies brighter than the thirteenth magnitude. This incompleteness is of course partially due to the relatively small scale of the Franklin-Adams plates (1 mm = 3′).

For the larger objects Hardcastle's list is much more nearly complete, as shown by the following tabulation, which includes only the objects brighter than the thirteenth magnitude. The first column gives intervals of angular diameter; the second, the number of nebulae found by Hardcastle, and the third the corresponding percentage of all the nebulae that appear in the Harvard catalogue within the given diameter intervals (the diameters of four nebulae are unknown).

Diameter	Number	Percentage
160.0–10.0	24	83
9.9– 5.0	73	70
4.9– 4.0	56	72
3.9– 3.0	109	69
2.9– 2.0	104	46
1.9– 1.0	87	30
<1.0	9	23
Total	462	46

Of the 133 nebulae in the Harvard catalogue with angular diameter of five minutes of arc or more Hardcastle lists 97, or seventy three per cent.

When the Hardcastle and Harvard lists are compared for completeness in magnitude intervals the former is found to give eighty three per cent of the number to magnitude 11.5 — that is, the other objects have been overlooked completely. Fainter than magnitude 11.5 the percentage falls off rapidly, as shown in Table I in which the numbers of nebulae in the Hardcastle list are given for decreasing magnitude and for various groupings based on position and class. Each number is preceded by the percentage which it represents of the number of objects on the same classification in the Harvard catalogue. As might be expected, the spheroidal external objects have been less easily identified on the Franklin-Adams plates than the spiral and irregular nebulae. Forty six per cent of all the Harvard objects brighter than magnitude thirteen appear in Hardcastle's list. There is little difference between the northern and southern hemispheres, showing that the relative completeness of the Hardcastle list is the same for the two regions.

TABLE I

COMPARISON OF HARDCASTLE AND HARVARD LISTS

Harvard Pg. Mag.	Spiral		Spheroidal		Irregular		Type Unknown		North Equatorial		South Equatorial		Total	
	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
]10.0	*86*	12	*100*	2	*100**	2	. .		*80*	8	*100**	8	*89**	16
10.0–10.4	*100*	10	*50*	1	*100*	1	. .		*100*	9	*75*	3	*92*	12
10.5–10.9	*86*	19	*70*	9	*100*	2	. .		*79*	19	*85*	11	*81*	30
11.0–11.4	*82*	47	*92*	11	*80*	4	. .		*82*	33	*85*	29	*84*	62
11.5–11.9	*69*	77	*39*	12	*100*	2	*0*	0	*67*	56	*56*	35	*62*	91
12.0–12.4	*54*	106	*26*	12	*60*	3	*17*	2	*47*	63	*48*	60	*47*	123
12.5–12.9	*36*	103	*16*	18	*40*	4	*11*	7	*26*	62	*29*	70	*28*	132
Totals	*53*	374	*30*	65	*62*	18	*12*	9	*46*	250	*44*	216	*46*	466

* The Harvard list contains the two Magellanic Clouds, which are omitted in computing these percentages.

The brighter galaxies omitted from Hardcastle's list include, in addition to the two Magellanic Clouds, the following N.G.C. objects:

	Class	Magnitude	Diameter		Class	Magnitude	Diameter
4736 (M 94)	S	9.0	5′.0	4486 (M 87)	E	10.7	3′.3
5457 (M 101)	S	9.0	22.0	2683	Sc	10.8	10.0
1291	E	10.2	5.0	4636	E	10.8	1.2
4699	SBb	10.5	3.7	1399	E	10.9	1.4
4649 (M 60)	E	10.6	3.9	3310	Sb	10.9	1.5

Four nebulae were found to have been identified with different numbers by Hardcastle and at Harvard:

N.G.C. 3794 should read N.G.C. 3804
N.G.C. 4208 should read N.G.C. 4212
I.C. 3026 should read I.C. 764
I.C. 5265 should read I.C. 1459

It is quite possible that others have been erroneously identified, but this cannot be established because Hardcastle's descriptions are too meager.

A comparison has also been made of the present catalogue with the most extensive list of nebulae published by Hubble (Mt. Wilson Contr. 324, 1925). Of the 399 nebulae in the Mount Wilson list all but forty five appeared in the Harvard list on first comparison. Twelve of the forty five were assumed to be certainly too faint for the Harvard catalogue. They were called 12.m or >12.?m by Holetschek, the original observer, and corrected to magnitude 13.3 (both are visual magnitudes) by Hopmann and Hubble. Thirty three of the Mount Wilson nebulae were reëxamined on the Harvard plates and the magnitudes estimated. Five were added to the Harvard list, making the total number in common 359; but only two of these five were brighter than the limit to which the catalogue is assumed to be practically complete, the magnitudes being 12.5, 12.8, 13.0, 13.2, and 13.2.

For various intervals of declination north of −20°, and for successive intervals of brightness the Mount Wilson and Harvard lists are compared in Table II, in the same form as Table I, in order to show in what regions and to what magnitudes Holetschek's survey was complete. It should be noted that Table II is not the comparison of Harvard and Mount Wilson measures but is only an indication of the completeness of the Mount Wilson list. In the northern hemisphere 100 per cent of the Harvard nebulae brighter than the eleventh magnitude are in the Mount Wilson list, whereas of those between 12.5 and 12.9 seventy per cent are omitted altogether by Holetschek. Of all those brighter than the thirteenth magnitude only fifty four per cent of the northern objects are included in the Holetschek-Hubble survey. The probable incompleteness of the survey for objects fainter than the eleventh photographic magnitude has of course been duly recognized by Holetschek and Hubble.

TABLE II

COMPARISON OF MOUNT WILSON AND HARVARD LISTS

Harvard Pg. Mag.	+90° to ±0°		±0° to −10°		−10° to −20°	
	%	No.	%	No.	%	No.
]10.0	*100*	10	*100*	1	*100*	1
10.0–10.4	*100*	9	*100*	1	.	.
10.5–10.9	*100*	24	*100*	3	.	.
11.0–11.4	*88*	35	*100*	6	*00*	0
11.5–11.9	*83*	70	*83*	10	*58*	7
12.0–12.4	*56*	75	*22*	5	*33*	5
12.5–12.9	*30*	70	*13*	6	*7*	3
Totals	*54*	293	*26*	32	*29*	16

4. *Photographic Magnitudes.* — The magnitude estimates were made almost entirely on plates of ninety minutes exposure in the AY series for the north and the AX series for the south. These plates are taken with the 2-inch Ross-Tessar and the 2-inch Zeiss-Tessar at centers regularly spaced to cover the sky. The scale is six hundred seconds to the millimeter and the magnitude limit for ninety minute exposures is between 13.5 and

14.0. Three plates were used in estimating the magnitude of each object. It was occasionally necessary to use plates of the AC series, taken with the 1-inch Cooke telescope and of the same scale as above; occasionally either the northern or southern 3-inch Ross lenses were also used. The scale of the Ross lenses (series RH and RB) is 380 seconds to the millimeter. The standards of magnitude were stars from the Kapteyn selected areas with values reduced to the present international scale. These standard sequences are conveniently placed, slightly off the centers of the AY and the AX plates.

The images of the nebulae were compared directly with the images of the stars of the magnitude sequences, and the magnitudes estimated to tenths. The magnitude of each object, after identification on a large scale plate, was first estimated by Miss Ames. All those found to be brighter than magnitude 13.2 were measured by her on two more plates. For about one third of all those accepted, a second estimate on one of the plates was made by Dr. Shapley. Each of these magnitude estimates was given weight one, and the three or four measures, as the case might be, were combined to form the published mean. The residuals are given for each mean; where there are four, the fourth one refers to Shapley's measure.

The average residual for the 1005 galaxies fainter than magnitude 9.9 and brighter than 13.0, including measures by both observers, is ±0.126 magnitudes.

The nebulae for which magnitudes were estimated by Shapley were distributed over nine regions, each region covered by a single plate of the AY or AX series. Table III shows the magnitude differences and the residuals in these regions for the two observers.

TABLE III

COMPARISON OF TWO OBSERVERS

Plate	Region	Number	Syst. Diff. HS−AA	Av. Diff. HS−AA	AA av. Residual	HS and AA Av. Residual
AX 2066	$2^h \pm 0^\circ$	23	+0.20	±0.28	±0.14	±0.17
AX 1479	4 −30	41	−0.02	.17	.12	.13
AY 1008	10 +30	32	+0.22	.26	.13	.16
AY 1403	11 +15	37	−0.08	.15	.14	.15
AX 1043	12 ± 0	85	+0.14	.24	.12	.14
AY 491	12 +60	39	+0.01	.17	.13	.13
AX 2263	14 −30	14	+0.20	.25	.11	.13
AX 1309	21 −45	31	−0.15	.19	.12	.13
AX 1166	23 −45	28	−0.01	.21	.08	.10
Total or Mean		329	+0.05	±0.21	±0.12	±0.14

It is evident that the systematic difference between the two observers may be appreciable for a single plate, where some condition of plate fog or focus affects the estimates by each differently. But the differences are sometimes in one direction and sometimes in the other, and when the several regions are combined, the average systematic difference for the total is small.

The average residuals from means taken of Miss Ames' estimates alone are given below. The objects fainter than magnitude 13.0 are omitted, as are also the twenty nebulae brighter than magnitude 10.0. The data are divided into intervals of declination to show the effect of different series of plates on the consistency of the estimates.

Region	Plate Series	Number	Average Residual
+90° to +20°	AY	288	±0.126
+20 to ± 0	AX & AY	240	±0.122
± 0 to −90	AX	477	±0.113
Whole sky		1005	±0.118

Several lists of total photographic magnitudes have been published at Harvard in recent years. Some of these were quite provisional and all of them are to be replaced by the present catalogue. The most extensive of the earlier lists of integrated photographic magnitudes for the brighter galaxies appears in the first number of the present volume. The estimates were made by Miss Ames. For the 108 nebular magnitudes common to that and to the present list, the average magnitude difference is ±0.19, and the earlier values are nine hundredths of a magnitude fainter systematically. This systematic difference may perhaps be attributed to the selection of some less satisfactory plates for parts of the earlier work.

Lundmark has published provisional magnitude estimates from the Franklin-Adams plates for a number of extragalactic objects (Ups. Med., No. 21, 1927). For the 157 in common we find the systematic difference

$$AA - L = +0.72.$$

The excess of brightness as estimated by Lundmark is what should be anticipated when stellar and nebular images are compared on plates of the Franklin-Adams series, for which the scale and exposure times are too great for nebulae brighter than the thirteenth magnitude.

The photographic magnitudes of fifteen bright external galaxies have been published by Hubble (Mt. W. Contr. 427, 13, 1931) on the basis of extra-focal plates measured with a thermo-couple photometer. All of these objects are in the Harvard list and the magnitudes, compared with the Mount Wilson measures, are given in Table IV. The differences in the fifth column are nearly all negligible throughout this interval of about three magnitudes, except for the systematic difference of two tenths of a magnitude by which the Harvard values are brighter than those determined at Mount Wilson. It is interesting that this close agreement is obtained notwithstanding the wide variety of nebular types measured.

CATALOGUE OF BRIGHT EXTERNAL GALAXIES

Des.	α 1950	δ	λ	β	Mag.	Res.	Diams.		Type	Aut.
	0h									
	m	° '	°	°			'	'		
7814	0.7	+15 51	75	-45	12.4	111	3.0	0.8	Sa	H,C
16	6.5	+27 27	80	-35	13.0	001				R
23	7.3	+25 39	82	-36	12.7	111	1.0	0.6	..	R
24	7.4	-25 15	14	-82	12.2	120	4.0	1.0	S	a
45	11.4	-23 27	28	-82	12.1:	132	10.0	7.0	S	G
55	12.5	-39 30	295	-77	7.8:	223	25.0	3.0	S	K
95	19.6	+10 12	81	-52	13.1	100				R
128	26.7	+02 33	81	-60	12.9	201	2.5	0.4	S:	R
134	27.9	-33 32	296	-83	11.4	001	5.0	1.0	S	K
147	30.4	+48 14	87	-14	12.1	001	6.5:	3.8:	SEp	R
148	30.8	-32 4	300	-85	12.9	001	1.2	0.5	E	a'
151	31.6	- 9 58	80	-72	12.5	001	4.0	2.0	S	C
150	31.8	-28 5	1	-88	12.2	011	2.0	1.0	SB	K
157	32.3	- 8 40	81	-71	11.1	111	2.5	2.0	Sc	H,a'
175	34.9	-20 12	80	-82	12.8	201	1.8	1.4	SB	a
185	36.1	+48 4	89	-14	11.8	100	3.5	2.8	Ep	L,H
178	36.6	-14 27	83	-77	12.9	111	..	..	..	K
205	37.6	+41 25	89	-21	10.8	111	8.0	3.0	Ep	H,C
210	38.0	-14 9	85	-76	12.5	001	4.5	2.5	S	K
214	38.7	+25 14	88	-37	12.8	101	1.1	0.7	S:	R
224	40.0	+41 0	89	-20	5±		160	40	Sb	H
221	40.0	+40 36	89	-22	9.5	412	2.6	2.1	E2	H
227	40.1	- 1 48	90	-64	13.1	001				R
237	40.9	- 0 24	90	-63	13.2	101				
245	43.7	- 1 59	92	-65	12.9	010	1.0	0.8	S	R
247	44.6	-21 1	94	-83	10.7	202	18.0	5.0	S	C
253	45.1	-25 34	100	-88	7.0:	112	22.0	6.0	Sc	H,a
255	45.2	-11 45	93	-74	12.8	122	1.0	1.0	S	C
254	45.2	-31 42	263	-86	12.8	000	1.3	0.5	E	G
268	47.6	- 5 28	92	-58	13.2	201				R
274	48.5	- 7 20	93	-70	13.0	201			E:	K,R
275	48.5	- 7 20	93	-70	13.0	111				K,R
278	49.2	+47 18	91	-15	11.6	111	1.2	1.2	Sc	H,C
S M C	50	-73	269	-45	1.5±		216	216	I	a
289	50.4	-31 29	245	-85	12.1	001	2.0	1.5	S	K
	0h-1h									
300	52.6	-37 58	258	-80	11.3:	223	20	10	S	K,G
309	54.0	-10 13	100	-72	12.5	212	2.0	2.0	S	K
337	57.3	- 7 51	101	-70	12.2	102	2.0	1.5	I	K
357	0.8	- 6 37	103	-69	13.0	123			SB	R
New 1	2.6	- 6 29	105	-68	12.8	203	3.5	3.5	Sβ:	a'
406	5.8	-70 9	267	-48	12.9	010	3.5	1.5	S	a
404	6.6	+35 27	95	-27	11.9	230	1.3	1.3	Eρ	H
434	10.2	-58 31	263	-58	13.0	131				
428	10.4	+ 0 43	105	-61	11.9	1125	4.0	2.2	S	C
439	11.5	-32 0	214	-82	13.0	001				
450	13.0	- 1 7	106	-62	12.6	3122	2.5	2.0	S	K
470	17.1	+ 3 9	107	-58	12.4	2134	1.6	1.0	Sc	H,R
473	17.5	+16 14	103	-46	13.1	001				R
474	17.5	+ 3 10	107	-58	12.6	2143	0.4	0.4	E0	H
488	19.1	+ 5 0	106	-56	11.8	2011	3.0	3.0	Sa	H,C
491	19.1	-34 19	225	-79	13.0	120				
514	21.3	+12 39	105	-50	12.4	001	2.0	2.0	S	C
520	22.0	+ 3 32	109	-58	12.4	1044	3.0	0.7	I:	R
521	22.0	+ 1 28	111	-60	13.0	2002			S	R
524	22.1	+ 9 16	106	-52	12.0	112	2.6	2.6	Ep	H,C
533	22.9	+ 1 30	111	-60	13.0	2210			E	R
578	28.0	-22 56	157	-78	11.7	010	5.0	3.0	S	a
584	28.8	- 7 7	120	-66	11.6	001	2.0	1.2	E3	H
596	30.3	- 7 17	121	-66	12.2	100	0.6	0.5	E6	H
598	31.1	+30 24	103	-31	7.8	422	60	40	Sc	H,C

Des.	α 1950	δ	λ	β	Mag.	Res.	Diams.		Type	Aut.
	1h									
	m	° '	°	°			'	'		
613	32.0	-29 40	194	-78	11.1	111	4.0	2.0	SBc	H,a'
615	32.6	- 7 35	121	-66	12.6	010	2.7	0.8	Sc	H,R
625	32.9	-41 41	237	-72	12.3	312	2.5	1.0	S	G
628	34.0	+15 32	108	-45	11.2:	021	8.0	8.0	Sc	H,C
643	34.1	-75 48	266	-42	13.0	110				
636	36.6	- 7 45	125	-67	12.6	001	0.7	0.7	E	R
670	44.5	+27 38	106	-34	13.0	302				R
672	45.0	+27 11	106	-34	11.9	112	3.5	2.0	Sb	H,a'
685	45.9	-53 2	249	-62	12.7	011	2.3	2.3	S	a'
681	46.7	-10 40	134	-68	12.9	110	1.3	1.2	S:	mc
701	48.6	- 9 57	133	-67	12.7	010	1.6	0.5	Sa:	mc
720	50.6	-13 59	142	-69	11.7	220	1.3	0.7	E6	H
718	50.7	+ 3 57	118	-55	12.7	3132	0.5:	0.4	..	R
741	53.8	+ 5 23	120	-53	13.0	1111				R
753	54.6	+35 41	105	-25	13.0	201				R
750	54.6	+32 58	106	-27	12.9	112	0.4	0.3	E0	R,C
782	56.1	-58 1	252	-57	12.7	101	2.0	2.0	S	a'
772	56.6	+18 46	113	-39	12.0	023	5.0	3.0	Sb	H,C
779	57.2	- 6 12	132	-62	11.8	1212	3.0	0.5	SBc	H,C
777	57.3	+31 12	108	-29	13.0	021				R
	1h-2h									
788	58.6	- 7 3	133	-62	13.1	1121				R
821	5.6	+10 46	120	-47	12.7	111	1.0	0.4	E6	H
I1783	7.8	-33 13	200	-71	13.1	101				
864	12.8	+ 5 45	126	-51	12.3*	1313	2.8	2.8	S	R
I1788	13.4	-31 26	197	-70	13.2	210				
877	15.3	+14 19	121	-43	12.4	120	1.9	1.3	S	R
890	19.1	+33 2	112	-25	12.7	313	0.9	0.4	E:	R,mc
895	19.1	- 5 45	140	-58	12.2	1111	3.5	2.0	S	P
891	19.3	+42 7	108	-17	12.2:	211	12.0	1.0	S	C
908	20.8	-21 27	170	-67	11.1	303	4.0	1.3	Sc	H,C
922	22.9	-25 1	178	-67	12.3	212	2.0:	1.0:	..	a'
925	24.3	+33 22	113	-24	12.6:	032	4.7	0.6	S	R
936	25.1	- 1 22	136	-54	11.5	2100	3.0	2.0	SBa	H,C
941	26.0	- 1 22	137	-54	13.3	021				C,G
949	27.6	+36 56	113	-21	12.8	120	1.0	0.3	Sb	H,R
955	28.0	- 1 19	137	-53	13.1	122				H,R
958	28.1	- 3 9	140	-55	13.0	2121				R
976	31.2	+20 44	121	-35	12.7	212	0.7	0.7	S:	R
972	31.3	+29 6	116	-27	12.6	224	2.0	1.9	Sp	P,H
986	31.6	-39 15	213	-65	11.8	201	1.5:	0.8:	S:	a'
991	33.2	- 7 22	148	-57	12.7	2503	2.0	2.0	S	K
1022	36.1	- 6 53	148	-56	12.0	2011	1.1	0.6	SBb	H,R
1035	37.0	- 8 20	150	-57	12.8	001	2.0	0.5	S	K
1023	37.2	+38 52	113	-17	11.2	101	6.9	1.3	SBa	H,C
1048	38.2	- 8 45	152	-56	12.5	010	3.0	3.0	Sc	mc
1052	38.6	- 8 28	150	-57	11.6	202	0.7	0.5	E3	H
1055	39.2	+ 0 16	140	-51	12.0	1313	5.0	1.0	S	C
1068	40.1	- 0 14	140	-51	10.0	1300	2.5	1.7	Sb	H,C
1058	40.2	+37 8	115	-20	12.7	202	2.3	2.1	S:	mc
1073	41.2	+ 1 10	139	-50	12.0	2303	4.0	4.0	S	R
1079	41.6	-29 13	189	-63	12.6	111	1.1:	0.8:	..	mf
1084	43.5	- 7 47	151	-55	11.2	021	2.2	0.8	Sc	H,C
1087	43.9	- 0 42	142	-51	11.2	3233	2.3	1.3	Sc	H,C
1090	44.0	- 0 27	142	-51	12.8	1303	4.0	1.5	S	G
1097	44.3	-30 29	194	-63	10.6	121	9.0	5.5	SB	K,G
	2h-3h									
1140	52.2	-10 14	155	-54	13.0	201				R
1156	56.7	+25 3	125	-28	12.9	021	2.5	..	I	C
1172	59.3	-15 2	166	-57	13.1	212				R
1179	59.7	-19 6	172	-57	13.0	100				
1169	0.1	+46 12	114	-10	13.0	100				R

1932AnHar..88...41S

Des.	α 1950	δ	λ	β	Mag.	Res.	Diams.		Type	Aut.
	3^h									
	m	° ′	°	°			′	′		
1187	0.4	-23 4	179	-58	11.3	011	5.0	5.0	SB	G
1175	1.3	+42 8	116	-14	13.0	010				R
1199	1.3	-15 48	166	-56	12.7	000	0.8:	0.8:	..	R
1201	2.0	-26 15	185	-58	12.0	111	1.1:	1.0:	E: So	mf
1209	3.8	-15 48	166	-55	12.5	100	0.5:	0.3:	E4	R
1232	7.5	-20 46	176	-57	11.1	231	7.0	7.0	S	K
1249	8.6	-53 32	234	-53	12.3	011	4.5	2.5	S	a
1241	8.8	- 9 7	158	-52	13.0	001			S	R
1255	11.4	-25 58	185	-57	12.1	1234	3.5	2.4	S	a
1288	15.3	-32 46	198	-57	13.0	0110			SBa	K
1291	15.5	-41 17	213	-56	10.2	311	5.0	2.0	E	G
1270	15.6	+41 18	119	-13	12.7	112	0.2	0.2	E:	R
1292	16.0	-27 48	190	-56	12.8	1311	..	..	Sb	..
1297	17.0	-19 16	175	-53	13.0	010				
1300	17.5	-19 35	175	-55	11.8	033	6.0	3.0	SB	C
1313	17.6	-66 40	250	-44	10.8	100	4.5	3.0	SBbc	a'
1302	17.7	-26 14	186	-55	11.9	1011	1.5	1.4	E**	a
1309	19.8	-15 35	170	-52	11.8	122	1.4	1.4	Sb	H,a'
1316	20.7	-37 25	207	-55	10.1	2011	3.5	2.5	S: E	a
1317	20.8	-37 17	205	-56	12.2	3112	0.7	0.6	S	a
1326	22.0	-36 39	205	-55	11.8	1011	3.0	2.5	SB	a
1325	22.3	-21 43	180	-53	12.9:*	011	2.5	0.8	S: Sb	a
1332	24.1	-21 31	180	-53	11.4	010	2.7	0.5	Sa	H,a'
I1933	24.3	-52 57	231	-51	13.2	311				
1337	25.6	- 8 34	162	-47	12.7	212	6.0	1.0	S	C
1339	26.1	-32 27	198	-54	12.8	1102	1.0	1.0	E	a
1341	26.1	-37 19	205	-54	13.1	0100				
1344	26.7	-31 14	195	-54	11.6	2112	2.0	1.0	E	a
1351	28.6	-35 2	202	-53	12.8	1002	0.8	0.6	E	a
1350	29.1	-33 38	200	-54	11.8	314	3.0	1.5	SBb	a
1353	29.8	-21 0	179	-51	12.4	1111	2.5	1.0	S	a
I1954	30.2	-52 5	230	-50	12.2	212	3.0	1.5	S	a
1357	30.9	-13 50	170	-48	12.5	001	1.1	1.1	S:	a'
1358	31.2	- 5 16	158	-44	13.1	001				
I1953	31.4	-21 39	180	-52	12.5	101	2.4	2.4	S	a
1359	31.5	-19 41	176	-51	12.8	111	1.6	1.3	I*	a
1365	31.8	-36 18	203	-53	11.2	3021	8.0	3.5	SB	a
1366	32.0	-31 23	197	-53	13.0	1102			S:	
1371	32.8	-25 6	186	-52	12.2	3310	2.0	1.4	SB:	a
1374	33.4	-35 24	204	-53	12.4	0020	0.8	0.8	E	a
1379	34.2	-35 37	204	-53	12.3	1220	0.6	0.6	E	a
1380	34.6	-35 9	202	-53	11.4	0002	3.0	1.0	E: Sa	a
1376	34.7	- 5 12	159	-44	12.9	202	..	..	..	..
1381	34.7	-35 28	204	-53	12.6	2021	2.0	0.5	E: Sa	a
1386	35.0	-36 10	204	-53	12.4	4221	2.5	1.0	S: Sb	a
1387	35.1	-35 41	204	-53	12.1	2221	1.0	0.9	E	a
1385	35.2	-24 40	186	-51	11.8	3021	2.6	1.6	S	a
1389	35.3	-35 55	204	-53	12.8	1012	1.0	0.8	E	a
1395	36.3	-23 11	183	-50	11.2	313	1.0	0.8	E1	a
1399	36.6	-35 37	204	-52	10.9	4122	1.4	1.4	E	a
1398	36.8	-26 30	189	-52	11.3	2111	4.0	3.5	SB	a
1404	37.0	-35 45	204	-52	11.5	2023	1.0	1.0	E	a
1411	37.1	-44 15	217	-52	12.0	111	1.1:	..	E:	a'
1400	37.2	-18 51	177	-49	12.5	122	0.6	0.5	E1	H
1406	37.5	-31 28	197	-52	12.7	1121	3.0	0.8	S: b	a
1407	37.9	-18 44	177	-48	11.5	113	0.7	0.7	E0	H
1415	38.7	-22 43	183	-50	12.8	2110	2.0	1.0	S:	a
1417	39.5	- 4 48	160	-43	12.9	010	1.5:	1.1:	S:	R
1425	40.1	-30 4	194	-52	12.1	2312	3.5	1.7	S:	a
1421	40.2	-13 40	171	-46	12.0	321	3.0	0.5	S	C
	3^h									
1427	40.4	-35 34	203	-52	12.4	2210	..	..	.. E	K
1433	40.4	-47 24	222	-50	11.4	111	7.0	6.0	SB	a
1426	40.6	-22 16	182	-49	12.8	2001	0.6	0.4	E3	a
1437	41.7	-36 1	204	-52	12.9	2311	2.0:	1.5:	S: c	a'
1448	42.1	-44 48	218	-51	11.8	101	8.0	1.0	Sc	a
1439	42.6	-22 5	182	-48	12.9	2001	0.6	0.6	E0	a
1440	42.8	-18 27	178	-48	13.0	120				C
1452	43.1	-18 47	179	-48	13.0	011				
1453	44.0	- 4 8	160	-41	12.8	101	0.8	0.6	E2	H
1461	46.1	-16 32	175	-46	12.8	111	..	..	..	..
I2006	52.2	-36 8	204	-49	12.8	0111	..	..	S	..
1487	54.1	-42 31	214	-48	12.6	311	1.2	1.0	I	a'
1493	55.9	-46 21	218	-48	11.8	111	2.0:	2.0:	S:	a'
1494	56.2	-49 3	223	-48	12.2	221	2.5	2.0	S:	a'
1511	59.3	-67 46	248	-40	12.1	111	2.5	0.8	S	a
	4^h									
1507	1.8	- 2 20	161	-35	12.9	202	2.5:	0.5:	I	R
1512	2.3	-43 29	215	-47	11.8	322	3.0	2.5	SB	G
1515	2.7	-54 14	230	-45	12.1	001	6.0	1.0	S: b	a
1518	4.7	-21 18	197	-47	12.1	2014	3.0	1.0	S	G
1521	6.2	-21 11	183	-43	13.0	0021				G
1527	6.9	-48 1	221	-46	12.1	110	1.5	0.5	E:	a
I2035	7.6	-45 38	218	-47	12.6	021	0.6	0.6	E:	a'
1533	8.8	-56 15	232	-44	12.3	110	2.3	2.0	E:	a
1536	10.0	-56 36	234	-44	13.2	120			SBa	
1531	10.1	-32 59	200	-45	13.0	0022			S	K
1532	10.2	-33 0	200	-45	11.8	2021	5.0	1.0	S	K
1543	11.7	-57 52	235	-43	12.0	010	2.5	1.0	E:	a
1537	11.8	-31 41	198	-45	12.0	0111	1.2	0.6	S:	a'
1546	13.6	-56 11	232	-43	12.5	143	2.0	0.8	S: a	a
1549	14.7	-55 42	232	-43	11.0	001	3.0	2.7	E	a
1553	15.2	-55 54	232	-43	10.2	230	3.0	2.5	S	a
I2056	15.6	-60 20	237	-42	12.3	111	0.6	0.6	E:	a'
1559	17.0	-62 55	241	-41	11.1	120	3.0	1.5	S: I	a'
1566	18.9	-55 4	230	-43	10.5	100	8.0	6.0	S	a
1574	21.0	-57 5	233	-42	12.2	220	1.0	1.0	E:	a
1569	26.0	+64 45	111	+12	12.4	201	2.3	0.7	I	B
1596	26.6	-55 7	230	-42	12.3	102	3.0	1.0	E	a
1600	29.2	- 5 10	168	-32	12.7	111	1.5	1.0	E3	H
1617	30.6	-54 42	230	-41	11.7	000	4.0	1.5	S	a
1625	34.6	- 3 24	167	-30	13.1	001				R
1637	38.9	- 2 56	167	-30	11.6	100	3.0	2.5	Sc	H,R
1638	39.1	- 1 53	166	-28	13.1	010				C
1640	40.1	-20 32	187	-36	12.6	000	1.5	0.6	SB:	a
1659	44.0	- 4 53	170	-28	12.9	100	1.5:	0.7:	S:	R
1672	44.9	-59 20	235	-38	11.4	010	4.0	3.0	SBC	a'
1667	46.2	- 6 24	170	-29	12.9	100	1.0:	1.0:	S:	mc
1688	47.6	-59 53	236	-37	12.7	011	1.7	1.5	S	a
1705	53.2	-53 26	228	-38	12.9*	111	0.6	0.4	..	a'
1700	54.4	- 4 56	172	-27	12.4	412	0.8	0.5	E4	H
1726	57.3	- 7 49	175	-27	13.0	121				R
	4^h–5^h									
1744	57.9	-26 6	194	-33	12.5:	3222	6.0	4.0	SB	a
1796	2.1	-61 12	236	-36	12.9	010	1.5	0.8	S	a
1784	3.2	-11 56	179	-28	12.8	011	1.5	..	SB	C
1792	3.5	-38 4	208	-35	10.7	001	3.0	1.0	S	K
1800	4.6	-32 1	200	-34	12.9	100	0.8	0.4	S:	a'
1808	5.9	-37 34	208	-35	11.2	101	4.0	1.0	S	K
HA 85*	9.5	-14 50	183	-28	13.1	101				
1832	10.0	-15 47	184	-28	12.6	011	2.0:	1.5:	S	a
1947	26.0	-63*49	240	-33	12.2	021	1.3	1.3	S:	a
L M C	26	-69	247	-33	0.5		432	432	I	a

Des.	α 1950	δ	λ	β	Mag.	Res.	Diams.		Type	Aut.
	5h									
	m	° ′	°	°			′	′		
1964	31.2	-21 59	193	-25	12.0	201	5.0	2.5	S	a
1961	36.8	+69 24	110	+21	11.6	221	3.7	2.5	Sc	B
2082	41.6	-64 20	240	-32	12.8	112	1.3	1.3	Sλb	a
2090	45.2	-34 15	207	-26	12.4	102	2.5	1.0	Sλb	a
2139	58.6	-23 49	198	-20	12.5	011	2.0	1.8	S	a
	6h									
2149	1.1	- 9 44	185	-14	12.6	111	..	..	G:	..
2179	5.9	-21 44	195	-18	13.0	011				
2188	8.3	-34 5	208	-22	12.6	010	3.0	0.6	I	a'
2196	10.1	-21 47	196	-17	12.6	120	2.0	1.0	S	K
2146	10.7	+78 23	103	+25	11.6	110	5.0	2.5	S	P
2207	14.3	-21 21	195	-15	12.3	010	3.0	2.0	S	K
2217	18.7	-27 14	202	-17	12.6	100	5.0	4.0	SB	a
2223	22.5	-22 49	198	-15	12.7	311	3.5	2.5	S	a
2280	42.8	-27 35	206	-13	12.7	010	2.0	1.0	S	G
2310	52.4	-40 48	218	-16	12.8	011	2.0	0.5	S:	a'
	7h									
2325	0.7	-28 38	208	-10	12.9	120	..	..	E2	..
2268	1.3	+84 30	96	+28	12.2:	212	2.2:	1.0:	..	R
2314	3.8	+75 19	107	+28	12.9	111	..	..	E3	..
2339	5.4	+18 52	165	+14	12.7	313	1.9	1.5	Sc	H,R
2276	11.0	+85 52	95	+28	12.4:	111	2.5	2.0	S	mc
2347	11.6	+64 54	118	+28	12.7	221	..	..	..	..
2369	16.0	-62 16	240	-21	13.1	101				
2336	16.2	+80 20	102	+29	12.4	123	5.0:	3.0:	S	R
2300	16.5	+85 50	95	+28	12.2	122	1.0	0.7	Eλ2	mc
2397	21.5	-68 54	248	-22	12.8	100	1.6	1.0	S	a'
2366	23.6	+69 8	114	+29	12.6:	022	6.0	3.0	I	C
2403	32.0	+65 43	118	+30	10.2	122	16	10	Sc	H,C
2434	35.0	-69 10	248	-21	12.8	121	0.6	0.5	E	a'
2427	35.1	-47 30	227	-12	12.4:	412	5.0	3.0	Sc	a'
2442	36.5	-69 25	248	-21	11.8	431	6.0	0.5	S	a'
	7h-8h									
2441	47.1	+73 6	109	+36	12.7	111	1.6	1.6	S	mc
2460	52.7	+60 31	124	+32	12.7	111	..	..	..	..
2500	58.2	+50 54	136	+33	12.6	010	1.6	..	S	C
2525	3.3	-11 17	200	+12	12.2	101	2.0	1.5	SB	mf,a'
2523	9.2	+73 45	107	+33	12.7	122	..	..	..	..
2537	9.7	+46 9	142	+34	12.2	111	1.0	0.7	Sp	H,P
2541	11.1	+49 15	137	+35	12.7	012	4.0:	1.8:	S	R
2545	11.3	+21 30	169	+28	13.0	122				R
2549	14.9	+57 58	126	+35	12.5	124	1.5	0.7	Sφ	mc
2552	15.4	+50 11	136	+35	12.5	112	..	..	..	..
2551	18.8	+73 35	107	+33	13.1	110				
2613	31.1	-22 48	214	+11	11.3	100	6.0	1.8	S	a
2608	32.2	+28 38	162	+37	12.9	102	1.7	0.7	S	R
2642	38.3	- 3 57	198	+23	12.7	111	1.5	1.5	S:	R
2639	40.1	+50 24	135	+39	12.4	421	1.0	0.5	Sb	H,R
2633	42.7	+74 18	106	+35	12.6	311	2.2	1.1	SBc	B
2654	44.3	+60 28	123	+38	12.9	202	2.1	0.7	S:	mc
2646	44.6	+73 40	106	+35	12.8	211	..	..	..	..
2672	46.6	+19 16	176	+36	12.6	021	0.4	0.3	E2	H
2655	49.4	+78 25	102	+33	11.6	113	4.0	..	Sa	H
2683	49.6	+33 38	157	+40	10.8	102	10.0	1.0	Sc	H,C
2681	50.0	+51 31	135	+41	11.3	422	3.0	..	Sa	H
2685	52.2	+58 59	124	+40	12.5	311	2.0	0.5	So	mc
2693	53.5	+51 33	135	+42	12.9	120	0.7	0.3	E2	H
2713	54.8	+ 3 8	194	+30	12.7	211	3.2	1.0	S	R
	8h-9h									
2701	55.5	+53 59	131	+42	12.5	010	2.0	1.0	S	R,mc
2712	56.2	+45 7	144	+43	12.7	010	1.6	1.0	Sc	H,R
2715	2.0	+78 16	102	+34	12.1	102	4.8	1.3	Sb	R,H
2749	2.5	+18 31	177	+39	13.1	111				R
2742	3.7	+60 41	123	+40	12.5	221	2.5	1.3	Sc	H,R

Des.	α 1950	δ	λ	β	Mag.	Res.	Diams.		Type	Aut.
	9h									
	m	° ′	°	°			′	′		
2763	4.5	-15 17	213	+22	12.7	220	1.3	1.3	S:	R
2764	5.4	+21 39	175	+40	13.3	201				R
2732	7.3	+79 24	100	+33	13.0	011				R
2775	7.7	+ 7 15	193	+35	11.5	210	2.1	1.2	Sa	H,R
2768	7.8	+60 16	123	+42	12.0	210	1.5	0.7	E5	H
2748	8.2	+76 41	104	+35	12.4	012	2.1	0.7	Sb	H,R
2776	8.9	+45 11	144	+44	12.2	342	2.2	2.2	Sc	H,R
2781	9.1	-14 36	212	+24	12.7	111	1.3	0.4	SBa	H,R
2784	10.1	-23 58	220	+17	11.8	010	3.0	0.9	SO	a
2782	10.9	+40 19	150	+45	12.4	011	1.8	1.8	SBp	H,R
2793	13.7	+34 39	158	+45	12.9	1213	1.1:	1.1:	S	R
2811	13.9	-16 6	215	+23	12.5	011	1.9	0.3	Sa	H,G
2815	14.1	-23 24	220	+18	12.9	131	3.0	1.0	Sλb	a
2798	14.4	+42 10	149	+45	12.9	010	0.4	0.4	E:	R
2787	14.9	+69 25	111	+39	12.1	210	2.3	..	SBa	H
2835	15.7	-22 8	220	+20	12.0:	000	6.0	4.0	Sc	a
2832	16.8	+33 59	160	+46	12.9	2101	0.6:	0.6:	E1	R
2848	17.8	-16 18	215	+24	12.8	212	2.0	1.5	S:	K
2841	18.6	+51 12	135	+45	10.5	330	6.0	1.6	Sb	H,C
2844	18.6	+40 22	150	+47	13.0	000				R
2855	19.1	-11 41	212	+27	12.4	210	1.3	1.3	Sa	H,R
2865	21.2	-22 58	222	+19	12.6	202	0.8	0.6	E2	a
2859	21.3	+34 44	159	+47	12.2	0211	1.9	1.2	SBa	H
2888	24.2	-27 48	226	+16	13.1	111				
2889	24.8	-11 25	213	+29	12.4	001	1.5	1.5	S	K
2880	25.7	+62 44	118	+43	12.9	110	1.4	0.7	E2	R,H
2902	28.5	-14 30	215	+27	13.1	011				
2903	29.3	+21 44	177	+45	10.3	032	11.0	5.0	Sc	H,C
2907	29.3	-16 32	217	+25	12.9	111	..	..	..	..
2911	31.0	+10 22	193	+42	13.1	203				R
2924	32.8	-16 11	218	+27	13.2	100				
2935	34.5	-20 54	222	+24	12.4	011	..	..	..	..
2942	36.2	+34 14	161	+50	12.9	2010	2.0	1.2	S:	mc
2955	38.3	+36 7	155	+49	13.1	100				R
2962	38.3	+ 5 24	198	+41	12.9	010	1.4	0.7	S:	R
2950	39.1	+59 5	122	+46	12.1	023	1.4	..	SBa	H
2967	39.5	+ 0 34	205	+38	12.4	010	1.7	1.7	S	R
2964	40.0	+32 5	164	+50	11.9	2122	2.5	1.2	Sc	H,P
2974	40.0	- 3 29	208	+36	12.7:*	111	0.7	0.4	E4	H
2968	40.3	+32 10	164	+50	12.8	2032	1.2	0.7	I	H,P
2983	41.3	-20 15	224	+25	12.8	102	1.0:	..	E:	a'
2986	42.0	-21 3	224	+25	12.2	120	1.0:	..	E1	a'
2989	43.1	-18 9	223	+27	13.1	012				
2976	43.2	+68 8	110	+42	11.2	011	3.2	1.1	Sc	H,C
2992	43.3	-14 6	218	+30	13.0	011				
2993	43.4	-14 8	218	+30	13.0	001				
2997	43.5	-30 58	231	+18	11.0	302	6.0	5.0	S	K
2990	43.6	+ 5 57	200	+43	13.0	011				R
3001	44.1	-30 13	230	+18	13.2	201				
3003	45.6	+33 39	160	+52	12.5	1311	6.0	1.0	Sc	H,C
2998	45.8	+44 19	144	+48	12.8	113	2.0	0.8	S	R
2985	46.0	+72 31	105	+39	11.8	100	3.0	..	Sb	H
3021	48.0	+33 47	160	+52	12.7	1112	1.3	..	Sc	H
3032	49.2	+29 28	166	+53	12.8	0332	0.3	0.3	S/0	R,mc
3038	49.2	-32 32	233	+18	12.9	001	..	..	..	..
3059	49.5	-73 41	258	-15	12.2	102	2.8	2.8	S	a
3041	50.3	+16 55	185	+48	12.7	111	3.0	2.0	S	R
3044	51.0	+ 1 49	203	+41	12.6	111	6.0	0.6	S/a	mc
3031	51.5	+69 18	108	+42	8.9	111	16	10	Sb	H,C
3034	51.9	+69 56	108	+42	9.4	111	7.0	1.5	I	H,C

3043 next page

Des.	α 1950	δ	λ	β	Mag.	Res.	Diams.		Type	Aut.
	9^h									
	m	° '	°	°			'	'		
3052	52.0	−18 24	222	+28	12.8	131	2.0:	1.8:	S:	a'
3054	52.1	−25 28	228	+23	12.6	010	3.0	2.0	S	G
3056	52.3	−28 4	231	+21	12.8*	022	0.5:	0.5:	E:	a'
3055	52.7	+ 4 31	203	+44	12.5	011	1.2	0.6	S:	R
3043	52.8	+59 32	120	+47	13.2	211				R
I2522	53.1	−32 54	233	+18	12.9	010	1.5	1.5	S	a'
3067	55.4	+32 37	162	+54	12.8	0102	2.4	1.2	S:	mc
3078	56.2	−26 41	230	+24	12.4	011	0.5	0.4	S: E2	a'
3081	56.8	−22 33	228	+26	12.8	012	1.5	1.2	S:	a'
3087	57.0	−33 59	236	+17	13.0	001			E	
3089	57.3	−28 4	232	+22	13.0	100				
3065	57.7	+72 25	105	+40	12.9	102	0.3	0.3	E: S0	mc
3091	57.8	−19 23	225	+28	12.7	100	1.0:	1.0:	E:2	a'
3095	57.9	−31 18	234	+20	12.7	001	2.0	1.2	Sb	a
3079	58.6	+55 57	126	+50	11.9	122	8.0	1.0	Sc	H,C
	9^h–10^h									
3077	59.4	+68 58	109	+42	11.4	201	3.0	2.0	I	H,C
3098	59.5	+24 58	175	+53	13.0	0010				R
3109	0.8	−25 55	231	+24	11.2:	232	10.0	2.0	S	K,G
I2537	1.7	−27 19	232	+24	12.8	021	2.0	1.4	S:	a'
3115	2.8	− 7 28	216	+38	9.8	403	4.0	1.0	E7	H
3124	4.2	−19 0	226	+30	12.8	403	2.0	2.0	S	K,G
3125	4.2	−29 41	234	+22	13.0	011				
3136	4.5	−67 8	255	−10	12.4	111	1.0	0.7	E2	a
3145	7.7	−12 10	221	+35	12.5	101	..	..	Sb	..
3156	10.1	+ 3 22	207	+46	13.1	101				R,C
3162	10.7	+22 59	180	+55	12.3	0042	1.4	1.1	S	R
3158	10.9	+39 0	151	+57	12.7	1523	0.5	0.5	E3	R
3166	11.2	+ 3 40	207	+46	11.6	010	1.0	..	Sc	H
3169	11.7	+ 3 43	207	+47	11.9	011	4.0	1.7	Sa	H,C
3175	12.4	−28 38	235	+23	12.1	212	2.0	0.5	S:	K
3147	12.8	+73 39	103	+40	11.9	110	2.0	1.7	Sc	H,R
3177	13.9	+21 22	184	+56	12.8	0213	0.8	0.8	E	R
3185	14.9	+21 56	184	+56	12.7	1112	1.7	1.0	SBa	R
3184	15.2	+41 40	145	+57	11.8	010	6.0	6.0	Sc	H,C
3190	15.4	+22 5	180	+56	12.1	2122	3.0	1.0	Sb	H,R
3193	15.7	+22 9	180	+56	12.6	1032	1.0	0.8	E2	H,R
3200	16.2	−17 44	228	+32	12.8	432	3.0:	0.8:	S:	a'
3203	16.3	−26 27	234	+26	13.2	210				
3198	16.7	+45 49	138	+56	11.7	120	9.0	3.0	Sc	H,C
3223	19.4	−34 0	240	+19	12.1	032	3.5	1.4	Sbc	a
3226	20.7	+20 9	186	+57	12.8	1212	1.0	0.9	E0	H,C
3227	20.7	+20 7	186	+57	12.2	1440	3.0	1.2	Sb	H,C
3241	22.1	−32 13	238	+22	13.0	010				
3250	24.3	−39 41	244	+15	12.4	012	..	..	..	..
3245	24.5	+28 46	170	+60	12.0	0320	2.0	..	Sa	H
3256	25.7	−43 38	245	+13	12.1	001	2.0	1.5	Sb:	a
3254	26.5	+29 45	166	+60	12.6	2011	4.0	1.0	Sc	H,C
3258	26.6	−35 20	242	+20	13.0	000			E	
3261	26.8	−44 23	245	+13	12.8	101	3.0	2.5	S	a
3268	27.6	−35 6	242	+20	13.0	001			E	G
3271	27.8	−35 6	242	+20	12.9	011	1.0:	0.6:	Sb	a'
3275	28.6	−36 28	243	+19	12.8	001	..	..	SBb	K
3259	29.2	+65 18	110	+47	12.9	120	1.1	0.6	S:	mc
3274	29.6	+27 56	170	+61	13.0	1101				R
3281	29.7	−34 36	242	+21	12.9	010	2.0	1.0	S	G
3277	30.2	+28 46	168	+60	12.6	1112	1.0	1.0	Sb	H,C
3285	31.3	−27 12	237	+27	13.2	010				
3287	32.1	+21 55	185	+60	12.8	2122	2.2	0.7	S	R
3294	33.4	+37 35	150	+61	11.6	0648	3.0	1.5	Sc	H,C
3300	34.0	+14 26	197	+57	13.1	1010				R
	10^h									
	m	° '	°	°			'	'		
3301	34.3	+22 8	182	+60	12.4	0312	1.4	..	Sa	H
3309	34.3	−27 16	238	+27	12.7	110	1.0:	1.0:	E0	a
3312	34.8	−27 20	238	+27	13.1	121				
3318	35.1	−41 22	245	+15	12.6	201	..	..	Sbc	..
3310	35.7	+53 46	124	+55	10.9	314	1.5	0.8	Sb	H,P
3319	36.4	+41 56	144	+61	12.3	212	6.0:	2.5:	S	R
3320	36.7	+47 40	131	+58	12.9	001	2.0	1.1	S:	mc
3338	39.5	+14 0	200	+58	12.2	1123	5.0	2.7	S	R
3347	40.5	−36 6	245	+20	12.8	010	4.0	2.0	S	G
3329	40.6	+77 5	98	+38	12.9	010	1.0	0.6	E:	mc
3344	40.7	+25 11	180	+63	11.9	1626	4.0	4.0	SBc	H,C
3346	41.0	+15 9	199	+59	12.4	0012	2.5	2.0	SBc	H,R
3351	41.3	+11 58	204	+57	11.5	212	3.0	3.0	SBb	H,C
3358	41.3	−36 7	245	+20	13.0	000				G
3353	42.3	+56 14	119	+55	13.0	1301				R
3359	43.4	+63 30	110	+50	12.2	312	2.0	2.0	S	mc
3348	43.5	+73 7	102	+42	12.1	101	0.7	0.7	E0	H
3367	44.0	+14 1	200	+59	12.3	2231	2.0	2.0	S	C
3368	44.2	+12 5	205	+58	10.4	1314	7.0	4.0	Sa	H,R
3370	44.5	+17 32	195	+61	12.4	4253	2.7	1.4	S	R
3377	45.1	+14 15	200	+60	11.6	2130	1.5	0.8	E6	H
3379	45.2	+12 51	203	+59	10.8	1223	2.0	2.0	E0	H
3384	45.7	+12 54	203	+59	11.3	2123	3.0	..	SBa	H
3389	45.8	+12 48	203	+59	12.6	2132	2.0	0.9	Sc	H,P
3390	45.8	−31 17	243	+25	13.2	101				
3395	47.1	+33 15	161	+64	12.4	1211	1.3	0.6	Sc	H,P
3396	47.2	+33 16	161	+64	12.8	2121	0.8	..	Sc	H
3412	48.3	+13 41	202	+60	11.6	3310	2.5	1.3	SBa	H,R
3414	48.6	+28 15	170	+64	12.2	0402	1.8	..	SBb	H
3423	48.7	+ 6 7	215	+55	11.9	110	3.8	3.8	Sc	B
3415	48.9	+43 59	137	+62	13.1	011				R
3433	49.4	+10 26	207	+58	12.9	1110	2.0:	2.0:	S	R
3430	49.5	+33 14	162	+65	12.4	0102	3.1	1.5	Sc	H,R
3432	49.7	+36 54	154	+65	12.2	212	6.2	0.7	Sc	H,R
3437	49.9	+23 11	185	+64	12.6	2000	1.9	0.8	Sc	H,mc
3403	50.1	+73 57	100	+42	12.9	112	1.9	0.6	S	R
3449	50.6	−32 40	244	+25	13.2	100				
3445	51.6	+57 15	117	+56	12.9	1011	1.2	1.2	Sc	H,R
3448	51.7	+54 34	119	+57	12.6	1202	1.8	0.3	Sc	H,R
3455	51.8	+17 33	198	+62	13.1	0231				R
3464	52.2	−20 49	238	+35	13.2	110				
3458	53.0	+57 22	115	+55	13.0	0011				H,R
3478	56.5	+46 23	130	+62	13.2	202				
3485	57.4	+15 6	203	+63	12.8	1221	1.3	1.2	S:	R
3489	57.7	+14 10	203	+63	11.3	0000	2.5	1.0	Sb	H,C
	10^h–11^h									
3486	57.8	+29 15	168	+67	11.4	111	3.8	..	Sc	H
3495	58.6	+ 3 53	220	+55	12.7	101	3.6	1.8	S:	mc
3504	0.5	+28 15	170	+67	11.7	3243	2.0	1.0	SBb	H,R
3506	0.6	+11 21	208	+62	13.2	1101				R
3511	0.8	−22 50	243	+33	11.9	412	4.0	1.0	S	K
3510	1.0	+29 9	170	+68	12.8	1134	3.5:	0.3:	S:	R
3513	1.1	−22 58	243	+33	12.0	201	2.0	2.0	S	K
3512	1.3	+28 18	170	+67	12.8	102	1.0	1.0	Sc	H,C
3521	3.2	+ 0 14	223	+53	10.3	011	4.5	..	Sc	H
3516	3.4	+72 50	100	+43	12.2	100	1.6	1.6	Sa	H,R
3547	7.3	+11 0	210	+62	12.9	1120	1.2	0.5	S:	R
I2627	7.5	−23 28	244	+34	12.8	100	2.0	2.0	S	K
3557	7.5	−37 16	249	+22	12.1	320	1.5	1.5	E:	a'
3549	8.2	+53 39	117	+58	12.8	3111	2.7	0.8	Sc	H,R
3556	8.7	+55 57	115	+56	11.0	0002	8.0	1.5	Sb	H,C

Des.	α 1950	δ	λ	β	Mag.	Res.	Diams.		Type	Aut.
	11^h									
	m	° '	°	°			'	'		
3571	8.9	-18 1	240	+40	13.1	113				R,K
3585	10.9	-26 29	245	+32	11.5	011	1.0	0.5	E5	G
3583	11.4	+48 39	125	+63	12.2	022	2.2	2.2	S	mc
3593	12.0	+13 6	210	+64	12.4	2321	4.5	1.0	Sb	H,P
3596	12.4	+15 4	208	+65	12.2	1012	4.0	4.0	Sc	H,a'
3605	14.2	+18 18	198	+67	13.1	1123				H
3607	14.3	+18 20	198	+67	11.4	0223	1.3	1.0	Ep	H,R
3608	14.4	+18 26	198	+67	12.5	2032	0.6	0.5	E2	H
3611	14.9	+ 4 50	224	+59	12.5	2001	0.9	0.5	..	mc
3610	15.6	+59 4	110	+56	11.7	3141	1.4	0.8	E4	H
3614	15.6	+46 2	128	+65	12.9	010	3.0	1.5	S	mc
3613	15.7	+58 17	110	+56	12.0	2022	1.8	0.7	E4	H
3621	15.9	-32 32	250	+27	10.6	342	5.0	2.0	S	K
3623	16.3	+13 23	210	+65	10.5	303	8.0	2.0	Sb	H,C
3619	16.5	+58 2	110	+56	12.8	2120	1.0	1.0	SaE0	H,C
3626	17.5	+18 38	200	+68	11.8	0122	1.9	..	Sa	H
3627	17.6	+13 17	211	+65	9.9	2142	8.0	2.5	Sb	H,C
3628	17.7	+13 53	210	+65	11.3	1203	12.0	1.5	Sb	H,C
3630	17.7	+ 3 15	228	+58	12.8	1011	1.5	0.4	S:E7	mc,R
3629	17.9	+27 15	178	+71	12.9	111	1.7	1.4	S	R
3637	18.1	- 9 58	238	+48	12.8	111	0.3	0.3	E3	R
3631	18.3	+53 28	115	+60	11.8	3323	4.6	4.6	Sc	H,R
3640	18.5	+ 3 31	228	+58	11.6	2211	0.9	0.7	E2	H
3646	19.2	+20 27	197	+69	11.8	1200	4.0	1.7	S/c	R
3642	19.6	+59 21	108	+56	12.4	1220	5.3	..	Sc	H
3655	20.3	+16 51	206	+68	12.3	2210	1.1	0.6	Sc	H,R
3659	21.1	+18 5	203	+69	12.9	111	1.3	0.6	S/b	a'
3664	21.7	+ 3 35	227	+59	12.9	1123	1.6	1.6	S:	mc
3666	21.9	+11 37	218	+65	12.6	2141	3.5	0.7	Sc	H,P
3665	22.1	+39 2	142	+70	12.3	122	1.0	0.8	Sa	H,R
3672	22.5	- 9 32	240	+48	11.8	111	3.5	1.5	Sc	H,K
3673	22.8	-26 28	248	+33	12.9	113	2.0	1.0	S:	K,G
3675	23.5	+43 52	129	+68	11.8	001	3.0	1.0	Sb	H,C
3681	23.9	+17 9	207	+68	12.8	1010	1.0	1.0	Sb	H,C
3684	24.5	+17 18	205	+69	12.6	1020	1.2	0.8	Sb	H,R
3683	24.8	+57 9	110	+58	13.2	2201				H,R
3686	25.1	+17 30	205	+69	12.3	1223	2.0	2.0	SBc	H,C
3687	25.3	+29 47	166	+73	13.0	011				R
3689	25.5	+25 56	183	+72	12.8	023	1.0	0.7	S:	R
3691	25.5	+17 11	204	+69	13.1	1320				C
3690	26.0	+58 49	107	+57	12.1	1311	1.4:	0.4	S:	R
3706	27.3	-36 8	253	+24	12.7	203	..	..	..	..
3705	27.6	+ 9 33	223	+65	12.2	1112	5.0	1.7	S	R
3717	29.0	-29 59	252	+30	12.6	100	2.0	0.4	S:	a'
3720	29.8	+ 1 5	234	+58	13.0	111			E	R
3718	29.9	+53 21	113	+61	12.4	2111	3.0	..	SBb	H
3726	30.7	+47 19	120	+66	11.7	302	4.6	3.5	S	C
3729	31.0	+53 24	112	+61	13.0	1111				H,C
3732	31.7	- 9 34	243	+48	12.9	220	0.4:	0.4:	Sb	R
3735	33.1	+70 48	98	+46	12.6	412	3.8	0.7	Sc	B
3738	33.1	+54 48	110	+60	12.2	0222	1.1	0.7	I	mc
3756	34.1	+54 34	111	+61	12.5	3323	3.5	1.4	Sc	R,B
3769	35.1	+48 11	119	+66	12.5	220	2.7	0.6	SBc	H,R
3773	35.6	+12 23	222	+68	13.0	000			E	R
3783	36.5	-37 28	256	+24	12.8	021	1.0	0.9	E:	b
3780	36.7	+56 33	108	+60	12.6	1110	2.5	2.0	Sc	H,R
3782	36.9	+46 44	120	+68	12.9	111	1.2	0.5	S	R
3810	38.4	+11 45	221	+68	11.8	0203	4.2	..	Sc	H
3813	38.7	+36 49	144	+74	12.6	320	2.1	..	Sc	H
3818	39.4	- 5 53	244	+53	12.7	2020	0.7	0.4	E3	mc

Des.	α 1950	δ	λ	β	Mag.	Res.	Diams.		Type	Aut.
	11^h									
	m	° '	°	°			'	'		
3865	42.7	- 8 56	246	+50	13.0	221			SBa	G
3872	43.2	+14 3	223	+70	12.8	0110	0.6	0.3	E3	R
3877	43.5	+47 46	115	+67	12.0	102	4.4	..	Sc	H
3885	44.3	-27 39	254	+34	12.9	010	1.0	0.7	E:	a'
3887	44.6	-16 35	250	+44	11.6	312	2.5	1.5	Sc	H,R
3888	45.0	+56 15	106	+60	13.0	1111				R
3892	45.5	-10 41	247	+49	12.9	102	2.0	2.0	S	C
3893	46.1	+49 0	113	+67	11.0	100	4.1	..	Sc	H
3900	46.6	+27 17	180	+77	12.7	100	1.8	..	Sb	H
3898	46.7	+56 22	105	+60	12.0	2210	2.7	0.7	Sa	H,R
3904	46.7	-29 2	255	+32	11.9	111	1.5	1.0	E2	a
3912	47.5	+26 46	182	+77	13.0	120			Ep	R
3917	48.3	+52 6	110	+65	12.8	2130	4.6	0.9	Sc	B
3923	48.5	-28 33	255	+33	11.1	111	1.5	1.2	E4	a
3936	49.9	-26 37	256	+35	13.0	010			Sb	G
3938	50.2	+44 24	117	+70	11.6	213	4.5	4.5	Sb	H,C
3941	50.3	+37 16	138	+76	11.4	113	2.0	1.0	Sa	H,R
3945	50.6	+60 57	101	+57	12.1	1011	1.6	..	SBa	H
3949	51.1	+48 8	113	+68	11.6	012	2.2	..	Sc	H
3952	51.1	- 3 43	247	+56	13.0	111				R
3953	51.2	+52 37	108	+65	11.5	2021	6.3	3.2	Sc	B
3955	51.5	-22 54	255	+38	12.8	330	1.6	0.5	E:	a
3957	51.6	-19 17	254	+42	12.9	221	2.2	0.3	S:	a'
3956	51.6	-20 18	255	+41	12.6	220	2.5:	0.8:	S/b	R
3962	52.2	-13 42	252	+47	12.2	210	0.5	0.5	E1	H
3963	52.4	+58 46	102	+57	12.7	2201	1.9	1.9	S	R
3976	53.4	+ 7 2	238	+66	12.4	1102	3.8	0.9	S	R
3981	53.7	-19 37	255	+42	12.7	331	3.2	0.9	S	R
3982	53.9	+55 24	104	+62	11.8	0232	2.3	..	Sc	H
3985	54.1	+48 37	110	+67	12.9	001	1.0	0.5	S	R
3992	55.0	+53 39	106	+63	11.2	2010	7.0	..	SBc	H
3995	55.2	+32 35	152	+78	12.9	101	2.2	0.6	S	R
3998	55.3	+55 44	103	+61	11.6	0110	1.7	1.3	EpSo	H,B
4008	55.7	+28 28	169	+79	12.9	111	1.2	0.6	E.	a'
4013	56.0	+44 13	116	+72	12.7:*	102	4.0	0.4	Sc	H,R
I 749	56.0	+43 1	119	+72	13.2	211				
4024	56.0	-18 5	255	+43	12.9	101	1.1	0.2	S:E1	R
I 750	56.3	+43 0	117	+72	13.0	101				
4026	56.9	+51 14	107	+65	12.0	0111	3.0	0.6	SBa	H,R or So
4027	57.0	-18 59	256	+42	11.6	212	2.0	1.5	S	G
4030	57.8	- 0 49	246	+60	11.2	1203	3.5	2.5	Sb	G,H
4032	58.0	+20 21	214	+77	13.0	023				R
4033	58.0	-17 34	256	+44	12.8	321	0.7	0.4	E7	a'
4037	58.8	+13 41	230	+72	12.8	203	2.0	1.3	S	R
4036	58.9	+62 10	99	+55	11.9	0121	4.0	1.0	Sa	H,C
	11^h-12^h									
4038	59.3	-18 35	256	+42	11.0	202	2.5	2.5	S	G
4041	59.7	+62 25	98	+55	12.0	2000	2.0	2.0	Sc	H,C
4047	0.2	+48 55	108	+67	12.8	021	1.2	0.9	..	R
4045	0.2	+ 2 15	246	+63	12.8	1102	1.2	1.0	E:	R
4050	0.4	-16 6	255	+46	12.5	212	2.0	1.5	SB	K
4051	0.6	+44 48	114	+72	11.7*	012	4.0	2.0	Sb	H,C
4062	1.5	+32 10	155	+80	12.1	212	3.0	1.0	Sc	H,C
4064	1.6	+18 43	222	+77	12.8	201	3.5	1.5:	S	R
4073	1.9	+ 2 11	247	+63	13.2	223				R
4085	2.8	+50 38	105	+66	12.8	2120	2.3	0.5	Sb	H,R
4088	3.0	+50 49	105	+65	11.2	4213	5.2	1.7	Sc	H,R
I2995	3.0	-27 39	259	+35	12.7	001	3.2	1.0	S	a
4094	3.3	-14 16	256	+46	13.0	221				K
4096	3.5	+47 45	108	+68	12.2	111	6.0	1.0	Sc	H,C
4100	3.6	+49 51	105	+67	11.9	010	4.0	1.0	Sc	H,C

Des.	α 1950	δ	λ	β	Mag.	Res.	Diams.		Type	Aut.
	12h m	° '	°	°			'	'		
41[illegible]	[illegible]	[illegible]52 59	103	+64	12.1	4012	2.3	..	SBb	H
41[illegible]	[illegible]	[illegible]29 30	259	+33	12.0	123	1.5	1.5	E2	a
41[illegible]	[illegible]	[illegible]29 31	259	+33	12.5	011	1.0	0.8	E	a
41[illegible]	[illegible]	[illegible]43 21	113	+73	11.6	021	3.5	1.0	ESo	H
4116	5.1	+ 2 58	248	+64	12.4	3212	3.5	1.7	S	R
4124	5.6	+10 40	242	+71	12.5	011	3.6	1.4	S	a
4123	5.6	+ 3 9	248	+65	12.3	2221	3.7	2.7	S	R
4125	5.7	+65 27	96	+52	11.3	213	2.0	1.2	E5	H
4128	6.1	+69 3	95	+48	12.9	0111	2.0	0.5	Sa	R,B
4129	6.3	- 8 45	255	+52	12.9	0413	1.3	0.3	Sb	R
4136	6.7	+30 12	160	+82	12.1	011	3.0	3.0	S	R
4138	7.0	+43 58	110	+73	12.2	121	1.6	..	Sa	H
4143	7.1	+42 49	112	+74	12.2	000	1.3	..	Sa	H
4144	7.5	+46 44	108	+70	12.4	231	5.3	0.7	S:	R
4145	7.5	+40 10	115	+76	12.2	203	5.0	3.5	Sc	H,C
I 764	7.6	-29 28	261	+32	12.9	101	5.0	2.0	S	a
4151	8.0	+39 41	116	+76	11.2	010	2.5	1.6	Sb	H,C
4150	8.0	+30 41	158	+81	12.6	153	1.3	0.8	Sa	H,R
4152	8.1	+16 19	232	+75	12.7	412	1.0	0.9	S	R
4157	8.6	+50 46	104	+66	12.0	2224	5.9	1.0	Sc	H,R
4158	8.6	+20 27	220	+79	12.9	100	0.7	0.6	..	R
4160	9.1	+44 1	110	+72	12.6	311	3.0	1.2	S	mc
4162	9.4	+24 24	200	+82	12.6	011	1.8:	1.0:	..	R
4168	9.8	+13 29	240	+74	12.8	100	1.4	1.4	E1	a
4178	10.2	+11 9	245	+72	12.4	120	4.7	1.9	S	a
4179	10.3	+ 1 35	253	+63	11.8	0213	2.2	0.9	E7	H
4190	11.1	+36 54	123	+78	13.2	101				R
4189	11.2	+13 42	237	+74	13.0	212			Sc	A
4192	11.3	+15 11	240	+75	11.4	320	8.0	2.0	Sb	H,C
4203	12.5	+33 29	139	+82	12.0	113	2.3	2.3	SBa	H,R
4214	13.1	+36 36	120	+79	10.7	110	8.0	4.0	I	H,C
4212	13.1	+14 11	242	+75	12.1	320	2.6	1.8	Sc	a,H
4217	13.3	+47 22	105	+69	11.9:*	121	3.9	1.2	S	R
4216	13.4	+13 25	242	+75	11.3	321	7.0	1.0	Sb	H,C
4215	13.4	+ 6 41	250	+67	12.8	0112	1.5	0.4	Sa	R
4220	13.7	+48 10	104	+69	12.4	154	2.5	0.4	Sc	H,C
4219	13.8	-43 3	264	+18	12.7	021	..	..	..	..
4224	14.0	+ 7 44	250	+69	13.0	1201			Sa	A
4236	14.3	+69 45	93	+48	11.3:	1011	23.0	6.0	Sc	H,B
4233	14.6	+ 7 54	250	+69	13.0	0111			SB:	A
4235	14.6	+ 7 28	248	+69	12.8	0111	4.1	0.8	Sa	a
4234	14.6	+ 3 58	253	+65	13.0	2332			I	R
4237	14.7	+15 36	241	+75	12.6	212	1.5	1.0	S	a
4242	14.9	+45 54	105	+72	11.8	102	4.5	3.2	S	R
4244	15.0	+38 5	118	+78	11.0	100	13.0	0.9	Sb	H,C
4245	15.2	+29 53	160	+84	12.3	111	1.5	0.9	SBb	H,R
4251	15.7	+28 27	165	+84	11.6	121	1.8	0.8	Sa	H,a
4254	16.3	+14 42	245	+75	10.5	133	4.5	4.5	Sc	H,C
4256	16.4	+66 1	95	+53	13.0	100				R
4258	16.5	+47 35	103	+69	10.2	011	20.0	6.0	Sb	H,C
4260	16.8	+ 6 23	251	+67	12.7	2121	2.6	1.0	S	a
4261	16.8	+ 6 6	253	+67	11.7	1110	1.6	1.3	E2	H
4262	17.0	+15 9	244	+75	12.6	122	1.5	1.4	E1	a
4267	17.2	+13 3	247	+75	12.6	133	2.2	2.2	E	a
4270	17.3	+ 5 44	254	+67	12.8	2021	1.6	0.6	E7	a,H
4274	17.4	+29 53	158	+84	11.7	012	3.5	1.0	Sa	H,C
4273	17.4	+ 5 37	255	+67	12.2	0001	2.0	1.4	Sb	a,H
4278	17.7	+29 34	158	+84	11.6	022	1.0	0.9	E2	H
4281	17.8	+ 5 40	255	+67	12.2	1012	2.4	1.2	Sa	a,H
4283	17.9	+29 35	158	+84	12.8	212	0.3	0.3	E0	H

Des.	α 1950	δ	λ	β	Mag.	Res.	Diams.		Type	Aut.
	12h m	° '	°	°			'	'		
4291	18.1	+75 40	92	+42	12.5	311	0.3	0.3	E2	H
4290	18.5	+58 22	96	+59	12.7	0221	1.5:	0.7:	S:	R
4293	18.7	+18 40	230	+79	11.7	223	5.0	2.0	S	a
4294	18.7	+11 47	249	+72	13.0	021			Sc	A
4298	19.0	+14 53	246	+75	12.5	322	3.0	1.5	S	a
4302	19.2	+14 53	246	+75	13.2	122				A
4299	19.2	+11 47	249	+72	13.1	110				A
4303	19.4	+ 4 45	255	+66	10.4	1000	6.0	6.0	SBc	H,C
4307	19.5	+ 9 20	251	+71	13.0	2000			Sa	A
4304	19.6	-33 12	264	+29	12.4	111	1.0	1.0	S	K
4314	20.0	+30 10	155	+85	11.7	133	2.2	..	SBp	H
4321	20.4	+16 6	245	+76	10.8	111	5.0	5.0	Sc	H,C
4324	20.6	+ 5 31	255	+67	12.5	1110	1.9	0.8	Sb	a
4346	21.0	+47 16	100	+70	12.4	321	1.6	..	SBa	H
4340	21.0	+17 0	244	+78	13.0	201			SBb	C
4339	21.0	+ 6 22	255	+68	12.6	0011	1.5	1.5	E0	a
4342	21.1	+ 7 22	254	+70	12.8	1030	0.9	0.5	E6	a
I3253	21.1	-34 21	265	+28	12.3	101	2.5	1.0	S	G
4348	21.3	- 3 10	260	+59	13.1	012				R
4350	21.4	+16 58	245	+78	12.0	303	2.0	0.4	E7	C
4365	22.0	+ 7 36	255	+70	11.0	1021	4.0	3.0	E2	a,H
4369	22.1	+39 39	106	+77	12.4	111	1.0	1.0	E:	R
4386	22.4	+75 48	92	+41	12.8	212	0.3	0.2	E1	H
4371	22.4	+11 59	254	+73	12.1	000	1.7	1.3	SBa	H,a
4374	22.6	+13 10	253	+74	10.9	011	2.9	2.6	E1	a,H
4377	22.7	+15 2	250	+75	12.9	100	1.0	0.8	E2	H
4373	22.7	-39 28	266	+23	12.2	121	..	..	..	..
4382	22.8	+18 28	240	+80	10.5	302	4.0	2.5	E4	a,H
4379	22.8	+15 53	246	+76	13.0	010			S	A
4378	22.8	+ 5 12	257	+66	12.8	1100	3.0	2.7	E*	H,a
4380	22.9	+10 17	254	+71	12.8	1320	3.3	2.0	S	a
4383	23.0	+16 45	245	+78	12.9	112	1.2	0.7	E	a
4389	23.1	+45 58	100	+72	12.8	123	1.8	0.8	S	C
4385	23.1	+ 0 50	258	+63	12.9	1212	1.4	0.7	SBa	R
4388	23.3	+12 56	253	+74	12.2	111	5.0	1.0	S	a
4395	23.4	+33 49	118	+82	11.4:	021	12	10	Sp	P
4394	23.4	+18 29	244	+80	12.2	034	4.0	3.5	SBb	H,a
4406	23.7	+13 13	251	+75	10.9	211	3.8	2.9	E3	a,H
4414	24.0	+31 30	135	+85	11.1	101	3.0	1.5	Sc	H,C
4412	24.0	+ 4 14	259	+66	12.8	1204	1.2	0.9	S	a
4417	24.3	+ 9 52	255	+71	12.3	4111	2.7	1.1	Sa	a
4419	24.4	+15 19	250	+77	12.2	315	2.3	0.7	Sc	H,a.
4420	24.4	+ 2 46	260	+65	12.5	1022	1.7	0.7	S	R
4424	24.6	+ 9 42	255	+71	12.6	1110	2.7	1.6	Sa	a
4425	24.7	+13 1	255	+74	13.1	111				A,C
4429	24.9	+11 23	255	+72	11.7	100	3.0	1.0	Sa	H,C
4428	24.9	- 7 54	262	+54	13.1	111				R
4433	25.0	- 8 1	262	+54	12.9	120	1.3	0.5	Sb	R
I3370	25.0	-39 4	267	+23	12.4	122	..	..	..	..
4435	25.2	+13 21	252	+75	11.8	220	1.6	1.0	E6	a,H
4438	25.3	+13 17	252	+75	11.9	212	8.0	3.0	Sb	a,H
4442	25.6	+10 5	256	+71	11.4	1113	3.2	1.0	SBa	H,a
4449	25.8	+44 22	100	+74	10.3	330	4.5	2.5	I	H,P
4448	25.8	+28 54	160	+86	11.9	113	3.0	1.0	Sb	H,C
4450	25.9	+17 21	249	+80	11.4	122	4.4	3.5	Sb	a,H
4455	26.2	+23 6	230	+84	13.0	123			Sb	R
4452	26.2	+12 2	257	+73	13.2	211				H,A
4454	26.3	- 1 40	261	+61	12.8	4022	1.0:	1.0:	SBa	R
4460	26.4	+45 8	99	+73	12.5	010	2.1	0.6	Sc	mc,H
4457	26.4	+ 3 51	260	+66	11.7	1022	1.8	1.4	S:	a

Des.	α 1950	δ	λ	β	Mag.	Res.	Diams.		Type	Aut.
	12h m	° ′	°	°			′	′		
4459	26.5	+14 15	255	+76	11.9	023	2.0	1.0	E7?	a
4461	26.6	+13 28	255	+75	12.4	341	3.0	1.0	S	a
4462	26.7	-22 54	265	+38	13.0	010			Sa	
4469	27.0	+ 9 2	258	+70	12.5	1211	3.3	1.0	S	a
4473	27.3	+13 42	255	+75	11.7	111	3.0	1.5	E4	a,H
4472	27.3	+ 8 16	258	+70	10.1	1213	4.5	4.0	E1	a,H
4474	27.4	+14 21	255	+76	12.9	210	1.5	0.7	E	a
4476	27.5	+12 37	255	+75	13.2	021				H
4477	27.6	+13 55	256	+75	11.8	011	2.5	1.8	SBa	H,a
4478	27.8	+12 36	255	+78	12.5	324	1.2	1.0	E2	a,H
4485	28.2	+41 58	102	+76	12.9	221	1.0	0.7	Ep	C,a
4483	28.2	+ 9 17	259	+71	13.3	1011				A
4490	28.3	+41 55	102	+76	10.5	220	4.0	1.8	Sc	H,C
4486	28.3	+12 40	255	+75	10.7	312	3.3	3.3	E0	a,H
4487	28.3	- 7 48	263	+54	12.0	5230	4.0	3.0	S	G
4494	28.9	+26 3	210	+86	10.9	102	1.6	1.6	E0	mc,H
4517	29.0	+ 0 21	263	+63	11.6	0130	10.0	1.0	Sc	H,C
4496	29.1	+ 4 12	260	+66	12.0	0323	3.0	2.0	S	a
4501	29.5	+14 42	255	+75	10.9	101	6.0	3.0	Sc	a,H
4503	29.6	+11 27	258	+74	12.8	010	2.5	0.9	SO	R,a
4504	29.7	- 7 17	264	+55	12.3	1263	3.0	2.0	Sc	H,G
R 80*	29.9	+ 0 38	264	+63	13.0	102			Sc	
4519	31.0	+ 8 56	260	+71	12.6	1011	3.0	2.0	S	a
4522	31.2	+ 9 27	260	+72	12.9	1112	3.5	1.0	S	a
4526	31.6	+ 7 58	260	+70	10.7	0021	6.0	1.2	Sa	a,H
4527	31.6	+ 2 56	265	+65	11.3	1121	5.0	1.2	S	C
4535	31.8	+ 8 28	261	+70	11.1	2111	6.4	5.0	S	a
4532	31.8	+ 6 44	262	+68	12.1	2111	2.5	1.0	I	a
4536	31.9	+ 2 28	265	+65	11.2	0223	7.0	1.8	Sc	H,C
4540	32.3	+15 50	258	+77	12.9	021	1.4	1.0	S	a
4548	32.9	+14 46	258	+76	11.9	303	4.0	3.6	SBb	H,a
4550	32.9	+12 30	260	+75	12.7	111	2.7	0.8	Sa E7	H,a
4546	32.9	- 3 31	265	+58	11.4	2021	1.5	0.5	E	H
New 2	32.9	-39 31	268	+23	12.9	001	1.2	1.2	..	mf
4552	33.1	+12 50	261	+75	11.3	121	2.2	2.2	E0	a,H
4559	33.5	+28 14	160	+87	10.7	111	8.0	2.0	Sc	H,C
4561	33.6	+19 36	255	+81	12.9	113	1.2	1.1	[illegible]	a
4565	33.9	+26 16	212	+87	10.7	202	15.0	1.1	Sb	H,C
4564	34.0	+11 43	260	+73	12.1	221	2.0	0.6	SO	a
4567	34.0	+11 32	262	+73	12.3	111	2.4	1.6	S	a
4568	34.1	+11 31	262	+73	12.2	131	3.6	1.8	S	a
4571	34.3	+14 28	260	+76	12.8	111	3.0	2.7	S	a
4569	34.3	+13 26	260	+75	11.2	201	6.0	3.0	Sc	a,H
4570	34.4	+ 7 31	263	+70	12.0	0123	3.0	1.0	E7	a,H
4578	35.0	+ 9 50	264	+72	12.5	022	2.5	1.5	E0	a
4579	35.1	+12 5	263	+74	11.0	101	3.6	3.2	SBc	a,H
4580	35.3	+ 5 38	265	+68	12.8	1113	1.5	1.2	Sc	H,a
4589	35.6	+74 28	91	+43	12.1	011	0.5	0.5	E0	H
4586	35.9	+ 4 35	266	+67	13.0	1122			Sb	R
4592	36.7	- 0 16	267	+62	12.4	1002	3.4	0.6	Sp	R,mc
4593	37.0	- 5 4	268	+57	12.1	0121	3.0	2.0	SB	G
4595	37.3	+15 34	265	+77	13.1	210				A
4594	37.3	-11 21	268	+51	8.1:	111	7.0	1.5	Sa	H,C
4596	37.4	+10 27	266	+73	12.2	314	2.4	0.9	SBa	a,H
4597	37.5	- 5 32	268	+57	12.9	1033	3.7	1.3	Sc	R
4605	37.8	+61 53	91	+56	10.9	1316	3.0	1.0	Sc	H,C
4602	38.0	- 4 52	268	+58	12.4	0402	3.0	1.5	S	G
4603	38.3	-40 42	269	+23	12.5	113	2.5	1.2	S:	mf
4608	38.7	+10 26	266	+73	12.7	011	2.0	1.5	S	a
4612	39.0	+ 7 35	266	+70	12.6:	1113	1.1	1.1	E	R
4618	39.2	+41 25	93	+76	11.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4621	39.5	+11 55	266	+73	11.4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4623	39.6	+ 7 56	268	+71	13.2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4631	39.8	+32 49	98	+84	9.6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4630	40.0	+ 4 14	269	+66	13.1	1231				R
4632	40.0	+ 0 11	269	+62	12.1	0313	3.2	1.0	Sc	H,R
4635	40.2	+20 12	268	+82	13.0	010			Sc:	R
4638	40.2	+11 43	268	+74	12.2	111	1.0	0.5	E5	a,C
4639	40.3	+13 31	268	+76	12.3	022	1.5	1.2	S	a
4636	40.3	+ 2 57	269	+65	10.8	5212	1.2	1.1	E1	H
4643	40.8	+ 2 15	270	+64	11.6	0112	1.8	0.7	SBa	H,R
4647	41.0	+11 51	268	+74	12.0	220	2.5	2.2	S	a
4649	41.1	+11 49	269	+74	10.6	311	3.9	3.1	E2	a,H
4651	41.2	+16 40	269	+78	11.8	111	3.2	2.2	S	a
4645	41.3	-41 29	270	+22	13.1	101				
4654	41.4	+13 23	269	+76	11.7	000	4.8	3.3	S	a
4653	41.4	- 0 18	270	+63	13.1	201				C
4656	41.6	+32 26	92	+85	11.3	112	20.0*	..	I	H
4660	42.0	+11 26	270	+74	12.3	320	1.0	0.5	E5	H
4658	42.1	- 9 49	270	+52	12.4	231	1.5	0.6	S:	R
4665	42.6	+ 3 19	270	+66	11.8	5123	1.2	..	Sa	H
4666	42.6	- 0 12	270	+62	11.3	2112	4.0	0.6	Sc	H,C
4670	42.8	+27 23	0	+90	12.7	131	0.8	0.5	..	R
4668	43.0	- 0 17	270	+62	13.0	412				C
4679	44.5	-39 18	270	+23	12.9	122	..	..	E.	..
4684	44.7	- 2 28	271	+60	12.2	2311	1.5	0.5	Sa	R,H
4682	44.7	- 9 48	271	+52	13.1	102				R
4689	45.2	+14 1	273	+76	12.0	331	3.0	2.0	S	C
4688	45.3	+ 4 36	272	+67	13.0	110			Sc	R
4691	45.6	- 3 4	272	+59	11.8	2012	1.3	0.3	SBc	mc
4694	45.7	+11 15	273	+73	12.6	011	2.0	0.6	Sb:	R
4698	45.8	+ 8 45	272	+71	12.2	221	2.7	0.9	Sa	H,R
4697	46.0	- 5 32	272	+57	10.6	2241	3.0	1.2	E4	H
4696	46.1	-41 2	271	+22	12.2	011	1.7:	1.2:	S:	mf
4699	46.5	- 8 24	272	+54	10.5	111	3.7	2.0	SBb	H,G
4700	46.5	-11 8	272	+51	12.2	212	2.2	0.3	Sc	R
4701	46.6	+ 3 39	272	+65	12.8	1312	0.9	0.8:	Sb	R
New 3	46.8	- 9 51	272	+52	12.5	211	3.5	3.0	S	a
4710	47.1	+15 26	275	+78	12.0	101	3.5	0.5	Sa	H,R
4712	47.2	+25 44	300	+87	12.9	421	2.0	0.8	S	C
4713	47.5	+ 5 35	273	+68	12.3	0324	2.4	1.7	Sc	H,R
4725	48.1	+25 46	303	+87	10.8	221	5.0	4.0	SBb	H,C
4750	48.4	+73 9	89	+45	12.2	120	1.8	1.0	Sb	H,mc
4731	48.4	- 6 8	273	+56	12.2	131	6.0	2.5	S	a
4736	48.6	+41 23	86	+76	9.0	505	5.0	3.5	Sb	H,C
4742	49.2	-10 12	272	+52	11.9	303	1.0	0.6	E4	H
4747	49.4	+26 1	309	+86	12.7	111	3.0	0.5	S	C
4754	49.7	+11 35	275	+73	12.0	001	3.0	1.0	SBa	H,R
4753	49.8	- 0 55	277	+61	10.5	4233	2.7	..	I	H
4756	50.3	-15 8	273	+47	13.3	202				R
4762	50.4	+11 31	276	+73	11.8	120	3.7	0.4	Sa	H,mc
4760	50.5	-10 13	273	+52	12.5	043	0.5	0.5	E0	C
4763	50.6	-16 43	273	+45	13.2	423				R
4765	50.7	+ 4 45	275	+66	12.9	1123	0.6	0.4	E.	R
4771	50.8	+ 1 33	275	+63	12.9	4113	4.2	0.6	S	R
4772	51.0	+ 2 27	275	+65	12.6	1003	3.0	1.0	S	R
4775	51.1	- 6 21	275	+56	11.6	423	1.7	1.7	Sc	R
4767	51.2	-39 27	272	+23	12.8	011	..	..	..	..
4781	51.8	-10 16	273	+52	11.7	133	3.0	1.0	Sc	H,C
4782	51.9	-12 11	274	+50	12.9:	011	0.6	0.6	S0	a

Des.	α 1950	δ	λ	β	Mag.	Res.	Diams.		Type	Aut.
	12h m	° ′	°	°			′	′		
4786	52.0	- 6 35	275	+55	12.7	112	1.0	0.8	E	a
4783	52.0	-12 12	274	+50	12.7:	012	0.6	0.6	S:	a
4790	52.2	- 9 58	275	+52	12.5	213	1.5	1.0	S	a
4793	52.3	+29 13	30	+87	12.5	120	1.6	0.7	Sc	H,R
4800	52.4	+46 48	85	+72	12.0	223	1.3	0.8	Sb	H,R
4795	52.5	+ 8 20	277	+70	13.1	021			E:	R
New 4	52.6	+ 0 23	276	+63	12.9	100	3.3	2.5	Sc	mf
4814	53.3	+58 37	87	+59	12.3	3013	3.6	..	Sb	H
4808	53.3	+ 4 35	276	+66	12.5	3103	2.2	0.8	Sc	H,R
I3896	53.7	-50 3	272	+12	13.0	120				
4826	54.3	+21 47	296	+82	8.0:	505	8.0	4.0	Sb	H,C
4818	54.3	- 8 15	275	+54	12.1	110	3.5	1.0	S	a
4825	54.5	-13 24	275	+48	12.9	212	1.4	1.0	E3	a
4835	55.3	-45 59	273	+16	12.5	021	2.3	0.7	S:	a'
4845	55.5	+ 1 51	277	+63	12.6	2112	4.0	0.9	Sb	R
4861	56.7	+35 8	70	+83	12.7	220	2.0	1.0	S	mc
4856	56.7	-14 46	275	+47	11.4	311	3.5	0.5	E	G
4868	56.8	+37 35	75	+80	13.1	110				R
4866	57.0	+14 27	285	+76	12.1	111	3.2	0.5	Sa	H,mc
4872	57.2	+28 43	5	+86	12.6	100	1.3	0.9	S:	a
4880	57.7	+12 45	283	+74	13.1	000			Sc	R
4891	58.1	-13 9	276	+48	13.0	302				
4900	58.2	+ 2 46	279	+64	11.8	3323	1.7	1.7	Sp	H,R
4899	58.3	-13 41	276	+48	12.7	201	2.0:	1.1:	Sb	R
4902	58.3	-14 15	276	+47	11.6	313	2.0	2.0	S	K
	12h-13h									
4914	58.4	+37 35	75	+80	13.0	110				R
4904	58.4	+ 0 15	278	+62	12.8	1103	2.0	1.0	Sbp	R
4915	58.8	- 4 16	277	+57	12.9	0211	0.4	0.4	E0	R
4928	0.3	- 7 49	278	+53	12.9	210	0.8	0.6	Sb	R,G
4933	1.2	-11 14	277	+51	12.8	231	1.2	0.6	E:	a
4936	1.5	-30 15	275	+32	12.6*	202	1.0	1.0	E1	a
4941	1.6	- 5 17	280	+56	12.4	212	3.0	1.0	S	G
4939	1.7	-10 5	278	+52	12.2	100	5.0	2.5	S	R
4945	2.4	-49 1	273	+12.	9.2:	230	11.5	2.0	Sbp	a'
4951	2.5	- 6 14	280	+56	12.7	101	1.2	..	I	C
4947	2.6	-35 4	275	+28	12.6	111	..	..	..	..
4958	3.1	- 7 45	280	+54	11.6	111	4.0	..	Sa E6	H
4961	3.4	+28 0	10	+85	13.2	423				R
4976	5.9	-49 14	274	+12	11.6	111	2.0	1.5	E	a
4981	6.1	- 6 31	281	+56	12.2:	421	2.0	1.8	S	K
4984	6.4	-15 15	279	+46	11.9	221	1.5	1.0	SB	a
4995	7.0	- 7 34	281	+55	11.7	001	2.3	..	Sc	H
4999	7.2	+ 1 55	285	+63	12.8	1302	2.0	2.0	S	mc
5005	8.5	+37 19	64	+78	11.3	010	5.0	1.5	Sc	H,C
5012	9.3	+23 11	320	+83	12.6	033	2.7	..	Sc	H
5016	9.7	+24 21	334	+84	12.8	101	1.0:	0.8:	S:	R
5011	10.0	-42 50	275	+19	12.9	101	..	..	..	..
5017	10.3	-16 30	280	+45	13.3	422				R
5018	10.3	-19 15	279	+43	11.6	111	1.0	0.7	E3	R
5033	11.2	+36 51	58	+78	11.6	011	6.0	3.0	Sc	H,C
5037	12.4	-16 20	280	+45	13.1	001				R
5044	12.8	-16 8	280	+45	12.2	432	1.5	1.5	E0	a
5055	13.5	+42 17	68	+74	10.5	330	8.0	3.0	Sb	H,C
5054	14.3	-16 23	281	+45	11.9	241	5.0	2.5	S	R
5061	15.3	-26 36	279	+35	11.7	211	1.4	1.4	E0	a
5064	16.0	-47 39	276	+15	13.1	201				
5074	16.2	+31 44	30	+82	13.2	100				R
5068	16.2	-20 47	280	+40	11.6:	213	7.0	6.0	S	a
5077	16.9	-12 24	284	+49	12.2	102	1.0	0.7	E3	a
5084	17.5	-21 34	281	+40	12.4	001	3.6	0.7	Sa	a

Des.	α 1950	δ	λ	β	Mag.	Res.	Diams.		Type	Aut.
	13h m	° ′	°	°			′	′		
5085	17.6	-24 9	280	+37	12.3	234	3.0	3.0	S	a
5088	17.7	-12 19	285	+49	13.2	211				R
5087	17.7	-20 21	282	+42	12.4	133	0.7	0.4	S	a
5090	18.3	-43 28	277	+18	12.9	021	1.3	1.3	E	a
5101	19.0	-27 11	280	+35	12.5	102	2.0	0.6	Sb:	a
5102	19.1	-36 23	278	+26	10.8	232	1.5	0.5	E	a
5112	19.6	+39 0	56	+76	12.6:	111	3.2:	2.5:	S	R
5116	20.5	+27 14	0	+81	12.9	313	1.7	0.4	S I	R
5121	21.9	-37 25	278	+25	12.5	211	0.6:	0.6:	..	a'
5128	22.4	-42 45	278	+18	7.2:	223	10.0	8.0	I	a
5134	22.6	-20 51	283	+40	12.4	225	2.0	1.0	S	a
5135	22.9	-29 34	281	+32	12.8	0012	1.8	0.5	S	a
5147	23.7	+ 2 22	294	+63	12.1	120	1.3	1.1	S:	mc
5150	24.9	-29 18	281	+32	13.1	101				
5156	25.7	-48 39	277	+12	12.9	403	1.5	1.5	S	a
5161	26.3	-32 54	281	+28	12.5	0122	4.0	1.5	S	a
5172	26.9	+17 19	315	+75	12.5	122	1.5:	0.7:	S:	R
5170	27.1	-17 42	285	+43	12.6	212	7.0	0.6	S:	R
5194	27.8	+47 27	70	+68	10.1	331	12.0	6.0	Sc	H,C
5195	27.9	+47 31	71	+68	11.1	212	2.0	1.5	I Ep	C,a
5198	28.2	+46 56	68	+69	12.9	012	0.7	0.6	E1	a',R
5204	28.3	+58 40	80	+58	12.2	0303	3.9	..	Sc	H
5188	28.6	-34 32	281	+26	12.7	1123	1.0	0.8	S:	a'
5193	29.1	-32 58	282	+28	12.6	1112	1.0	1.0	E	a
5230	33.0	+13 56	311	+72	12.9	021	1.8:	1.8	S	R
I4296	33.8	-33 43	283	+28	11.9	1101	0.6	0.6	E	a'
5236	34.3	-29 37	284	+32	8.0:	0605	10.0	8.0	Sc	H,C
5248	35.1	+ 9 8	306	+67	11.0	022	3.2	1.4	Sc	H,C
5247	35.3	-17 38	287	+43	11.9	012	5.0	5.0	Sc	H,C
5253	37.1	-31 24	284	+30	10.8	1322	4.0	1.5	Sa	a
5273	39.9	+35 55	36	+76	12.9	111	1.0	1.0	E0	mc,H
5266	39.9	-47 56	279	+12	12.8	210	1.5	1.0	E	a
5297	44.3	+44 5	57	+70	13.0	122				H,R
5301	45.0	+46 24	60	+68	13.0	001				R
5308	45.4	+61 14	76	+56	12.8	022	1.9	0.6	S0	H
5300	45.7	+ 4 11	305	+61	12.3	234	3.5	2.0	S	R
I4329	46.2	-30 3	286	+30	12.8	1020	1.5	0.5	E	a'
5322	47.6	+60 26	76	+55	11.6	100	1.4	1.0	E3	H
5313	47.7	+40 13	47	+72	13.0	101				R
5326	48.7	+39 49	46	+72	13.1	110				R
5324	49.4	- 5 48	298	+53	12.6	112	1.5	1.5	S	K
5328	50.0	-28 14	288	+32	12.9	111	1.0	0.9	E0	a
5334	50.4	- 0 53	302	+57	12.5	113	4.0	2.2	S:	R,G
5347	51.1	+33 43	26	+75	13.2	100				R
5350	51.2	+40 37	48	+71	12.9	001	1.9	1.0	S	R
5351	51.2	+38 9	41	+72	13.0	321				R
5353	51.3	+40 31	47	+71	12.4	122	0.9	0.3	..	R
5362	52.8	+41 30	50	+70	13.2	200				R
5357	53.1	-30 6	288	+30	13.2	1001				
5376	53.6	+59 45	75	+55	13.0	110				B
5371	53.6	+40 43	45	+70	11.7	023	4.0	2.8	S	R
5363	53.6	+ 5 29	310	+62	11.1	210	1.6	..	I	H
5364	53.7	+ 5 15	310	+62	11.8	100	4.0	..	Sc	H
5377	54.3	+47 27	61	+65	12.8	120	3.0	0.6	Sa	H,C
5380	54.8	+37 51	40	+72	13.2	201				C
5365	54.8	-43 42	284	+17	13.0	132				
I4351	54.9	-29 5	289	+30	12.8	2002	5.0	0.5	S:	a
5383	55.0	+42 5	48	+70	12.7	110	2.5	2.3	SBc	H,P
5395	56.5	+37 39	40	+72	13.0	100				H,C
HA 72*	57.7	-45 10	284	+15	13.0	210				

Des.	α 1950	δ	λ	β	Mag.	Res.	Diams.		Type	Aut.
	13^h–14^h									
	m	° '	°	°			'	'		
5406	58.2	+39 9	41	+71	13.0	001				R
5398	58.3	-32 50	288	+27	12.8	1231	1.5:	1.5:	S:	a'
5422	59.0	+55 24	70	+59	13.0	131				H,R
5430	59.1	+59 34	74	+55	12.8	201	2.0	1.0	SB	B
5419	0.7	-33 44	288	+26	12.4	0203	1.0:	0.7:	E	a'
5427	0.8	- 5 47	302	+51	12.0	023	2.0	2.0	S	K
5426	0.8	- 5 49	302	+51	12.8	210	1.0	1.0	S	K
5448	0.9	+49 25	60	+63	12.5	021	3.0	0.8	S	R
5444	1.2	+35 22	32	+72	13.1	110				R
5457	1.4	+54 35	67	+60	9.0	201	22	22	Sc	H,C
5473	3.0	+55 8	66	+59	12.8	122	1.2	0.6	SBa	H,R
5474	3.2	+53 54	65	+60	11.7	100	4.0	4.0	Sc	H,R
5468	4.0	- 5 14	305	+51	12.4	102	2.2	2.2	S	R
5464	4.2	-29 46	290	-29	13.1	210				
5480	4.6	+50 57	61	+62	12.6	121	1.5	0.9	S:	R,mc
5485	5.5	+55 14	66	+59	12.9	112	0.9	0.9	Ep	H,R
5483	7.4	-43 5	286	+16	12.4	210	2.0	1.8	S	a
5493	8.9	- 4 49	305	+50	12.4	122	0.9	0.4	S E4	R
5496	9.0	- 0 56	309	+55	12.8	122	4.0	0.6	S	C
5494	9.5	-30 26	292	+28	12.6	1021	1.5	1.5	S/b	K
5523	12.6	+25 34	358	+70	12.8	021	5.0	0.8	S:	R
5533	14.1	+35 35	27	+69	12.9	021	2.0	0.8	..	mc
5534	15.0	- 7 11	307	+48	13.0	001			Sb	
5530	15.4	-43 9	288	+16	12.3	023	3.5	2.0	S	a
5548	15.7	+25 22	0	+69	12.9	021	0.5	0.5	..	R
5557	16.4	+36 43	30	+68	12.6	122	0.7	0.7	E1	mc,H
5556	17.6	-29 1	294	+29	12.5:	1202	2.5	2.2	S	a
5566	17.8	+ 4 11	318	+57	11.9	201	6.0	1.5	SBb	P,H
5585	18.0	+56 57	65	+57	12.0	302	4.0	2.0	Sc	H,mc
5574	18.4	+ 3 28	317	+57	13.1	111				H,R
5576	18.5	+ 3 30	317	+57	11.9	110	0.7	0.4	E4	H
5584	19.8	- 0 10	314	+54	12.2	211	3.0	0.5	S	a'
5592	21.0	-28 27	295	+29	13.1	302				
5600	21.4	+14 52	335	+64	12.4	100	1.0	0.7	S:	a'
5595	21.5	-16 30	302	+40	12.4	312	1.5	0.8	S	K
5597	21.7	-16 33	302	+39	12.6	202	1.5	1.5	S	K
5614	22.0	+35 5	25	+68	12.9	210	1.0	0.8	E:	mc
5605	22.3	-12 57	304	+42	13.1	021				R
5631	25.1	+56 48	65	+56	12.5	331	0.9	0.9	Sa	H,mc
5633	25.6	+46 22	49	+63	12.8	111	0.9	0.5	Sb	H,R
5641	27.1	+29 2	10	+67	13.1	220				
5638	27.1	+ 3 27	318	+57	12.6	010	1.2:	1.2:	E/	R
5653	28.0	+31 25	14	+66	12.9	102	0.5	0.4	E:	R
5660	28.1	+49 50	55	+60	12.3	220	2.2	2.2	Sc	B
5645	28.1	+ 7 29	327	+58	12.9	214	1.4	1.0	I:	R
5612	28.2	-78 11	275	-18	13.0	011			E	
I4444	28.5	-43 12	290	+15	12.2	210	1.5	1.3	S	a
5643	29.4	-43 59	289	+14	11.4	113	2.5	2.3	S	a
5665	29.9	+ 8 18	328	+58	12.7	100	1.0	0.8	S/E3	a'
5669	30.3	+10 8	330	+59	12.5	101	2.5	0.7:	S	R
5678	30.7	+58 8	65	+54	12.1	110	2.6	1.0	Sc	H,C
5668	30.9	+ 4 40	323	+55	12.4	213	1.5:	1.5:	S:	R
5676	31.0	+49 41	55	+60	11.9	120	3.0	1.5	Sc	H,C
5687	33.3	+54 42	60	+57	12.7	011	0.5:	0.5:	S: E3	mc
5689	33.7	+48 57	52	+60	12.6	211	2.0	0.6	SBa	H,mc
5690	35.2	+ 2 30	323	+53	12.9	012	2.6	0.5	S/b	R
5691	35.3	- 0 11	319	+52	13.0	100			Sb	R
5701	36.7	+ 5 34	325	+56	12.8	120	1.5*	..	SBa	H
5713	37.6	- 0 5	320	+51	11.8	011	2.1	2.1	Sb	H,R
5728	39.6	-17 3	306	+37	12.4	311	2.0	1.0	S	R,K

Des.	α 1950	δ	λ	β	Mag.	Res.	Diams.		Type	Aut.
	14^h									
	m	° '	°	°			'	'		
5739	40.6	+42 3	38	+62	13.1	001				H
5740	41.9	+ 1 54	323	+52	12.8	111	3.0	2.0	Sb	H,C
5746	42.3	+ 2 10	323	+51	11.8	210	7.4	0.8	Sb	H,P
5750	43.6	- 0 1	321	+51	12.6	111	1.4	0.9	Sb	H,R
5756	44.9	-14 39	309	+38	13.1	011				R,K
5757	45.0	-18 53	306	+34	12.6	213	1.2	0.9	..	R
5768	49.6	- 2 20	322	+47	12.9	012	1.0	0.8	S:	mc
5775	51.5	+ 3 45	327	+52	12.4	111	4.2	0.8	Sb	a'
5792	55.8	- 0 54	324	+46	12.9:	303	5.0	1.7	S	R
5791	56.0	-19 4	308	+33	13.0	413				R
5796	56.6	-16 26	311	+35	12.8	111	..	..	Eo ..	..
5820	57.2	+54 5	56	+54	12.8	101	0.7	0.3	E6	B
5806	57.5	+ 2 5	326	+48	12.5	110	2.0	1.0	Sb	H,C
5812	58.2	- 7 16	318	+42	12.5	221	0.4	0.4	E1	H,R
5813	58.7	+ 1 54	326	+48	12.2	112	1.4	1.4	E1	C
	15^h									
5831	1.6	+ 1 24	327	+47	12.7	202	0.5	0.5	E/3	a'
5838	2.9	+ 2 18	328	+47	12.1	212	1.6	..	So	C
5846	4.0	+ 1 48	328	+47	11.6	010	1.0	1.0	E0	H
5850	4.6	+ 1 44	329	+46	12.9	111	2.6	2.1	SB	C,R
5866	5.1	+55 57	57	+53	11.5	201	3.0	1.0	Sa	H,C
5854	5.3	+ 2 45	329	+48	12.7	133	2.2	0.4	S/a	R
5861	6.4	-11 8	317	+38	12.4	000	3.0	1.3	S	G
5864	7.0	+ 3 14	330	+47	12.8	120	2.0	0.3	S/b	R
5879	8.4	+57 12	58	+51	12.1	210	3.3	1.3	Sb	B
5878	11.0	-14 5	315	+35	12.9	231	2.6	1.0	S:	a'
F 703*	11.0	-15 18	315	+34	12.8	230	2.0	2.0	S:	a'
5885	12.4	- 9 53	319	+37	12.4	120	2.0	2.0	S	K
5899	13.2	+42 14	34	+56	12.4	133	2.3	0.6	S	R
5905	14.1	+55 42	55	+51	13.1	111				R
5907	14.6	+56 31	57	+51	11.8	212	11.0	0.6	Sc	H,C
5898	15.2	-23 55	309	+26	12.6	110	0.5	0.5	E0	a
5908	15.4	+55 36	56	+52	13.0	111				R
5903	15.6	-23 51	309	+26	12.9	412	0.7	0.7	E2	a
5915	18.8	-12 55	317	+34	12.5	131	0.7	0.3	S	R
5921	19.5	+ 5 15	335	+46	12.5	001	5.0	5.0	SB	C
5949	27.2	+64 55	66	+45	12.9	353	2.0	1.0	S:	mc
5936	27.6	+13 9	348	+49	12.9	022	1.0	0.8	S:	R
5962	34.2	+16 46	354	+48	12.5	101	1.9	1.0	S:	R
5970	36.1	+12 20	346	+45	12.4	121	3.0	1.0	S	R
5982	37.6	+59 32	60	+47	12.5	001	1.0	0.7	E3	H
5985	38.6	+59 30	60	+47	12.2	033	4.0	2.0	Sb	H,C
5984	40.6	+14 22	351	+46	13.0	121				R
5967	41.9	-75 31	281	-17	12.9	010	2.5	1.5	S	a
6015	50.7	+62 28	63	+43	12.1	231	5.5	2.1	Sc	B
6026	58.1	-34 25	310	+12	12.5	120	1.0	0.8	E	a
	16^h									
6052	3.1	+20 41	3	+43	13.0	212				R
6070	7.4	+ 0 50	340	+34	12.7	311	3.0	1.6	S	C
6106	16.3	+ 7 31	349	+36	12.9	012	1.7	0.8	S:	R
6118	19.3	- 2 11	340	+31	12.3	102	4.0	1.2	S	K
6181	30.1	+19 56	4	+38	12.6	412	2.0	0.7	Sc	H,C
6217	34.8	+78 18	78	+34	12.6	111	1.8	1.2	Sc	H,R
6207	41.3	+36 56	25	+40	12.3	212	2.0	0.7	Sb	H,C
6215	46.8	-58 55	297	-10	11.2	210	1.7	1.3	S:	a
6239	48.4	+42 50	35	+39	13.1	122				R
6221	48.5	-59 8	298	-11	11.4	111	2.7	2.0	S	a
	17^h									
6340	11.1	+72 22	71	+33	12.8	010	1.0	1.0	E	mc
6300	12.3	-62 46	295	-15	11.4:*	110	3.0	3.0	S	a
6384	29.9	+ 7 6	358	+20	12.7	210	3.0:	3.0:	S	R
6412	30.8	+75 45	74	+31	12.8	021	2.0	2.0	S	C
I4662	42.1	-64 39	296	-18	11.7	302	1.3	0.9	I	a

Des.	α 1950	δ	λ	β	Mag.	Res.	Diams.		Type	Aut.
	17^h-18^h									
	m	° '	°	°			'	'		
6482	49.8	+23 5	15	+22	12.2	201	0.3	0.3	E2	C
6503	49.9	+70 10	66	+31	11.4	102	5.0	1.0	Sc	H,C
6574	9.5	+14 58	10	+14	12.7	2533	1.0	0.6	S	C,R
6643	21.2	+74 33	72	+28	12.7	010	3.0	1.1	Sb	H,C
I4710	23.5	-67 1	295	-23	12.8	202	4.0	2.5	S	a
I4721	30.1	-58 32	304	-22	12.9	111	3.5	1.3	S	a
6684	44.1	-65 14	298	-25	11.7	202	2.0	1.5	S	a
6699	47.8	-57 23	306	-23	12.4	220	1.2	1.2	SBbc	a
I4797	52.3	-54 22	310	-23	12.2	012	1.3	0.6	E	a
HA 85*	52.9	-54 36	308	-24	12.4	012	0.7	0.5	E/	a
	18^h-19^h									
6721	56.5	-57 51	305	-25	13.1	102				
6744	5.0	-63 56	300	-27	10.6	421	9.0	9.0	SBbc	a
6753	7.2	-57 8	307	-26	11.7	120	2.5	2.0	S	a
6754	7.5	-50 44	314	-25	13.1	032				
6758	9.8	-56 24	308	-26	12.7	100	1.0	0.8	E	a
I4837	11.3	-54 46	309	-26	12.9	101	1.4	1.0	S:	a
6769	13.9	-60 35	303	-28	12.7	011	2.0	1.2	E:	a
6776	17.3	-63 59	299	-28	12.8	210	0.7	0.7	E	a
6780	18.7	-55 53	308	-27	13.2	231				
6782	19.5	-60 2	304	-28	12.8	010	1.5	0.8	E	a
6808	38.5	-70 46	292	-31	13.0	012			Sb:	
6810	39.4	-58 47	305	-31	12.4	102	2.5	0.8	E	a
6814	39.9	-10 25	357	-17	12.2	211	2.0	2.0	S	C
I4889	41.3	-54 29	310	-31	12.5	101	1.6	0.8	E	a
6822	42.1	-14 53	354	-20	11.0:	450	20	10	I	H
	19^h-20^h									
6835	51.8	-12 42	356	-22	13.0	202				
6851	59.9	-48 25	317	-33	12.8	214	1.0	0.7	E	a
6854	1.8	-54 32	311	-33	13.2	212				
6861	3.7	-48 31	318	-34	12.3	212	1.3	0.7	E	a
6868	6.3	-48 31	318	-34	12.1	202	1.4	1.0	E	a
6875	9.6	-46 19	322	-34	12.6	1012	1.0	0.5	E	a
6878	10.3	-44 41	323	-34	13.1	0131				
6876	13.1	-71 1	292	-34	12.7	021	1.5	0.8	E	a
6887	13.4	-52 56	313	-35	12.8	010	3.3	1.3	S	a
6890	14.8	-44 58	323	-35	12.7	0131	1.2	1.0	E/	a
6893	17.2	-48 25	318	-36	12.5	1213	1.5	1.0	SBa:	a
New 5	20.6	-44 10	324	-36	12.3	1321	..	..	..	..
6902	21.2	-43 50	325	-36	12.4	0223	..	..	..	..
6907	22.1	-24 58	346	-32	12.1	100	2.0	1.8	S	a
6909	24.1	-47 12	320	-37	12.8	2220	0.8	0.6	E	a
I5020	27.8	-33 42	336	-36	13.1	122				
6923	28.6	-31 1	340	-35	12.9	000	2.0:	1.0:	S:	a'
6925	31.2	-32 9	339	-36	12.1	102	3.0	1.0	S	K
6946	33.9	+59 58	64	+11	11.1:	111	8.0	8.0	S	C
6935	34.7	-52 17	315	-38	12.9	112	..	..	SBa	..
6951	36.5	+65 56	67	+15	12.4	102	3.5	3.5	S	C
6942	37.0	-54 30	310	-39	12.9	023	..	..	SBa	..
6943	39.8	-68 55	293	-36	12.5	023	3.5	1.8	S	a
I5039	40.2	-30 3	342	-38	13.1	210				
6958	45.4	-38 11	332	-40	12.5	1121	0.6	0.6	E	a'
	20^h-21^h									
I5052	47.5	-69 25	292	-37	12.3	124	6.0	0.8	S/c	a
I5063	48.2	-57 16	307	-40	13.0	102			E	
6970	48.6	-48 59	318	-41	12.7	2101	0.6	0.6	S	a
6984	54.3	-52 4	315	-42	13.1	113				
7007	1.9	-52 45	313	-43	12.9	100	1.0	0.6	E/	a
7014	4.5	-47 24	318	-43	13.2	302				
7020	7.3	-64 15	298	-40	13.1	111				
7029	8.4	-49 30	316	-44	12.3	0111	1.0	0.9	E/	a'
7038	11.7	-47 26	318	-45	12.5	0111	2.5	1.8	S	a
7041	13.0	-48 35	317	-45	12.2	1012	0.8	0.4	E:	a'

Des.	α 1950	δ	λ	β	Mag.	Res.	Diams.		Type	Aut.
	21^h									
	m	° '	°	°			'	'		
7049	15.6	-48 47	317	-46	11.8	1013	0.8	0.5	E:	a'
New 6	20.0	-46 0	322	-47	12.9	2111	4.0	1.0	S:	a'
I5105	21.2	-40 50	329	-47	13.0	2212				
7059	23.6	-60 14	302	-43	13.1	111				
7064	25.5	-53 0	311	-46	12.7	1102	3.5	0.5	S:	a
7070	27.3	-43 19	323	-48	12.6	0213	2.0:	1.8:	S/c	a'
7079	29.3	-44 18	323	-48	12.3	2301	0.5:	0.5:	..	a'
7083	31.8	-64 7	296	-43	12.6	010	4.0	2.8	S	a
7090	32.9	-54 47	308	-47	11.8	2310	6.0	1.0	S	a
7097	37.1	-42 46	325	-51	12.6	1110	0.6:	0.5	..	a'
7096	37.4	-64 8	295	-43	13.1	100				
7107	39.2	-45 2	322	-50	13.1	3121				
7119	43.1	-46 45	320	-51	13.1	3242				
7124	44.8	-50 48	313	-49	12.9	1111	2.5	1.5	S	a
I5135	45.3	-35 11	338	-52	13.1	001				
7125	45.6	-60 56	299	-46	13.2	121				
7126	45.7	-60 50	299	-46	13.2	121				
7137	45.9	+21 56	45	-24	13.1	111				R
7135	46.8	-35 7	338	-52	13.0	201				
7144	49.5	-48 29	315	-52	12.2	2002	0.5:	0.5:	..	a'
7145	50.1	-48 7	315	-52	12.7	2111	0.5:	0.5:	..	a'
7155	52.9	-49 46	314	-52	12.8	1122	..	..	E:	..
7162	56.7	-43 33	322	-54	13.1	1021				
7166	57.6	-43 39	322	-54	12.6	2232	1.5	0.5	E	a
7177	58.3	+17 29	43	-30	12.1	101	2.5	1.5	S	P
	21^h-22^h									
7171	58.3	-13 31	10	-49	12.8	221	2.5	1.5	S	G
7168	58.9	-52 0	312	-52	12.7	0212	0.5	0.4	E	a
I5152	59.6	-51 32	312	-52	12.3*	221	4.0	2.0	S	a
7184	59.9	-21 4	2	-53	12.0	100	5.0	1.0	S	C
I5156	0.4	-34 2	339	-55	13.2	211				
7196	2.6	-50 22	312	-53	12.3	0201	0.8	0.6	E	a
7192	3.2	-64 33	293	-45	12.9	111	1.0	1.0	E	a
7205	5.1	-57 40	300	-49	11.7	302	4.0	2.0	S	a
7217	5.6	+31 7	55	-20	11.6	232	3.0	2.5	S	P
7213	6.2	-47 25	315	-54	11.8	1001	1.0:	1.0:	E/	a'
7218	7.5	-16 54	9	-52	12.7	100	1.8	0.7	S	R
I5181	11.3	-46 9	318	-55	12.6	1110	2.0	0.5	E/Sa	a
7232	12.6	-46 5	318	-56	13.0	0012			Sa	
I5186	13.4	-37 5	335	-57	12.5	202	2.0	0.8	S	a'
7252	18.0	-24 56	358	-58	13.0	012			SB;	
I5201	18.3	-46 19	317	-57	12.8	0013	8.0	4.0	Sc	a
7300	28.3	-14 17	15	-56	13.2	201				R
7302	29.7	-14 23	15	-56	13.1	000				R
7307	30.9	-41 12	326	-60	13.1	1210				
7309	31.6	-10 37	24	-55	13.1	110				C
7314	33.0	-26 18	354	-62	11.9	102	3.0	1.3	S	a
7331	34.8	+34 10	63	-21	11.2	001	9.0	2.0	Sb	H,C
7332	35.0	+23 32	56	-31	12.6	023	2.0	0.3	S:	C
7329	37.0	-66 44	288	-47	13.0	101			SBb	
I5240	39.0	-45 4	316	-60	12.6	1100	2.3	1.5	SBab	a'
7361	41.5	-30 19	347	-65	12.8	102	3.0	1.0	S/b	a
7371	43.4	-11 16	25	-58	12.9	001	1.0	1.0	S	C
7377	45.1	-22 35	4	-63	12.7	211	1.2	1.1	E	a
7392	49.2	-20 53	10	-63	12.6	012	1.5	1.0	S	a'
7410	52.1	-39 56	325	-64	11.8	1102	4.0	1.0	S	G
7412	53.0	-42 55	318	-63	12.2	0002	3.0	2.0	S	G
7418	53.8	-37 17	329	-66	11.8	2112	2.5	2.5	Sc	G
7421	54.1	-37 37	329	-66	12.8	0130	1.5	1.5	SBb	K
I5267	54.4	-43 43	316	-63	11.8	0312	..	..	Sb	..
I1459	54.5	-36 41	330	-66	11.3	2133	1.0	0.7	E	b

1932AnHar..88...41S

Des.	α 1950 δ	λ β	Mag. Res.	Diams. Type Aut.
	22^h			
	m ° ′	° °		′ ′
7424	54.5 -41 20	321 -63	12.0 0021	6.0 6.0 S G
I5269	54.8 -36 11	334 -66	13.1 1011	
I5271	55.3 -34 1	338 -66	12.6 001	2.0: 0.8: S a'
I5273	56.5 -38 2	328 -66	12.0 2112	1.8 1.4 S b
7448	57.6 +15 43	56 -40	11.8 010	2.0 0.8 Sc H,C
	22^h–23^h			
7457	58.6 +29 53	65 -27	12.3 203	2.0 0.5 Sa (E5aSo?) H,C
7456	59.3 -39 51	324 -66	12.5 1201	6.0 1.0 S G
7462	0.0 -41 6	324 -66	12.7 2001	3.0 1.0 S: K,b
7469	0.7 + 8 36	52 -46	13.0 001	R
7479	2.4 +12 3	55 -44	11.9 312	3.0 2.5 SBc H,C
7496	7.0 -43 42	314 -65	12.2 2111	2.0: 1.0: S a'
7507	9.5 -28 49	352 -69	12.0 120	1.0 1.0 E a'
7531	12.1 -43 53	313 -66	12.5 1003	1.5: 0.5: S: a'
7541	12.2 + 4 15	52 -51	12.8 121	2.6 0.6 Sb H,C
7552	13.5 -42 53	315 -68	11.6 1003	3.0 3.0 S G
7585	15.4 - 4 56	44 -59	12.8 110	1.0: 0.7 .. R
7582	15.8 -42 38	313 -67	11.8 2002	3.0 0.5 S G
7600	16.3 - 7 52	40 -62	13.1 201	R
7590	16.3 -42 31	313 -67	11.9 0011	2.2 0.8 S G
7606	16.5 - 8 46	38 -63	11.9 010	6.0 1.6 Sb H,C
7599	16.7 -42 32	313 -67	12.0 0100	4.0 1.0 S G
7619	17.8 + 7 55	56 -49	12.8 010	0.7 0.5 E3 H
7625	18.0 +16 57	64 -42	12.9 122	0.6 0.5 .. R
7626	18.2 + 7 56	56 -49	12.8 210	0.7 0.7 E1 P,H
7640	19.7 +40 35	73 -19	12.5 111	9.0 1.0 S C
	23^h			
	m ° ′	° °		′ ′
I5325	26.0 -41 36	313 -68	12.5 1011	2.0: 1.8: S a'
7678	26.1 +22 9	68 -38	12.9 110	1.4 1.1 S R
7679	26.2 + 3 15	56 -54	13.1 021	R
7689	29.9 -54 22	292 -60	12.3 001	3.0 2.0 S a'
7690	30.2 -51 58	294 -63	13.0 112	
I5328	30.5 -45 19	303 -67	12.7 1121	.. .. E: ..
I5332	31.7 -36 22	324 -73	11.9 1315	4.0: 4.0: S: a'
7702	32.7 -56 17	288 -58	13.1 011	
7713	33.8 -38 13	320 -72	11.8 1102	4.0 1.5 S G
7716	33.9 + 0 1	57 -58	13.0 001	E R
7721	36.2 - 6 48	50 -64	12.4 001	2.6 1.0 S C
7723	36.4 -13 14	41 -68	12.1 111	3.0 2.0 SBb G,H
7727	37.3 -12 34	41 -68	12.0 110	2.7 .. Sa H
7741	41.4 +25 48	71 -34	12.6: 101	3.0 2.0 S R
7742	41.8 +10 29	67 -49	12.7 111	0.7 0.7 E: R
7743	41.8 + 9 39	66 -50	12.8 302	1.8 1.3 .. R
7744	42.4 -43 12	305 -71	12.8 0022	.. .. S.B: ..
7755	45.5 -30 48	343 -78	12.5 322	4.0 3.0 S K
7764	48.4 -41 1	307 -73	12.8 0100	.. ..
7769	48.5 +19 52	74 -40	12.9 110	0.8 0.7 S R
7782	51.4 + 7 42	68 -54	13.1 010	C
7785	52.8 + 5 38	66 -55	12.9 010	1.2 0.5 .. R
7793	55.3 -32 51	330 -78	9.7 322	6.0 4.0 S K
7796	56.5 -55 44	283 -61	12.9 011	0.8 0.8 E a'

NOTES

864 Star of magnitude 11.5 superposed on south edge
1302 Faint outer ring, 4' in diameter
1325 Star of magnitude 12.5 superposed, north preceding
1359 Possibly double
I2056 Possibly planetary) 4HA88,4
1705 Star of magnitude 14.5 superposed
HA 85 From Harvard Annals 85, No.6, Pos. No. 0507-1454.5
1947 Declination in N.G.C. incorrectly given as -64° 49' (1950)
2974 Star of magnitude 11.5 very near, following
3056 Star of magnitude 12.5 very near, north
4013 Star of magnitude 13.5 superposed
4051 Star of magnitude 14 superposed
4217 Two stars of magnitudes 10 and 13 superposed
4378 Faint outer ring, 3' in diameter
R 80 From Heidelberg Publications Vol.8, No.12; Reinmuth, Nebula No. 80
4656 Hubble detects faint extensions to this nebula on Mount Wilson plates.
4936 Star of magnitude 12.5 very near, preceding
HA 72 From Harvard Annals 72, No.2, H.N. 1734
5701 R describes this nebula as surrounded by a faint ring, 4'.6 by 3'.8.
F 703 From Astronomical Journal Vol.28, p.75, 1914; Fath, Table I, Nebula No.703
6300 Four stars of magnitudes 12, 13.5, 13.5, and 14.5 superposed
HA 85 From Harvard Annals 85, No.6, Pos. No. 1848-5440.4
I5152 Star of magnitude 9.5 superposed on south edge

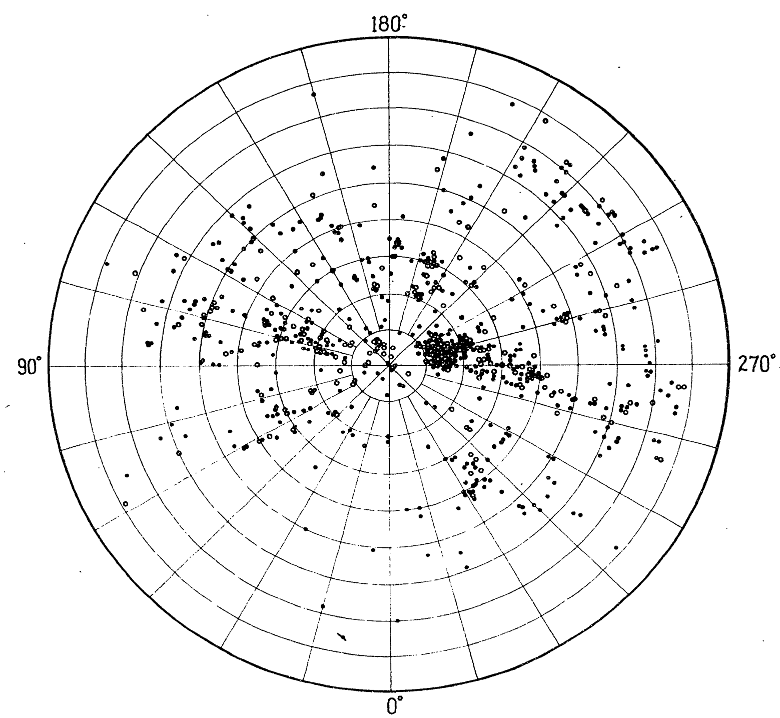

Figure 1

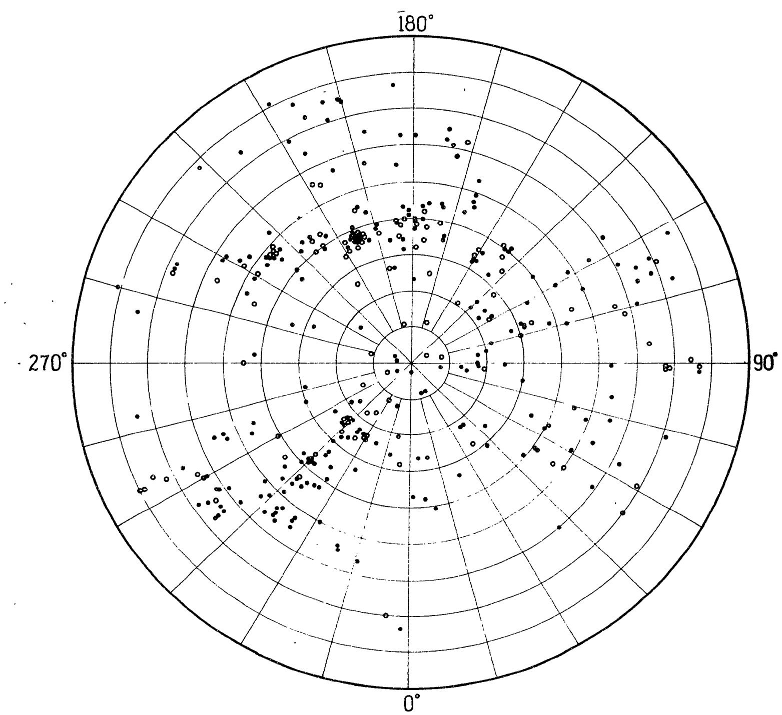

Figure 2

Figures 1 and 2.— The distribution of the bright nebulae in the northern (left) and southern galactic hemispheres. Open circles represent the 291 nebulae brighter than the 12th photographic magnitude, dots the 734 between the 12th and 13th.

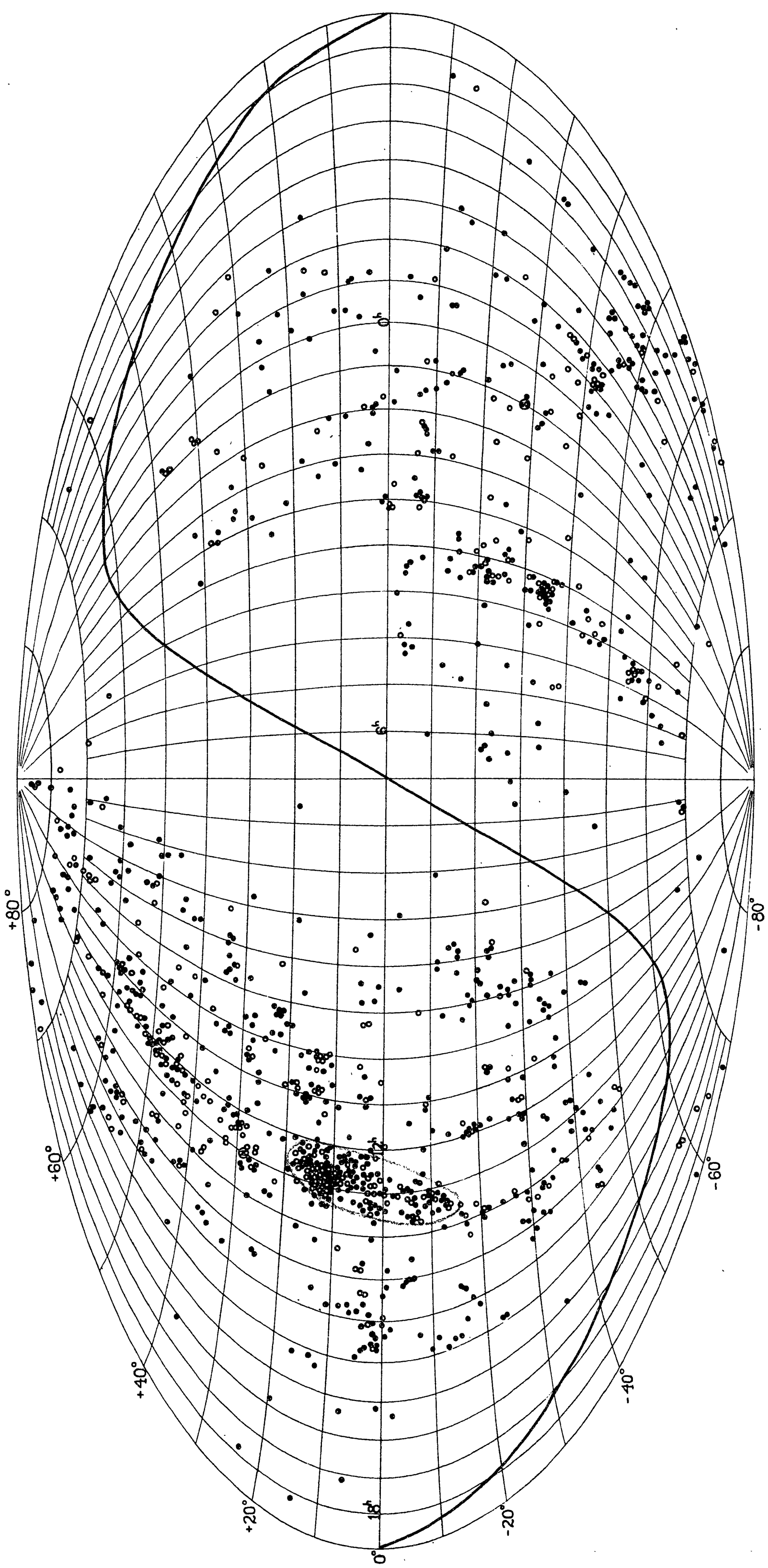

Figure 3

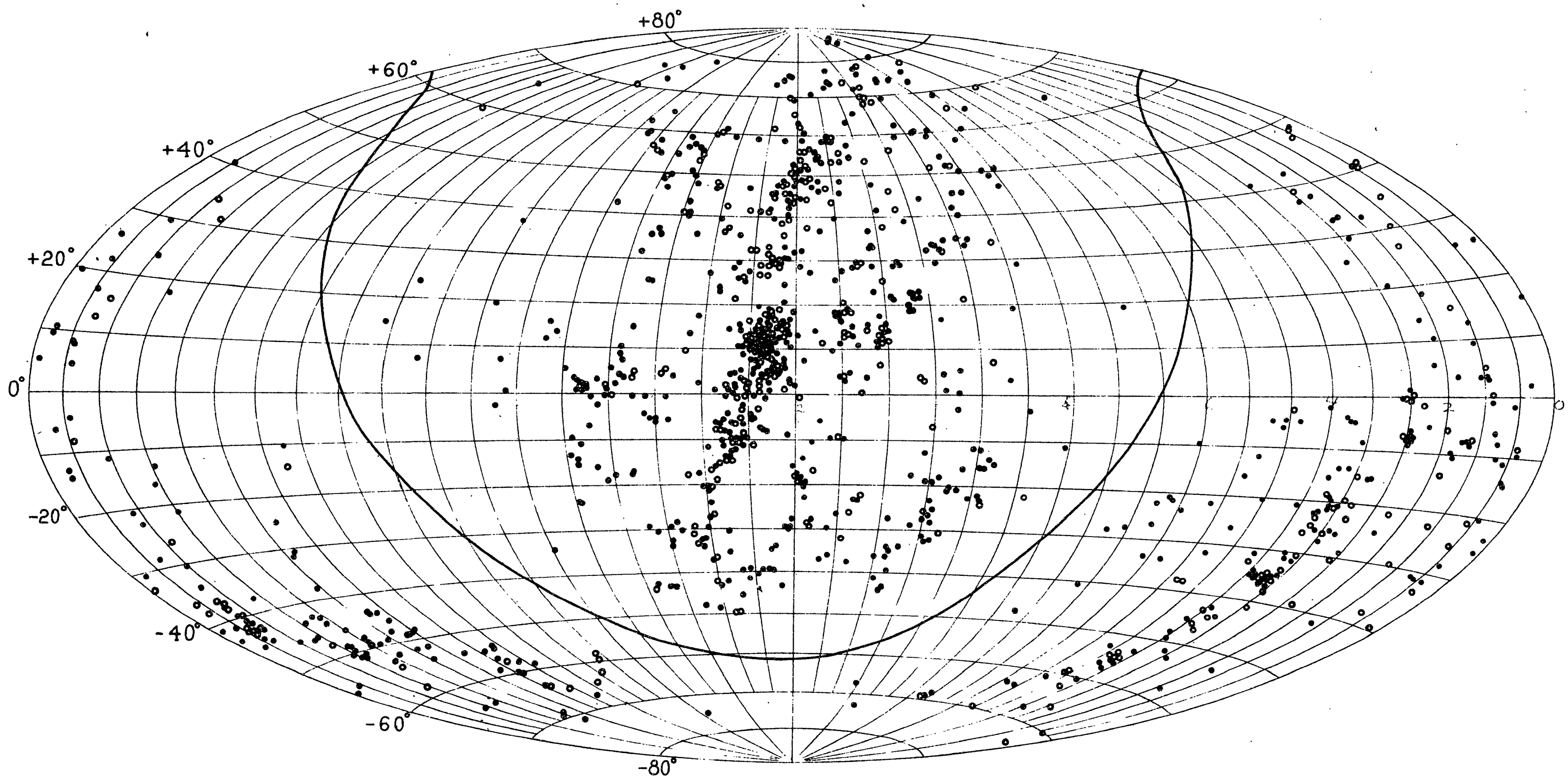

Figure 4

Figures 3 and 4.— The distribution of the extragalactic nebulae brighter than the 13th photographic magnitude. The 291 nebulae brighter than the 12th magnitude are shown by open circles; dots represent the 734 nebulae between the 12th and 13th magnitudes. The central line of the Milky Way is indicated.

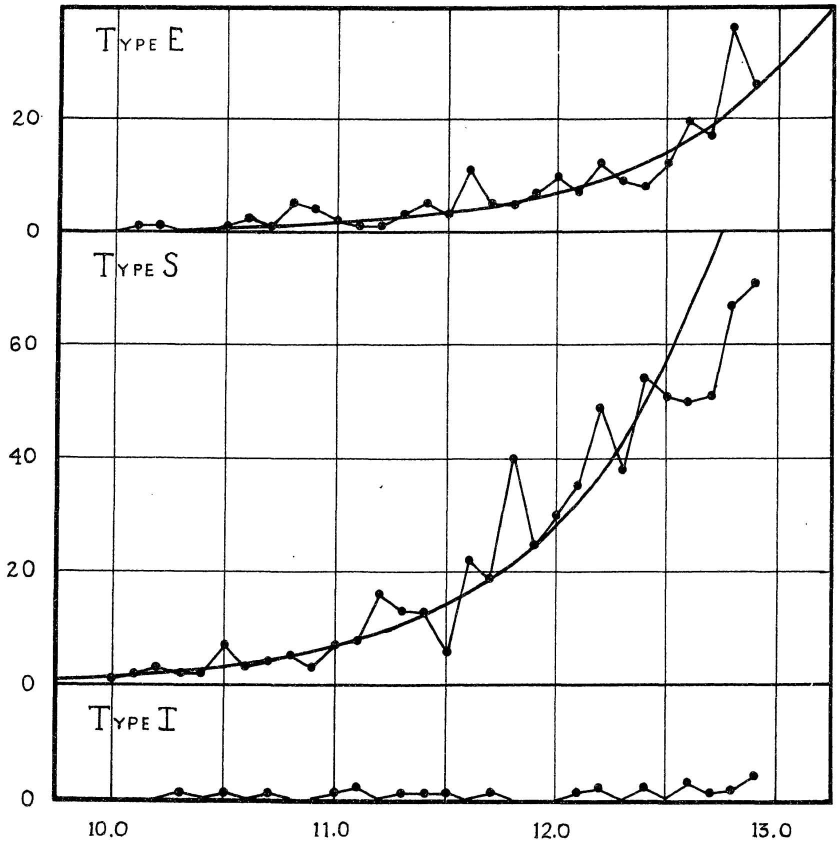

Figure 5.— Frequency of nebular types in magnitude intervals. Ordinates, number of objects; abscissae, photographic magnitudes.

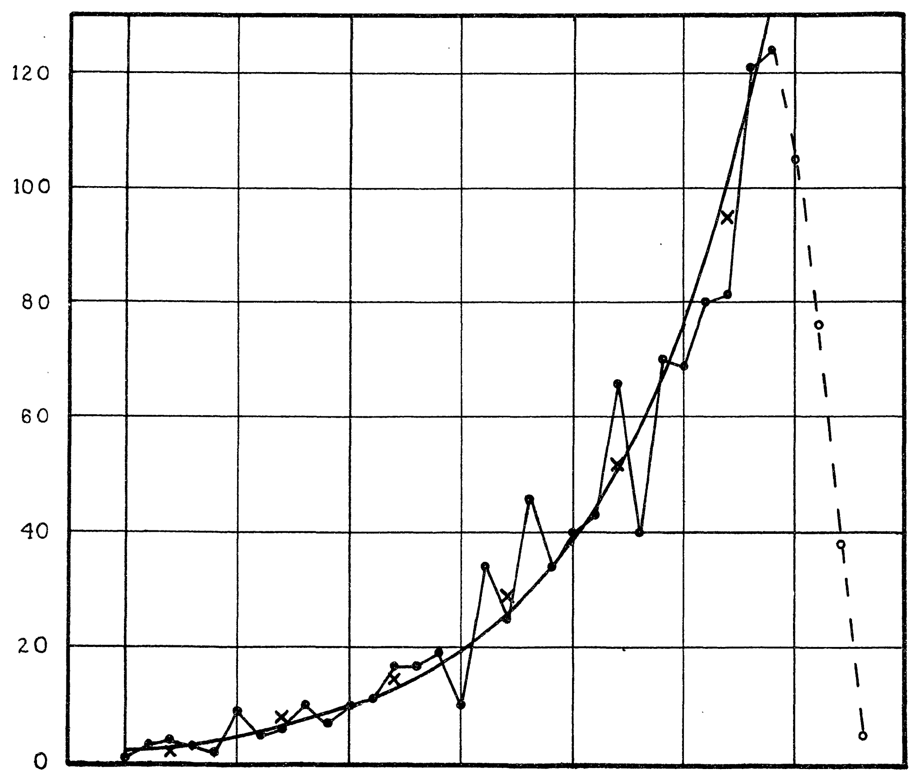

Figure 6.— Frequency curve of all types of nebulae in magnitude intervals. Crosses indicate mean values. Smoothed curves in Figures 5 and 6 represent theoretical uniform density in space.

TABLE IV

COMPARISON OF HARVARD AND MOUNT WILSON PHOTOGRAPHIC MAGNITUDES

N.G.C. Number	Hubble's Type	Harvard Pg. Mag.	MW Pg. Mag.	Harvard −MW	Adjusted H − MW
205	Epec	10.8	11.0	−0.2	0.0
221	E2	9.5	9.6	−0.1	+0.1
278	Sc	11.6	11.8	−0.2	0.0
404	E0	11.9	12.0	−0.1	+0.1
584	E4	11.6	11.8	−0.2	0.0
936	SBa	11.5	11.6	−0.1	+0.1
1023	SBa	11.2	11.4	−0.2	0.0
1068	Sb	10.0	9.85	+0.15	+0.35
1700	E4	12.4	12.7	−0.3	−0.1
4382	E4	10.5	10.9	−0.4	−0.2
4472	E1	10.1	10.1	0.0	+0.2
4486	E0	10.7	10.8	−0.1	+0.1
4526	Sa	10.7	11.3	−0.6	−0.4
4649	E2	10.6	10.8	−0.2	0.0
7619	E3	12.8	13.1	−0.3	−0.1

5. *Descriptions.* — The descriptions given in the last three columns of the catalogue are far from homogeneous: they are in fact compiled from eight different published lists and from the examination of five different series of Harvard plates. The various sources are indicated in the catalogue as follows:

B Baade, A.N., **243**, 303, 1931
C Curtis, Publ. Lick Obs., **13**, pt. 1, 1918
G Gregory, Helwân Obs. Bull. 21 and 22, 1921, 1922
H Hubble, Mt. W. Contr. 324, 1926
K Knox-Shaw, Helwân Obs. Bull. 9, 15, and 30, 1912, 1915, 1924
L Lundmark, Upsala Medd. 7, 1926
P Pease, Mt. W. Contr. 132 and 186, 1917, 1920
R Reinmuth, *Die Herschel-Nebel*, Publ. Heidelberg Obs., **9**, 1926
a plates of series A, 24-inch Bruce refractor, exposure over 170 minutes, scale 60″ = 1 mm
a′ plates of series A, 24-inch Bruce refractor, exposure under 170 minutes
b plates of series B, 8-inch Bache refractor, scale 179″ = 1 mm
mc plates of series MC, 16-inch Metcalf telescope, 98″ = 1 mm
mf plates of series MF, 10-inch Metcalf telescope, 167″ = 1 mm

The first step in compiling the descriptions in the catalogue was the assembling of all the published descriptions of each nebula, together with the data obtained from a long exposure plate of the A series, if any were available. It was then necessary to decide which sources might be considered the most reliable, and to extract from them the three characteristics to be enumerated: the maximum and the minimum diameter in minutes of arc, and the type — whether spiral, "S," spheroidal, "E," or irregular, "I."

The descriptions given by Hubble were, in most cases, considered standard, and used without change. In his lists in Mount Wilson Contribution No. 324 he gives, however, only the maximum diameter for each object. The minor diameters of the nebulae classed by him as spheroidal (E0 to E7) were derived from the ratio of axes given by his classification. For the spiral classes the minor diameters had to be taken from other published lists, or from estimates on Harvard plates; but the minimum diameter from a supplementary source could be used with Hubble's maximum only when the maximum diameter given in that source was in good agreement with Hubble's. There are therefore a number of spiral nebulae in the catalogue having Hubble as the authority for the description, for which no minor diameter is given, although a published value exists. A detailed explanation of the symbols used by Hubble will be found in Mount Wilson Contribution No. 324, 1926.

For some nebulae the diameters given by Hubble appear to be too small, particularly for the spheroidal nebulae of the Virgo region, which are well shown on long exposure A plates. His classification is retained, but the diameters are taken from the Harvard plates.

In using the descriptions from other published sources and from the long exposure A plates, an effort has been made to incorporate the information into Hubble's set of symbols. Curtis in the Lick Publications and Knox-Shaw and Gregory in the Helwân Bulletins occasionally mention that a spiral is of the so-called ϕ type, and some nebulae belonging to this class have been seen on the A plates; these are indicated by the symbol SB. The diameters from the Helwân Bulletins are occasionally taken from the published illustrations.

The use of the material from Reinmuth's *Die Herschel-Nebel* requires special explanation. The major and minor diameters, in minutes of arc, are taken directly from his catalogue. When a parenthesis around his description indicates a poor plate, a colon is placed after the corresponding estimate of diameter in the Harvard catalogue.

Reinmuth gives for each nebula a Wolf type, indicated by the letters (a) to (w). In some cases he also describes the nebula as irregular, spir., or spir.?, or indicates the direction of the spiral arms by the symbols S or Ƨ. How accurately this classification can be represented by the letters S, E, and I has been tested by a comparison of Hubble's or Curtis' classification with Reinmuth's for 287 objects, 186 brighter than magnitude 12.0, and 201 fainter. The general agreement is no better for the brighter than for the fainter nebulae, and the two groups are considered together. One hundred and fifty six nebulae described by *both* Reinmuth and the observers using larger telescopes are called by Reinmuth spir., spir.?, or have the direction of the spiral arms indicated. Of these, 150 are also called spiral by Hubble or Curtis, two are classed as spheroidal, and four as irregular. Hence, among the nebulae having *only* Reinmuth's list as a source for the type, those described as noted above were entered in our catalogue as S.

Of thirty two nebulae assigned by Reinmuth to Wolf's type (s) with no further description, twenty nine are called spiral by the other authorities, two spheroidal, and one irregular. It seems justifiable that type (s) should also be taken, for nebulae described only by Reinmuth, as equivalent to Hubble's S.

In the same way the other Wolf types, as used by Reinmuth, have been tried out, and the corresponding description decided upon. Of ninety nine called (g), forty eight were spiral, forty nine spheroidal, and two irregular; hence no inference is made for the nebulae of Wolf type (g). Of twenty eight called (f), six were spiral and twenty two spheroidal according to Hubble or Curtis. Wolf type (f) is interpreted, when found elsewhere in Reinmuth, as E:; it is the least certain of the classifications used from his catalogue.

The 1025 objects brighter than the thirteenth magnitude are distributed among the various types as follows:

E	145	SBb	13	S:	133
E:	66	Sc	115	SB:	4
Epec	6	SBc	12		
		Spec	4	I	26
Sa	42	SBpec	2	I:	3
SBa	22	S	274		
Sb	59	SB	21	Type Unknown	78

When all the available descriptions had been taken from the published sources and from the long exposure A plates, a number of nebulae were found to have only an incomplete description, or none at all. Series A plates of shorter exposure, or plates of the B, MC, or MF series, were used whenever possible to fill out these descriptions.

The number of references to each authority and combination of authorities is as follows:

H	93	P,H	3	K	43	a	217
H,C	106	R,H	3	G	33	a′	82
H,R	65	G,H	2	K,G	5	mc	37
H,P	11	L,H	1	R,G	2	mf	6
H,a	11	B	12	R,K	1	b	3
H,mc	7	R,B	2	K,b	1	mf,a′	1
H,a′	6	P	5	R	143		
H,G	3	C	40	R,mc	5	Total	1025
H,B	2	C,R	2	R,a	1		
H,K	1	C,a	2	mc,R	1		
a,H	24	a,C	1	a′,R	1		
mc,H	4	R,C	1				

For the nebulae of magnitude 13.0 and fainter, only references to published descriptions are given. A new letter, "A," appears, referring to the catalogue of the Virgo region in Harvard Annals, **88**, No. 1. When descriptions for the objects brighter than $13^m.0$ are taken from this volume, they are given under the reference "a," since long exposure A plates were used in compiling the catalogue.

It should be remembered that not all the available references are given for each object, but only the best of those necessary to complete the description. Moreover, not all the descriptions can be completed. A nebula called SBc, for instance, has been fully classified; but one called only S may belong to either the S or the SB group, and to any one of the sub-groups, a, b, or c.

6. *Comparison of Photographic and Visual Magnitudes.* — Three hundred and fifty nine objects of our catalogue appear in the list given by Hubble in Mount Wilson Contribution 324. A comparison of the Harvard photographic magnitudes with the magnitudes given by Hubble, which purport to be on the standard visual system, should give some evidence of the color indices of the nebulae; but it appears to tell more of the quality of the magnitude systems, and their dependence on brightness, size, and especially on type of nebula, than it tells of color. In the following comparisons, thirteen objects called peculiar are omitted, and also N.G.C. 5194, for which we give the magnitude of the companion separately.

The magnitudes published by Hubble are the well known Holetschek determinations corrected in accordance with recommendations by Hopmann (A.N., **214**, 425, 1921). Grouping the nebulae in order of magnitude, we have the following mean values of the difference, photographic *minus* visual:

Harvard Magnitude	Number	Pg–V
]11.0	49	+0.36
11.0–11.4	43	+0.15
11.5–11.9	82	+0.13
12.0–12.4	82	+0.25
[12.4	89	+0.36

The average "color index" is +0.25. While there is an indication that the brightest and the faintest objects are redder than those between the eleventh and twelfth magnitudes, there is no conspicuous dependence of "color index" on magnitude.

Arranging the material according to type we have the following tabulation:

Type	Number	Pg–V
E0 to E3	46	+0.65
E4 to E7	28	+0.68
Sa and SBa	66	+0.42
Sb and SBb	73	+0.29
Sc and SBc	122	−0.09
I	10	+0.01

There is here a definite indication of the dependence of the difference between the two magnitude systems on the form of the object. The difference, Pg–V, for the spheroidal nebulae, E0 to E7, are approximately what might be expected for the color indices of objects, in transparent space, with the average spectral class observed for the external galaxies. That is, if the Hopmann correction is accepted, the visual and photographic observers have measured effectively the same surface areas in obtaining integrated magnitudes.

Small and negative values of Pg–V for the objects showing spiral structure are to be interpreted in the sense that the visual observer measured less than the total magnitude; perhaps he has measured chiefly the nuclei. This interpretation appears reasonable, since Holetschek's observations of objects fainter than the tenth magnitude were made with instruments of much greater focal length than that of the Harvard patrol cameras.

As a further indication that Holetschek's total magnitudes may refer chiefly to the central portions of the sharply nucleated nebulae, we tabulate below the mean differences in order of increasing diameters:

Log d	Eo to E7		Sa, Sb, SBa, and SBb		Sc and SBc		All Types	
	No.	Pg–V	No.	Pg–V	No.	Pg–V	No.	Pg–V
−0.52 to −0.20	19	+0.47	2	+0.10	0	..	21	+0.39
−0.19 to ±0.00	23	+0.60	9	+0.08	3	−0.13	35	+0.40
+0.01 to +0.19	13	+0.75	21	+0.31	7	+0.24	43	+0.45
+0.20 to +0.39	14	+0.89	30	+0.43	26	+0.02	71	+0.36
+0.40 to +0.59	4	+0.92	43	+0.39	32	−0.08	82	+0.20
+0.60 to +0.79	1	+0.30	17	+0.44	37	−0.13	56	+0.06
+0.80 to +2.25	0	..	17	+0.25	17	−0.34	37	−0.05
Totals	74	+0.659	139	+0.349	122	−0.09	345	+0.251

Again we see that the spheroidal are redder than the spiral systems, and that types Sc and SBc are visually faint and blue. The correlation of Pg–V with diameter for all the nebulae taken together may be attributed largely to the correlation of diameter with type. Open spirals and irregular objects are for a given magnitude systematically larger than spheroidal nebulae.

The dependence of Pg–V on type is emphasized by the following tabulation of all 153 objects for which the diameters lie in the restricted interval between 1′.6 and 3′.9 (log d +0.2 to +0.6). The mean Pg–V is +0.27, but the average differences change from +1.05 to −0.40 in going from the spheroidal and circular Eo to the open type, I.

Type	Number	Pg–V	Mean Log d
Eo to E3	8	+1.05	+0.29
E4 to E7	10	+0.77	+0.36
Sa and SBa	40	+0.50	+0.37
Sb and SBb	33	+0.28	+0.40
Sc and SBc	58	−0.03	+0.39
I	4	−0.40	+0.38

It seems clear from the foregoing discussion that useful data on the colors of external galaxies cannot yet be obtained. Either the photographic or the visual magnitudes are systematically dependent on nebular type. For the few objects brighter than the tenth magnitude, the photographic magnitudes are admittedly uncertain because the over exposure on standard plates has produced images that are not comparable with the comparison star images; the bright magnitudes will indeed tend to be too bright photographically, especially for open spirals. But 86 per cent of the objects involved in the present comparison are fainter than the eleventh magnitude, and for them over exposure does not enter in the measurement of photographic magnitude. As intimated above, it seems probable that the discrepancies brought out in the preceding tabulations arise from the systematic tendency in visual observations to record only the central regions of distended objects.

In addition to the uncertainty dependent on type, further doubt has been thrown on the corrected visual magnitudes by Bernheimer's recent remeasurements (Lund Obs. Circulars 5 and 6, 1932) of some of the nebulae observed by Holetscheck. The average value of the magnitude correction applied by Hubble on the basis of Hopmann's investigation is 1.18. Bernheimer's preliminary results indicate that the uncorrected Holetscheck magnitudes are already approximately on the Harvard visual scale. The mean value of Pg–V found above is +0.25; the difference would be +1.43 if no correction is applied to Holetscheck's visual magnitudes. Neither value of the difference is consistent with the average spectral class of external nebulae, that is, if we take the photographic magnitudes as essentially correct and intergalactic space in high latitudes as effectively transparent.

It is obviously important to set up a new system of visual or photovisual magnitudes for the brighter extragalactic objects. Until then we shall be uncertain concerning (1) the color excess for distant nebulae, (2) the distances based on estimates of total visual magnitudes, and (3) differences in color for objects of the various types.

7. *Distribution in the Sky.* — Figures 1 to 4 fully illustrate the distribution of the external galaxies brighter than the thirteenth magnitude. The avoidance of low latitudes, the relative richness in the northern galactic hemisphere, the importance of the elongated Virgo supersystem in the statistics of the nearer galaxies, and the general unevenness in distribution are all shown. There are just twice as many of these brighter systems in the northern galactic hemisphere as there are in the southern. The distribution by galactic octants is as follows:

Galactic Longitude	m_t] 12.0	m_t [12.0	Total
	NORTH		
0° to 90°	16	49	65
90 to 180	62	127	189
180 to 270	82	188	270
270 to 0	35	126	161
	195	490	685
	SOUTH		
0° to 90°	10	37	47
90 to 180	27	59	86
180 to 270	34	72	106
270 to 0	25	76	101
	96	244	340

There are conspicuous vacant regions in both hemispheres, in addition to the emptiness in low latitudes that presumably results chiefly from the obscuring matter in and around the Local Galaxy. Examination of long exposures plates has revealed in some of these high latitude vacancies an approximately normal number of faint nebulae. The faint objects are not of unusual diameter for their total magnitudes. Provisionally we conclude that in latitudes greater than $\pm 30°$ the deficiencies, like the clusterings, are real rather than apparent.

8. *Luminosity curves.* — The number of objects of the principal nebular types for each magnitude interval is shown in Table V and graphically represented in Figures 5 and 6. Notwithstanding the great irregularity in distribution in large sections of the sky, a close approach to a constant frequency per unit of space is obtained when the whole sky is considered. The smooth curves, drawn in the plots for spheroidal and spiral nebulae separately, indicate the theoretical uniform distribution in space. The point is similarly illustrated in Figure 6 for all types together. The deviations amount to fifty per cent at some magnitudes, but the general increase in number of objects with decreasing brightness is not far from the theoretical quadrupling per magnitude.

Fainter than magnitude 12.5 the recognized spiral nebulae fall short of the theoretical curve, whereas the spheroidal nebulae maintain the ratio. Probably this circumstance chiefly indicates the failure to recognize the spirality of some of the objects now classed as spheroidal or of unrecognized type.

Figure 6 presents the individual values of the last column of Table V; it also gives mean values as crosses. The smoothed curve represents uniform density in space. The essential completeness of the catalogue to magnitude 12.9 seems to be indicated by this plot of the frequencies of magnitudes.

Without more information than is now available concerning the distribution of the absolute luminosities of extragalactic nebulae, it will not be possible to make more than rough estimates of the distances throughout which the present survey extends, or estimates of the space density of galaxies or of matter. Taking the values adopted by Hubble for the average absolute magnitude, we compute that within three megaparsecs all objects of average luminosity are included in the catalogue. (Cf. H.B. 887, p. 4, 1932.) There is on the average one galaxy for each cube 4×10^5 parsecs on the side. Although, as shown by Figure 6, there is no general concentration of nebulae toward our own system, there are many more than the average number within 4×10^5 parsecs, thus lending support to the supergalaxy hypothesis (H.C. 350, 1930).

If we assume that the mass of an average galaxy is 10^9 times the mass of the sun, we compute from the data for galactic latitudes greater than $\pm 30°$ that the mean density of matter in these inner parts of the metegalactic system is 10^{-30} grams per cubic centimeter. Although this is probably the best documented estimate we have at the present time, it

TABLE V

THE FREQUENCY OF MAGNITUDES

Photographic Magnitude	Type E	Type S	Type I	Type Unknown	All Types
]10.0	2	14	4	..	20
10.0	..	1	..	..	1
.1	1	2	..	..	3
.2	1	3	..	..	4
.3	..	2	1	..	3
.4	..	2	..	..	2
10.5	1	7	1	..	9
.6	2	3	..	..	5
.7	1	4	1	..	6
.8	5	5	..	..	10
.9	4	3	..	..	7
11.0	2	7	1	..	10
.1	1	8	2	..	11
.2	1	16	..	..	17
.3	3	13	1	..	17
.4	5	13	1	..	19
11.5	3	6	1	..	10
.6	11	22	..	1	34
.7	5	19	1	..	25
.8	5	40	..	1	46
.9	7	25	..	..	32
12.0	10	30	..	..	40
.1	7	35	1	..	43
.2	12	49	2	3	66
.3	9	28	..	3	40
.4	8	54	2	6	70
12.5	12	51	..	6	69
.6	20	50	3	7	80
.7	17	51	1	12	81
.8	36	67	2	16	121
.9	26	71	4	23	124
]13.0	217	701	29	78	1025
13.0					105
.1					76
.2					38
.3					5
Total					1249

can be considered little more than a guess because of the necessary neglect of material outside the individual galaxies and the uncertainty in the assumed average population of external systems.

SUMMARY

1. The photographic total magnitudes of 1249 external galaxies given in the accompanying catalogue have been based on photographs of two series of small scale plates. The catalogue is essentially complete to the thirteenth magnitude for the whole sky.

2. The magnitudes are based on the international standards of stellar magnitudes by reference to the magnitudes of stars in the Selected Areas. Each mean result is based on three different photographs; and the average deviation is ±0.126 for the 1005 nebulae between magnitudes 10.0 and 13.0.

3. The scale of magnitudes appears to be in agreement with the short list of photographic magnitudes published at Mount Wilson, but important discrepancies dependent on type and size of object appear when the new photographic magnitudes are compared with visual estimates by Holetschek. It appears probable that systematic deviations arise mainly from failure in the visual observations to integrate the total brightness of distended and nucleated spiral nebulae.

4. Of the objects brighter than the thirteenth photographic magnitude, 701 are recognized as spiral or probably spiral in form, 217 are classed as spheroidal, 29 as irregular, and no type is now assignable to 78. Further investigation of those questionably of spheroidal form and of those as yet unclassified will probably show that three out of four of the objects within three megaparsecs are spiral in structure.

5. The distribution of the thousand and twenty five objects brighter than the thirteenth magnitude is shown in four diagrams, which illustrate the avoidance of the low latitudes, the strong clustering in the northern galactic hemisphere, and the general unevenness of distribution. The luminosity curves are consistent with the hypothesis that there is no general concentration of galaxies toward our own system throughout the region surveyed, which may be taken as approximately one hundred cubic megaparsecs. The average density of matter throughout this region is estimated at 10^{-30} grams per cubic centimeter. There is on the average one galaxy for each volume of 6.4×10^{16} cubic parsecs.